June 2020

Operation and Maintenance Manual
Freshwater Treatment Plant Upgrade

6526-461-132-REP-001

In Accordance with Licence 2AM-MEL1631 Part D, item 1 & 2

Prepared by:

Agnico Eagle Mines Limited – Meliadine Division

EXECUTIVE SUMMARY

Agnico Eagle has prepared the following document which summarizes the operational and maintenance procedures to be followed at the Freshwater Treatment Plant.

This report documents the stand-alone Operation & Maintenance Manual, includes the following requirements:

- The manual was prepared in accordance with the “Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories, 1996”, and adapted for the use of a mechanical contact water treatment facility;

- The manual includes contingency measures in the event of a plant malfunction.

IMPLEMENTATION SCHEDULE

This Plan will be implemented upon Board approval and subject to any modifications proposed by the NWB as a result of the review and approval process.

DISTRIBUTION LIST

Agnico Eagle Internal:

- Energy & Infrastructure Superintendent
- Energy & Infrastructure General Supervisor
- Energy & Infrastructure Supervisor
- Environment Superintendent
- Hydrology Coordinator
- Environment Coordinator
- Environment Compliance Counselor
- Water Treatment Plant Operator

DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Revision
R0	26/06/2019			OMM

Prepared By:  2020-06-26
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Water Treatment Eng.
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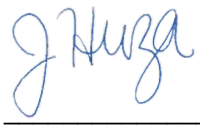
Approved by:  2020-07-03
Jessica Huza
Environment Superintendent

TABLE OF CONTENTS

1 INTRODUCTION 7

1.1 Purpose 7
1.2 Site Location and Access 7
1.3 Site Facilities 7
1.4 Contact Information 7

2 DESCRIPTION 12

2.1 Freshwater Treatment Plant 12
2.2 Raw water storage 12
2.3 Filtration 12
2.4 Ultraviolet treatment 13
2.5 Chlorination 13
2.6 Treated water storage 13
2.7 Reagents 13
2.8 Controls 13

3 OPERATION & MAINTENANCE 13

3.1 pumping 13
3.2 Filtration 13
3.3 Chemical dosing 14
3.4 UV light 14
3.5 Effluent control qualtiy 14
3.6 Record keeping 14
3.7 Safety procedures 14
3.8 Controlling acces 15

4 EMERGENCY RESPONSE 15

4.1 Fire 15
4.2 Spill 15
4.3 Plant malfunction 15

LIST OF FIGURES

Figure 1 : General location plan 9
Figure 2 : General Arrangement – a/ Existing Plant b/ Upgrade 11
Figure 3 : Basic PFD 12

LIST OF APPENDICES

Appendix A: Equipment upgrade drawings
Appendix B: Current system PID
Appendix C: SDS
Appendix D: Operation and Maintenance Manual of upgrade equipment
Appendix E: Operation and Maintenance Manual of current equipment

1 INTRODUCTION

1.1 PURPOSE

This Operation and Maintenance Manual (OMM) for the Meliadine Mine has been prepared based on the "*Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories, 1996, prepared by the Department of Municipal and Community Affairs, NWT*".

The objectives of this plan are summarized as follows:

1. To define the location, design and operating procedures to be used in the treatment of freshwater on site; and
2. To provide monitoring requirements for the plant.

1.2 SITE LOCATION AND ACCESS

Agnico Eagle Mines Limited (Agnico Eagle) is operating the Meliadine gold mine located approximately 25 km north of Rankin Inlet, and 80 km southwest of Chesterfield Inlet in the Kivalliq Region of Nunavut. The Mine site is located on the peninsula between the East, South, and West basins of Meliadine Lake (63°01'23.8"N, 92°13'6.42"W). The area is accessible from the all-weather gravel road linking the Meliadine mine site with Rankin Inlet.

A general location plan for the project is shown in Figure 1.

1.3 SITE FACILITIES

The current mine plan focuses on the development of the Tiriganiaq gold deposit which is mined using both conventional open-pit and underground mining operations. Current mining facilities to support the Mine include a plant site and accommodations, tailings storage facility, waste rock storage facilities, ore storage pads, process plant, power plant, maintenance facilities, water management treatment plants and supporting infrastructures.

Such infrastructures include water retention dikes, berms, culverts, channels, collection ponds, pumping stations, fresh water intake and water treatment plants are required to manage water during pre-production, operation, and interim mine closure.

To support the camp accommodation, additional storage would be required to the current fresh water treatment plant. The treatment capacity within the freshwater treatment plan is not modified but additional treated water storage tanks are added to the current infrastructure. Figure 2 presents the layout of the freshwater treatment plant with the new container for treated water storage.

1.4 CONTACT INFORMATION

The individuals responsible for the operation of the freshwater treatment plant on site are the following:

Energy & Infrastructure Superintendent	819-759-3555 ext. 4603161
Energy & Infrastructure General supervisor	819-759-3555 ext. 4603128
Energy & Infrastructure Supervisor	819-759-3555 ext. 4603908

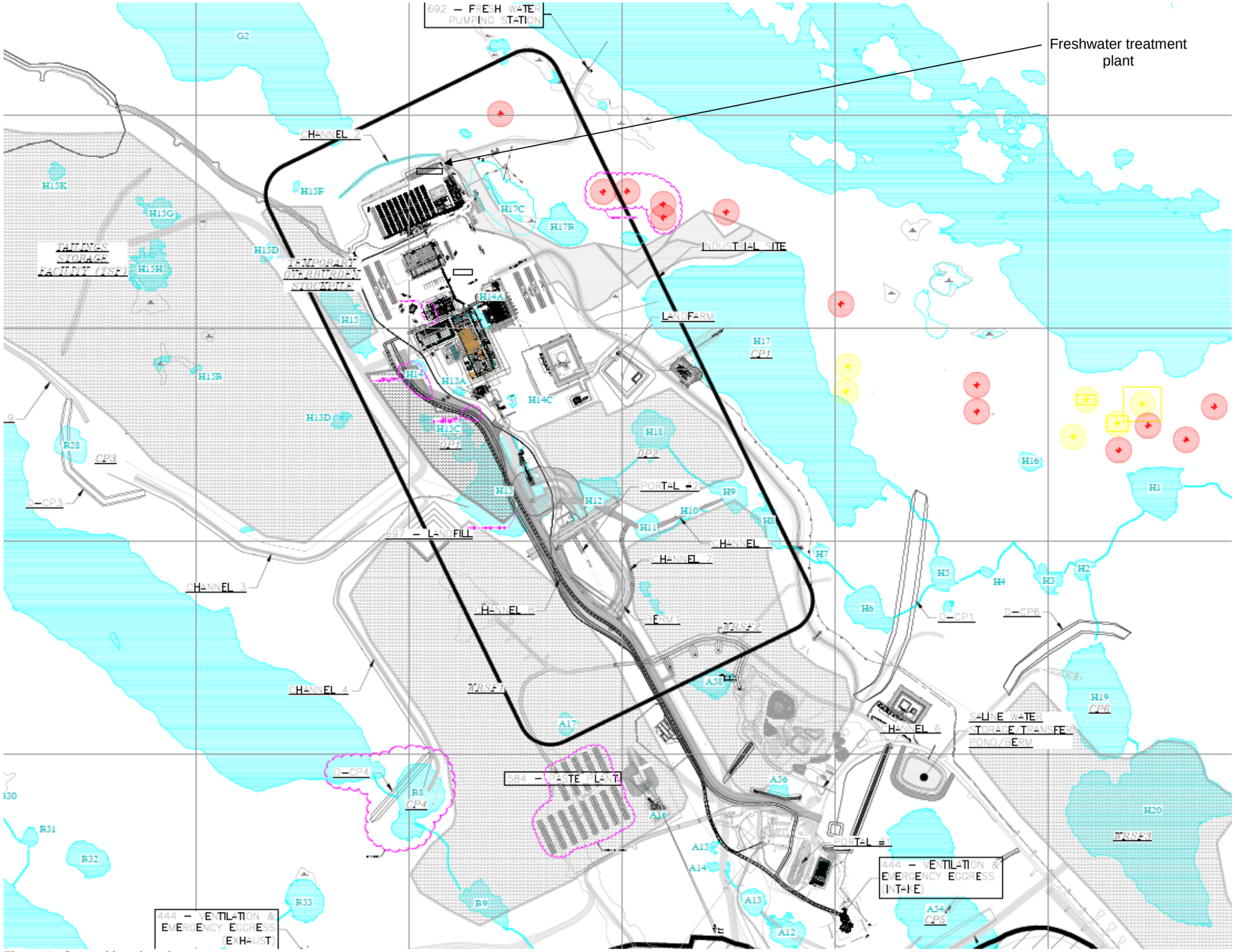
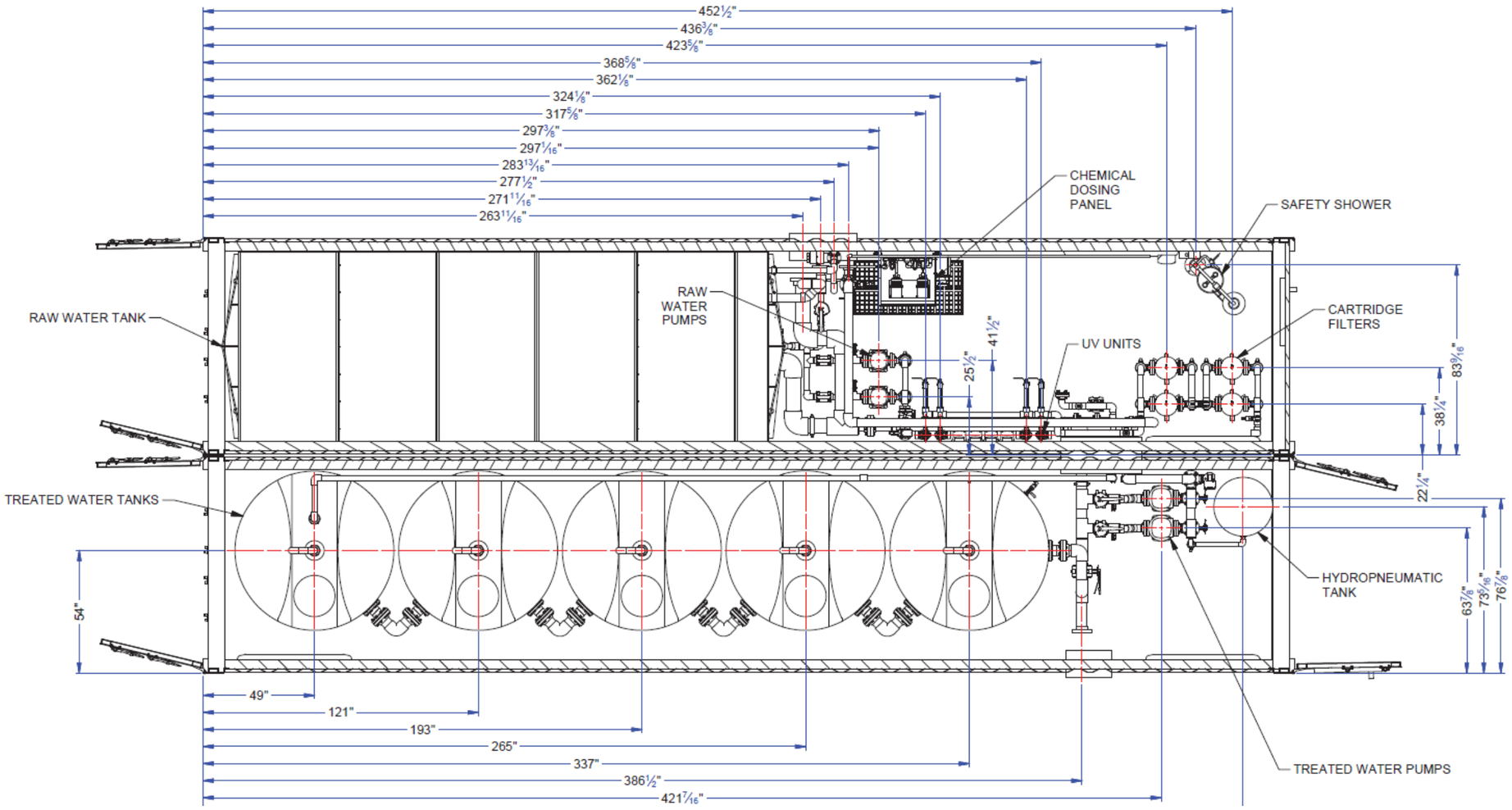


Figure 1 : General location plan

a/



b/

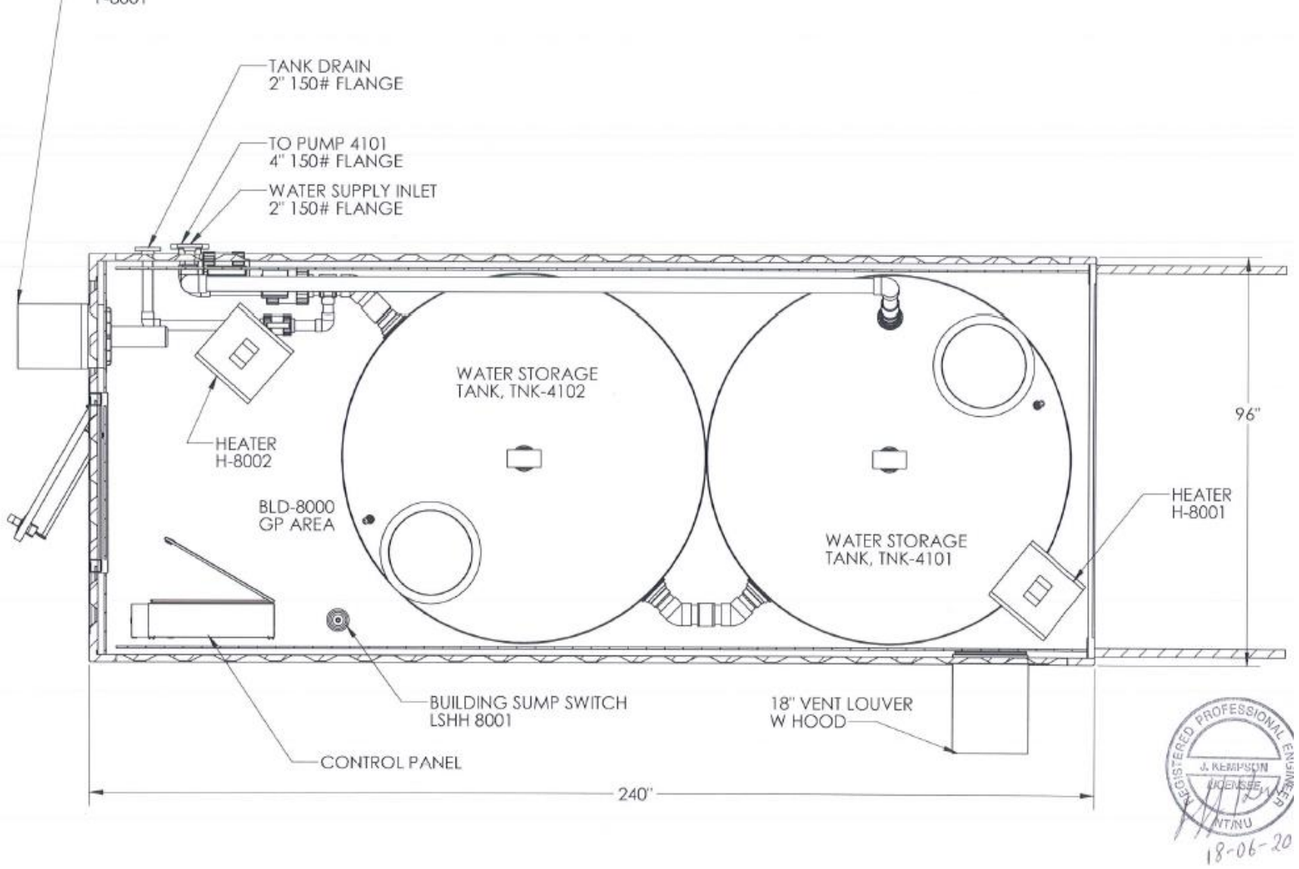


Figure 2 : General Arrangement – a/ Existing Plant b/ Upgrade

2 DESCRIPTION

2.1 FRESHWATER TREATMENT PLANT

The camp area has a Freshwater Treatment Plant for potable (domestic) water. The design flow rate for potable water for the main camp and accommodations is 216 m^3 per day. In the plant, the freshwater first goes through cartridge filters and then is pumped through ultraviolet units, and finally treated with sodium hypochlorite (chlorine). The treated water is stored within potable water tanks. Potable water is monitored according to the Nunavut health regulations for total and residual chlorine and microbiological parameters. Treated potable water is piped to areas in the process plant, service complex, and other facilities requiring potable water. The following sections describe in more detail each step of the treatment.

The following sections describe in more detail each step of the treatment. Appendices A and B present the PID of the freshwater treatment plant. Figure 3 presents the basic flowsheet (PFD) of the process.

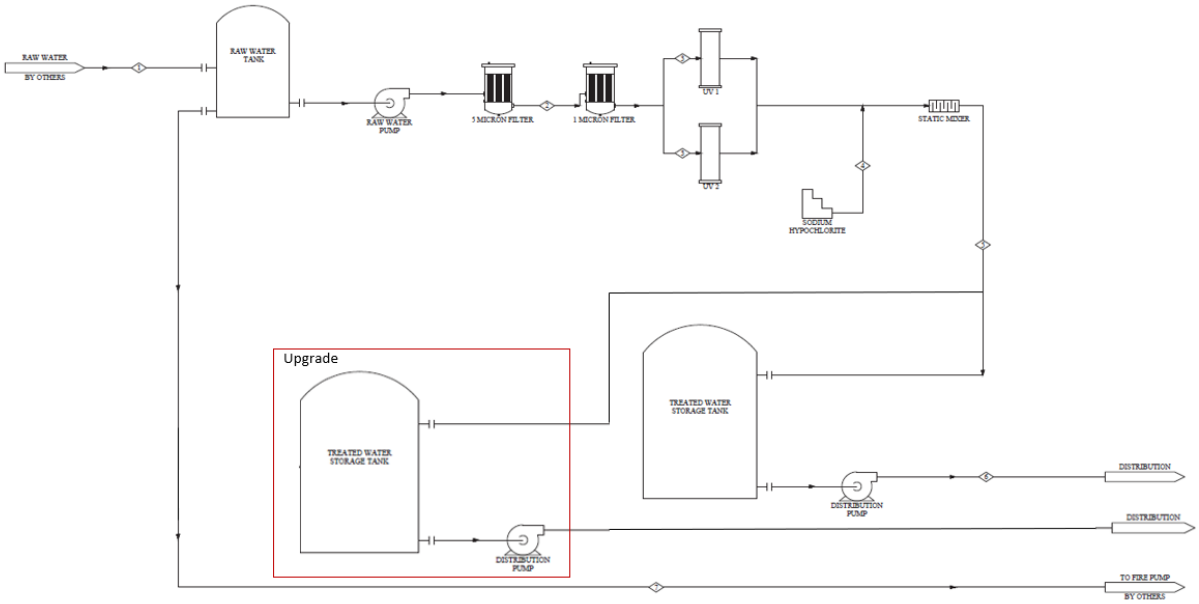


Figure 3 : Basic PFD

2.2 RAW WATER STORAGE

Prior to be treated, raw water sourced from Meliadine lake is stored in a 20 m^3 raw water tank.

2.3 FILTRATION

Physical treatment is accomplished by removing the suspended particles in raw freshwater. This is achieved with cartridge filters which contain 4 pleated element cartridges that are able to trap debris, oils and other unwanted particles as water flows through it. The first cartridge filter achieves 5 microns filtration and the second achieves 1 micron filtration.

2.4 ULTRAVIOLET TREATMENT

The water is then disinfected by ultraviolet reactors installed in parallel. This treatment serves as sterilization which deactivates organic contaminants, such as pathogens, bacteria, parasites or viruses.

2.5 CHLORINATION

Chemical treatment is accomplished by the injection of sodium hypochlorite (NaOCl), which is often used for water purification. Hypochlorite can be used to prevent algae growth and is effective against bacteria and viruses.

2.6 TREATED WATER STORAGE

Prior to being distributed, treated water is stored in several tanks for a total of 35.8 m^3; 20 m^3 for the current storage and an additional 15.8 m^3 for the upgraded storage tank.

2.7 REAGENTS

Sodium hypochlorite at a concentration of 12% is used to disinfect water prior distribution. The dosage is set to have a residual chlorine in treated water. Safety data sheet is provided in Appendix C.

2.8 CONTROLS

The general control strategy is detailed in the P&ID in Appendix A and B. The pump and dosing skid are controlled by a series of sensors measuring level, flow, and water quality analyzers.

More specifically the following are monitored:

- Turbidity of filtrated water;
- pH, residual chlorine, temperature of treated water;
- Pressure at the treated water discharge to the network.

3 OPERATION & MAINTENANCE

Operation and Maintenance requirements are presented more in detail in Appendices D and E for the current process and the upgraded plant.

3.1 PUMPING

All pumps are regularly inspected by the Operator who ensures the pumps continue to operate efficiently and addresses any deficiencies. If the pumps require maintenance, the Operator reports the situation and takes appropriate action. Some of the pumps are installed with a standby unit that allows the Operator to switch from one pump to the other if necessary.

A preventative maintenance program, as recommended by the pump supplier, is followed by the Maintenance Crew to ensure the pumps are always kept in good working order.

3.2 FILTRATION

It is recommended to replace the filter when the differential pressure cartridge filter is over 20 PSI.

3.3 CHEMICAL DOSING

During the daily inspection, the Operator monitors the level of hypochlorite and add additional reagent, if required.

Preventive maintenance of the mechanical equipment is performed according to the supplier operating manual specifications. Chemical dosage is optimized to ensure disinfection is maintained in treated water.

3.4 UV LIGHT

During the daily inspection, the Operator monitors the UV light efficiency and lamp changes are done, if required.

3.5 EFFLUENT QUALITY CONTROL

Treated water is monitored continuously for:

- Turbidity of filtrated water;
- pH, residual chlorine, temperature of treated water;
- Pressure at the treated water discharge to the network.

Calibration of the sensor are performed according to the manufacturer recommendation.

The Operator conducts regular inspections of the entire operating system to ensure it operates as intended. Any upset condition is reported immediately by the Operator and corrective actions are applied accordingly. The Operator also records key process indicators that allow the process to be optimized and any discrepancies between the process and expected performances to be detected.

3.6 RECORD KEEPING

Records of the operational and maintenance and sampling procedures are accessible to assist in the evaluation of the plant performance.

3.7 SAFETY PROCEDURES FOR OPERATORS

Operators working in the freshwater treatment facility must be trained prior to work so that they are aware of the health and safety risks as well as the operational procedures. The following are important safety considerations:

- Working within the plant, especially with chemicals, requires adequate personal protective equipment (PPE) for Operators. This includes wearing steel toed boots, hard hat, rubber aprons, safety glasses with side shields and gloves.
- Operators are required to conduct good housekeeping of the working area to minimize the risk of incidents.
- Lock-out/tag-out procedures must be applied when servicing equipment.
- The SDS for reagents used are readily available for the Operator at all times.
- Eyewash stations/shower are located within proximity of reagent systems.

3.8 CONTROLLING ACCESS

Access to the freshwater treatment plant is restricted to authorized personnel only. Signs are posted at the entrance.

4 EMERGENCY RESPONSE

4.1 FIRE

In case of fire, the on-site emergency response team (ERT) will be notified as per Agnico Eagle's protocol. Instructions from the on-site emergency response team will be followed by all personnel. Further details of fire response are provided in the "*Emergency Response Plan*". The plant will include the necessary fire safety protection measures in accordance with the Nunavut and North West Territories Mine Act.

4.2 SPILL

Spill kits and the necessary secondary containment are available on site. In the event of a spill, the Environment Department will be notified immediately and provide support, as required. In the event of a large spill, the on-site ERT will be notified as per Agnico Eagle's protocol. Instructions from the ERT will be followed by all personnel. All spills will be reported and treated according to the "*Spill Contingency Plan".*

4.3 PLANT MALFUNCTION

If there is a major problem or failure in the plant, it will be likely due to a problem with filtration or disinfection.

In the case of an operational upset, the most likely impact on the process performance would be an increase of turbidity leading to an increase in chlorine demand. Critical equipment (filter, UV, pumps) are installed with redundancy to avoid any upset during maintenance.

Appendix A: Drawings of the New Equipment

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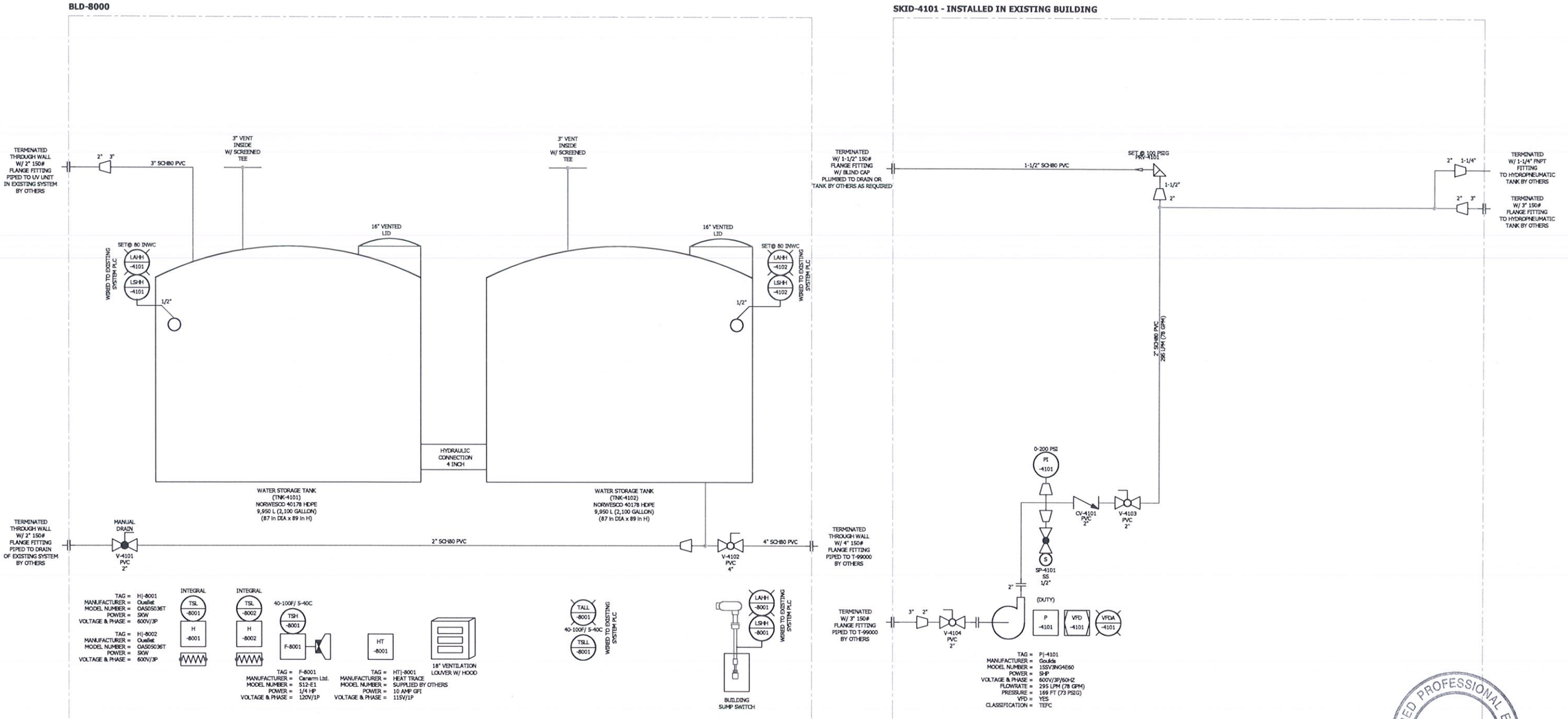
Water Treatment Plant Expansion
Agnico Eagle Mine Ltd.

newterra®

MECHANICAL DRAWING PACKAGE

REGISTERED PROFESSIONAL ENGINEER
J. KEMPSON
LICENSEE
NT/NU
18/06/20

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REGISTERED PROFESSIONAL ENGINEER
J. KEMPSON
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NT/NU
18/06/20

NOTES:
- Water flow meters: Install as per manufacturer's recommendations. Ensure that throttling valves are not in direct line of the meter.
- Materials of valves and piping is to be as specified on the diagram.
- There are no special piping requirements outside of newterra's standards unless specified on the diagram.
- Flexible hose is to be as specified on the diagram. If a flexible connection is preferred please consult Engineering to ensure selected hose is rated for the operating conditions.
- All female PVC threaded adaptors must be re-enforced female adaptors.
- No dissimilar metals are to be in direct contact on water lines. Follow ENG.WIN.014
- All gaskets to be used must be NSF61 approved and/or compliant where applicable.
- All materials of construction to be NSF61 approved and/or compliant where applicable.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C01	AS BUILT - FOR CONSTRUCTION	10/06/2020	jeaton
B01	FOR PRODUCTION	01/05/2020	jeaton
A02	REVISED PER CUSTOMER COMMENTS	30/04/2020	jeaton
A01	FOR APPROVAL	20/04/2020	jeaton

PROJ. NO: 2006348

TITLE AND LOCATION: PROCESS & INSTRUMENTATION DIAGRAM BLD-8000

CUSTOMER: Agnico Eagle Mine Ltd. Water Treatment Plant Expansion

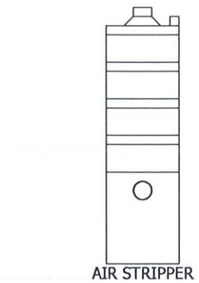
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NTS	2	5

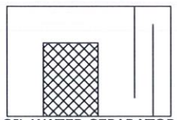
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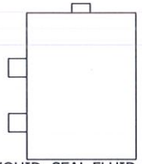
VALVES AND PIPING

	NO	NC
BALL VALVE -		
GATE VALVE -		
GLOBE VALVE -		
NEEDLE VALVE -		
SLIDE VALVE -		
SOLENOID VALVE -		
BUTTERFLY VALVE -		
SWING CHECK VALVE -		
WAFER CHECK VALVE -		
SPRING CHECK VALVE -		
WYE STRAINER -		
SAMPLE PORT -		
PRESSURE RELIEF VALVE -		
VACUUM RELIEF VALVE -		
CAMLOCK CONNECTION -		
FLEXIBLE CONNECTION -		
FLANGED CONNECTION -		
REDUCER -		
UNION -		
ADSORBENT FILTER -	TWIST DRAIN	AUTO DRAIN
COALESCING FILTER -	TWIST DRAIN	AUTO DRAIN
PARTICULATE FILTER -	TWIST DRAIN	AUTO DRAIN
FILTER, SILENCER -		
PRESSURE REGULATOR -		
REGULATOR W/ FILTER -		

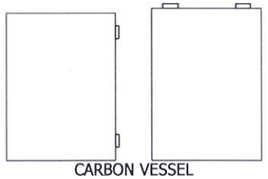
EQUIPEMENT

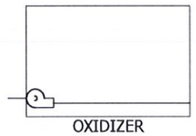

AIR STRIPPER

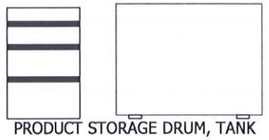

OIL WATER SEPARATOR

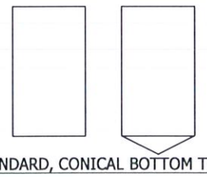

VAPOR/LIQUID, SEAL FLUID SEPARATOR


BAG FILTER


CARBON VESSEL

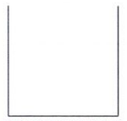

OXIDIZER


PRODUCT STORAGE DRUM, TANK


STANDARD, CONICAL BOTTOM TANK

EQUIPEMENT

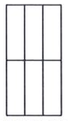

CLOSED TOP TANK


OPEN TOP TANK


OPEN TOP TANK WITH LID


AIR DIFFUSER ASSEMBLY

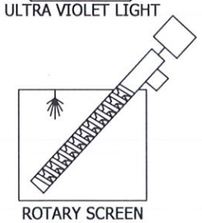

STRAINER/FILTER

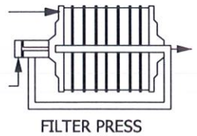

MEMBRANE CASSETTE


NO CLOG SPRAYER ASSEMBLY



ULTRA VIOLET LIGHT

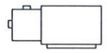

ROTARY SCREEN


FILTER PRESS

EQUIPEMENT


CENTRIFUGAL PUMP -


PROGRESSIVE-CAVITY PUMP -


CHEMICAL-INJECTION PUMP -


CENTRIFUGAL, REGENERATIVE BLOWER -


POSITIVE-DISPLACEMENT BLOWER -


ROTARY-CLAW BLOWER -


LINEAR BLOWER -


LIQUID-RING PUMP -


ROTARY-VANE COMPRESSOR -


RECIPROCATING COMPRESSOR -


PASSIVE COOLING FINS -


HEAT EXCHANGER -


EDUCTOR -



MAGNETIC FLOWM METER -



AVERAGING PITOT TUBE -


VENTURI -


ROTOMETER -


WATER FLOW METER -

INSTRUMENTATION IDENTIFIERS

	FIRST LETTERS		SUCCEEDING LETTERS		
	MEASURED/INITIATING VARIABLE	VARIABLE MODIFIER	READOUT/PASSIVE FUNCTION	OUTPUT/ACTIVE FUNCTION	FUNCTION MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION				
C	CYCLE	CONTROL		CONTROL	CLOSE
D		DIFFERENCE, DIFFERENTIAL			DEVIATION
E	VOLTAGE		SENSOR, PRIMARY ELEMENT		
F	FLOW, FLOW RATE	RATIO			
G	GAS (LEL)		GLASS, GAUGE, VIEWING DEVICE		
H	HAND			HAND	HIGH
I	CURRENT		INDICATE		
J	POWER		SCAN		
K	TIME, SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MONITOR			MOTORIZED	MIDDLE, INTERMED
N					
O			ORIFICE, RESTRICTION		OPEN
P	PRESSURE		POINT(TESTCONNEC'N)	PNEUMATIC	
Q	QUANTITY	INTEGRATE, TOTALIZE	INTEGRATE TOTALIZE		
R	RADIATION		RECORD		RUN
S	SPEED, FREQUENCY	SAFETY		SWITCH, SOLENOID	STOP
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	
V	VIBRATION, MECHANICAL ANALYSIS, VACUUM			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL, PROBE		
X	UNCLASSIFIED	X-AXIS	ACCESSORY DEVICES, UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE, PRESENCE	Y-AXIS		AUXILIARY DEVICES	
Z	POSITION, DIMENSION	Z-AXIS, SAFETY INSTRUMENTED SYSTEM		DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	



- INDICATING INSTRUMENT
- DIGITAL INPUT TO CONTROL PANEL
- DIGITAL INPUT CAUSING ALARM
- DIGITAL INPUT CAUSING SYSTEM SHUTDOWN ALARM
- ANALOG INPUT TO CONTROL PANEL
- ANALOG OUTPUT FROM CONTROL PANEL

AS - AIR STRIPPER
BLD - BUILDING, TRAILER, OR SKID
FLT - FILTER VELLEL
LPC - LIQUID-PHASE CARBON VESSEL
MFD - MANIFOLD
OWS - OIL/WATER SEPARATOR
OX - OXIDIZER
PST - PRODUCT STORAGE TANK
SOS - SEAL OIL SEPARATOR
SWS - SEAL WATER SEPARATOR
TNK - TANK
VLS - VAPOR/LIQUID SEPARATOR
VPC - VAPOR-PHASE CARBON VESSEL

NOTES:

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C01	AS BUILT - FOR CONSTRUCTION	10/06/2020	jeaton
B01	FOR PRODUCTION	01/05/2020	jeaton
A02	REVISED PER CUSTOMER COMMENTS	30/04/2020	jeaton
A01	FOR APPROVAL	20/04/2020	jeaton

PROJ. NO: 2006348
TITLE AND LOCATION: LEGEND
CUSTOMER: Agnico Eagle Mine Ltd. Water Treatment Plant Expansion
SCALE: NTS | SHEET: 3 | SHEETS: 5

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BLD-8000

Quantity	APES Number	Manufacturer	Part Number	Description	TAG
2	10515	Canarm Ltd.	CN TF115-001	Temperature, Switch, Thermostat, 40-100F/ 5-40C, Building Fans and Fan P...	TSH|-8001 , TSLL|-8001
1	12351	Almeg	ATB3-48B	Level, Switch, Vertical, 1/4" NPT	LSHH|-8001
1	23439	KPSI	750S14D4A004.334000.000B1 0015B	Pressure, Transmitter, 0-10ft H2O, 4-20mA, KPSI 750 series, intrinsically saf...	LT|-4101
2	26667	Ouellet	OAS05036T	Heater, Ouellet, 5KW, 600V, 3 Phase, Includes T-Stat	H|-8001 , H|-8002
2	35709	Almeg		Switch, Level, Almeg, SX-601, Side Mount, 1/2" NPT, Stainless	LSHH|-4101 , LSHH|-4102
1	37662	Afflu-O	K15-020VS	Valve, Manual, Ball, PVC, 2", True-Union, Soc Ends, c/w FPM [Viton] O-Rings...	V-4101
1	37664	Custom	K15-040VS	Valve, Manual, Ball, PVC, 4", True-Union, Soc Ends, c/w FPM [Viton] O-Rings...	V-4102
1	M1072	Canarm Ltd.	S12-E1	Fan, Building, 12", 1/4hp, 1750rpm, 120V, 1ph, TEAO, S12-E1	F-8001

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J. KEMPSON
LICENSEE
NT/NU
18-06-20

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newterra
1291 CALIFORNIA AVE.
BROCKVILLE ONTARIO
CANADA K6V 5Y6
PHONE: 1-800-420-4056
www.newterra.com

LEVEL	REVISION	DATE (dd/mm/yy)	BY
C01	AS BUILT - FOR CONSTRUCTION	10/06/2020	jeaton
B01	FOR PRODUCTION	01/05/2020	jeaton
A02	REVISED PER CUSTOMER COMMENTS	30/04/2020	jeaton
A01	FOR APPROVAL	20/04/2020	jeaton

PROJ. NO: 2006348

TITLE AND LOCATION: BILL OF MATERIAL - PAGE 1/1

CUSTOMER: Agnico Eagle Mine Ltd. Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	4	5

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SKID-4101 - INSTALLED IN EXISTING BUILDING

Quantity	APES Number	Manufacturer	Part Number	Description	TAG
1	12868	Various		Valve, Manual, Check, Swing, PVC Body, 2", Clear, 1520-20C	CV-4101
1	14435	Pinacle Stainless Steel	14435	Valve, Manual, Ball, SS Body, Teflon Seal, 1/2"	SP-4101
1	27406	Indumart	P22T2-FG-200	Gauge, Pressure, 0-200 PSI, Bottom Mount, 2-1/2" Dial, SS Case, SS Interna...	PI|-4101
1	27811	IFM Efector	EVC002	Flow, Meter, Connector, 4 Wire Mirco DC connector, Cable 5m, 22AWG	PT|-4101
1	34883	Goulds		Pump, Centrifugal, Goulds, Misc.	P|-4101
1	36970	IFM Efector	PX3224	Pressure, Transmitter, 0-100 PSI, 4-20mA, No Display, 1/4" NPT Process Co...	PT|-4101
2	37662	Afflu-O	K15-020VS	Valve, Manual, Ball, PVC, 2", True-Union, Soc Ends, c/w FPM [Viton] O-Rings...	V-4103 , V-4104
1	39936	Endress + Hauser Ltd.	10D50-4LGA1RA0B5AA+M1	Flow, Meter, 2" Waffer, 4-20mA and Pulse Totalizer, 24VDC, Promag 10D50	FIT|-4101
1	43030	Cla-Val	50-01-1.5	Valve, Pressure Sustaining, Cla-Val 50-01, 1.5", DI Body, Globe Style, Epo...	PRV-4101

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J. KEMPSON
LICENSEE
NT/NU
18-06-20

NOTES:

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PROJ. NO: 2006348

TITLE AND LOCATION: BILL OF MATERIAL - PAGE 1/1

CUSTOMER: Agnico Eagle Mine Ltd. Water Treatment Plant Expansion

SCALE: NTS | SHEET: 5 | SHEETS: 5

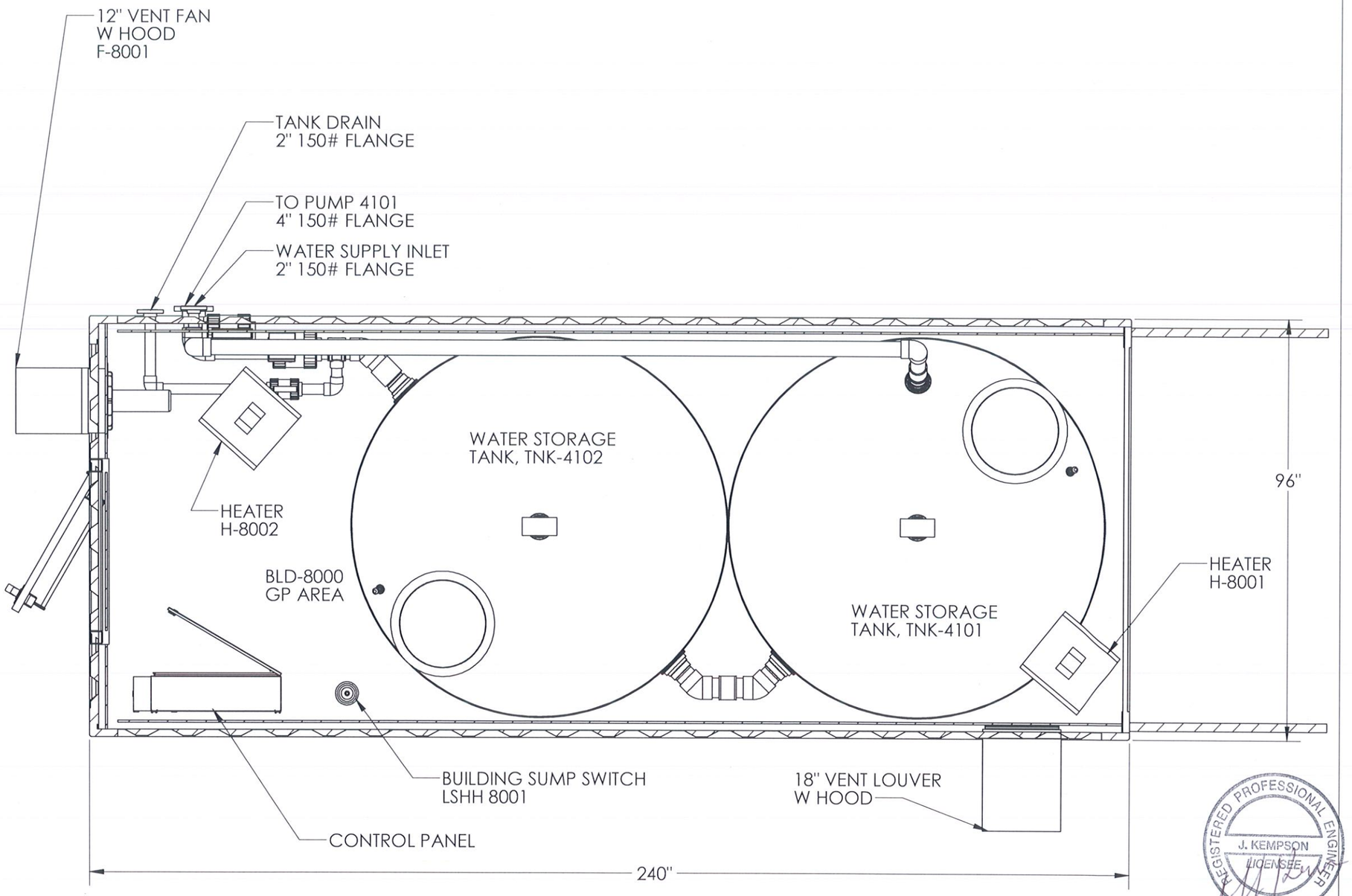
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Civil Construction Notes
- install sump at location indicated.
- provide wood lip around perimeter to allow sump switch to trip.
- install grating between building fans and outside louvers.
- spray foam thermal insulation on walls and ceiling.
- door colour to be the same as building, white

Mech/Elec. Construction Notes
- locate cooling thermostat in the warmest location at ceiling level.
- locate heating thermostat at floor level.
- plug and seal (with washers) any holes in the floor to contain water spills.
- maximum width for shipping is 102". this includes all connections that protrude through the sides of the enclosure.

Commissioning Notes
- fan and louver hoods need to be installed on site. cannot ship with hoods attached.
- buildings need to be shimmed on site to allow doors to open freely. please have shimming material ready during building installation.
- newterra recommends pad be at least 12" larger than enclosure in all directions. local codes may require alternate dimensions.

newterra standard system labels
- flow direction labels
- air line labels
- water line labels
- air/water line labels
- hot surface label (lines >= 140 degf)
- hearing protection labels
- warning label: this machine is automatically controlled
- arc flash warning label



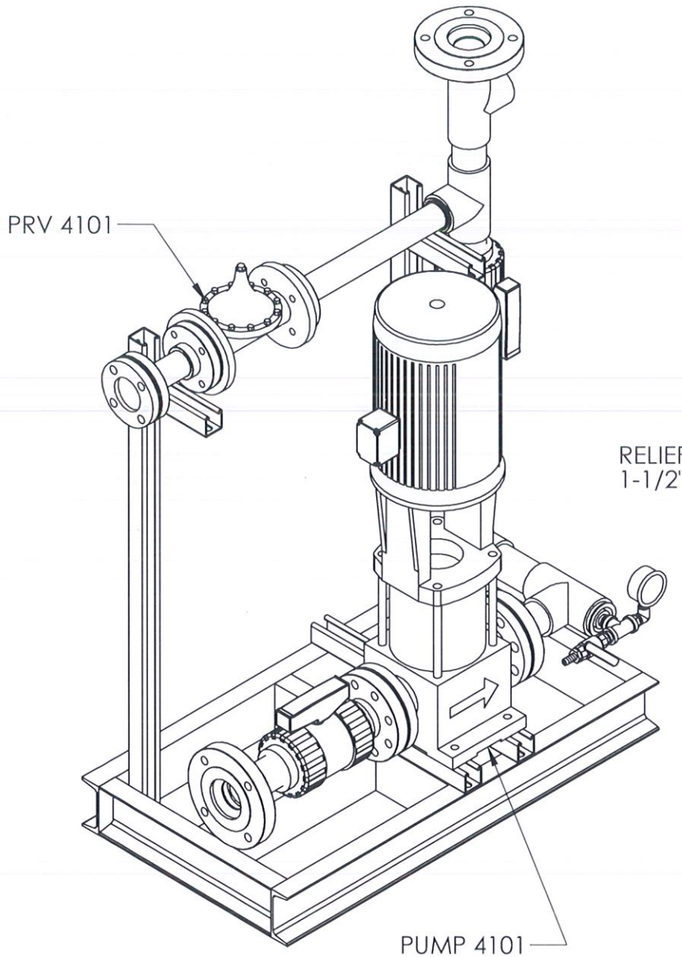
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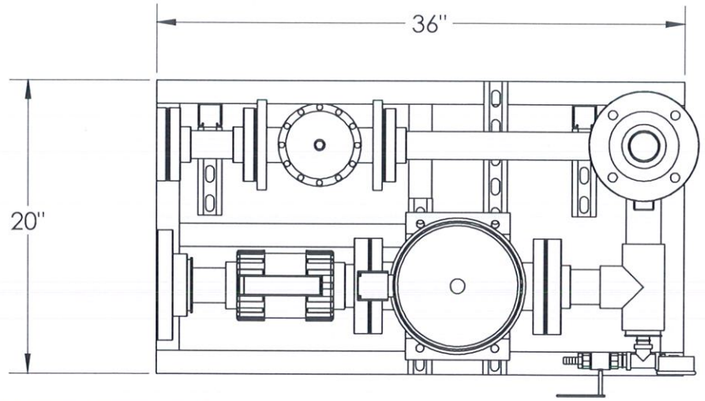
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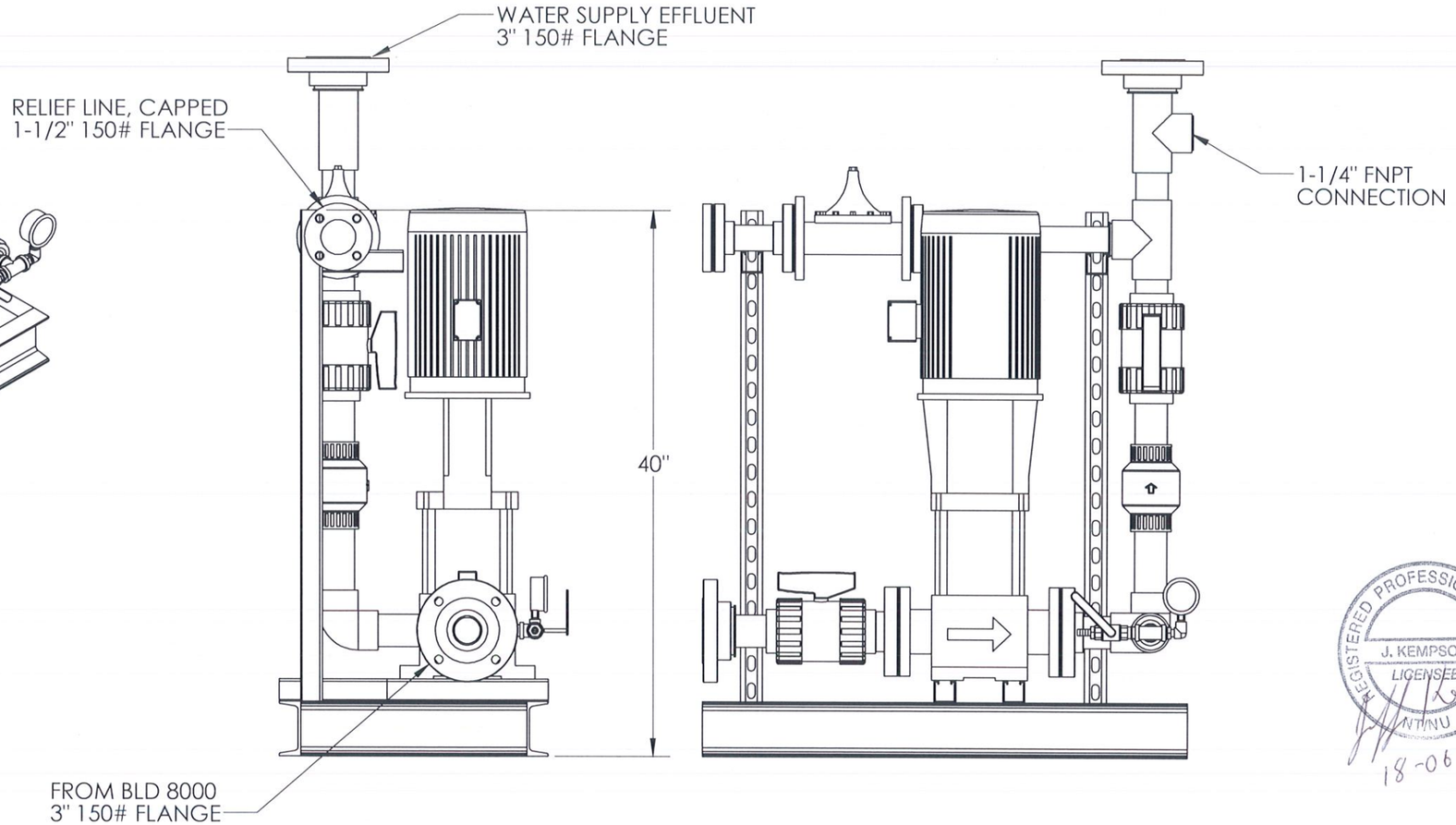
GENERAL TOLERANCES
.XX ± 1/8"
.XXX ± 1/16"
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

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SKID 4101 GA







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.XX ± 1/8"
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Appendix B: Current Treatment Plant on Site

VALVE SYMBOLS

N.OPEN N.CLOSED

- BALL
- V-BALL
- BUTTERFLY
- DIAPHRAGM
- GATE
- GLOBE
- NEEDLE
- PLUG
- SAMPLE/DRAIN
- CHECK
- BACKFLOW PREVENTER
- INJECTION QUILL
- 3-WAY, 4-WAY
- PRESSURE REGULATING
- BACK PRESSURE REGULATING
- FLOW CONTROL
- 2-WAY SOLENOID
- 3-WAY SOLENOID
- 4-WAY SOLENOID
- AIR RELEASE
- VACUUM BREAKER
- PRESSURE RELEASE
- SLUICE GATE/WEIR

VALVE ACTUATOR SYMBOLS

- PNEUMATIC (FAIL LAST POSITION)
- F.C. PNEUMATIC FAIL CLOSE
- F.O. PNEUMATIC FAIL OPEN
- ELECTRIC
- DIAPHRAGM
- POSITIONER (ANY ACTUATOR TYPE)
- HAND OVERRIDE (ANY ACTUATOR TYPE)
- TRAVEL STOPS (ANY ACTUATOR TYPE)

FLOWMETER SYMBOLS

- ROTAMETER
- ROTAMETER W/ INTEGRAL NEEDLE VALVE
- THERMAL

INTEGRAL REMOTE

- MAGNETIC
- PADDLE
- VORTEX
- DP/ORIFICE

INSTRUMENTATION SYMBOLS

LOCALLY MOUNTED	IN CONTROL PANEL	DESCRIPTION
X	X	DISCRETE INSTRUMENT
	X	PRIMARY PLC OR DCS SHARED CONTROL
	X	SECONDARY PLC OR DCS SHARED CONTROL
	X	COMPUTER FUNCTION

INSTRUMENT FUNCTIONS

- K SIGNAL PROCESSING FUNCTION
- A/M AUTO/MANUAL
- Σ ADDITION/SUMMATION
- Δ DIFFERENTIAL
- INTERLOCK LOGIC FUNCTION
- AVERAGING

INSTRUMENT CONNECTIONS

THREADED SOCKETWELD WELDED

PIPING CONNECTIONS & SYMBOLS

- FLANGE
- QUICK DISCONNECT HOSE/TUBE
- THREADED CONNECTION
- EXPANSION/FLEXIBLE/ ISOLATION JOINT
- UNION
- GROOVED COUPLING
- BLIND FLANGE
- DOUBLE CONTAINMENT
- CAPPED END
- INSULATION THICKNESS
- REDUCER
- INSULATION
- ECCENTRIC REDUCER
- INSULATION THICKNESS
- HEAT TRACING E=ELECTRIC S=STEAM G=GLYCOL
- DRAIN OUTLET

PIPING ABBREVIATIONS

316 SS	316 STAINLESS STEEL
304 SS	304 STAINLESS STEEL
316L SS	LOW CARBON 316 STAINLESS STEEL
304L SS	LOW CARBON 304 STAINLESS STEEL
CPVC	CHLORINATED POLYVINYL CHLORIDE
CS	CARBON STEEL
DI	DUCTILE IRON
HDPE	HIGH-DENSITY POLYETHYLENE
PE	POLYETHYLENE
PVC	POLYVINYL CHLORIDE
RLCS	RUBBER LINED CARBON STEEL
SCH	SCHEDULE
SDR	STANDARD DIMENSION RATIO

LINE SYMBOLOGY

- MAIN PROCESS LINE
- SECONDARY PROCESS LINE
- PROCESS LINE, BY OTHERS
- COMM LINK (EX. PLC TO HMI)
- COMM LINK (EX. PLC TO DCS)
- ELECTRIC WIRING
- PNEUMATIC LINE
- LINE JUMPER
- PIPE DISCONTINUATION
- FLOW DIRECTION ARROWS
- 4" 316 SS SCH.10 LINES SIZE/ MATERIAL IDENTIFIER
- SKID BOUNDARY
- SKID BY H_2O Innovation
- NOT BY H_2O Innovation
- REVISION
- LINES TO/FROM OTHER SHEETS DESCRIPTION C01-0001 SHT 1 DESTINATION

PUMP SYMBOLS

- CENTRIFUGAL
- CHEMICAL METERING
- DIAPHRAGM
- POSITIVE DISPLACEMENT
- VACUUM
- SUBMERSIBLE OR FLOATING
- VERTICAL TURBINE
- PERISTALTIC/HOSE

MISCELLANEOUS EQUIPMENT SYMBOLS

- CARTRIDGE FILTER HOUSING
- AUTOMATIC STRAINER
- SILENCER
- MOTORIZED MIXER
- STATIC MIXER
- RESIN TRAP
- MOTOR
- EDUCTOR OR VENTURI
- Y STRAINER
- CONICAL OR TEMPORARY STRAINER
- PULSATION DAMPENER
- DIAPHRAGM
- FLOW ORIFICE
- RUPTURE DISK (PRESSURE)
- RUPTURE DISK (VACUUM)
- SPECTACLE BLIND (NORMALLY OPEN, NORMALLY CLOSED)
- COARSE BUBBLE DIFFUSER
- FINE BUBBLE DIFFUSER
- FILTER
- TURBOCHARGER
- MANWAY
- TANK
- IMMERSED HEATER
- IN-LINE HEATER
- ULTRASONIC LEVEL TRANSMITTER
- FLOAT-STYLE LEVEL SWITCH
- CHEMICAL CONTAINMENT
- CALIBRATION COLUMN
- MEMBRANE
- UV STERILIZER
- AIR COMPRESSOR
- POSITIVE DISPLACEMENT BLOWER
- REGENERATIVE BLOWER
- CENTRIFUGAL BLOWER
- REFRIGERATED AIR DRYER
- FLOW CHAMBER
- BIO-WHEEL

FLOW INSTRUMENTS

FAH	FLOW ALARM HIGH
FAL	FLOW ALARM LOW
FCV	FLOW CONTROL VALVE
FE	FLOW ELEMENT
FI	FLOW INDICATOR
FIC	FLOW INDICATING CONTROLLER
FIT	FLOW INDICATING TRANSMITTER
FR	FLOW RECORDING
FSH	FLOW SWITCH HIGH
FSL	FLOW SWITCH LOW
FV	FLOW CONTROL OR ON/OFF VALVE
FQ	FLOW TOTALIZER
FY	FLOW SIGNAL CONVERT, I/P, OR SOLN

PRESSURE INSTRUMENTS

PAH	PRESSURE ALARM HIGH
PAL	PRESSURE ALARM LOW
PC	PRESSURE CONTROLLER
PCV	SELF REG PRESS CONTROL VALVE
PDH	DIFFERENTIAL PRESSURE HIGH
PDI	DIFFERENTIAL PRESSURE INDICATOR
PDIT	DIFF PRESS INDICATING TRANSMITTER
PDSH	DIFFERENTIAL PRESS SWITCH HIGH
PG	PRESSURE GAUGE
PI	PRESSURE INDICATOR
PIC	PRESSURE INDICATING CONTROLLER
PIT	PRESSURE INDICATING TRANSMITTER
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
PSV	SELF REG PRESS SAFETY VALVE
PT	PRESSURE TRANSMITTER
PY	PRESS SIGNAL CONVERT, I/P, OR SOLN
PSLH	PRESSURE SWITCH LOW HIGH

LEVEL INSTRUMENTS

LAH	LEVEL ALARM HIGH
LAL	LEVEL ALARM LOW
LCV	SELF REG LEVEL CONTROL VALVE
LE	LEVEL ELEMENT
LG	LEVEL GAUGE
LI	LEVEL INDICATOR
LIC	LEVEL INDICATING CONTROLLER
LIT	LEVEL INDICATING TRANSMITTER
LSH	LEVEL SWITCH HIGH
LSL	LEVEL SWITCH LOW
LT	LEVEL TRANSMITTER
LV	LEVEL CONTROL OR ON/OFF VALVE
LY	LEVEL SIGNAL CONVERT, I/P, OR SOLN

TEMPERATURE INSTRUMENTS

TAH	TEMPERATURE ALARM HIGH
TAL	TEMPERATURE ALARM LOW
TC	TEMPERATURE CONTROLLER
TE	TEMPERATURE ELEMENT
TG	TEMPERATURE GAUGE
TI	TEMPERATURE INDICATOR
TIC	TEMP INDICATING CONTROLLER
TIT	TEMP INDICATING TRANSMITTER
TSH	TEMPERATURE SWITCH HIGH
TSL	TEMPERATURE SWITCH LOW
TT	TEMPERATURE TRANSMITTER
TV	TEMP CONTROL OR ON/OFF VALVE
TY	TEMP SIGNAL CONVERT, I/P, OR SOLN

ELECTRICAL ABBREVIATIONS

JB	JUNCTION BOX
MCP	MAIN CONTROL PANEL
RIO	REMOTE I/O PANEL
PP	POWER PANEL
VFD	VARIABLE FREQUENCY DRIVE
HOA	HAND-OFF-AUTO

ANALYTICAL INSTRUMENTS

AAH	ANALYTICAL ALARM HIGH
AAL	ANALYTICAL ALARM LOW
AE	ANALYTICAL ELEMENT
AI	ANALYTICAL INDICATOR
AIC	ANAL INDICATING CONTROLLER
AIT	ANAL INDICATING TRANSMITTER
ASH	ANALYTICAL SWITCH HIGH
ASL	ANALYTICAL SWITCH LOW
AT	ANALYTICAL TRANSMITTER
AY	ANALYTICAL SIGNAL CONVERT, I/P, OR SOL

MISCELLANEOUS INSTRUMENTS

HS	HAND SWITCH
HI	HAND SWITCH POSITION INDICATOR
II	CURRENT INDICATOR
QQI	TOTALIZER INDICATOR
SC	SPEED CONTROLLER
SI	SPEED INDICATOR
YA	MOTOR ALARM
YC	MOTOR CONTROL
YI	MOTOR ON/OFF INDICATOR
ZI	POSITION INDICATOR
ZIC	SWITCH CLOSE INDICATOR
ZIO	SWITCH OPEN INDICATOR
ZSC	POSITION SWITCH CLOSED
ZSO	POSITION SWITCH OPEN
ZT	POSITION TRANSMITTER
ZY	POSITIONER

VALVES & EQUIPMENT

AC	AIR COMPRESSOR
ARV	AIR RELEASE VALVE
AS	AIR SUPPLY
B	BLOWER
BT	BULK TOTE
CBD	COARSE BUBBLE DIFFUSER
CV	CHECK VALVE
ED	EDUCTOR
F	FILTER
FBD	FINE BUBBLE DIFFUSER
FL	FAIL LAST (DEFAULT IF NOT SHOWN)
FC	FAIL CLOSED
FO	FAIL OPEN
FQG	CALIBRATION COLUMN
H	HEATER
HCV	HAND CONTROL VALVE
HTR	HEATER
HV	HAND VALVE
MX	MIXER
P	PUMP
RT	RESIN TRAP
T	TANK
UV	ULTRAVIOLET
V	HAND VALVE
MTN	MULTI-TURN ACTUATION VALVE

OTHER ABBREVIATIONS

C	CAPACITANCE
CIP	CLEAN-IN-PLACE
COND	CONDUCTIVITY
DO_2	DISSOLVED OXYGEN
ESP	EMERGENCY STOP
IA	INSTRUMENT AIR
I/P	CURRENT TO PNEUMATIC CONVERTER
ORP	OXIDATION REDUCTION POTENTIAL
pH	HYDROGEN ION
RES	RESISTIVITY
RTD	RESISTANCE TEMP DETECTOR
SOL	SOLENOID
SP	SET POINT
uS	MICROSIEMENS

Vendor Document Status

1 ☐ Process and mechanical submission and details.

2 ☐ Process and mechanical completion, as-built drawings and details.

3 ☐ Site mechanical completion.

4 ☐ Process, mechanical and mechanical as-built submissions and details.

5 ☐ Site acceptance.

6 ☐ Process, as-built and mechanical as-built submissions and details.

4 ☐ Complete, no further submissions required.

Rev. Date

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No. 6915-C-250-010-205-PID-0002 Sub002

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00	13/06/2016	INITIAL RELEASE	M.P.	S.B.	R.D.	A.M.

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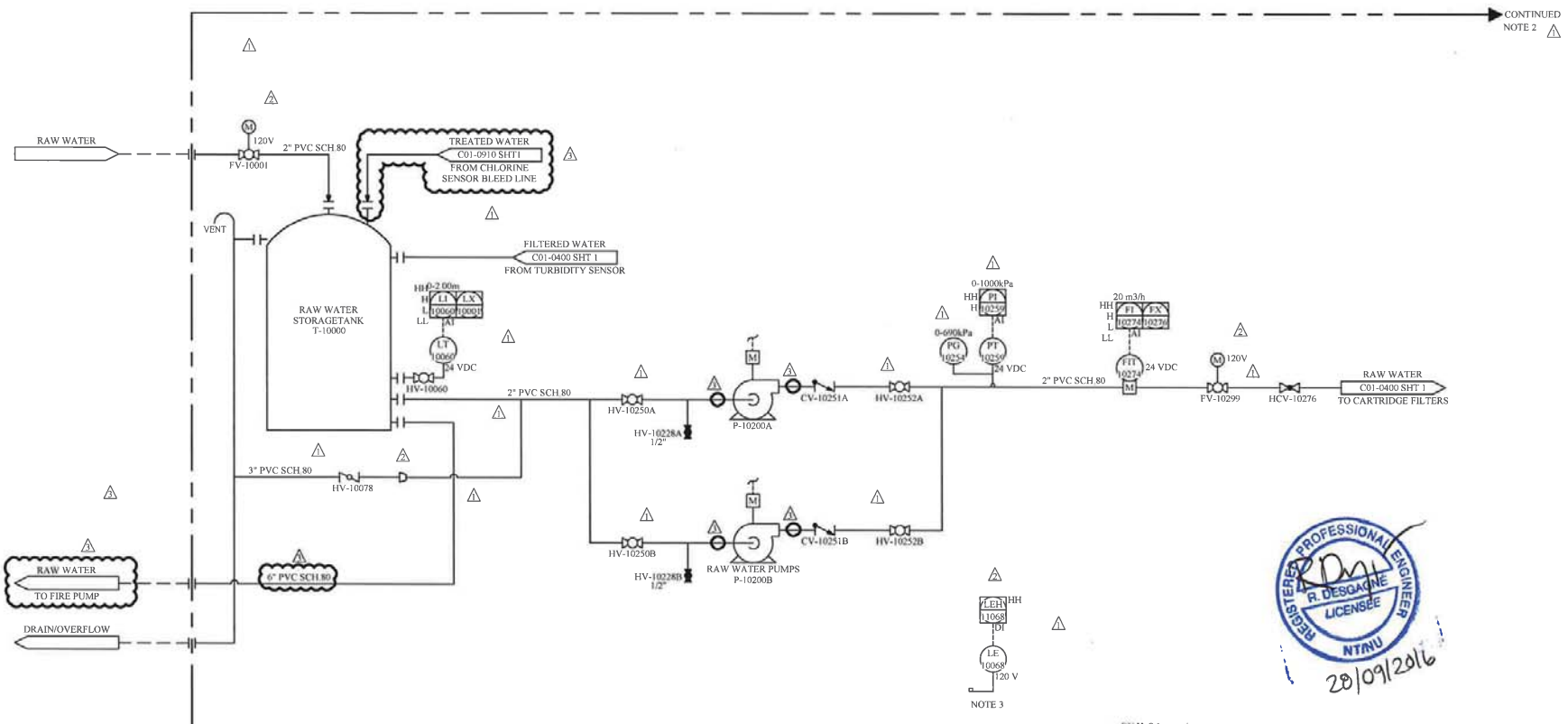
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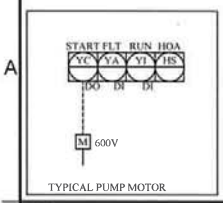
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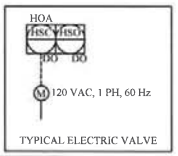
SHEET: 1 of 1



REGISTERED PROFESSIONAL ENGINEER
R. DESGAGNÉ
LICENSÉE
NTNU
28/09/2016



TYPICAL PUMP MOTOR



TYPICAL ELECTRIC VALVE

NOTES:

1. ALL SIGNALS GOING INTO MCP-101.
2. EQUIPEMENT TO BE PLACED IN CONTAINER #1.
3. WATER LEAK DETECTOR

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00	13/06/2016	INITIAL RELEASE	M.P.	S.B.	R.D.	A.M.

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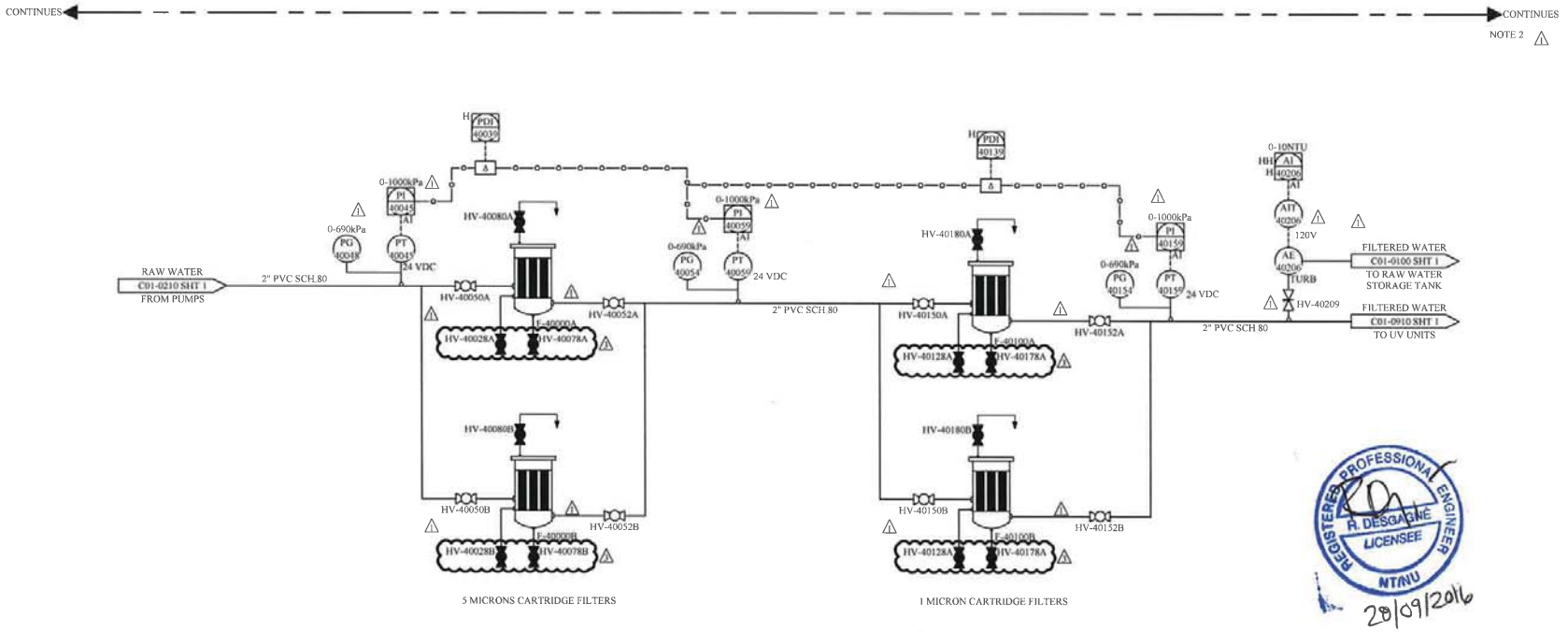
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TITLE:
RAW WATER FEED SYSTEM
PROCESS & INSTRUMENTATION DIAGRAM

SCALE: N/A
DRAWING NUMBER: P65873-C01-0100
SHEET: 1 of 1
REVISION: 03



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R. DESGAGNE
LICENSEE
NTNU
29/09/2016

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1. ALL SIGNALS GOING INTO MCP-101.
2. EQUIPEMENT TO BE PLACED IN CONTAINER #1.

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00	13/06/2016	INITIAL RELEASE	M.P.	S.B.	R.D.	A.M.

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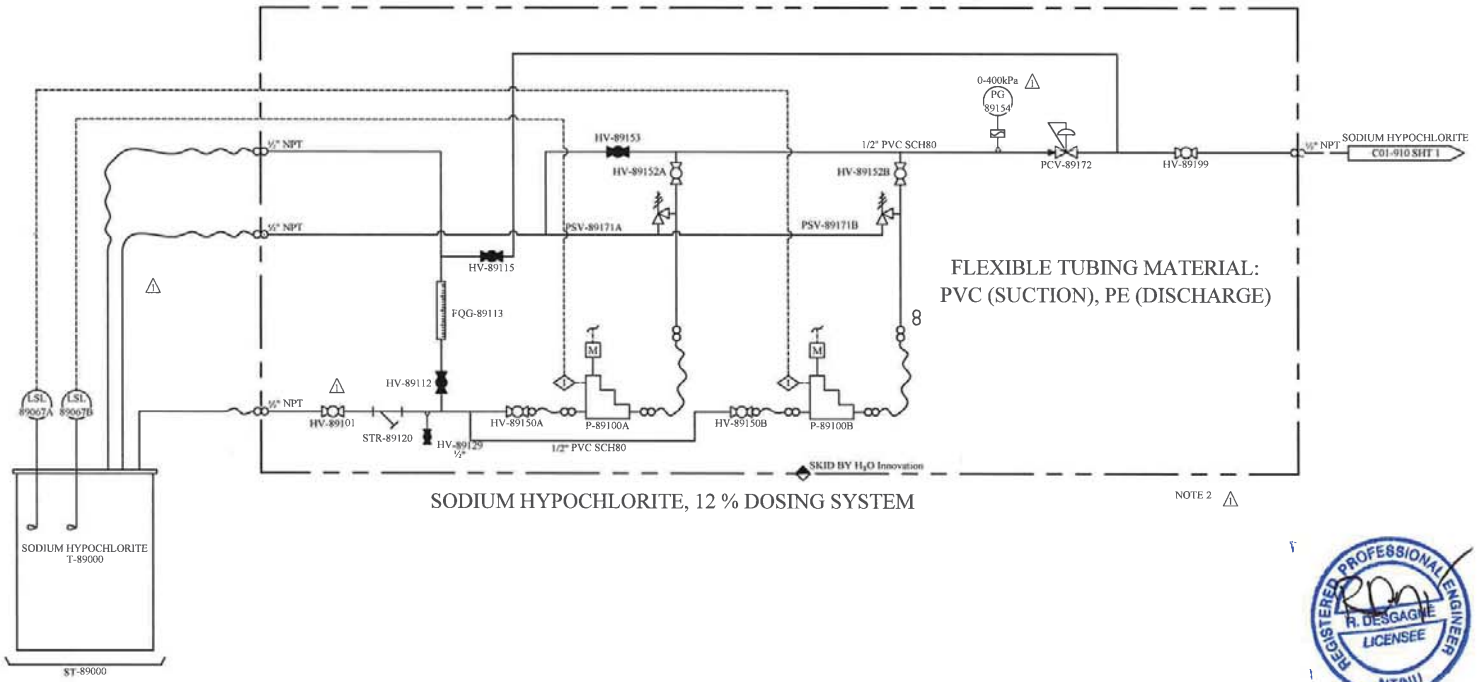
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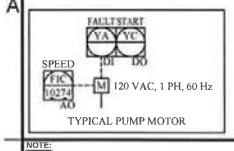
SHEET: 1 of 1



SODIUM HYPOCHLORITE, 12 % DOSING SYSTEM

NOTE 2 ⚠

REGISTERED PROFESSIONAL ENGINEER
R. DESGAGNÉ
LICENSEE
NTNU
28/09/2016



TYPICAL PUMP MOTOR

NOTES:

1. ALL SIGNALS GOING INTO MCP-101.
2. EQUIPEMENT TO BE PLACED IN CONTAINER #1. ⚠

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UNLESS NOTED OTHERWISE
INTERPRETATION AND FITS
TOLERANCES
FRACTIONS ±1/64
DECIMALS X.X ±0.020
X.XX ±0.010
X.XXX ±0.005
ANGLES ±1°
HOLE SIZES ±1/64
HOLE CENTERS ±1/64
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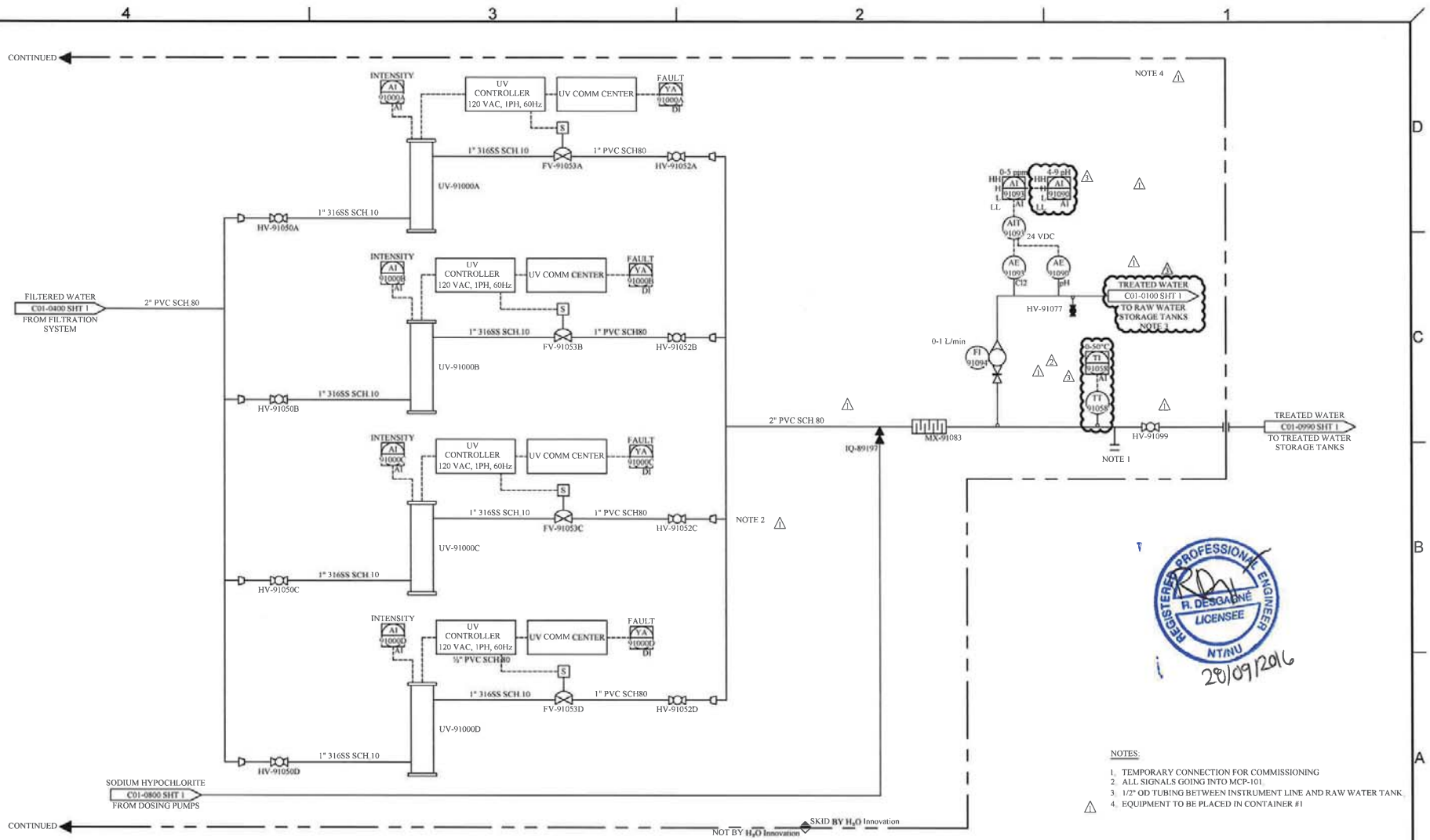
MELIADINE

WTP CONTAINERIZED UNIT

TITLE:
DOSING SKIDS - DUPLEX SOLENOID
PROCESS & INSTRUMENTATION DIAGRAM

SCALE:	DRAWING NUMBER:	REVISION
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SHEET: 1 of 1



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R. DESGAGNÉ
LICENSEE
NT/NU
20/09/2016

NOTES:

1. TEMPORARY CONNECTION FOR COMMISSIONING
2. ALL SIGNALS GOING INTO MCP-101
3. 1/2" OD TUBING BETWEEN INSTRUMENT LINE AND RAW WATER TANK
4. EQUIPMENT TO BE PLACED IN CONTAINER #1

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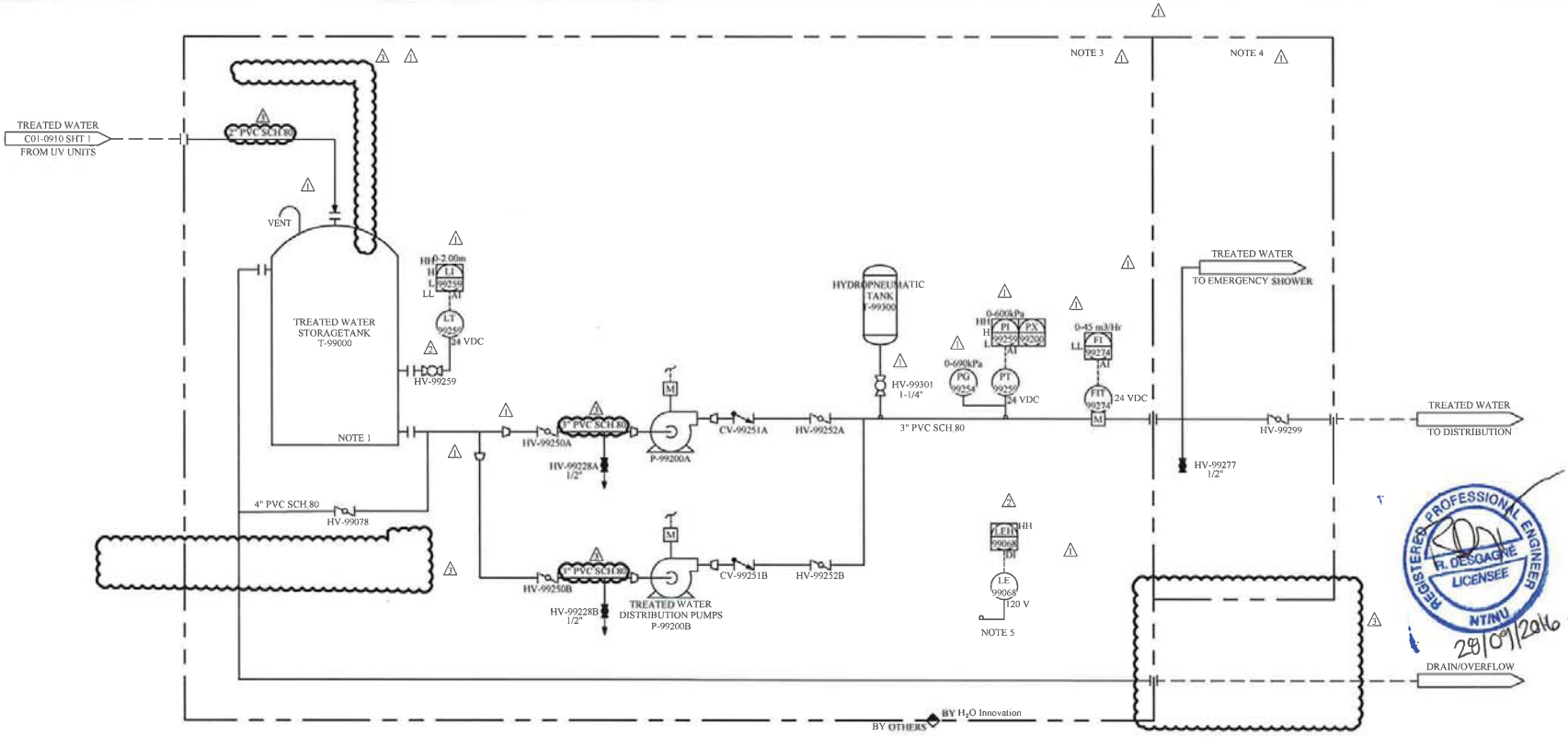
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TOLERANCES
FRACTIONS
DECIMALS .X
.XXX
ANGLES
EDGE SIZES
HOLE CENTERS
DO NOT SCALE PRINTS

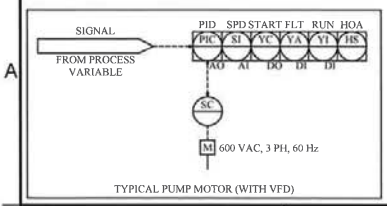
MELIADINE

WTP CONTAINERIZED UNIT

TITLE:
UV TREATMENT UNITS
PROCESS & INSTRUMENTATION DIAGRAM

SCALE:	DRAWING NUMBER:	REVISION
N/A	P65873-C01-0910 SHEET: 1 of 1	03





NOTES:

1. 5 TANKS IN SERIES LINKED TOGETHER
2. ALL SIGNALS GOING INTO MCP-101.
3. EQUIPMENT TO BE PLACED IN CONTAINER #2
4. EQUIPMENT TO BE PLACED IN CONTAINER #1
5. WATER LEAK DETECTOR

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R. DESCAGNE
LICENSEE
NT/NU
29/09/2016

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INTERPRETATION ANSI Y14.5
TOLERANCES
FRACTIONS ±1/-
DECIMALS X.X ±0.030
X.XX ±0.010
ANGLES ±1/-
HOLE SIZES ±1/-
HOLE CENTERS ±1/-
DO NOT SCALE PRINTS

MELIADINE

WTP CONTAINERIZED UNIT

TITLE:
TREATED WATER DISTRIBUTION SYSTEM
PROCESS & INSTRUMENTATION DIAGRAM

SCALE: N/A

DRAWING NUMBER: P65873-C01-0990

SHEET: 1 of 1

REVISION 03

Appendix C: SDS

Material Safety Data Sheet

LA5839
Sodium Hypochlorite 12% Water Treatment

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Id: LA5839
Product Name: Sodium Hypochlorite 12% Water Treatment
Synonyms: Sodium oxychloride; Soda bleach liquor; Javel water; Clorox; Javex.
Chemical Family: Hydrochlorous acid, sodium salt.
Application: Chemical intermediate. Laboratory reagent. Water treatment. Pulp and paper. Bleaching agent. Disinfectant.

Distributed By:
Univar Canada Ltd.
9800 Van Horne Way
Richmond, BC
V6X 1W5

Prepared By: The Environment, Health and Safety Department of Univar Canada Ltd.
Preparation date of MSDS: 03/Apr/2014
Telephone number of preparer: 1-866-686-4827

24-Hour Emergency Telephone Number (CANUTEC): (613) 996-6666

2. HAZARDS IDENTIFICATION

Potential Acute Health Effects:
Eye Contact: Corrosive to eye tissue and may cause severe damage and blindness.
Skin Contact: Corrosive. May cause severe skin irritation. Prolonged contact may lead to burns and blisters and may aggravate dermatitis. May cause whitening or bleaching of the skin.
Inhalation: Corrosive to the respiratory passage. Causes irritation of the mouth, nose and throat. Repeated and/or prolonged exposures may cause productive cough, running nose, bronchopneumonia, pulmonary edema (fluid build-up in lungs) and reduction of pulmonary function. If mixed with acids or warmed to temperatures greater than 40 °Celsius, Sodium hypochlorite solutions release chlorine gas. This gas can cause severe irritation of the nose and throat. Exposures to high levels of chlorine gas may result in severe lung damage.
Ingestion: Corrosive. Causes burns to the mouth, throat and stomach. Causes vomiting, nausea, and diarrhea. Coma, shock and death may occur.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients	Percentage (W/W)	LD50s and LC50s Route & Species:
Water 7732-18-5	60-100	Oral LD50 (Rat) >90 mL/kg
Sodium Hypochlorite, Solution 7681-52-9	10-30	Oral LD50 Rat = 8200 mg/kg Dermal LD50 Rabbit > 10000 mg/kg

Note: Drug Identification Number (DIN) - 02265729

4. FIRST AID MEASURES

Eye Contact: Wash eyes with water for a minimum of 30 minutes or until no evidence of the chemical remains. Hold eyelids open during flushing. Seek immediate medical attention.
Skin Contact: In case of contact, immediately flush skin with plenty of water for at least 30 minutes. Get medical attention.
Inhalation: Remove person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, get immediate medical attention.
Ingestion: Rinse mouth with water. Do not induce vomiting. Do not give anything by mouth to an unconscious person. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs. Seek immediate medical attention.
Notes to Physician: Due to the severely irritating or corrosive nature of the material, swallowing may lead to ulceration and inflammation of the upper alimentary tract with hemorrhage and fluid loss. Also, perforation of the esophagus or stomach may occur, leading to mediastinitis or peritonitis and the resultant complications.

5. FIRE FIGHTING MEASURES

Flash Point: None.
Flash Point Method: Not applicable.
Autoignition Temperature: Not available.
Flammable Limits in Air (%): Not Available.
Extinguishing Media: Use extinguishing media appropriate for surrounding fire.
Special Exposure Hazards: Keep containers cool to prevent rupture and release of material. Closed containers may explode in fire. Spilled material may cause floors and contact surfaces to become slippery.
Hazardous Decomposition/Combustion Materials (under fire conditions): Chlorine. Oxygen. Oxides of sodium.
Special Protective Equipment: Fire fighters should wear full protective clothing, including self-contained breathing equipment.
NFPA RATINGS FOR THIS PRODUCT ARE: Not Available.
HMIS RATINGS FOR THIS PRODUCT ARE: HEALTH 3, FLAMMABILITY 0, REACTIVITY 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures: Wear appropriate protective equipment.
Environmental Precautionary Measures: Prevent entry into sewers or streams, dike if needed. Consult local authorities.
Procedure for Clean Up: Ventilate area. Small spills: soak up with absorbent material and scoop into containers. Large spills : prevent contamination of waterways. Dike and pump into suitable containers. Clean up residual with absorbent material, place in appropriate container and flush with water. Spilled material may cause floors and contact surfaces to become slippery.

7. HANDLING AND STORAGE

Handling: For industrial use only. Handle and open containers with care. Avoid contact with eyes, skin and clothing. Do not ingest. Avoid inhalation of chemical. Empty containers may contain hazardous product residues. Keep the containers closed when not in use. Protect against physical damage. Use appropriate personnel protective equipment. When diluting, add this product to water in small amounts to avoid spattering. Never add water to this material.
Storage: Store in a cool, dry, well ventilated area, away from heat and ignition sources. Store below 29 °C. Do not freeze. Keep away from direct sunlight. Store away from organic chemicals, strong bases, metal powders, carbides, sulfides, and any readily oxidizable material. Storage area should be equipped with corrosion-resistant floors, sumps and should have controlled drainage to a recovery tank. Store in a sealed polyethylene lined container.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls:

Local exhaust ventilation as necessary to maintain exposures to within applicable limits. Make up air should always be supplied to balance air exhausted (either generally or locally). Ventilation required when spraying or applying in a confined area. Ventilation should be explosion proof. Eliminate ignition sources.

Respiratory Protection: Wear a NIOAH approved full facepiece respirator for acid gases or a self-contained breathing apparatus for air concentration levels up to 5 ppm. NIOSH approved supplied air respirator when airborne concentrations exceed exposure limits.

Gloves:

Impervious gloves. Neoprene gloves. Nitrile gloves. Rubber gloves.

Skin Protection: Neoprene coated apron or chemical resistant clothing. Impervious boots.

Eyes: Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes.

Other Personal Protection Data: Ensure that eyewash stations and safety showers are proximal to the work-station location.

Ingredients	Exposure Limit - ACGIH	Exposure Limit - OSHA	Immediately Dangerous to Life or Health - IDLH
Water	Not available.	Not available.	Not Available.
Sodium Hypochlorite, Solution	0.5 ppm As For Chlorine.	Not available.	Not Available.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid
Color: Clear Green to yellow.
Odor: Chlorine.
pH 11.5 - 13
Specific Gravity: 1.175
Boiling Point: Decomposition at 40°C / 104°F
Freezing/Melting Point: -25°C / -12°F
Vapor Pressure: 17.5 mmHg
Vapor Density: Not Available.
% Volatile by Volume: Not Available.
Evaporation Rate: Not Available.
Solubility: Soluble in water.
VOCs: Not Available.
Viscosity: Not Available.
Molecular Weight: Not Available.
Other: Not Available.

10. STABILITY AND REACTIVITY

Chemical Stability: Unstable above 40°C / 104 °F.
Hazardous Polymerization: Will not occur.
Conditions to Avoid: High temperatures. Exposure to light.
Materials to Avoid: Acids. Ammonia. Strong oxidizers. Reducing agents. Metals.
Hazardous Decomposition Products: When heated to decomposition, it emits acrid smoke and irritating fumes. Chlorine. Oxides of sodium. Oxygen.

Additional Information:

Hypochlorites may react with primary amines to form nitrogen trichloride which explodes spontaneously in air. Hypochlorite bleach reacts with urea to form nitrogen trichloride which explodes spontaneously in air. Some metals accelerate the decomposition of Sodium Hypochlorite. Nickel. Copper. Tin. Iron and its alloys. Manganese.

11. TOXICOLOGICAL INFORMATION

Principle Routes of Exposure

Ingestion: Corrosive. Causes burns to the mouth, throat and stomach. Causes vomiting, nausea, and diarrhea. Coma, shock and death may occur.

11. TOXICOLOGICAL INFORMATION

Skin Contact: Corrosive. May cause severe skin irritation. Prolonged contact may lead to burns and blisters and may aggravate dermatitis. May cause whitening or bleaching of the skin.
Inhalation: Corrosive to the respiratory passage. Causes irritation of the mouth, nose and throat. Repeated and/or prolonged exposures may cause productive cough, running nose, bronchopneumonia, pulmonary edema (fluid build-up in lungs) and reduction of pulmonary function. If mixed with acids or warmed to temperatures greater than 40 °Celsius, Sodium hypochlorite solutions release chlorine gas. This gas can cause severe irritation of the nose and throat. Exposures to high levels of chlorine gas may result in severe lung damage.
Eye Contact: Corrosive to eye tissue and may cause severe damage and blindness.

Additional Information: Aspiration may cause lung damage. Corrosive effects on the skin and eyes may be delayed, and damage may occur without the sensation or onset of pain.
Acute Test of Product:
Acute Oral LD50: Not Available.
Acute Dermal LD50: Not Available.
Acute Inhalation LC50: Not Available.

Carcinogenicity:

Ingredients	IARC - Carcinogens	ACGIH - Carcinogens
Water	Not listed.	Not listed.
Sodium Hypochlorite, Solution	Group 3	Not listed.

Carcinogenicity Comment: No additional information available.

Reproductive Toxicity/ Teratogenicity/ Embryotoxicity/ Mutagenicity: Not Available.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information:

Ingredients	Ecotoxicity - Fish Species Data	Acute Crustaceans Toxicity:	Ecotoxicity - Freshwater Algae Data
Water	Not Available.	Not Available.	Not Available.
Sodium Hypochlorite, Solution	0.03 - 0.19 mg/L LC50 (Oncorhynchus mykiss) 96 h semi-static 0.05 - 0.771 mg/L LC50 (Oncorhynchus mykiss) 96 h flow-through 0.06 - 0.11 mg/L LC50 (Pimephales promelas) 96 h flow-through 0.18 - 0.22 mg/L LC50 (Oncorhynchus mykiss) 96 h static 0.28 - 1 mg/L LC50 (Lepomis macrochirus) 96 h flow-through 0.4 - 0.8 mg/L LC50 (Lepomis macrochirus) 96 h static 4.5 - 7.6 mg/L LC50 (Pimephales promelas) 96 h static	Not Available.	0.095 mg/L EC50 Skeletonema costatum 24 h

Other Information:
Harmful to aquatic life at low concentrations. Toxicity is primarily associated with pH.

13. DISPOSAL CONSIDERATIONS

Disposal of Waste Method: Disposal of all wastes must be done in accordance with municipal, provincial and federal regulations.
Contaminated Packaging: Empty containers should be recycled or disposed of through an approved waste management facility.

14. TRANSPORT INFORMATION

DOT (U.S.):
DOT Shipping Name: HYPOCHLORITE SOLUTION
DOT Hazardous Class 8
DOT UN Number: UN1791
DOT Packing Group: III
DOT Reportable Quantity (lbs): Not Available.
Note: No additional remark.
Marine Pollutant: No.

TDG (Canada):
TDG Shipping Name: HYPOCHLORITE SOLUTION
Hazard Class: 8
UN Number: UN1791
Packing Group: III
Note: No additional remark.
Marine Pollutant: No.

15. REGULATORY INFORMATION

U.S. TSCA Inventory Status: All components of this product are either on the Toxic Substances Control Act (TSCA) Inventory List or exempt.

Canadian DSL Inventory Status: All components of this product are either on the Domestic Substances List (DSL), the Non-Domestic Substances List (NDSL) or exempt.

Note: Not available.

U.S. Regulatory Rules

Ingredients	CERCLA/SARA - Section 302:	SARA (311, 312) Hazard Class:	CERCLA/SARA - Section 313:
Water	Not Listed.	Not Listed.	Not Listed.
Sodium Hypochlorite, Solution	Not Listed.	Listed	Not Listed.

California Proposition 65: Not Listed.
MA Right to Know List: Listed.
New Jersey Right-to-Know List: Listed.
Pennsylvania Right to Know List: Listed.

WHMIS Hazardous Class:
E CORROSIVE MATERIAL



16. OTHER INFORMATION

Additional Information: This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

Disclaimer: NOTICE TO READER:
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Do not use ingredient information and/or ingredient percentages in this MSDS as a product specification. For product specification information refer to a Product Specification Sheet and/or a Certificate of Analysis. These can be obtained from your local Univar Sales Office.

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*****END OF MSDS*****

Appendix D: Operation and Maintenance Manual of upgrade equipment

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2650 Eisenhower Ave, Bldg. 100A, Trooper, PA 19403
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newterra Recovered Water Treatment System

OPERATION AND MAINTENANCE MANUAL

System:	**POTABLE WATER STORAGE AND DISTRIBUTION**
Location:	**Agnico Eagle Mines – Meliadine Division**
Client:	**Agnico Eagle Mines**
Project:	**2006348**
Rev.:	**1**
Date:	**June 11, 2020**

newterra inc.
2650 Eisenhower Ave, Bldg. 100A, Trooper, PA 19403
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TABLE OF CONTENTS

1.0 INTRODUCTION 6

2.0 SAFETY 8
2.1 Introduction 8
2.2 Personal Protective Equipment (PPE) 9
2.2.1 Head protection 9
2.2.2 Eye and Face Protection 9
2.2.3 Foot Protection 10
2.2.4 Hand Protection 10
2.2.5 Body Protection 10
2.2.6 Hearing Protection 10
2.3 Contamination Safety 11
2.4 Electrical Safety 11
2.4.1 Lockout Procedures 12
2.5 Confined Spaces 12
2.6 Fire Safety 13
2.7 Responsibility for Safety 13
2.7.1 Management 13
2.7.2 Worker 13
2.7.3 Plant Safety – Simple Rules to Follow 14
2.8 Hazard Warning Signs/Symbols 15
2.9 First Aid 16
2.9.1 CPR Poster 17

3.0 SYSTEM DESIGN BASIS 18
3.1 General System Description 18
3.2 System Design Basis 18
3.3 System Technical Specifications 19
3.3.1 Potable Water Storage – TNK-4101/4102 19
3.3.2 Potable Water Distribution – P-4101 20

4.0 Plant Installation, Inspection, and Testing 21
4.1 Plant Initial Installation 21
4.2 Installation and Commissioning Checklists 21
4.3 System Electrical Specifications 21
4.4 Safety 22
4.5 Pipe Flushing, Hydrotesting, and Sanitization 22
4.5.1 Tank Flush 22
4.5.2 Pressure Testing 22
4.5.2.1 General Pressure Test Guidelines 23

5.0 WATER TREATMENT SYSTEM (WTS) OPERATION 24
5.1 System Utilities 24
5.1.1 Inputs 24
5.1.2 Setpoints 24
5.1.3 Outputs 24

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6.0 SYSTEM MAINTENANCE 25
6.1 General 25
6.2 Schedule for Routine Maintenance 25
6.3 Maintenance General Procedures 27
6.3.1 General Guidelines 27
6.3.1.1 Piping 27
6.3.1.3 Hand Valves 27
6.3.1.4 Check Valves 27
6.3.1.5 Leak Checking 28
6.3.1.6 Pumps 28
6.3.2 Avoiding Mechanical Problems 28
6.3.2.1 System Components 28
6.3.2.2 Pumps 28
6.3.2.3 Instruments 28
6.3.2.4 Pressure Drops 28
6.3.2.5 Threaded Fittings 28
6.3.3 Electrical Equipment & Instrument Maintenance 29
6.3.3.1 Contact Switches 29

7.0 TROUBLESHOOTING 30
7.1 Overview 30
7.2 General Troubleshooting Tips 30
7.3 P-0801/2 31

8.0 SERVICE & SUPPORT 32
8.1 Commissioning and Start-up 32
8.2 Post commissioning Services 32
8.3 Technical support 32
8.4 Spare parts 32
8.5 Assistance in telemetry control and monitoring 33
8.6 Site visits and system audits 34

9.0 WARRANTY 36

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APPENDICES

Appendix A – Drawings and Bill of Material
Appendix B – Packing Slip
Appendix C - Pre-Commissioning Checklists
Appendix D – Recommended Spare Parts List
Appendix E - Technical Specs and Brochures for Parts and Equipment
Appendix F - Glossary & Terms
Appendix G –Control Narrative

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1.0 INTRODUCTION

The purpose of this manual is to provide necessary information for the Installation, Operation and Maintenance of the newterra Water Treatment System (WTS) equipment.

	The newterra WTS functions optimally if the operating procedures described in this manual are followed. If you have any questions after reading through this manual, please contact newterra ltd.

- This O&M Manual must be kept on-site and available to employees at all time.
- It is IMPERATIVE that employees read the manual BEFORE working in the plant.
- Employees must read ***Section 2*** – Health and Safety.
- Technical Support Department contacts are provided in ***Section 10***.



WARNING: Failure to comply with the instructions provided in this manual can cause equipment & property damage or severe personal injury and will render the warranty null and void.

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2.0 SAFETY

2.1 Introduction

This section provides general personal and environmental safety information for the operators of the newterra WTS.

Always refer to local codes and regulations.

Specific equipment and parts safety information can be found in Appendix E.

Information and guidelines outlined in this manual **must** be followed at all times prior to system installation and during operation and maintenance.

ESSENTIAL FOR SAFE OPERATION:

1. Installation and operation of the newterra WTS **must** only be carried out by **trained and qualified** personnel.
2. All necessary **safety precautions must** be carefully exercised, including but not limited to proper use of personal protective equipment considering given working environment and conditions.
3. All **electrical installations and troubleshooting must** only be carried out by licensed electricians.
4. All **plumbing work must** only be carried out by licensed plumbers or qualified personnel.
5. Please keep in mind that trees and shrubs taller than two meters located near the plant buildings may become a safety concern at the time of installation or service.

DEFINITION OF SAFETY AND WARNING SIGNS USED IN THE MANUAL



ATTENTION SYMBOL
Special attention is required to ensure compliance with instructions concerning correct operating sequences to prevent damage to the plant or its function.



GENERAL WARNING SIGN
This symbol accompanies important instructions or warnings associated with risks of injury as well as possible equipment damage.

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WARNING

CRITICAL WARNING SIGN
Warns against an unsafe situation or practice associated with severe injury as well as major equipment damage.

2.2 Personal Protective Equipment (PPE)

Personal protective equipment (PPE) refers to protective clothing, gloves, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection. The hazards addressed by protective equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter. ”Protective clothing" is applied to traditional categories of clothing, and "protective gear" applies to items such as pads, guards, shields, masks, and others.

The purpose of personal protective equipment is to reduce employee exposure to hazards when engineering and administrative controls are not feasible or effective to reduce these risks to acceptable levels. PPE is needed when there are hazards present. PPE has the serious limitation that it does not eliminate the hazard at source and may result in employees being exposed to the hazard if the equipment fails.

The following list includes the minimum scope of PPE that should be available to system operators:

2.2.1 Head protection

Hard hats, bump caps, or helmets are types of protection that should be considered if there is a hazard of head injury. Head injuries can occur under various circumstances including as the result of a slip or fall, working in confined areas or where there are low ceilings, where there may be falling objects. Hard hats should be worn at all times when overhead work is being conducted.

2.2.2 Eye and Face Protection

Eye protection with side shields should be used at all times while inside the newterra system as there may be a danger of flying objects, particles, liquids, sprays or other matter entering the eyes. Protection can take many forms including:

- safety glasses,
- goggles, or
- full face protection. This should be used if handling chemicals, waste product or working around pressurized lines (air of liquid).

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2.2.3 Foot Protection

Foot protection should be used at all times within the newterra system. Foot protection is usually in the form of steel-toed work boots, with a steel shank to protect the bottom of the foot from puncture wounds. In wet environments, steel-toed boots that are waterproof and slip-resistant may be necessary.

2.2.4 Hand Protection

Hand protection should be worn within the newterra system. The workplace can create many hazards for hands, whether from chemicals, cuts or burns. No single glove can provide appropriate protection for every work situation, so it is important to assess the risk for each task and select a glove that provides specialized protection.

The following is a list of gloves and their suggested appropriate application:

- Coated fabric gloves: This type of glove can provide protection against some moderate concentrated chemicals. They can be used in laboratory work provided they are strong enough to protect against the specific chemical being handled.
- Rubber, plastic or synthetic gloves: These types of glove can be used when cleaning or working with oils, solvents and other chemicals.
- Leather gloves: These should be used when welding, as the leather can resist sparks and moderate heat. The risk of cuts and abrasions also can be minimized by wearing leather gloves.
- Kevlar gloves: These have a wide variety of industrial applications. They are cut- and abrasion-resistant and provide protection against both heat and cold.
- Chemical/liquid-resistant gloves: Several types of gloves help protect against specific chemicals:
    - Butyl rubber gloves: nitric acid, sulfuric acid, hydrochloric acid and peroxide
    - Natural latex/rubber gloves: water solutions or acids, alkalis, salts, and ketones
    - Neoprene gloves: hydraulic fluids, gasoline, alcohols and organic acids
    - Nitrile rubber gloves: chlorinated solvents

2.2.5 Body Protection

Body protection may be required in various situations including dusty environments or when spraying liquid pesticides or handling dangerous chemicals. The hazard to be controlled will determine the type of protection that is most appropriate, for example, an apron, coveralls or a full rain suit. As a minimum, the operator should be wearing work coveralls.

2.2.6 Hearing Protection

Hearing protection should be worn in work environments where noise levels exceed 85 decibels – such as around blowers and air compressors. There are many types of hearing protection, including earplugs or muffs. Hearing protection that is suitable for the work environment and provides adequate noise reduction should be chosen. Disposable ear plugs or headset style are acceptable.

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2.3 Contamination Safety

Water treatment plants require good operating practices including avoiding contamination of the treated water supply. Special care should be exercised to avoid introducing biological organisms into the facility. The use of proper hygiene measures, protective equipment, good housekeeping and common sense is to be exercised to minimize the risk of such contamination.

These measures prevent contamination!



Ensure that hands are washed with an antibacterial soap and warm water and dried by disposable towels on a regular basis!
Do not enter the system area while wearing PPE or clothing that may have been in direct contact with contaminated water!
Follow sampling protocols!
Assess risk of cross-connections before installing or modifying pipework!



WARNING

Mixing chemicals can result in dangerous reactions, including violent splashing, fires, explosions and release of toxic gases!
Chemicals should only be used for their intended uses!

2.4 Electrical Safety

Power may be supplied to control panels from various sources. Even if the disconnect is in the OFF position, certain electrical components inside the panel may be energized and servicing should not be conducted unless all incoming power is disconnected. Refer to the electrical drawings in Appendix A of this manual.

Ensure that the system is properly grounded before applying power to the system. Installation and servicing is only to be performed by qualified authorized personnel.

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2.4.1 Lockout Procedures

Lockout procedures must be followed prior to performing mechanical or electrical maintenance to ensure that equipment has been de-energized. All relevant local guidelines and procedures must be applied. The person who locked out the device, should be the only person to remove the lockout.

When equipment is to be locked out, employers, supervisors and workers should follow accepted lockout principles, including:

- Pre-planning for the lockout by identifying all energy sources, switches, etc.
- Where lockout is complex, a written sequence in checklist form should be prepared for equipment access, lockout/tagout, clearance, release and start-up.
- All workers affected by the lockout should be notified.
- Equipment should be shut down by normal means by turning of switches and closing valves etc.
- Equipment should be isolated from energy sources by disconnecting or blocking the sources of energy.
- Lockout and tag the energy isolating devices by padlock or some other locking device that the worker has control over as well as a tag indicating that the equipment has been shut down.
- Verify that all energy sources have been isolated by attempting to cycle the equipment prior to working on it.
- When work is completed, release equipment from lockout.
- Test equipment

2.5 Confined Spaces

“confined space” means a fully or partially enclosed space:

- That is not both designed and constructed for continuous human occupancy, and
- In which atmospheric hazards may occur because of its construction, location or contents or because of work that is done in it.

If you have a space that is fully or partially enclosed, the two conditions – (a) and (b) above – must both apply before the space can be considered a "confined space".

"atmospheric hazards" means:

- the accumulation of flammable, combustible or explosive agents,
- an oxygen content in the atmosphere that is less than 19.5 per cent or more than 23 per cent by volume, or
- the accumulation of atmospheric contaminants, including gases, vapours, fumes, dusts or mists, that could,
  - result in acute health effects that pose an immediate threat to life, or
  - interfere with a person's ability to escape unaided from a confined space.

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Follow local laws and regulations with respect to entering a confined space.

If a workplace includes a confined space that workers may enter to perform work, it is highly recommended that written program for the confined space is developed and maintained in accordance with this local regulations and policies before a worker enters the confined space.

A confined space program is a written document that would include: a method for recognizing each confined space to which the program applies; a method for assessing the hazards to which workers may be exposed; a method for the development of confined space entry plans; a method for training workers; and, an entry permit system.

2.6 Fire Safety

Exposed hot surfaces can create potential burn/ignition hazards. Blowers and air compressors compress ambient air, causing heat to be generated. This heat can bring the temperature of the air compressor head and blower piping to a level that can cause burns to exposed flesh.
Follow local laws and regulations with respect to Fire Safety and regulations.

2.7 Responsibility for Safety

2.7.1 Management

Management is responsible for providing a safe working environment. This is accomplished partly by:

- Ensuring that all facilities and equipment are built and maintained in accordance with the appropriate safety standards
- Providing adequate funds for equipment and plant maintenance
- Establishing, promoting, and enforcing a ***safety policy***
- Establishing a safety training program
- Supplying easy accessible eyewash and first-aid stations and proper personal protective equipment (PPE) for personnel servicing the WTS.

2.7.2 Worker

- To develop a positive and professional attitude towards safety.
- To avoid mistakes caused by indifference to safety, poor work habits, lack of attentiveness, rushing the job, failure to observe established safety procedures and poor physical condition.



Remember the “ABC” of accident prevention:
ALWAYS BE CAREFUL!!!

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In addition to ***"being careful"*****,** it is the responsibility of all workers to:

- Work in accordance with established safety procedures
- Follow the established safety rules
- Wear appropriate personal protective equipment (PPE)
- Report all accidents, no matter how minor
- Report potential safety hazards
- Participate in safety programs

2.7.3 Plant Safety – Simple Rules to Follow



Common sense plays a very important part in the safe operation of any type of plant!

- Wear the appropriate personal protective equipment at all times.
- Keep walkways clear of snow and ice, and loose objects such as pails, shovels, tools, etc.
- Clean up spills of oil, grease, chemicals, or other substances immediately.
- Keep all tools and similar equipment clean, in good condition, and properly stored when not in use.
- Replace all manhole covers, access trap doors, etc. as soon as possible. Erect a safety barrier if it is necessary to leave the opening uncovered.
- Use the proper tools when removing or replacing a manhole cover.
- Wear a safety belt whenever there is the possibility of falling even a short distance, or when working over water.
- Lock out and tag electrical equipment before working on it or the associated equipment.
- Ensure that moving machinery is properly guarded. Wear ear protection in noisy environments.
- Ensure that fire-fighting equipment is in good working condition.

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2.8 Hazard Warning Signs/Symbols



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2.9 First Aid

First Aid is emergency care given immediately to an injured person. The purpose of first aid is to minimize injury and future disability. In serious cases, first aid may be necessary to keep the victim alive.

It often consists of a one-time, short-term treatment and requires little technology or training to administer. First Aid can include cleaning minor cuts, scrapes, or scratches; treating a minor burn; applying bandages and dressings; drinking fluids to relieve heat stress, etc.

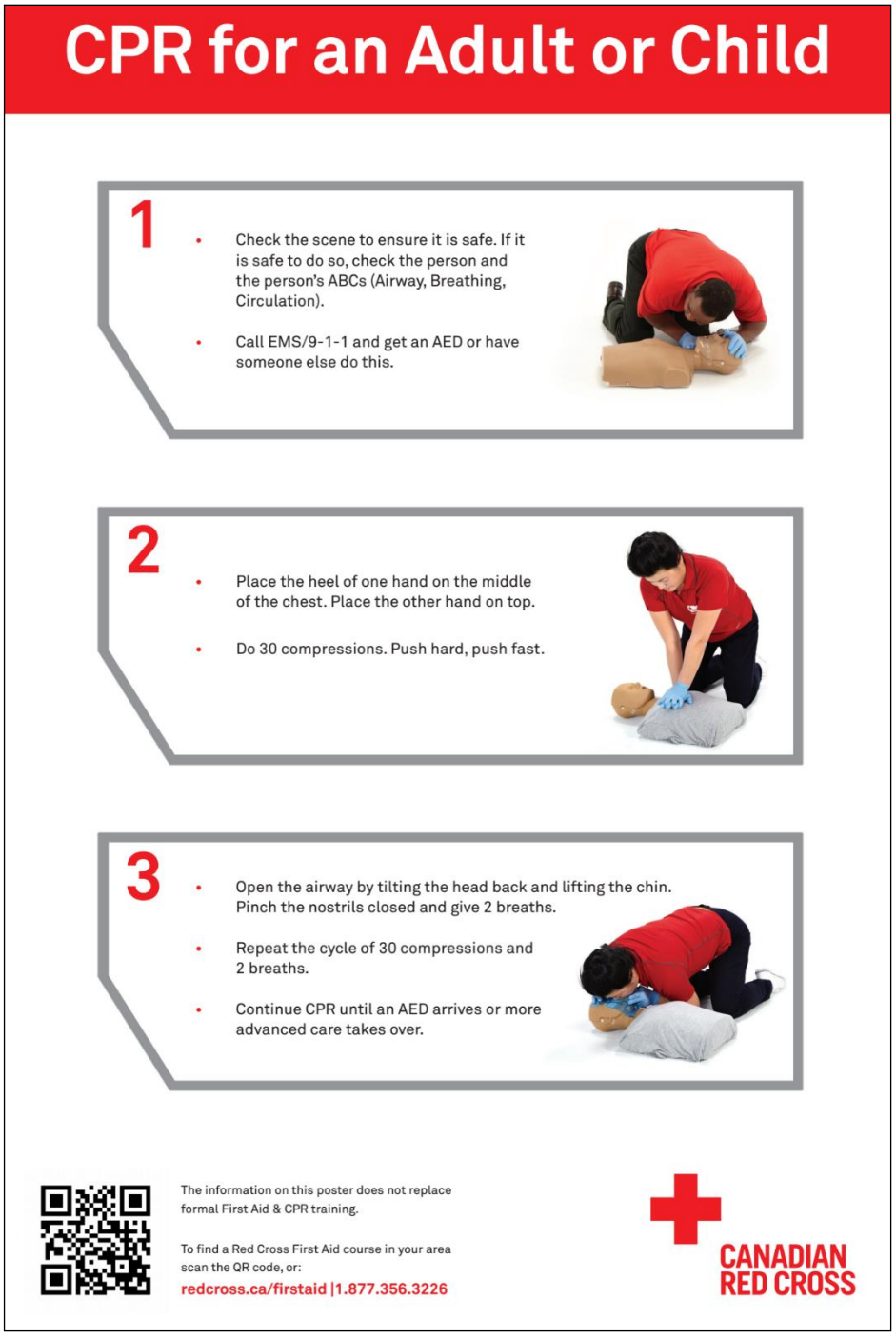
Operators must know the location of emergency telephone number(s), First Aid Kits, emergency eye wash stations and first aid attendant(s).

In over 98% of locations in the United States and Canada, dialing "9-1-1" from any telephone will link the caller to an emergency dispatch office—called a Public-Safety Answering Point (PSAP) by the telecom industry—which can send emergency responders to the caller's location in an emergency. In approximately 96 percent of the U.S., the Enhanced 9-1-1 system automatically pairs caller numbers with a physical address.

Follow local laws and regulations with respect to First Aid procedures and reporting.

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2.9.1 CPR Poster



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3.0 SYSTEM DESIGN BASIS

3.1 General System Description

This system consists of two (2) 2,100 gallon potable water storage tanks and a potable water distribution pump skid. All controls are by others. System has internal controls for heating and ventilation only.

3.2 System Design Basis

Not applicable

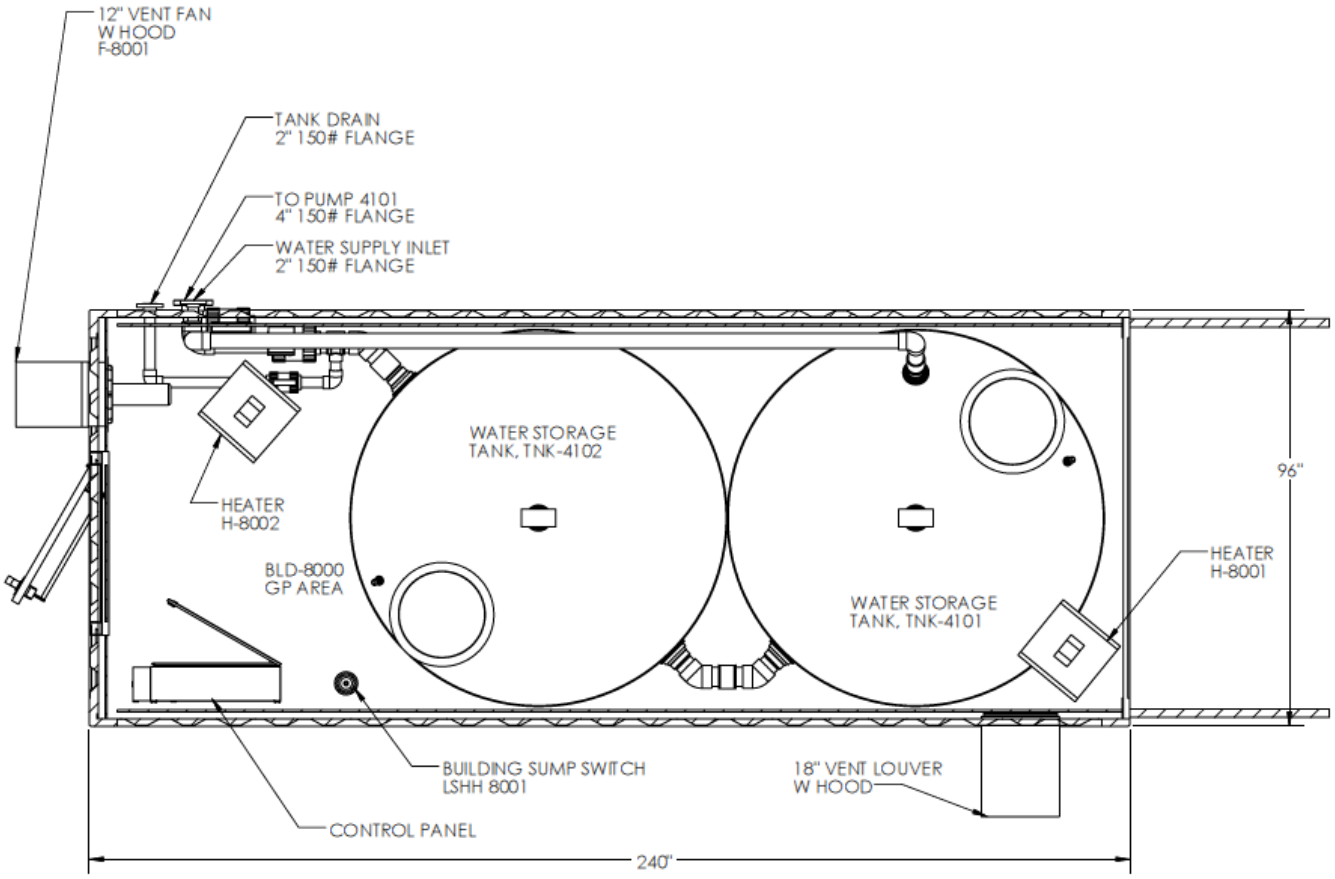
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3.3 System Technical Specifications

3.3.1 Potable Water Storage – TNK-4101/4102

Two (2) HDPE potable water storage tanks:

- Each tank is 87” diameter, 89” high and 2,100-Gal volume
- Each tank with a High-high level alarm float switch
- Each tank with a passive vent stack
- Common tank drain
- Common 4” discharge terminated with flanged connection on exterior of container



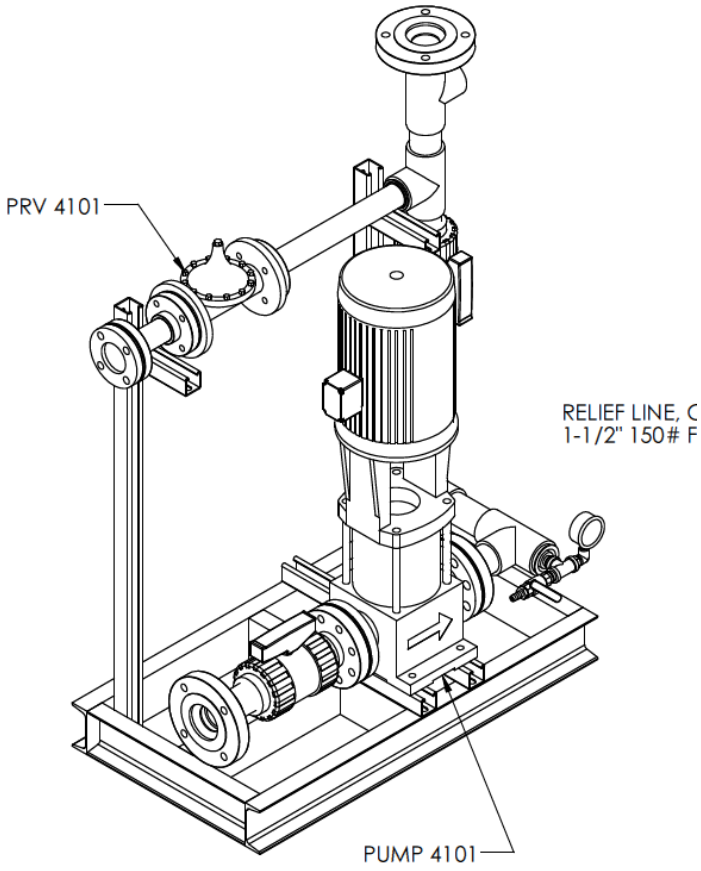
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3.3.2 Potable Water Distribution – P-4101

Single (1) potable water distribution pump skid with:

- Model Goulds 15SV3NG4E60
- Performance – 295 LPM (78 GPM) at 169 ft (73 PSIG)
- VFD provided by others
- Inlet and discharge isolation valves and check valve, sample port and pressure gauge
- Pressure relief valve PRV-4101 set at 100 PSIG
- Terminates with 3” flange and 1 ¼” FNPT connections to be plumbed to hydropneumatic tank by others



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4.0 Plant Installation, Inspection, and Testing

4.1 Plant Initial Installation



WARNING: The installer must ensure that the installation site is safe from hazards. These could include excavations left open overnight, debris left lying around, and tanks & equipment not properly blocked. Provisions must be made to eliminate the potential hazards by roping off and proper shoring around the excavations, cleaning up at the end of each workday, and proper storage of equipment. Failure to do so could result in severe injury or death.

4.2 Installation and Commissioning Checklists

Complete the commissioning checklists that are in Appendix C.

4.3 System Electrical Specifications

Verify site power per system design criteria.

ELECTRICAL SPECIFICATIONS	
VOLTAGE	600VY 3 WIRE
PHASE	3
FREQUENCY	60Hz
FULL LOAD AMPS	15
MAIN DISCONNECT SIZE	30
MAIN OVERCURRENT PROTECTION RATING	30
SCCR SYMMETRICAL (kAMPS)	10
SYSTEM APPROVAL AND CLASSIFICATION	cMETus GP
PANEL APPROVAL AND CLASSIFICATION	cMET GP TO C22.2 NO. 14
ELECTRICAL INSTALL SPECIFICATIONS	PVC CONDUIT IN BLD-8000
WIRE SPECIFICATIONS	USE CANADIAN COLOURS

Please refer to the as-built electrical drawings in Appendix A of this manual.

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	**Only trained and certified electricians should make the electrical connections.**

The electrical power connections into the system control panel from your main power supply must be installed by a qualified electrician and meet your local or state electrical codes. Verify that the correct electrical voltage, hertz and phase power is available at your site as per the system electrical drawings in Appendix A of this manual.

4.4 Safety

- Ensure availability of on-site emergency eyewash station and personal protection equipment.

4.5 Pipe Flushing, Hydrotesting, and Sanitization

4.5.1 Tank Flush

Inspect the interiors of all liquid storage tanks. If dirt or other material is present, use clean water to rinse out the tanks.

Immediately replace the tank covers to keep out dirt. Keep the tank covers in place except when mixing the chemicals.

4.5.2 Pressure Testing

When all equipment and components have been installed, the system must be pressure tested with water. Note: All piping was pressure tested in the factory prior to shipping. However, after pressure testing and before shipping some parts are loosened to avoid breakage during transport.

When site interconnecting piping is completed, it is necessary to retest the piping prior to operation. Any leaks must be repaired and the leak test repeated before the system is placed in operation. Study the following guidelines before performing the pressure test.

Warning: 

Mechanical failure during pressure testing can result in serious injury to workers. Do not exceed the pressure rating of components when performing pressure tests.
Wear eye and face protection when performing pressure tests.

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4.5.2.1 General Pressure Test Guidelines

- Be sure that the piping and vessels to be tested are filled with water. This minimizes the possibility of injuries should a mechanical failure occur during the pressure testing.

Warning: 

Do not pressure test vessels with compressed air. If a mechanical failure occurs while the system is pressurized with air, the released air can propel fragments of metal or plastic, resulting in personnel injury.

Pipes that will carry concentrated chemicals should be pressure tested with low-pressure air.

- Do not pressurize vessels and piping over the maximum design pressure.
- During the pressure testing, stand away from vessel windows, inline sight glasses, glass-tube flow meters, and plastic piping. These are the components that are most likely to fail during pressure testing.
- Relieve all pressure from the system before attempting to repair any leaks.

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5.0 WATER TREATMENT SYSTEM (WTS) OPERATION

This system does not contain a control panel, HMI or PLC. Controls wiring in this sstem is terminated in junction boxes for connection to control system by others. For a complete list of Inputs and outputs see the control Narrative in Appendix G

5.1 System Utilities

5.1.1 Inputs

Description	Input Type	Notes
Temperature Switch High	Direct	Wired to a Junction Box for Connection to Existing System
Temperature Switch Low Low	Discrete N.O.	Wired to a Junction Box for Connection to Existing System

5.1.2 Setpoints

None

5.1.3 Outputs

Description	Control Logic
Building Fan	The building fan will turn on when the building temperature exceeds the manual setpoint of TSH-8001. The building fan will turn off when the building temperature falls below the manual setpoint of TSH-8001.
Building Heater	The building heater will turn on when the building temperature falls below the manual setpoint of its integral thermostat. The building heater) will turn off when the building temperature exceeds the manual setpoint of its integral thermostat.
Building Heater	The building heater will turn on when the building temperature falls below the manual setpoint of its integral thermostat. The building heater) will turn off when the building temperature exceeds the manual setpoint of its integral thermostat.

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6.0 SYSTEM MAINTENANCE

6.1 General



MAINTENANCE SHOULD ONLY BE PERFORMED BY TRAINED PERSONNEL!
Always wear protective clothing, e.g. waterproof, protective gear, boots, and gloves to keep these materials from body. Wear face and eye protection as required by health & safety protocols and standards, especially when handling chemicals.



Perform proper lock-out/tag-out procedures, including shutting off all electrical power, before working on mechanical or electrical equipment.

The system should be routinely checked for signs of operational problems as part of the daily operation of the plant. Additionally, preventative maintenance checks should be performed as discussed in this section.

6.2 Schedule for Routine Maintenance

To ensure safe and effective system operations, the following maintenance actions must be taken in order to validate the system warranty (see Section 11) and assist newterra in any trouble shooting.

Item	Daily	Weekly	Monthly	Quarterly	Yearly	Comments
Inspect and maintain valves & fittings for leaks		X				Repair as necessary
Inspect piping and valves for leaks		X				Repair as necessary
Check for leaks		X				Repair as necessary

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<table>
<tr><th>Item</th><th>Daily</th><th>Weekly</th><th>Monthly</th><th>Quarterly</th><th>Yearly</th><th>Comments</th></tr>
<tr><td>P-4101 Potable Water Dist Pump

-Check that the pump meets the required performance and is
operating smoothly and quietly.
-Check that there are no leaks, particularly at the shaft seal.
-Check that the motor is not overheating.
-Remove and clean all strainers or filters in the system.
-Check that the tripping function of the motor overload protection works.
-Check the operation of all controls
-If the pump is not operated for unusually long periods, maintain the pump in accordance with these instructions. In addition, if the pump is not drained, the pump shaft should be manually rotated or run for short periods of time at monthly intervals.</td><td></td><td></td><td>X</td><td></td><td></td><td>In accordance with vendor manual in Appendix E.</td></tr>
<tr><td>MOTOR LUBRICATION
Recommended Motor Bearing Lubrication Intervals
<table><tr><th>Interval</th><th>Service Environment</th></tr><tr><td>1 - 2 Years</td><td>Light Duty in Clean Atmosphere</td></tr><tr><td>1 Year</td><td>8 - 16 hours/day - Clean, Dry Atmosphere</td></tr><tr><td>6 Months</td><td>12 - 24 hours/day - Moisture Present</td></tr><tr><td>3 Months</td><td>12 - 24 hours/day - Dirty, High Moisture</td></tr></table></td><td></td><td></td><td></td><td></td><td>0.5</td><td>Recommended 6 months based on pump manufacturer chart – See Appendix E</td></tr>
<tr><td>Mechanical Seal Replacement</td><td></td><td></td><td></td><td></td><td></td><td>As required – See Appendix E</td></tr>
</table>

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6.3 Maintenance General Procedures

Operators and maintenance technicians should pay specific attention to periodic maintenance of the treatment plant components.

6.3.1 General Guidelines

6.3.1.1 Piping

The main piping used in the unit vessels may be made of steel, rigid PVC, or stainless steel pipe. Any flanges used may require periodic tightening to prevent leaks.

If the unit is operated within the temperature and pressure limitations given in this manual, little or no piping maintenance will be required.

6.3.1.3 Hand Valves

All hand valves should be operated through their full range occasionally, to be certain that they are fully operational and do not leak.

Hand valves should be lubricated during scheduled maintenance if lube points are provided by the manufacturer.

6.3.1.4 Check Valves

Any check valves used in the unit should be inspected to be sure they are free of debris and are functioning properly.

Caution: Incorrectly installed check valves will not operate properly and can create an unsafe condition for personnel & equipment.



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6.3.1.5 Leak Checking

Operators should be alert for leaking components.

Caution: A small amount of leakage through some pump shaft seals is normal and required for cooling & lubrication. Do not tighten these packing nuts in an attempt to stop leakage.

6.3.1.6 Pumps

- Safety guards and shields must be maintenance as necessary.
- Pumps should be flushed thoroughly with an approved solution before storage or before start-up after repairs have been made. Consult vendor literature found in Appendix E..

6.3.2 Avoiding Mechanical Problems

6.3.2.1 System Components

Always operate equipment within the ranges specified by the manufacturer's service literature.

6.3.2.2 Pumps

Do not allow pumps to run dry. Be sure shut-off controls are functioning properly. If the pump uses seal water, ensure that drain lines are not restricted. Adjust valve closing and pump start / stop mode to avoid water surge against the pump. Install pulsation dampers where required.

6.3.2.3 Instruments

Inspect pipe bracing to and tighten any loose fasteners to avoid vibration damage. Keep instruments as dust-free as possible.

6.3.2.4 Pressure Drops

Monitor pressures at individual vessels to detect problems such as a plugged filter.

6.3.2.5 Threaded Fittings

Correct torque specifications must be used. Under tightening will result in leaks and over-tightening can cause cracks, stripped threads, warped parts, all resulting in leaks and increased downtime.

Caution: Equipment requiring service that is out of normal reach requires the use safe, approved ladders, scaffolding, or lifting devices.

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6.3.3 Electrical Equipment & Instrument Maintenance

6.3.3.1 Contact Switches

Check externally mounted switches periodically for corrosion, debris, and loose or frayed wires. Switches that are used to initiate step, mode, or alarms should be periodically checked for calibration.

> **NOTE:** Operators and technicians should read and follow additional instructions and procedures given in the vendor component literature found in Section 10 - Cut Sheets & Vendor Manuals.

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7.0 TROUBLESHOOTING

7.1 Overview

This section describes some of the common problems that can occur during operation of the system and suggests remedies for operation and maintenance personnel to consider.

In order for operation and maintenance personnel to understand how to address system problems, is necessary to have full knowledge of normal system operation. It is recommended that all other sections of this manual be studied prior to using this section.

7.2 General Troubleshooting Tips

Selected sampling and testing procedures should be performed regularly during the operation of the system. While the actual frequency of sampling and testing is at the discretion of the customer, any tests used with this system must be performed on a regular basis and must be accurately recorded in a log book *(refer to – Sampling and Testing in this section).*

A well-kept log of test dates and results along with operator observations is an invaluable tool for troubleshooting performance problems.

> **CAUTION:** *When a symptom occurs, investigate carefully to be sure a problem really exists. An inaccurate instrument, a temporary change in feed quality, pressure, or flow can present a symptom, not a real problem.*

Some simple physical conditions that will present a symptom or problem:

- A closed hand valve
- Power off at a control panel
- Power off at a pump panel
- Wires cut or disconnected
- Equipment damage
- Low air pressure to valves and solenoids
- Valve solenoids manually overridden
- Incorrect control set-points at the process controller

To troubleshoot flow blockage, locate any large pressure drop and investigate all equipment in that area until the source of the blockage is found. To troubleshoot electrical problems, first identify and trace the control flow pattern, which is the pathway that the signal takes from an input device to the controller, through the controller, and from the controller to the output device.

When the problem is not obvious, start with the easiest and most probable components, and work toward the least probable.

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7.3 P-0801/2

TROUBLESHOOTING GUIDE

⚠WARNING Hazardous voltage

DISCONNECT AND LOCKOUT ELECTRICAL POWER BEFORE ATTEMPTING ANY MAINTENANCE. FAILURE TO DO SO CAN CAUSE SHOCK, BURNS OR DEATH.

SYMPTOM	PROBABLE CAUSE
MOTOR NOT RUNNING See Probable Cause – 1 through 5	1. Motor thermal protector tripped.
LITTLE OR NO LIQUID DELIVERED BY PUMP See Probable Cause – 6 through 12	2. Open circuit breaker or blown fuse.
POWER CONSUMPTION TOO HIGH See Probable Cause – 3, 12, 13, 15	3. Impellers binding.
EXCESSIVE NOISE AND VIBRATION See Probable Cause – 3, 6 - 8, 10, 12, 13, 16	4. Motor improperly wired.
	5. Defective motor.
	6. Pump is not primed, air or gases in liquid.
	7. Discharge, suction plugged or valve closed.
	8. Incorrect rotation (three phase only).
	9. Low voltage or phase loss.
	10. Impellers worn or plugged.
	11. System head too high.
	12. $NPSH_A$ too low – excessive suction lift or losses.
	13. Discharge head too low – excessive flow rate.
	14. Fluid viscosity, specific gravity too high.
	15. Worn bearing.
	16. Pump, motor or piping loose.

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8.0 SERVICE & SUPPORT

8.1 Commissioning and Start-up

Commissioning & start-up of the **newterra** System is the last step of the **newterra** project execution process. Experienced newterra engineers and technicians are available to conduct these procedures including system initial set up and primary start-up and providing all performance tests according to the pre-commissioning checklist.

Initial on-site training program is an important part of the commissioning service as well. During on-site training, a **newterra** technical representative will cover process monitoring, system operation, maintenance, and troubleshooting activities related to the **newterra** System.

8.2 Post commissioning Services

A comprehensive range of post commissioning services are available from **newterra** beyond system design and installation. Specific services include:

- Technical support (including after-hours emergency telephone support).
- Spare parts order and delivery.
- Training program.
- Plant optimization and upgrades.
- Telemetry control and monitoring.
- Assistance in preparing system performance reports (process data monitoring & analysis).
- Preventive maintenance cleaning (including membrane cleaning).
- System audits for reviewing the performance and efficiency of all subsystems.

8.3 Technical support

Technical support is available to assist in troubleshooting of **newterra** systems during normal working hours 8:30 am to 5:00 pm (Eastern Time Zone for **newterra** ltd.). Telephone service is available via **1.800.420.4056**.

Emergency 24/7 telephone technical support – This will be activated upon subscribing to **newterra's** 24/7 technical support service.
If a problem cannot be resolved through telephone or e-mail support, **newterra** technicians and engineers are available for site visits

8.4 Spare parts

newterra has spare parts to provide quick response to any critical system breakdown. Contact **newterra** parts department at **1.800.420.4056.**

All parts and components associated with **newterra** Systems are available from within service departments and manufacturing facilities of **newterra** ltd across Canada and abroad.

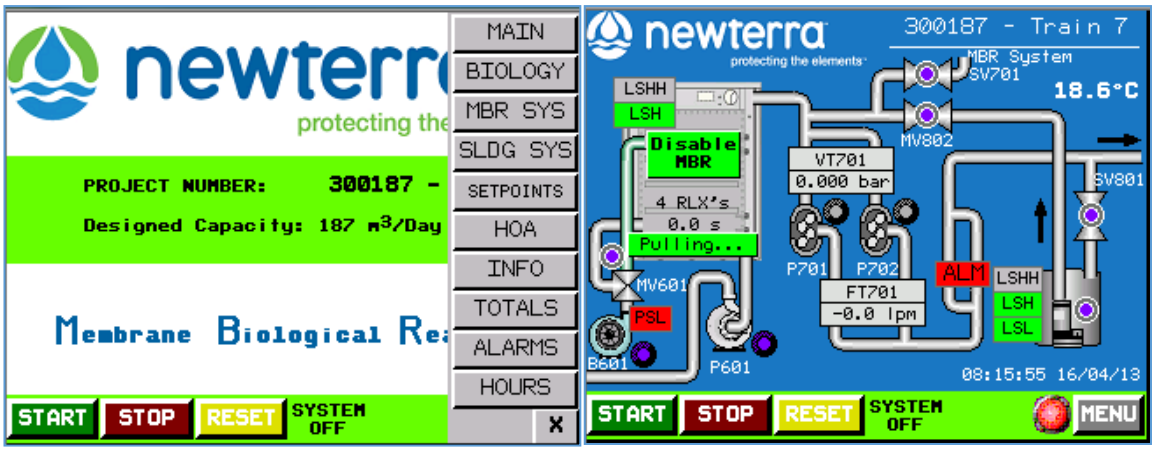
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Potentially required spare parts are:

- membrane modules
- parts for repair/replacement (valves, transmitters, switches, gauges, pH probes, pump motors, analyzers, PLC components, fuses, etc.);
- maintenance spare parts (air blowers, air filters, pumps, immersion heaters, chemical metering pumps, etc.).

8.5 Assistance in telemetry control and monitoring

newterra SITE-LINK is a customized software program and hardware configuration which provides a real-time link to a treatment system via cellular modem or customer supplied internet connection using our secure Site-Link Server.



newterra Site-Link comes with the following customizable features:

- Customized P&ID layout with system status
- Start/Stop/Reset of system
- Manual control of all system components
- Data logging downloads in .csv format†
- Daily system status reports (E-Monitor)
- Alarm history including current alarm status
- Hour meters for applicable equipment
- Customization of all system set points†
- Live and historical trending
- Immediate text & email on alarm (E-Alarm)

†certain restrictions apply

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The basic system requires that the customer provide a standard computer network cable to the control panel. If the customer's computer network is accessible to the internet, this system can also be monitored from any internet enabled computer. Static IP is not required but is recommended and must be provided by customer.

This system is not available if customer supplied internet connection or cellular service is not available at the site. During internet outages, reports cannot be sent and system status cannot be monitored remotely.

8.6 Site visits and system audits

Site visits and system audits can be arranged at an additional cost. Contact **newterra** for all financial aspects of **newterra** initial and post-commissioning services.

During a system audit, technical reviews of the performance of all **newterra** subsystems and the efficiency of the treatment process can be performed. Based on the site visit and agenda discussed with the client, we can assist in:

- Maintenance coordination and scheduling, including membrane maintenance and cleaning.
- Validation of chemical dosing settings.
- System inspection for the proper operation of the membrane system in accordance with the O&M manual; equipment calibration, process optimization and upgrades.
- Continued on-site operator training and coaching.

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9.0 WARRANTY

WARRANTY

This Warranty Agreement is between Newterra (known as **Newterra**) and customer (known as the **Buyer**).

General Warranty Statement

1. **Newterra** warranties those products of its manufacture against defective workmanship or material for a period of 12 months from startup or 18 months from the date of notice of readiness to ship, whichever comes first.
2. This warranty is expressly and strictly limited to replacing, without charge (see Warranty Exclusions), any part or parts which proven to **Newterra's** satisfaction upon examination, to have been defective in design, material or workmanship, and which have not been neglected, abused or misapplied, provided the **Buyer** gives **Newterra** immediate written notice upon discovery of any claimed defect.
3. During the warranty period, parts will be shipped as necessary with instructions to replace, which can be further elaborated over phone or email; visit(s) of our technician to site can be covered if there is a service agreement in place; otherwise, actual charges will be quoted to the owner at that time, if required.
4. **Newterra** will also warranty those component parts manufactured by others to the extent of the original manufacturer's warranty. In any case, specific components warranties will be extended a minimum of one year from date of notice of readiness to ship.
5. Membranes, if used, will be covered under separate warranty statement.
6. This warranty shall not be construed as a fitness of purpose warranty nor a performance warranty.

Warranty Exclusions

1. Warranty coverage does not include:
   - Freight, labor, travel, and living expenses associated with parts replacement
   - Normal maintenance items such as lubrication, fan belts, and cleaning of the equipment
   - Consumable items such as filters and reagents.
   - Replacement of items due to normal wear and tear
   - System parts damaged because of **Buyer** changes to the system and/or PLC program without the written consent of **Newterra**.
   - System electrical components or motors damaged by inconsistent power, voltage fluctuations and/or frequent power failures.
2. If the **Buyer**, or any contractor employed by the **Buyer**, contracts an outside company, other than **Newterra** for modification of system equipment, without knowledge of **Newterra**, the warranty coverage will be denied.
3. If the **Buyer**, or any installation contractor employed by the **Buyer**, contracts outside **Newterra** for installation work or erection of quoted equipment, the **Buyer** shall assume full responsibility for said contract.
4. The warranty shall not cover normally scheduled preventative maintenance or maintenance services listed in O&M Manual unless specifically contracted with **Newterra**.
5. If **Newterra's** Supplier assesses a part evaluation fee as part of their warranty claim assessment process, then the **Buyer** will be required to pay this fee. All parts must be returned to **Newterra**, transportation prepaid, unless other arrangements have been pre-approved by **Newterra**.

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Warranty Validation

1. **Newterra** requires that the system be commissioned by a **Newterra** factory trained technician unless specifically authorized by **Newterra**. **Newterra** authorization will be dependent on the qualifications of the **Buyer's** / contractor technicians.
2. Warranty validation is conditional upon timely receipt of:
    a. Signed Installation Checklist – by authorized **Buyer** representative, if not **Newterra**.
    b. As built Site drawings – by authorized **Buyer** representative, if not **Newterra**.
    c. Signed Pre-Commissioning Checklist – by authorized **Buyer**'s representative, if not **Newterra**.
    d. Signed Commissioning Checklist – by authorized **Buyer**'s representative, if not **Newterra**.
3. If the warranty validation requirements are not followed, **Newterra** reserves the right to deny warranty coverage.

Warranty Conditions

1. The system must be maintained and serviced in accordance with the schedule and procedures listed in the system O&M Manual. Failure to follow **Newterra's** recommendations may result in a denial of warranty coverage. **Newterra** reserves the right to review maintenance records as part of the warranty claim assessment process.

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APPENDIX A

Drawings and Bill of Materials

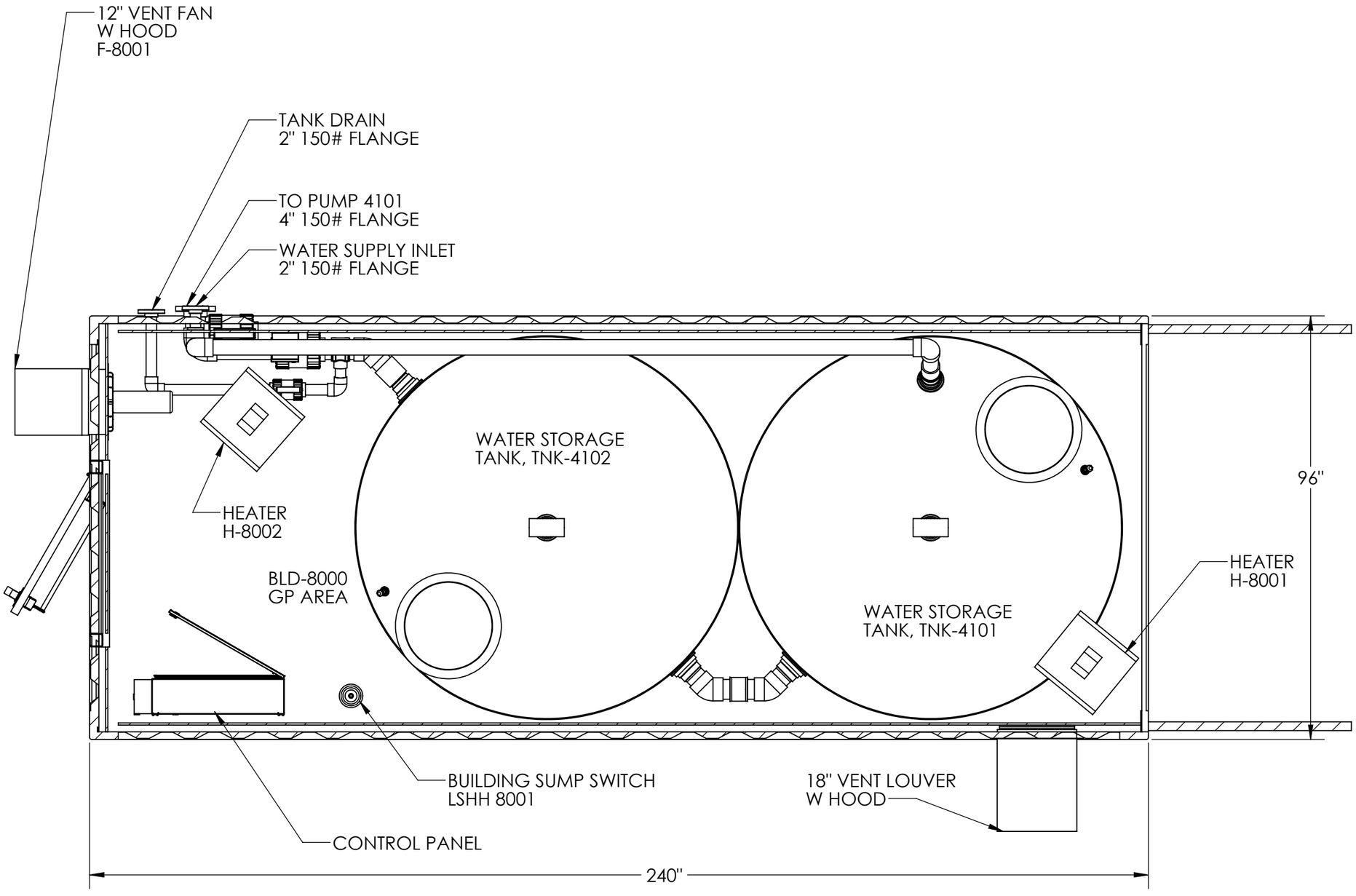
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Civil Construction Notes
- install sump at location indicated.
- provide wood lip around perimeter to allow sump switch to trip.
- install grating between building fans and outside louvers.
- spray foam thermal insulation on walls and ceiling.
- door colour to be the same as building, white

Mech/Elec. Construction Notes
- locate cooling thermostat in the warmest location at ceiling level.
- locate heating thermostat at floor level.
- plug and seal (with washers) any holes in the floor to contain water spills.
- maximum width for shipping is 102". this includes all connections that protrude through the sides of the enclosure.

Commissioning Notes
- fan and louver hoods need to be installed on site. cannot ship with hoods attached.
- buildings need to be shimmed on site to allow doors to open freely. please have shimming material ready during building installation.
- newterra recommends pad be at least 12" larger than enclosure in all directions. local codes may require alternate dimensions.

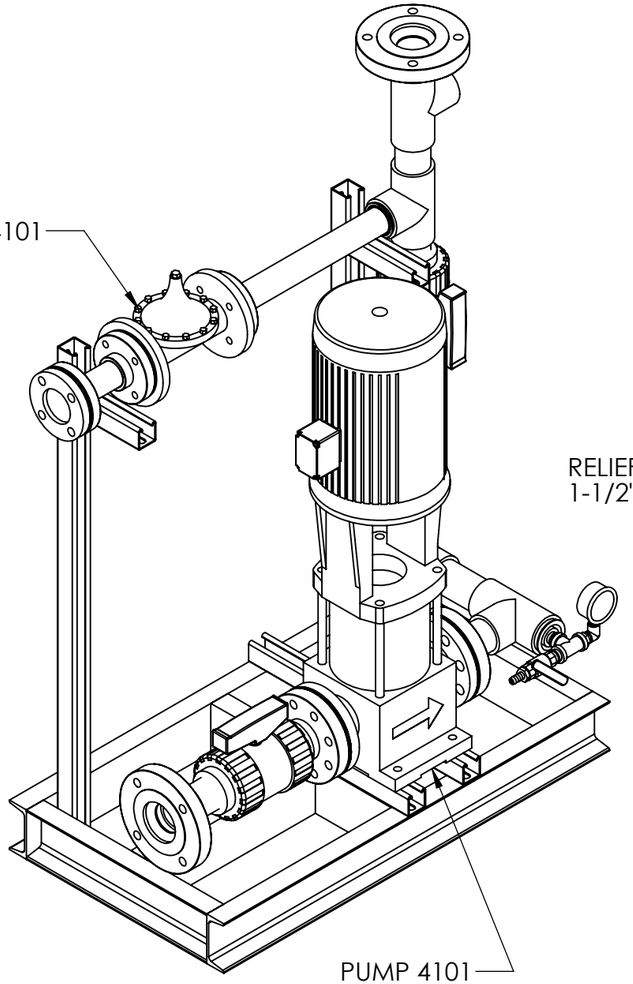
newterra standard system labels
- flow direction labels
- air line labels
- water line labels
- air/water line labels
- hot surface label (lines >= 140 degf)
- hearing protection labels
- warning label: this machine is automatically controlled
- arc flash warning label

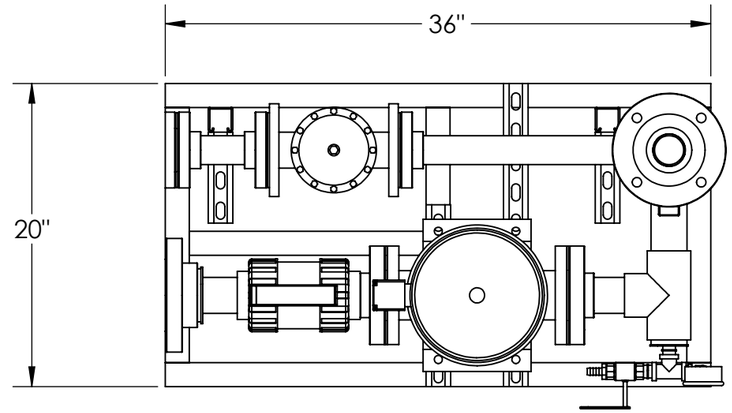


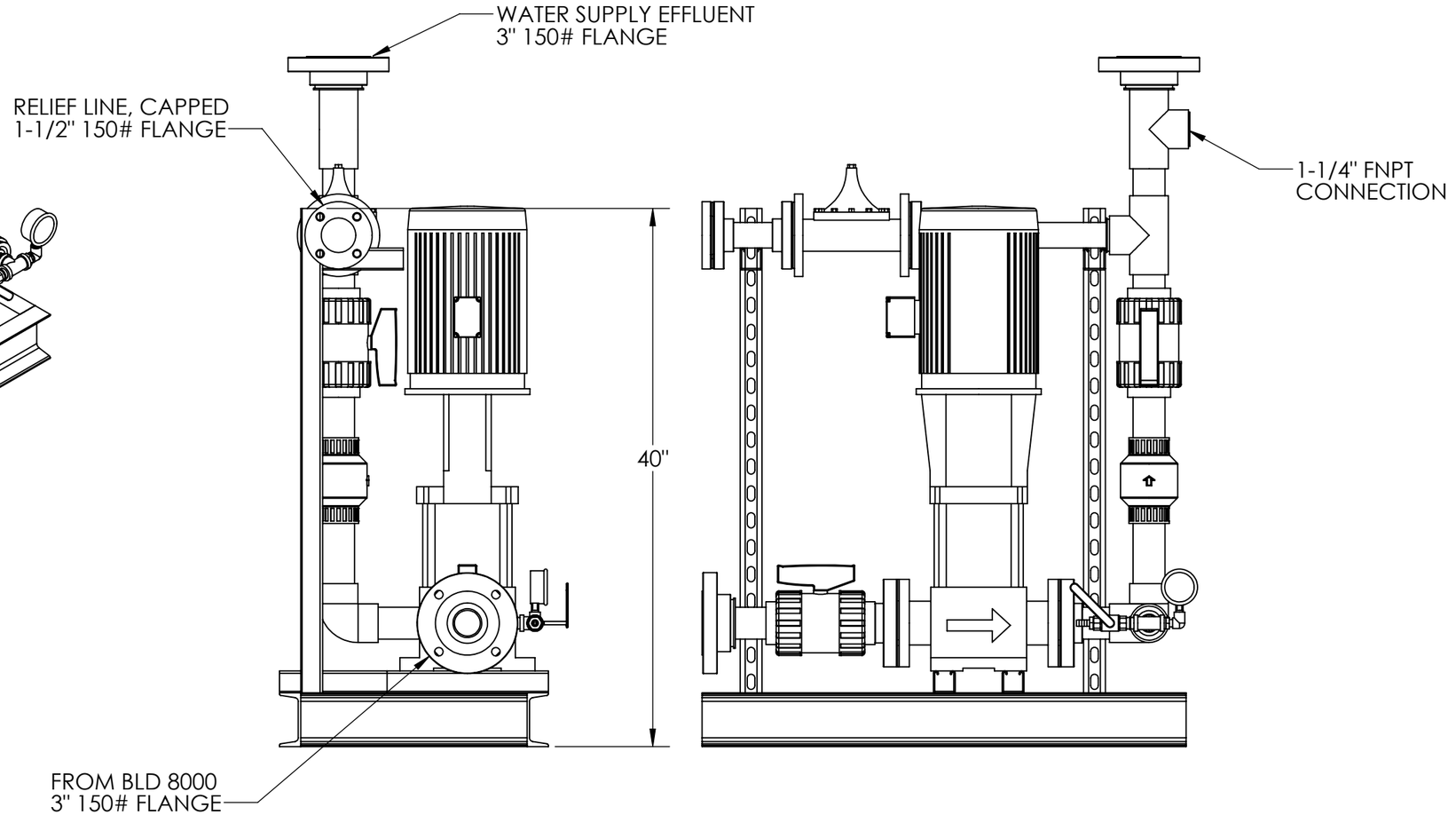
	GENERAL TOLERANCES .XX ± 1/8" .XXX ± 1/16" UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	STATUS: AS BUILT - FOR CONSTRUCTION				DRAWING TITLE: System Layout	DRAWING NUMBER: -
		LEVEL: C01	REVISED BY: JDE	REVISED ON: 10/6/20	APPROVED BY:	PROJECT TITLE: Agnico PWTP Expansion	PROJECT NUMBER: 2006348
		APPROVED ON:				CUSTOMER: Agnico Eagle Mines Limited	DRAWN BY: NM
							DATE: Apr 23, 2020
							SHEET 1 OF 2

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SKID 4101 GA







	GENERAL TOLERANCES .XX ± 1/8" .XXX ± 1/16" UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	STATUS: AS BUILT - FOR CONSTRUCTION				DRAWING TITLE: System Layout
		LEVEL: C01	REVISED BY: JDE	REVISED ON: 10/6/20	APPROVED BY:	APPROVED ON:
		THIS INFORMATION IS THE PROPERTY OF newterra AND CANNOT BE REUSED OR REPRODUCED WITHOUT WRITTEN CONSENT.				CUSTOMER: Agnico Eagle Mines Limited

DRAWING NUMBER: -
PROJECT TITLE: Agnico PWTP Expansion
PROJECT NUMBER: 2006348
DRAWN BY: NM
DATE: Apr 23, 2020

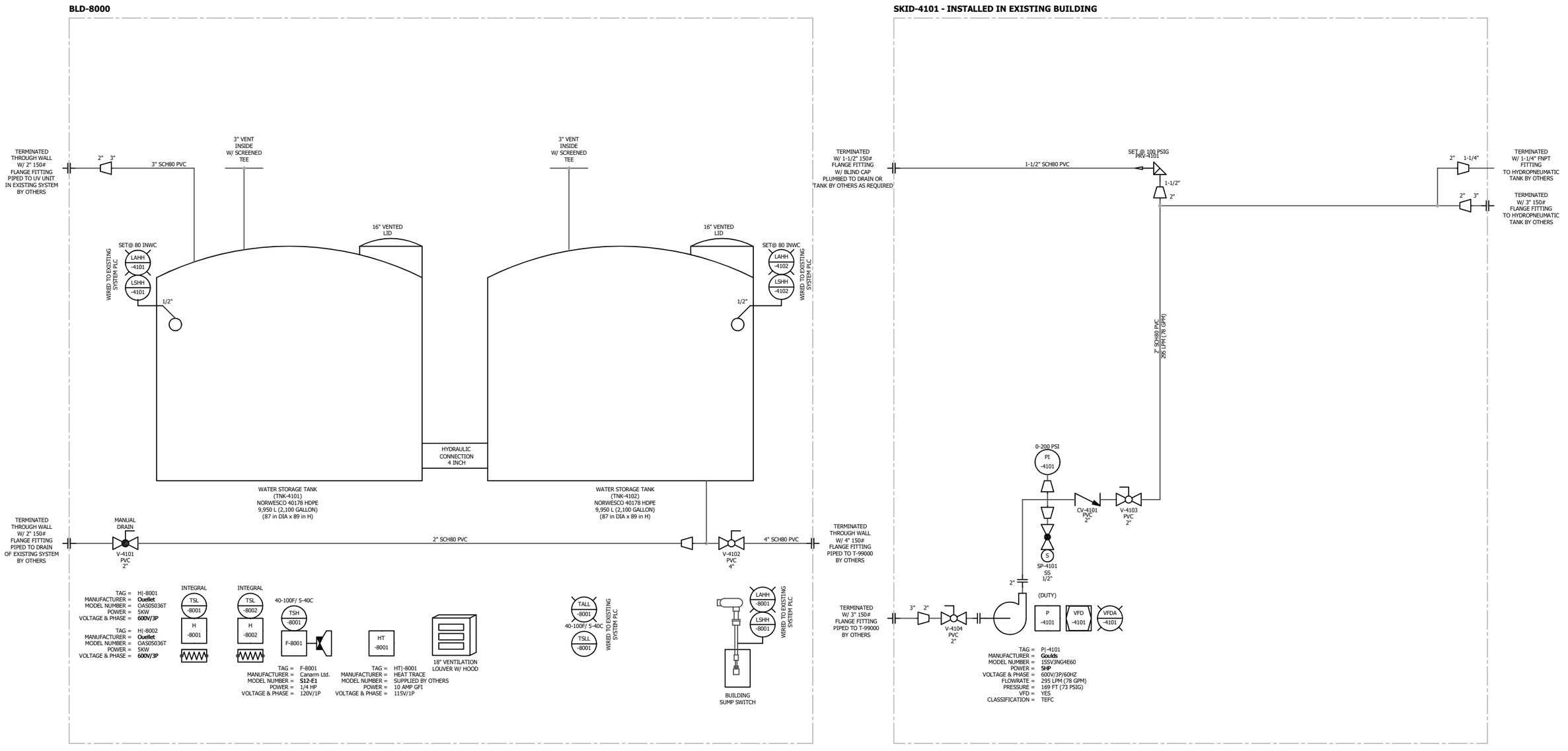
2006348

Water Treatment Plant Expansion
Agnico Eagle Mine Ltd.

newterra®

MECHANICAL DRAWING PACKAGE

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NOTES:
- Water flow meters: Install as per manufacturer's recommendations. Ensure that throttling valves are not in direct line of the meter.
- Materials of valves and piping is to be as specified on the diagram.
- There are no special piping requirements outside of newterra's standards unless specified on the diagram.
- Flexible hose is to be as specified on the diagram. If a flexible connection is preferred please consult Engineering to ensure selected hose is rated for the operating conditions.
- All female PVC threaded adaptors must be re-enforced female adaptors.
- No dissimilar metals are to be in direct contact on water lines. Follow ENG.WIN.014
- All gaskets to be used must be NSF61 approved and/or compliant where applicable.
- All materials of construction to be NSF61 approved and/or compliant where applicable.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C01	AS BUILT - FOR CONSTRUCTION	10/06/2020	jeaton
B01	FOR PRODUCTION	01/05/2020	jeaton
A02	REVISED PER CUSTOMER COMMENTS	30/04/2020	jeaton
A01	FOR APPROVAL	20/04/2020	jeaton

PROJ. NO: 2006348

TITLE AND LOCATION: PROCESS & INSTRUMENTATION DIAGRAM BLD-8000

CUSTOMER: Agnico Eagle Mine Ltd. Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	2	5

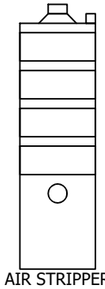
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VALVES AND PIPING

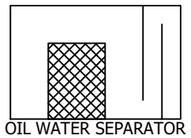
NO NC

- BALL VALVE -
- GATE VALVE -
- GLOBE VALVE -
- NEEDLE VALVE -
- SLIDE VALVE -
- SOLENOID VALVE -
- BUTTERFLY VALVE -
- SWING CHECK VALVE -
- WAFER CHECK VALVE -
- SPRING CHECK VALVE -
- WYE STRAINER -
- SAMPLE PORT -
- PRESSURE RELIEF VALVE -
- VACUUM RELIEF VALVE -
- CAMLOCK CONNECTION -
- FLEXIBLE CONNECTION -
- FLANGED CONNECTION -
- REDUCER -
- UNION -
- ADSORBENT FILTER - (A TWIST DRAIN, A AUTO DRAIN)
- COALESCING FILTER - (TWIST DRAIN, AUTO DRAIN)
- PARTICULATE FILTER - (TWIST DRAIN, AUTO DRAIN)
- FILTER, SILENCER -
- PRESSURE REGULATOR -
- REGULATOR W/ FILTER -

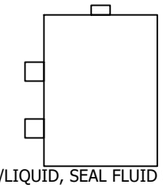
EQUIPEMENT



AIR STRIPPER



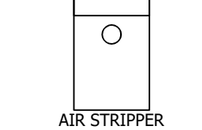
OIL WATER SEPARATOR



VAPOR/LIQUID, SEAL FLUID SEPARATOR

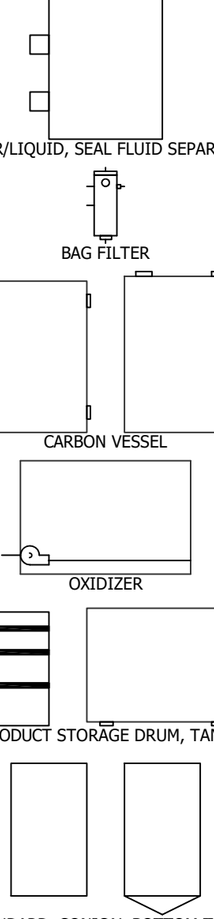
BAG FILTER

CARBON VESSEL



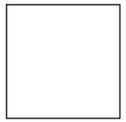
OXIDIZER

PRODUCT STORAGE DRUM, TANK

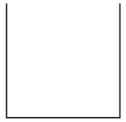


STANDARD, CONICAL BOTTOM TANK

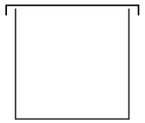
EQUIPEMENT



CLOSED TOP TANK



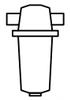
OPEN TOP TANK



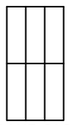
OPEN TOP TANK WITH LID



AIR DIFFUSER ASSEMBLY



STRAINER/FILTER



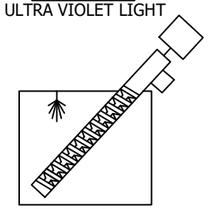
MEMBRANE CASSETTE



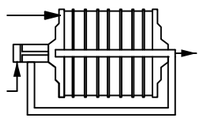
NO CLOG SPRAYER ASSEMBLY



ULTRA VIOLET LIGHT



ROTARY SCREEN



FILTER PRESS

EQUIPEMENT

- CENTRIFUGAL PUMP -
- PROGRESSIVE-CAVITY PUMP -
- CHEMICAL-INJECTION PUMP -
- CENTRIFUGAL, REGENERATIVE BLOWER -
- POSITIVE-DISPLACEMENT BLOWER -
- ROTARY-CLAW BLOWER -
- LINEAR BLOWER -
- LIQUID-RING PUMP -
- ROTARY-VANE COMPRESSOR -
- RECIPROCATING COMPRESSOR -
- PASSIVE COOLING FINS -
- HEAT EXCHANGER -
- EDUCTOR -
- MAGNETIC FLOWM METER - (M)
- AVERAGING PITOT TUBE - (H)
- VENTURI -
- ROTOMETER -
- WATER FLOW METER -

INSTRUMENTATION IDENTIFIERS

	FIRST LETTERS		SUCCEEDING LETTERS		
	MEASURED/INITIATING VARIABLE	VARIABLE MODIFIER	READOUT/PASSIVE FUNCTION	OUTPUT/ACTIVE FUNCTION	FUNCTION MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION				
C	CYCLE	CONTROL		CONTROL	CLOSE
D		DIFFERENCE, DIFFERENTIAL			DEVIATION
E	VOLTAGE		SENSOR, PRIMARY ELEMENT		
F	FLOW, FLOW RATE	RATIO			
G	GAS (LEL)		GLASS, GAUGE, VIEWING DEVICE		
H	HAND			HAND	HIGH
I	CURRENT		INDICATE		
J	POWER		SCAN		
K	TIME, SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MONITOR			MOTORIZED	MIDDLE, INTERMED
N					
O			ORIFICE, RESTRICTION		OPEN
P	PRESSURE		POINT(TESTCONNEC'N)	PNEUMATIC	
Q	QUANTITY	INTEGRATE, TOTALIZE	INTEGRATE TOTALIZE		
R	RADIATION		RECORD		RUN
S	SPEED, FREQUENCY	SAFETY		SWITCH, SOLENOID	STOP
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	
V	VIBRATION, MECHANICAL ANALYSIS, VACUUM			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL, PROBE		
X	UNCLASSIFIED	X-AXIS	ACCESSORY DEVICES, UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE, PRESENCE	Y-AXIS		AUXILIARY DEVICES	
Z	POSITION, DIMENSION	Z-AXIS, SAFETY INSTRUMENTED SYSTEM		DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

- INDICATING INSTRUMENT
- DIGITAL INPUT TO CONTROL PANEL
- DIGITAL INPUT CAUSING ALARM
- DIGITAL INPUT CAUSING SYSTEM SHUTDOWN ALARM
- ANALOG INPUT TO CONTROL PANEL
- ANALOG OUTPUT FROM CONTROL PANEL

AS - AIR STRIPPER
BLD - BUILDING, TRAILER, OR SKID
FLT - FILTER VELLEL
LPC - LIQUID-PHASE CARBON VESSEL
MFD - MANIFOLD
OWS - OIL/WATER SEPARATOR
OX - OXIDIZER
PST - PRODUCT STORAGE TANK
SOS - SEAL OIL SEPARATOR
SWS - SEAL WATER SEPARATOR
TNK - TANK
VLS - VAPOR/LIQUID SEPARATOR
VPC - VAPOR-PHASE CARBON VESSEL

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C01	AS BUILT - FOR CONSTRUCTION	10/06/2020	jeaton
B01	FOR PRODUCTION	01/05/2020	jeaton
A02	REVISED PER CUSTOMER COMMENTS	30/04/2020	jeaton
A01	FOR APPROVAL	20/04/2020	jeaton

PROJ. NO: 2006348

CUSTOMER: Agnico Eagle Mine Ltd. Water Treatment Plant Expansion

TITLE AND LOCATION: LEGEND

SCALE: NTS | SHEET: 3 | SHEETS: 5

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BLD-8000

Quantity	APES Number	Manufacturer	Part Number	Description	TAG
2	10515	Canarm Ltd.	CN TF115-001	Temperature, Switch, Thermostat, 40-100F/ 5-40C, Building Fans and Fan P...	TSH|-8001 , TSLL|-8001
1	12351	Almeg	ATB3-48B	Level, Switch, Vertical, 1/4" NPT	LSHH|-8001
1	23439	KPSI	750S14D4A004.334000.000B10015B	Pressure, Transmitter, 0-10ft H2O, 4-20mA, KPSI 750 series, intrinsically saf...	LT|-4101
2	26667	Ouellet	OAS05036T	Heater, Ouellet, 5KW, 600V, 3 Phase, Includes T-Stat	H|-8001 , H|-8002
2	35709	Almeg		Switch, Level, Almeg, SX-601, Side Mount, 1/2" NPT, Stainless	LSHH|-4101 , LSHH|-4102
1	37662	Afflu-O	K15-020VS	Valve, Manual, Ball, PVC, 2", True-Union, Soc Ends, c/w FPM [Viton] O-Rings...	V-4101
1	37664	Custom	K15-040VS	Valve, Manual, Ball, PVC, 4", True-Union, Soc Ends, c/w FPM [Viton] O-Rings...	V-4102
1	M1072	Canarm Ltd.	S12-E1	Fan, Building, 12", 1/4hp, 1750rpm, 120V, 1ph, TEAO, S12-E1	F-8001

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PROJ. NO: 2006348

TITLE AND LOCATION: BILL OF MATERIAL - PAGE 1/1

CUSTOMER: Agnico Eagle Mine Ltd. Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	4	5

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SKID-4101 - INSTALLED IN EXISTING BUILDING

Quantity	APES Number	Manufacturer	Part Number	Description	TAG
1	12868	Various		Valve, Manual, Check, Swing, PVC Body, 2", Clear, 1520-20C	CV-4101
1	14435	Pinacle Stainless Steel	14435	Valve, Manual, Ball, SS Body, Teflon Seal, 1/2"	SP-4101
1	27406	Indumart	P22T2-FG-200	Gauge, Pressure, 0-200 PSI, Bottom Mount, 2-1/2" Dial, SS Case, SS Interna...	PI|-4101
1	27811	IFM Efector	EVC002	Flow, Meter, Connector, 4 Wire Mirco DC connector, Cable 5m, 22AWG	PT|-4101
1	34883	Goulds		Pump, Centrifugal, Goulds, Misc.	P|-4101
1	36970	IFM Efector	PX3224	Pressure, Transmitter, 0-100 PSI, 4-20mA, No Display, 1/4" NPT Process Co...	PT|-4101
2	37662	Afflu-O	K15-020VS	Valve, Manual, Ball, PVC, 2", True-Union, Soc Ends, c/w FPM [Viton] O-Rings...	V-4103 , V-4104
1	39936	Endress + Hauser Ltd.	10D50-4LGA1RA0B5AA+M1	Flow, Meter, 2" Waffer, 4-20mA and Pulse Totalizer, 24VDC, Promag 10D50	FIT|-4101
1	43030	Cla-Val	50-01-1.5	Valve, Pressure Sustaining, Cla-Val 50-01, 1.5", DI Body, Globe Style, Epo...	PRV-4101

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A01	FOR APPROVAL	20/04/2020	jeaton

PROJ. NO: 2006348

TITLE AND LOCATION: BILL OF MATERIAL - PAGE 1/1

CUSTOMER: Agnico Eagle Mine Ltd. Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	5	5

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2006348

Water Treatment Plant Expansion
Agnico Eagle Mine Ltd.

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ELECTRICAL DRAWING PACKAGE

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ELEC-All Electrical Drawings

Page #	Location	Description 1	Description 2
1	.	ELECTRICAL TITLE PAGE	
2	.	DRAWING LIST	
3	.	SPECIFICATIONS	
4	.	ELECTRICAL LEGEND	
5	.	SINGLE LINE DIAGRAM	
6	MPP	600V & 120V POWER DISTRIBUTION	
7	MPP	SPARE SHEET	
8	MPP	MPP PANEL LAYOUT	
9	BLD-8000	CONTROL WIRING	
10	JB-8000-DC	JB-8000-DC JUNCTION BOX LAYOUT	
11	.	MPP BILL OF MATERIALS	MODULE 8201
12	.	MPP BILL OF MATERIALS	MODULE 8201
13	.	JUNCTION BOX BILL OF MATERIALS	MODULE 8202
14	.	BLD ELEC BILL OF MATERIALS	MODULE 8900

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A01	FOR APPROVAL	22/04/2020	DMB

PROJ. NO: 2006348

TITLE AND LOCATION: DRAWING LIST

CUSTOMER: Agnico Eagle Mine Ltd. Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	2	14

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ELECTRICAL SPECIFICATIONS

VOLTAGE	600VY 3 WIRE
PHASE	3
FREQUENCY	60Hz
FULL LOAD AMPS	15
MAIN DISCONNECT SIZE	30
MAIN OVERCURRENT PROTECTION RATING	30
SCCR SYMMETRICAL (kAMPS)	10
SYSTEM APPROVAL AND CLASSIFICATION	cMETus GP
PANEL APPROVAL AND CLASSIFICATION	cMET GP TO C22.2 NO. 14
ELECTRICAL INSTALL SPECIFICATIONS	PVC CONDUIT IN BLD-8000
WIRE SPECIFICATIONS	USE CANADIAN COLOURS

NOTES:

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A01	FOR APPROVAL	22/04/2020	DMB

PROJ. NO: 2006348

TITLE AND LOCATION: SPECIFICATIONS

CUSTOMER: Agnico Eagle Mine Ltd. Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	3	14

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FLOW SWITCH, NORMALLY CLOSED

FLOW SWITCH, NORMALLY OPEN

FLOAT SWITCH, NORMALLY CLOSED

FLOAT SWITCH, NORMALLY OPEN

LIMIT SWITCH, NORMALLY CLOSED

LIMIT SWITCH, NORMALLY OPEN

PRESSURE SWITCH, CHANGE OVER CONTACTS

PRESSURE SWITCH, NORMALLY CLOSED OPENS ON PRESSURE INCREASE

PRESSURE SWITCH, NORMALLY OPEN CLOSES ON PRESSURE INCREASE

TEMPERATURE SWITCH, CHANGE OVER CONTACTS

TEMPERATURE SWITCH, NORMALLY CLOSED OPENS ON TEMPERATURE INCREASE

TEMPERATURE SWITCH, NORMALLY OPEN CLOSES ON TEMPERATURE INCREASE

METAL OXIDE VARISTOR
MOV

DIODE

TANDEM TERMINAL BLOCK

PANEL TERMINAL BLOCK

JUNCTION BOX TERMINAL BLOCK

CUSTOMER TERMINAL BLOCK

FUSED TERMINAL BLOCK

TOGGLE SWITCH, NORMALLY OPEN

TEMPERATURE SWITCH, NORMALLY OPEN
CLOSES ON TEMPERATURE INCREASE

PUSH BUTTON, NORMALLY CLOSED

PUSH BUTTON, NORMALLY OPEN

TEMPERATURE SWITCH, NORMALLY OPEN
CLOSES ON TEMPERATURE INCREASE

SELECTOR SWITCH, 2 POSITION
2 NORMALLY OPEN

H A

SELECTOR SWITCH, 3 POSITION
2 NORMALLY OPEN

X

PILOT LIGHT, PUSH-TO-TEST
X=COLOUR

X

PILOT LIGHT, X=COLOUR

A - AMBER
B - BLUE
G - GREEN
R - RED
W - WHITE

BEACON LIGHT
X=COLOR

CONTACT, NORMALLY CLOSED

CONTACT, NORMALLY OPEN

TIME DELAY CONTACT, INSTANTANEOUS OPEN
TIMED CLOSED ON DE-ENERGIZE

TIME DELAY CONTACT, INSTANTANEOUS CLOSE
TIMED OPEN ON DE-ENERGIZE

TIME DELAY CONTACT, INSTANTANEOUS OPEN
TIMED CLOSE ON ENERGIZE

TIME DELAY CONTACT, INSTANTANEOUS CLOSE
TIMED OPEN ON ENERGIZE

COIL - RELAY, CONTACTOR
TIMER, MOTOR STARTER

ANNUNCIATOR, HORN

ANNUNCIATOR, BUZZER

BATTERY

TRANSMITTER, 2 WIRE
LOOP POWERED

INTRINSICALLY SAFE BARRIERS

4 CHANNEL DISCRETE

IN1
IN2
IN3
IN4

2 CHANNEL ANALOG

IN1
IN2

AM

PANEL METER
AM=AMMETER
VM=VOLT METER

ETM

ELAPSED TIME METER

CURRENT TRANSFORMER

GROUND

INSTRUMENTATION GROUND

SOLENOID

CURRENT SWITCH

FUSED DISCONNECT
X=AMP RATING

FUSE, X=AMP RATING

CIRCUIT BREAKER
X=AMP RATING

COMBINATION STARTER
X-X AMP=CURRENT RANGE

CONTACTOR

DISTRIBUTION BLOCK

M

3 PHASE MOTOR

HTR

3 PHASE HEATER

RECEPTACLE, SINGLE OUTLET

RECEPTACLE, DUPLEX

HV
LV

TRANSFORMER
CONTROL POWER
(NOT REPRESENTATIVE OF ALL TYPES)

HV
LV

TRANSFORMER
DISTRIBUTION/LIGHTING
(NOT REPRESENTATIVE OF ALL TYPES)

DC POWER SUPPLY
(NOT REPRESENTATIVE OF ALL TYPES)
(NOT TO SCALE)

REACTOR

CR0917C

CROSS REFERENCE TABLE

Line Voltage
Motor

VARIABLE FREQUENCY DRIVE
(NOT REPRESENTATIVE
OF ALL TYPES)
(NOT TO SCALE)

GENERAL PURPOSE WIRING
INTERNAL TO PANEL

GENERAL PURPOSE WIRING
EXTERNAL TO PANEL

CL1 DIV2 WIRING
EXTERNAL TO PANEL

WIRING BY OTHERS
EXTERNAL TO PANEL

USA 3 PHASE
POWER WIRING COLOR CODE

480V	208/230V (HIGH LEG)
PHASE A - BROWN	PHASE A - BLACK
PHASE B - ORANGE	PHASE B - RED(ORG)
PHASE C - YELLOW	PHASE C - BLUE

CANADIAN 3 PHASE
POWER WIRING COLOUR CODE

PHASE A - RED
PHASE B - BLACK
PHASE C - BLUE

NOTES:

1) UNLESS OTHERWISE STATED, ALL WIRING EXTERNAL TO PANELS IS #12AWG.

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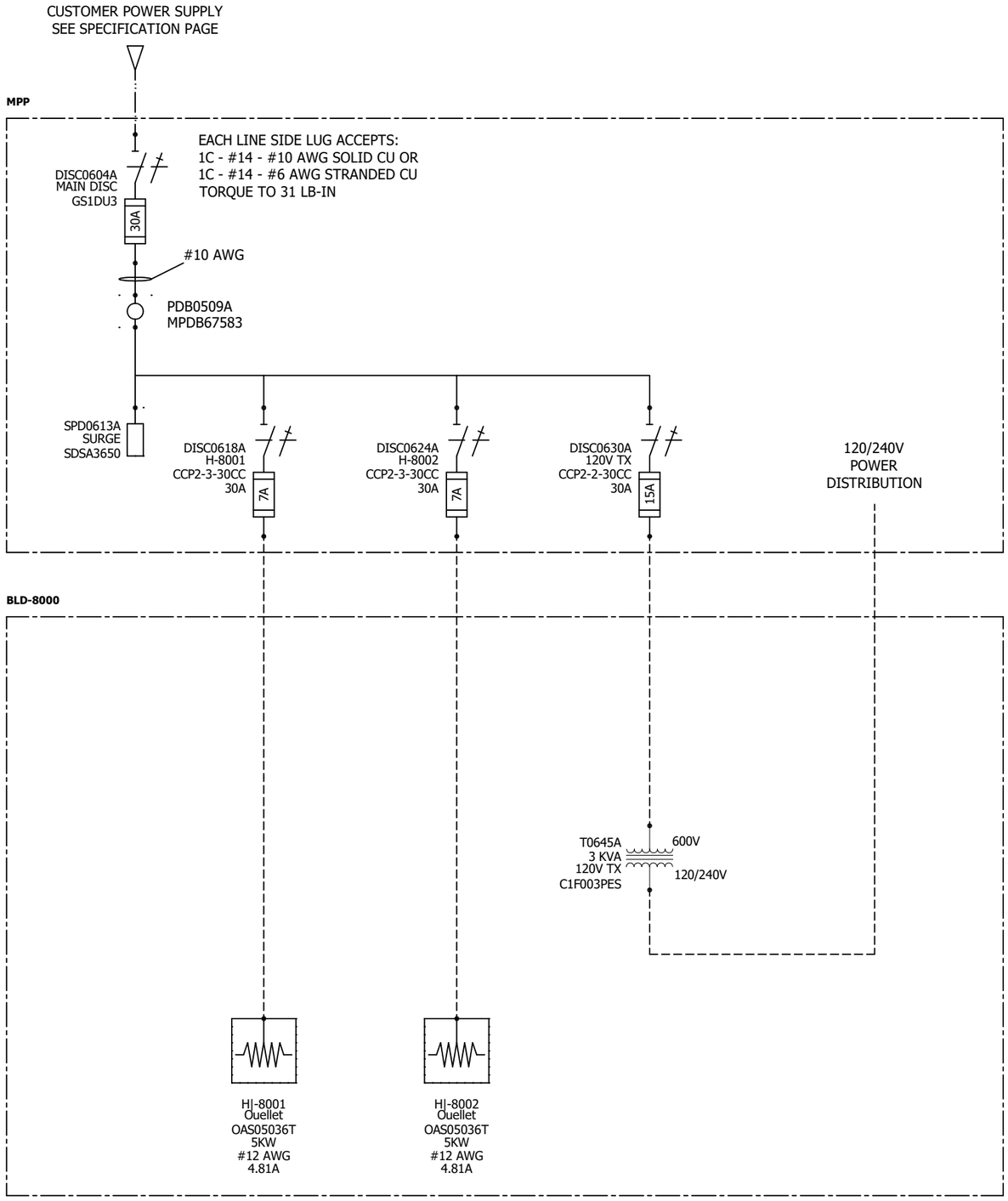
PROJ. NO: 2006348

TITLE AND LOCATION: ELECTRICAL LEGEND

CUSTOMER: Agnico Eagle Mine Ltd.
Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	4	14

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PROJ. NO: 2006348

TITLE AND LOCATION: SINGLE LINE DIAGRAM

.

CUSTOMER: Agnico Eagle Mine Ltd. Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	5	14

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CUSTOMER POWER SUPPLY
SEE SPECIFICATION PAGE

EACH LINE SIDE LUG ACCEPTS:
1C - #14 - #10 AWG SOLID CU OR
1C - #14 - #6 AWG STRANDED CU
TORQUE TO 31 LB-IN

DISC0604A
MAIN DISC
GS1DU3
30A 30A 30A

#10 AWG

PDB0509A
MPDB67583

0609A L1
0609B L2
0609C L3
SPD0613A
SDSA3650

BLD-8000

DISC0618A
H-8001
30A
CCP2-3-30CC

0609A → 7A → 0618A
0609B → 7A → 0619A
0609C → 7A → 0620A

HTR
HI-8001
#12 AWG
4.81A
5KW
OAS05036T
Ouellet

DISC0624A
H-8002
30A
CCP2-3-30CC

0609A → 7A → 0624A
0609B → 7A → 0625A
0609C → 7A → 0626A

HTR
HI-8002
#12 AWG
4.81A
5KW
OAS05036T
Ouellet

DISC0630A
120V TX
30A
CCP2-2-30CC

15A → 0630A
15A → 0631A

0643B
0643B

BLD-8000

0632A 0632A
0630A 0631A
H1 H2
T0645A
120V TX
C1F003PES
HV LV
600V
3 KVA
120/240V
X1 X3 X2 X4

AC N
0648N

CB0651A
120V TX
0827A T1 L1 0648A
0828A T2 20A L2 0648B
M9F42220

0655N

CB0657A
GFI
AC 0828A
L1 15A T1
M9F42115
0657A

REC0657A
GFI
L N
GFNT1-W

0659N

CB0661A
HT-8001
AC 0827A
L1 15A T1
M9F42115
0661A

REC0661A
HT-8001
L N
GFNT1-W

0827A
0828A

0665N

AC N

CB0667A
LIGHTS
L1 15A T1
M9F42115
0667A

SW0667A
SW-8001
CS115
0667B

L0667A
L-8001
L N
FW4-LED40-B-4K-DIM

L0670A
L-8002
L N
FW4-LED40-B-4K-DIM

CB0672A
F-8001
L1 15A T1
M9F42115
0672A

TSH|-8001
CN TF115-001
0672B

0673N

M
T1 T2
F-8001
Canarm Ltd.
#12 AWG
2.7A
1/4 HP
S12-E1

0673N

CONTROL WIRING LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

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PROJ. NO: 2006348

TITLE AND LOCATION:
600V & 120V POWER DISTRIBUTION
MPP

CUSTOMER:
Agnico Eagle Mine Ltd.
Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	6	14

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INTENTIONALLY BLANK

INTENTIONALLY BLANK

CONTROL WIRING LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

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PROJ. NO: 2006348

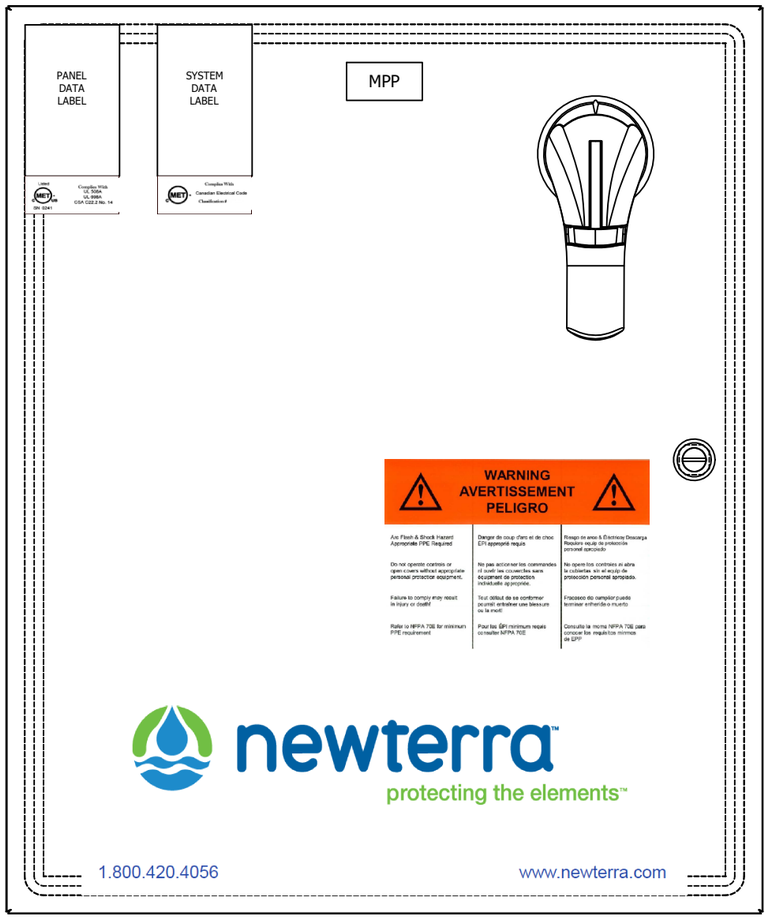
TITLE AND LOCATION:
SPARE SHEET

MPP

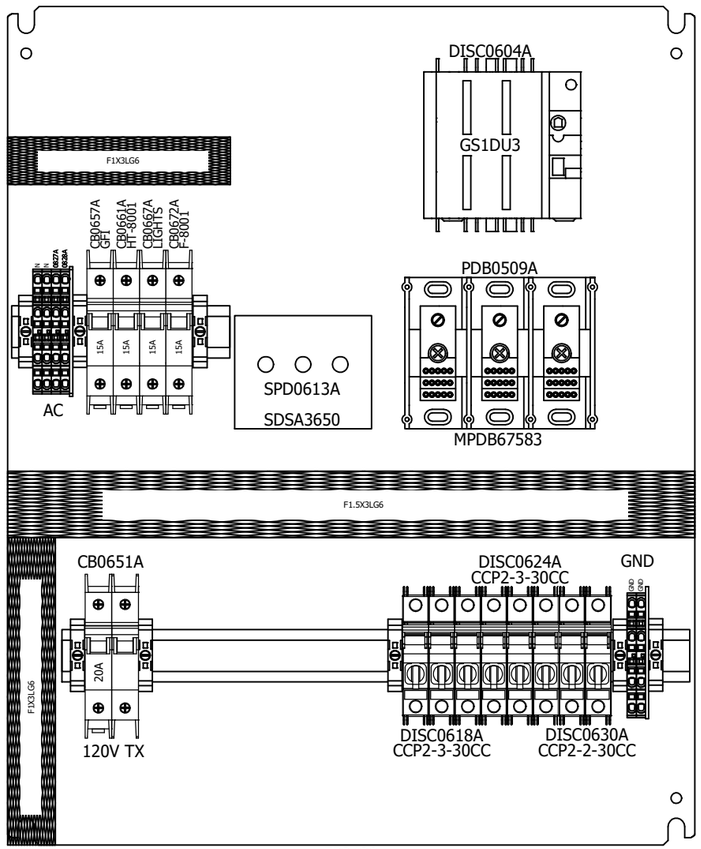
CUSTOMER:
Agnico Eagle Mine Ltd.
Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	7	14

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EP2420

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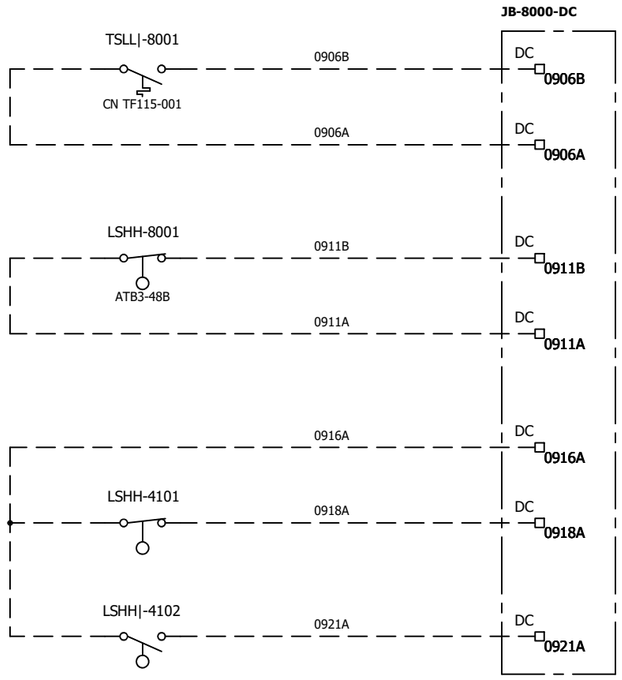
TITLE AND LOCATION: MPP PANEL LAYOUT

MPP

CUSTOMER: Agnico Eagle Mine Ltd. Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
1 : 4	8	14

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INTENTIONALLY BLANK

CONTROL WIRING LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

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C01	AS BUILT	08/06/2020	DMB
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A03	FOR RE-SUBMITTAL	30/04/2020	DMB
A02	FOR REVIEW	24/04/2020	DMB
A01	FOR APPROVAL	22/04/2020	DMB

PROJ. NO: 2006348

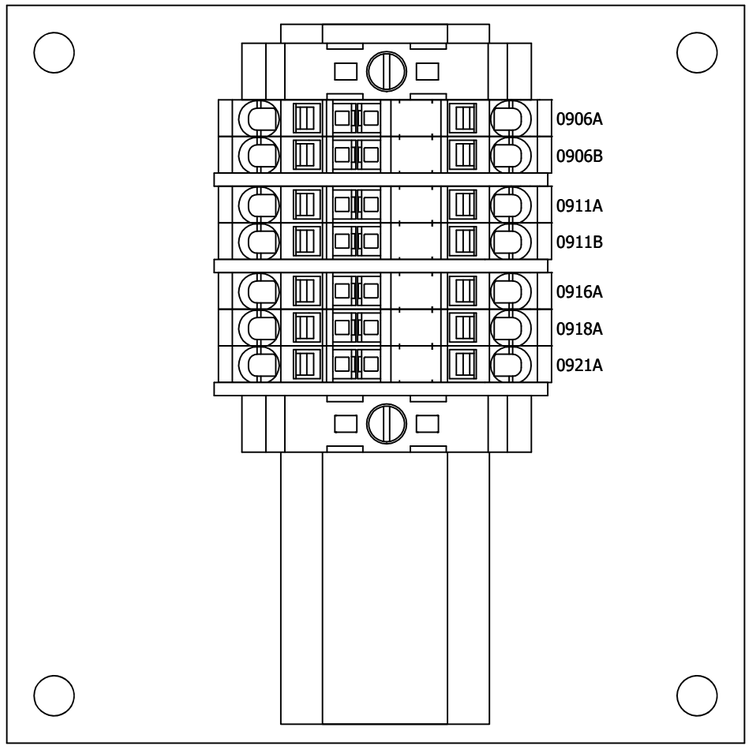
TITLE AND LOCATION: CONTROL WIRING

BLD-8000

CUSTOMER: Agnico Eagle Mine Ltd. Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	9	14

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EJ664

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A01	FOR APPROVAL	22/04/2020	DMB

PROJ. NO: 2006348

TITLE AND LOCATION:
JB-8000-DC JUNCTION BOX LAYOUT

JB-8000-DC

CUSTOMER:
Agnico Eagle Mine Ltd.
Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
1 : 1	10	14

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MPP

Quantity	APES Number	Manufacturer	Part Number	Description	TAG
2	19168	Phoenix Contact	801733	Galvinized Steel mounting rail; 35x7,5 mm, 1 mm thick; perforated	MPP
1	20698	Intermatic	AG1BRKT	Surge Protector, Mounting Bracket	SPD0613A
1	22890	Schneider Electric	SDSA3650	Surge Protector, 3PH, 600Y/347V, MAX 40kA Surge Suppression	SPD0613A
8	23745	Phoenix Contact	800886	End Bracket - DIN Rail	
1	26727	MERSEN	MPDB67583	Power Block, 175A 1Pri 8Sec Aluminum, 2/0-#14Pri #2-14Sec	PDB0509A
3	26741	MERSEN	MPDBC6667	Power Block, safety cover, Intermediate	PDB0509A
1	27396	Panduit	F1.5X3LG6	Wire Duct, 1.5"x3", Grey, Narrow Finger	MPP
1	27397	Panduit	C1.5LG6	Wire Duct Cover, 1.5", Grey	MPP
2	27400	Panduit	F1X3LG6	Wire Duct, 1"x3", Grey, Narrow Finger	MPP
2	27402	Panduit	C1LG6	Wire Duct Cover, 1", Grey	MPP
1	27716	Schneider Electric	GS2AH120	Disconnect Handle, Red/Yellow, NEMA 1, 3R, 12	DISC0604A
1	28338	Schneider Electric	GS1DU3	Internal Fusible switch, 30A, Class J	DISC0604A
1	28459	Schneider Electric	GS2AE8	Shaft for Rotary Thru Door Handle (30A)	DISC0604A
1	33799	Phoenix Contact	3030462	End Plate - Double Feed Thru	
1	37557	Hammond Mfg	2QPL	Panel, Enclosure, Door Hardware, Padlockable Quarter Turn Latch	MPP
1	37558	Hammond Mfg	EZPMFHD	Panel, Enclosure Mounting Feet, Set of 4, Zinc	MPP
4	38157	Schneider Electric	M9F42115	Breaker, 480/277V 15 AMP 1P C Trip Curve, 10k SCCR	CB0657A , CB0661A , CB0667A , CB0672A
1	38129	Schneider Electric	M9F42220	Breaker, 480/277V 20 AMP 2P C Trip Curve, 10k SCCR	CB0651A
1	38905	Hammond Mfg	EN4SD24208GY	24" x 20" x 8" NEMA4 Enclosure	MPP
1	38906	Hammond Mfg	EP2420	Panel, Backplate, 24" x 20"	MPP
4	40229	Phoenix Contact	3031445	Terminal, 4 Prong, 28-10AWG, 32A, 600V, GREY	AC(4)
1	40231	Phoenix Contact	3030527	Terminal, QUATTRO, End cover	
2	40765	Cooper Bussman	CCP2-3-30CC	Compact Circuit Protector, 3HP@240V, 5HP@480V, 7.5HP@ 600V, ClassCC Fuse	DISC0618A , DISC0624A

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PROJ. NO: 2006348

TITLE AND LOCATION: MPP BILL OF MATERIALS MODULE 8201

CUSTOMER: Agnico Eagle Mine Ltd. Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	11	14

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-> MPP

Quantity	APES Number	Manufacturer	Part Number	Description	TAG
1	40768	Cooper Bussman	CCP2-2-30CC	Compact Circuit Protector,2 POLE 30A, 600V, ClassCC Fuse	DISC0630A
2	42231	Phoenix Contact	3036039	Terminal, 4 Prong, Ground, 28-10AWG, 30A, 600V, Green	GND(2)
2	E1107	Mersen	ATDR15	Fuse, 15A 600V Time Delay	DISC0630A
6	E1125	Mersen	ATDR7	Fuse, 7A 600V Time Delay	DISC0618A , DISC0624A
3	E1157	Mersen	AJT30	Fuse, 30A 600V Time Delay	DISC0604A

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A01	FOR APPROVAL	22/04/2020	DMB

PROJ. NO: 2006348

TITLE AND LOCATION:
MPP BILL OF MATERIALS
MODULE 8201

CUSTOMER:
Agnico Eagle Mine Ltd.
Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	12	14

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JB-8000-DC

Quantity	APES Number	Manufacturer	Part Number	Description	TAG
1	19168	Phoenix Contact	801733	Galvinized Steel mounting rail; 35x7,5 mm, 1 mm thick; perforated	JB-8000-DC
7	23737	Phoenix Contact	3031364	Terminal, Grey, 28-12AWG, 30A, 600V	DC(7)
3	23742	Phoenix Contact	3030420	End Plate - 30A Feed Thru	
2	23745	Phoenix Contact	800886	End Bracket - DIN Rail	
1	37975	Hammond Mfg	EJ664	Junction Box, 6" x 6" x 4", with Back Panel and Hinged Lid, NEMA 4	JB-8000-DC

NOTES:

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A02	FOR REVIEW	24/04/2020	DMB
A01	FOR APPROVAL	22/04/2020	DMB

PROJ. NO: 2006348

TITLE AND LOCATION:
JUNCTION BOX BILL OF MATERIALS
MODULE 8202

CUSTOMER:
Agnico Eagle Mine Ltd.
Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	13	14

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BLD-8000

Quantity	APES Number	Manufacturer	Part Number	Description	TAG
2	10185	Leviton	GFNT1-W	GFCI 15A, 125V Duplex Receptacle	REC0657A , REC0661A
1	12567	Leviton	CS115	1P Switch, 15A, 120V, Commercial	SW0667A
1	21306	Hammond	C1F003PES	Encapsulated Transformer, 3KVA, 600, 120/240	T0645A
2	38205	RAB	FW4-LED40-B-4K-DIM	Light, 4ft Vapourtight, LED,4000K, 40W, 120-277V, Dimmable	L0667A , L0670A

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A03	FOR RE-SUBMITTAL	30/04/2020	DMB
A02	FOR REVIEW	24/04/2020	DMB
A01	FOR APPROVAL	22/04/2020	DMB

PROJ. NO: 2006348

TITLE AND LOCATION:
BLD ELEC BILL OF MATERIALS
MODULE 8900

CUSTOMER:
Agnico Eagle Mine Ltd.
Water Treatment Plant Expansion

SCALE	SHEET	SHEETS
NTS	14	14

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APPENDIX B

Packing Slip

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AGNICO EAGLE

Agnico Eagle Mines Ltd.
Meliadine Project
Project No 6526

MELIADINE PROJECT PACKING LIST

Package Number: 6526-S-291-402
AEM PO Number: OC-914514
Supplier Name: newterra ltd.
Shipment Number:
EXP: RELEASE #:

Sold to: Agnico Eagle Mines Ltd
Date Shipped: 6/12/2020
Origin:
Ship via: Truck
Shipping Terms: DAP
(incoterms)

Ship to: Port of Becancour: Agnico Eagle Meliadine
Address: 355 Alphonse-Deshaies
City, Prov: Bécancour, QC
Country: Canada
Contact: 819-294-9911

Total gross weight kg 6,800
Total volume m³ 42.94424
Total parcels 1

EQUIPMENT/MATERIAL DETAILS						HANDLING UNIT DETAILS						
Agnico Eagle PO	Agnico Eagle PO Line Number	Equipment or Tag #	Vendor Part Number (Drawing number & Item)	Material Description	Item Unit Quantity	Parcel No	Type box/skid/drums/b reak bulk/etc	Handling Unit Quantity	Length M	Width M	Height M	Gross weight kg
OC-914514	1, 2	BLD-8000	BLD-8000	PWTP Expansion Process Container	1		Container	1	6.09	2.44	2.89	6800
OC-914514	1, 2	BLD-8000	BLD-8000	Hood, Fan, FAN-12, Fits 12" Fan	1	Packed in container						
OC-914514	1, 2	BLD-8000	BLD-8000	Hood, Louver, LOUVER-18, Fits 18" Louver	1	Packed in container						
OC-914514	1, 2	BLD-8000	BLD-8000	SKID-4101, Pump Skid Assembly	1	Packed in container						

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APPENDIX C

Start-up and Pre-Commissioning Test Checklists

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INSTALLATION, PRE-COMMISSIONING AND COMMISSIONING – INSTRUCTION

2006348 – Agnico Eagle Potable Water Expansion

This purpose of this report is to test the functionality of electrical, control, biological and mechanical components to ensure the system operates as originally designed. This testing is then documented so it can be referenced at a later date if needed.

The following field test records must be completed by the startup technician on site before operating the process system. This is the last quality check ensuring the process equipment is ready for continuous operation.

newterra highly recommends that the system is started by a factory trained startup technician to ensure the long term success of your project. We understand that this may not always be feasible in which case we would require a highly skilled technician capable of troubleshooting both mechanical and electrical aspects of a process treatment system and be familiar with our manual, equipment and capable of training the operator on operating and maintenance requirements of the treatment system.

This checklist must be sent back to **newterra** Service Department to validate your equipment warranty which begins on the date of shipment from the factory. It can be sent back in one of the following methods:

E-mail service@newterra.com
Fax: Att: Service Department
613-345-7633
If you choose to fax the document then, please follow up with an email explaining that a fax was sent so we can ensure that we received the fax and properly validate the equipment warranty.

newterra Signoff	*Customer Acceptance*
Tested By: _____	*Name:* _____
Company: _____	*Company:* _____
Date Tested: _____	*Position:*_____
Signature: _____	*Signature:*_____

Names of Startup Technicians

_____

_____

Item	INSTALLATION CHECKLIST	Initial / Date
	SKID PLACEMENT	
1	Complete newterra Customer Job Site Safety Analysis Form (attached) **TAB A**	
2	Complete newterra Field Services Jobsite Inspection Checklist (attached) **TAB B**	
3	Note - customer Scope of Supply and Work in accordance with the ordered quote 1.2 Customer's Scope of Supply **newterra** does not include the following unless expressly detailed in this proposal: • Installation of loose shipped equipment supplied by **newterra** • Placement and anchoring (if required) of equipment • Interconnecting piping supply and installation • Interconnecting electrical and controls supply and installation including connection ins **newterra**'s control panel • Electrical power supply to our electrical panel, lightning, grounding, etc. • Permitting • Potable water supply to the plant site for plant hydraulic test during startup • Chemicals supply and storage o NOTE: Based on local regulations, additional safety equipment may be required to s and handle chemicals on the site which have not been included as part of this propo This may include but be limited to: eye wash stations, safety showers, spill containm secondary containment, isolation curtains, isolated ventilated bulk storage buildi personal protective equipment, constant ventilation systems, vapor suppres equipment, and spill containment equipment. newterra can provide pricing for th options upon request. • Treated effluent and waste sludge disposal • All civil work including design o Tank sizing as per **newterra** supplied PFD, to be confirmed during detailed design • Anything not mentioned in "Scope of Supply" above	
4	Complete an exterior visual inspection of the skids and loose equipment. **Record all dents, marks or holes in the systems that may have been caused during transportation. Take pictures and email to the newterra Project Manager.	
5	Verify that pad or base is clean, firm and level. If the pad or base is not level or firm, report (call or email) to the newterra PM for further instructions. Take pictures and email to the newterra Project Manager.	
6	Prior to lifting of the skid confirm that the appropriate safety briefings and documentation have been conducted. Confirm that an appropriate sized crane/fork truck is available and ready for container placement.	
7	Remove shipping material from the outside of the skid. Confirm the packing list items – Packing List is attached and at **Appendix B** of the O&M Manual. Detail any deficiencies in attached Punch List. (attached) **TAB C** Take pictures of any internal damaged items and Packing List items receipt/deficiencies to newterra Project Manager.	

Item	INSTALLATION CHECKLIST	Initial / Date
7	Place the skids on site noting the piping and electrical connections – in accordance with the layout drawing at **Appendix A** in this O&M Manual. Take pictures of container placement and email to the newterra Project Manager.	
8	Complete a secondary visual inspection of the skid and loose equipment once it has been placed on the pad/base. **Record all dents, marks or holes in the systems that may have been caused during craning or setting of system. Take pictures and email them to the newterra Project Manager.	
9	Verify all TAGGED system components are in the system. See attached TAG List (**TAB D**) – only sign off **VERIFIED** column. Detail Deficiencies in the attached Punch List – **TAB C**	
MECHANICAL INSTALLATION		
10	Inspect all mechanical equipment for damage. Detail Deficiencies in the attached Punch List.	
11	Confirm all hoses and mechanical connections are hooked up as per the P&ID – see **Appendix A** in this manual.	
12	Ensure all unions and fittings are tight as some have been loosened to prevent stress during shipping.	
13	Connect external piping connections to the system and piping connections between skids. See **P&ID at Appendix A** for details.	
14	Ensure that TNK-4101 and 4102 are clean of any debris. Clean as required.	
ELECTRICAL INSTALLATION		
15	Inspect all electrical equipment for damage. Detail Deficiencies in the attached Punch List.	
16	Measure the Site voltage and email measurements to newterra project Manager. L1/L2 - L2/L3 - L3/L1 - L1/GRD - L2/GRD - L3/GRD -	
17	Verify the system power requirements on site as per system design – See Electrical Drawings at **Appendix A** of this manual.	

Item	INSTALLATION CHECKLIST	Initial / Date
	ELECTRICAL SPECIFICATIONS VOLTAGE: 600VY 3 WIRE PHASE: 3 FREQUENCY: 60Hz FULL LOAD AMPS: 15 MAIN DISCONNECT SIZE: 30 MAIN OVERCURRENT PROTECTION RATING: 30 SCCR SYMMETRICAL (kAMPS): 10 SYSTEM APPROVAL AND CLASSIFICATION: cMETus GP PANEL APPROVAL AND CLASSIFICATION: cMET GP TO C22.2 NO. 14 ELECTRICAL INSTALL SPECIFICATIONS: PVC CONDUIT IN BLD-8000 WIRE SPECIFICATIONS: USE CANADIAN COLOURS	
18	Check Main Power and Control Panel for any loose wiring. Correct as required. Electrical Drawings at **Appendix A** of this Manual.	
19	Connect all wiring between skid, container and onsite equipment by others – see electrical drawings at **Appendix A** of this manual	
20	Connect the Site power to the Main Power Panel (as per the Electrical Drawings – at **Appendix A** to this O&M Manual)	
21	Ensure that proper electrical grounding and lightning protection is available and installed.	
22	Switch Main Switch Panel's isolator to the ON Position	
	OTHER	
23	Installation is now complete. Email newterra Project Manager with a scanned signed copy (by authorized customer rep) of the Installation instruction and any additional pictures.	

I hereby confirm that the newterra system has been:

- Successfully installed in accordance with the Installation Instruction
- Any Punch List Items have been recorded and attached to this Instruction as well as sent to the newterra Project Manager.
- Any deviations have been noted and sent to the newterra project Manager.

Name: _____

Signed: _____

Date: _____

Item	PRE-COMMISSIONING CHECKLIST	Initial/Date
1	Ensure that TNK-4101 and 4102 are clean of any debris. Clean as required.	
2	Ensure that all connections are tight.	
3	Confirm that the newterra Pre-Commissioning Checklist (PCCL) has been completed by the customer. **TAB E**.	
	P&ID Verification	
4	Verify building process flow and instrumentation matches P&ID drawing. P&ID is at **Appendix A** in this O&M Manual. Detail Deficiencies in the attached Punch List – **TAB C.** Ensure that customer piping is correct.	
5	If there has been an extended time between Installation and Pre-Commissioning. Verify that all major components and instrumentation – see attached TAG LIST (**TAB D**) – re-sign Verify column. Scan and email the completed list to the newterra Project Manager. Detail Deficiencies in the attached Punch List – **TAB C.**	
6	Confirm that all manual valves for in their P&ID position – See **Appendix A** in this manual	

I hereby confirm that the newterra system has been:

- Successfully pre-commissioned in accordance with the Pre-Commissioning Instruction
- Any Punch List Items have been recorded and attached to this Instruction as well as sent to the newterra Project Manager.
- The influent water has been tested.
- Any deviations have been noted and sent to the newterra project Manager.

Name: _____

Signed: _____

Date: _____

Item	COMMISSIONING CHECKLIST	Initial/Date
1	Complete the Field Aid Startup Checklist – **TAB F**	
2	Confirm that all customer piping/hoses are in accordance with the P&ID – located at **Appendix A** of this O&M Manual.	
3	Ensure that all valves are in their P&ID position before starting. See P&ID in Appendix A of this manual	
4	Check for leaks and repair as necessary.	
5	Record operational readings of all instrumentation – see attached TAG LIST (**TAB D**) – **Operational Readings** column. Scan and email the completed list to the newterra Project Manager. Detail Deficiencies in the attached Punch List – **TAB C**.	
6	Confirm the Control Narrative – Logic and Alarms. See **Appendix G** in this O&M Manual. Detail Deficiencies in the attached Punch List – **TAB C**.	
7	Commissioning is now complete Ref to Section 6 concerning operating guidelines and sampling/record keeping.	

I hereby confirm that the newterra system has been:

- Successfully commissioned in accordance with the Commissioning Instruction
- Effluent water quality meets requirement
- The Control Narrative has been verified and any deficiencies noted in the Punch List
- Any Punch List Items have been recorded and attached to this Instruction as well as sent to the newterra Project Manager.
- The System is substantially Complete

Name: _____

Signed: _____

Date: _____

Item	POST-COMMISSIONING CHECKLIST	Initial/Date
1	All Punch List Items have been addressed.	
3	Customer Training (if ordered)	
4	Customer post startup call (if required) to review how the startup went and any feedback.	

I hereby confirm that the newterra system has been:

- Successfully completed post-startup activities
- Effluent water quality meets requirement

Name: _____

Signed: _____

Date: _____

TAB	Description
A	newterra Customer Job Site Safety Analysis Form
B	newterra Field Services Jobsite Inspection Checklist
C	Punch List
D	TAG List
E	Pre-Commissioning Checklist
F	Field Aid Startup Checklist

Customer Job Site Safety Analysis Form

Project # and Description: 2006348 – Agnico Eagle Potable Water Expansion

Date: _____ Revision: _____

Location: _____ Analysis By: _____

Field Personnel: _____ Review By: _____

Job Title/Task: _____ Approved By: _____

Daily: _____

Customer Personnel: Name Position

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE):

- ☐ Hard hat
- ☐ Safety Glasses
- ☐ Electrically rated steel-toed boots
- ☐ Reflective Vest (fire retardant)
- ☐ Goggles - (on hard hat)
- ☐ Hearing Protection
- ☐ Arc flash/fire retardant coveralls
- ☐ Cut resistant gloves
- ☐
- ☐
- ☐

Customer Job Site Safety Analysis Form

Project # and Description: 2006348 – Agnico Eagle Potable Water Expansion

BASIC JOB	POTENTIAL HAZARDS	PREVENTATIVE/CORRECTIVE ACTION
1. Entering/exiting SVE / Air Sparge Enclosure	1. Biologic hazards- insects, poisonous plants and animals which may cause skin irritation or anaphylactic reaction. 2. Slips, trips, falls due to uneven terrain, slick or muddy ground surfaces, elevated thresholds at access doors causing broken bones. 3. Hearing impairment from compressor or generator noise may cause hearing loss. 4. Inhalation of hazardous vapors causing short or long term illness. 5. Struck by door resulting in contusions to body or head/crush hazards to fingers or hands.	1. Inspect work area in and around compound and manifolds to identify potential biological hazards (spider webs, animal droppings, small varmints, snakes, bee/hornet nests, etc.). Wear cut resistant ANSI 2 gloves (CSE5). 2. Identify, avoid, and mark possible slip, trip, and fall hazards such as holes, obstructions protruding from the ground, elevated thresholds or debris that may be scattered on the ground. Wear CSA approved steel toe boots, reflective vests and safety glasses with side shields (CSE 5). Inspect steps for moisture or obstructions before entering/exiting. Turn lights on to air sparge/SVE compound prior to entering. Inspect areas for ice and if present use traction devices (i.e. Yak Traks) and spread salt to melt ice. 3. Use hearing protection whenever accessing enclosure while equipment is operating (CSE5). 4. Monitor breathing zone with PID and LEL meter upon initial entry to system enclosure. Exit enclosure if vapours exceed {insert action levels from HASP} and allow enclosure to ventilate with all doors open for a minimum of 5 minutes. Repeat breathing zone air monitoring with PID/LEL upon attempting re-entry. 5. Open compound doors and secure using pins attached at back of compound prior to entering. Secure doors prior to leaving compound.
2. System Operations, Inspections, and Data Collection	1. Equipment containing Impacted, high temperature or pressurized liquids and gases (SVE blower discharge, air sparge discharge, oxidizer discharge) may cause burns to the skin. 2. Tight space for work with fixed objects (i.e. manifold, tanks, valves and piping) resulting in head knockers or body bruising may cause cuts or pinches to the body.	1. Inspect tools and equipment for defects. STOP WORK and notify PM if equipment related to the air sparge system is failing (i.e. leaks or vapors) or any unknown condition is observed (i.e. leaking pipes, fittings, and manifold connections). Schedule LOTO if needed with PM and conduct according to EMES/AECOM written LOTO procedures and EMES Work Permit Procedures (CSE 2 & 3). 2. Work with light on. Move slowly, check surroundings and DO NOT use awkward body positioning (i.e. adjusting valves). Work with minimum number of people needed in compound (2). Check for objects and fixed structures while working. Wear hard hat (CSE5). 3. If ambient temperature is above 90 degrees, limit time in compound to 15 minutes with 10 minute interval breaks. Leave compound doors open but secured for ventilation.

Customer Job Site Safety Analysis Form

Project # and Description: 2006348 – Agnico Eagle Potable Water Expansion

BASIC JOB	POTENTIAL HAZARDS	PREVENTATIVE/CORRECTIVE ACTION
System Operations, Inspections, and Data Collection, (Continued)	3. Heat stress, exhaustion or stroke due to higher temperatures in compound. 4. Overexertion/Strains from lifting heavy equipment or awkward body positioning. 5. Cuts, abrasions or crush hazards due to sharp edges or tight spaces 6. Burns from hot surfaces (blowers, compressors, oxidizer) 7. Line-of Fire from rotating equipment resulting in broken bones or amputations 8. Electrical Shock causing death or burns. 9. Burns / property damage from fire	4. DO NOT lift anything over 50lbs. Team lift or mechanical means (i.e. dolly) is required for items over 50 lbs. (5 gallons of water weighs 41.75 pounds) or awkward items. Bend at knees and lift using legs/arms, not your back, keeping load close to your body. Walk pathway before moving object to remove any obstacles or tripping hazards. Take regular rest/stretch breaks. Change position regularly. DO NOT twist body while lifting/unloading or making system adjustments (i.e. turning valves). 5. Keep hands clear of tight spaces within manifold and piping components. Keep hands clear of latches/cabinets when opening or closing. 6. DO NOT touch components labeled as hot surfaces in compound while system is in operation. Allow components to cool for 15 minutes prior to servicing. 7. DO NOT put hands or fingers into rotating equipment (i.e. After-Cooler, Drive Motors). Keep loose clothing, hair, jewelry away from operating equipment. Keep machine guards in place. Note that hair should be pulled back, and jewelry must be removed prior to work. 8. See 2.1.1. Follow LOTO procedures as discussed in O&M Binder. 9. Confirm 20-lb (9-kg) fire extinguishers are mounted at each entrance/exit to remediation enclosures, are fully charged and have been inspected within 1 year
3. Working outdoors	Slip, trips and falls.	Make note the weather constantly for sudden changes in temperatures. Inspect areas for ice and if present use personal traction devices (i.e. Yak Traks) and spread salt to melt ice, rain/heavy rains making certain areas slippery or not passable by walking.
		Keep work area clear and keep tools and equipment organized and out of walking areas.
		Wear Appropriate PPE, be aware of your surroundings.
		Maintain proper delineated work zone. Recognize hazards and avoid contact.
4. Working in hot/cold environments	Heat/cold stress	Take frequent breaks to cool down/warm up. Sunscreen, light-coloured cotton clothing (task permitting) for hot environments; drink plenty of fluids. Layer clothing (avoid cotton) for warmth in cold environments.
5. Installing/checking mechanical equipment	Pinch points. Cuts, pinches, scrapes from tools	Wear Appropriate PPE, be aware of your surroundings. Use the proper tool for the task being performed.

Customer Job Site Safety Analysis Form

Project # and Description: 2006348 – Agnico Eagle Potable Water Expansion

BASIC JOB	POTENTIAL HAZARDS	PREVENTATIVE/CORRECTIVE ACTION
6. Installing/ checking electrical equipment	Electric shock and sparks	Ensure LOTO procedures are followed to site compliance. Do not wire any equipment while the panel is live and ensure electrical, hydraulic, steam or any other mechanical potential has been dissipated prior to services being performed on the system.
7. Testing of electrical equipment	Testing in a live panel	Wear appropriate PPE - Arc flash/FR coveralls, electrically rated steel-toed boots, voltage rated insulated gloves. Use multi-meter with fused leads. Be aware of your surroundings.
		Only authorized newterra licensed electrician technician(s) are permitted to work on or be closer than 4 feet in any direction to an open live panel. Section off a 4 ft. radius from open panel to ensure a safe work area.
8. Testing of mechanical equipment	Operating components	Ensure LOTO are removed properly and on-site workers are aware of test. Any items that may have been worked on are complete and guards are in place.
	Rotating components	Ensure all guards are in place and equipment is secure. Notify workers of possible hazards with equipment they may be directly affected by.

Field Services Jobsite Inspection Checklist

Project: 2006348 – Agnico Potable Water Expansion **Job No.:** _____ **Date:** _____

Client/Project Mgr: _____ **Newterra Tech.:** _____

Inspection Criteria	Yes	No	Comments
A. General			
1. Emergency phone numbers and procedures posted?			
2. First aid supplies readily available?			
3. First aid supplies adequate for job manpower?			
4. Required posters and signs posted and readable?			
B. Personal Protective Equipment			
1. Hard hats worn by all personnel in work areas?			
2. Eye and face protection worn as required?			
3. Hearing protection worn as required?			
4. Respiratory protection worn as required?			
5. Safety harnesses and lanyards worn for fall protection?			
6. Workers dressed properly for the job?			
7. Personal protective equipment in good condition?			
8. Safety supplies adequate for job manpower?			
C. Housekeeping			
1. Walkways and stairs kept clear of material and debris?			
2. Cords and hoses strung to prevent trip and fall hazard?			
3. Are liquid spills cleaned up immediately?			
4. Restrooms and eating areas clean?			
5. Fabrication and work areas clean and orderly?			
6. Site trailers and vaults clean and orderly?			
7. Gang boxes clean and orderly?			
8. Trash, scrap, and debris picked up and disposed of?			
D. Fire Protection			
1. Firefighting equipment well marked and accessible?			
2. Employees trained to use fire-fighting equipment?			
3. Fire extinguishers inspected monthly?			
4. Smoking prohibited where flammables are located?			
5. Flammables stored and handled in approved containers?			
6. Oily rags disposed of in an approved container?			
7. Temp. heaters kept 20' away from combustible materials?			

Inspection Criteria	Yes	No	Comments
E. Material Handling and Storage			
1. Materials stored neatly in stacks or piles?			
2. Cylindrical materials racked or cribbed and blocked?			
3. Loose materials containerized or palletized?			
4. Aisle space maintained around stored materials?			
5. Storage areas kept clear of scrap, debris, and trash?			
6. Slings and chokers in good condition?			
7. Chain falls and come-a-longs in good condition?			
8. Cranes operated in a safe manner by operators?			
9. Workers move from under suspended loads?			
10. Workers know and use proper crane signals?			
11. Crane hand signals posted on jobsite?			
12. Workers attach tag lines to loads?			
13. Hoisting hooks have safety latches?			
14. Running cables inspected and in good condition?			
15. Load limits marked on all hoisting rigs?			
F. Tools			
1. Power tools have guards in place?			
2. Power tools either grounded or double insulated?			
3. Power tool cords and plugs in good condition?			
4. Impact tools with mushroomed heads dressed as needed?			
5. Broken tools repaired or replaced as needed?			
G. Welding and Cutting			
1. Gas cylinders stored upright and secured?			
2. Oxygen cylinders segregated from fuel gas cylinders?			
3. Full cylinders segregated from empty cylinders?			
4. Caps secured on all cylinders not in use?			
5. Welding leads in good condition?			
6. Welding screens erected in high flash areas?			
7. Welding blankets used to protect materials/equipment?			
8 Fire watches posted as needed?			
9. Proper permits issued (as required)?			
10. Fire extinguishers kept close to hot work areas?			

Field Services Jobsite Inspection Checklist

Inspection Criteria	Yes	No	Comments
H. Electrical			
1. 120 volt tools and equipment tested and tagged as such?			
2. Extension cords heavy duty, 3-wire type?			
3. Temporary lights equipped with bulb guards?			
4. Sufficient lighting to work and move safely?			
5. Lockouts used to de-energize operational systems?			
6. Welders and stationary equipment properly grounded?			
I. Ladders			
1. Straight ladders secured at top landing?			
2. Straight ladders extend 36" above top landing?			
3. Straight ladders have feet or blocked at bottom?			
4. Straight ladders set up with a 4 to 1 slope?			
5. Top step of stepladders not used as a step?			
6. Climbing the back of stepladders prohibited?			
7. Workers use the proper height ladder for the job?			
8. Portable ladders used only by company employees?			
J. Scaffolds and Manlifts			
1. All scaffold parts and hardware used as required?			
2. All scaffold hardware and parts in good condition?			
3. Scaffolds fully planked?			
4. All scaffold planks cleaned?			
5. Scaffolds have guardrails, midrails, and toe boards?			
6. Wheels on rolling scaffolds locked during scaffold use?			
7. Workers prohibited from riding rolling scaffolds?			
8. Manlifts in good operating condition?			
9. Only trained employees allowed to operate manlifts?			
10. Outriggers extended when manlifts are in use?			
11. Workers prohibited from exiting raised manlifts?			
12. Workers only allowed to work from floor of basket?			
13. Workers required to tie-off while basket is raised?			
14. Only company employees allowed to operate manlifts?			

Field Services Jobsite Inspection Checklist

Inspection Criteria	Yes	No	Comments
K. Handrails and Hole Covers			
1. Perimeters and drop-offs protected by rails or cables?			
2. Railings sturdy, continuous, and have midrails?			
3. Railings replaced after temporary removal?			
4. Floor holes protected by railings or hole covers?			
5. Hole covers secured to prevent movement?			
6. Hole covers marked to prevent accidental removal?			
7. Hole covers replaced after temporary removal?			
L. Excavation and Trenching			
1. Excavations 5' or deeper shored, sloped, or boxed?			
2. Workers stay within shored area?			
3. Excavated spoil stored at safe distance from work?			
4. Barricades placed on all open sides at end of shift?			
5. Ladders placed every 50' for entry and egress?			
6. Excavations de-watered as needed?			
7. Backfill placed as soon as possible?			
M. Employee Communications			
1. Do foremen communicate with their crews on job methods?			
2. Do foremen react to employee safety recommendations?			
3. Do foremen address unsafe actions and conditions?			
4. Are safety meetings held weekly with all employees?			

Comments:	

☐ ADDITIONAL COMMENTS ON BACK OF FORM

Date Completed (DD/MMM/YY)**:** _____

Completed By (Print & Sign)**:** _____

Completed By (Print & Sign)**:** _____

TAB C

1291 California Avenue, P.O. Box 1517
Brockville, ON, K6V 5Y6
T: 800.420.4056 F: 289.203.1319

PROJECT PUNCH LIST

General Notes

Put any notes, issues, etc. here that the newterra Project Manager should be made aware of/General comments.

newterra
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T: 800.420.4056 F: 289.203.1319

Punch list

Put all punch list items that newterra or others need to take care of prior to completion.

ITEM	DESCRIPTION (INCLUDE P&ID TAG IF APPICABLE)	Date	Initials	Date Closed	Initials
1					
2					
3					
4					
5					
6					
7					
8					

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ITEM	DESCRIPTION (INCLUDE P&ID TAG IF APPICABLE)	Date	Initials	Date Closed	Initials
9					
10					
11					
12					
13					
14					
15					
16					
17					

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ITEM	DESCRIPTION (INCLUDE P&ID TAG IF APPICABLE)	Date	Initials	Date Closed	Initials
18					
19					
20					
21					
22					
23					
24					
25					
26					

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T: 800.420.4056 F: 289.203.1319

ITEM	DESCRIPTION (INCLUDE P&ID TAG IF APPICABLE)	Date	Initials	Date Closed	Initials
27					
28					
29					
30					
31					
32					
33					
34					
35					

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ITEM	DESCRIPTION (INCLUDE P&ID TAG IF APPICABLE)	Date	Initials	Date Closed	Initials

2006348 TAG LIST						
Module	**TAG**	**Part Number**	**Part Description**	**Verified**	**Operational**	**Reading during Operation (if applicable)**
4100	TNK-4101	**24579**	Tank, Closed Top, Cylindrical, 2100 gal, Norwesco			
4100	TNK-4102	**24579**	Tank, Closed Top, Cylindrical, 2100 gal, Norwesco			
4100	LSHH-4101/2	**35709**	Switch, Level, Almeg, SX-601			
4100	V-4101	**37662**	Valve, Manual, Ball, PVC, 2'', True-Union, Soc Ends, c/w FPM [Viton] O-Rings			
4100	V-4102	**37664**	Valve, Manual, Ball, PVC, 4'', True-Union, Soc Ends, c/w FPM [Viton] O-Rings			
4100	V-4103	**37662**	Valve, Manual, Ball, PVC, 2'', True-Union, Soc Ends, c/w FPM [Viton] O-Rings			
4100	V-4104	**37662**	Valve, Manual, Ball, PVC, 2'', True-Union, Soc Ends, c/w FPM [Viton] O-Rings			
4100	CV-4101	**12868**	Valve, Check, Swing, PVC, 2", Clear, 1520-20C			
4100	SP-4101	**14435**	Valve, Ball, 304SS, 1/2"			
4100	PI-4101	**27406**	Gauge, Pressure, 0-200psi, Indumart, P22T2-FG-200			
4100	PRV-4101		Valve, Pressure Sustaining, Cla-Val 50-01, 1.5", DI Body, Globe Style, Epoxy Inner/Outer NSF-61			
4100	P-4101	**34883**	15SV3NG4E60W 15SV 316 SS 3 STAGE 5HP 3/60/575 3500 RPM WEG MOTOR 184TC Operating Point = 78 GPM @ 169 FT (73 PSIG)			
8000	TSL-8001	**10515**	Switch, Temperature Thermostat, CN TF115-001			
8000	TSL-8002	**10515**	Switch, Temperature Thermostat, CN TF115-001			
8000	H-8001	**26667**	Heater, Forced Air, Ouellet, 5kW, OAS05036T			
8000	H-8002	**26667**	Heater, Forced Air, Ouellet, 5kW, OAS05036T			
8000	TSH-8001	**10515**	Switch, Temperature Thermostat, CN TF115-001			
8000	F-8001	**M1072**	Fan, Building, 12", 1/4hp, 1750rpm, 120V, 1ph, TEAO*			
8000	TSLL-8001	**10515**	Switch, Temperature Thermostat, CN TF115-001			
8000	LSHH-8001	**12351**	Switch, Level, Almeg, Vertical, ATB3-48B			

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Pre-Commissioning Checklist – 2006348 – Agnico Eagle Potable Water Expansion

(Executed and Returned from Customer)

Please note that **newterra** has a limited number of Technicians. To successfully support your startup, **newterra** requires that the Pre-Commissioning Checklist be returned at least 15 business days prior to mobilizing a Technician to site (subject to Technician availability). **newterra** will not mobilize to site until the Pre-Commissioning Checklist has been executed and returned to service@newterra.com Or by Fax to: 289.203.1319.

If newterra startup activities are delayed due to lack of site readiness then there may be additional charges associated with overtime and/ or additional days on site.

newterra highly recommends that the system is started by a factory trained startup technician to ensure the long-term success of your project. We understand that this may not always be feasible in which case we would require a highly skilled technician capable of troubleshooting both mechanical and electrical aspects of a process treatment system and be familiar with our manual, equipment and capable of training the operator on operating and maintenance requirements of the treatment system.

The purpose of this report is to ensure that the customer is prepared for startup.

Checklist	Customer Initials	newterra Initials
Complete a visual inspection of all Equipment when placed. **Record any damage to the systems that may have occurred during shipping and provide photos to newterra. Order replacement parts		
Please read through the packing list (located in the manual) and ensure **ALL** the correct equipment was delivered. Some items that have shipped loose with your system that will need to be installed prior to start up, these may include exterior components such as tanks, stacks, filters and hoods. Sufficient hardware should have been supplied to facilitate installation of scope supplied parts. Notify of shortages.		
Any external equipment such as tanks, well pumps, oxidizers, degasifiers, etc. need to be installed, plumbed and wired prior to start up.		
Verify that equipment has been installed on a **SOLID, LEVEL** area. Call if any questions.		
Verify that system has been installed in accordance with the system layout drawing.		
Verify that the required approvals are in place to allow the system to discharge air and water.		
Verify site power is installed to the control panel and necessary electrical approvals have been completed.		
Verify that all Electrical wiring is completed and wired according to the Field Aid/ project O&M manual.		
Verify that all Electrical Equipment is secure and **ALL TERMINALS** are tight, including inside panels.		
Verify that all process piping has been installed and terminated to the correct place.		
Verify that all field piping is complete. Feed and Waste are connected to the operating system.		
Some unions in the system may have been loosened for shipment. This is done to prevent damaging susceptible equipment, especially flow meters. All unions in the systems should be checked and tightened.		
Some items may have been secured with brackets or tie downs for shipment – ensure these have been removed (e.g. reciprocating compressors/ stacked blowers).		
If an alarm auto-dialer, verify that a phone line is installed and activated. Number _____._____._____		
If Ethernet is to be used on site please provide 2 Static IP Addresses _____._____._____._____ Please verify connection. _____._____._____._____		
In colder climates, if you do not plan on starting up the system before the winter months, please refer to your O&M manual for instructions on extended shutdowns. It is imperative that the correct measures be taken to prevent freezing water from damaging your system.		
If the system has been winterized, ensure all anti-freeze has been drained and disposed of in accordance with local regulations.		

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Pre-Commissioning Checklist – 2006348 – Agnico Eagle Potable Water Expansion

(Executed and Returned from Customer)

Checklist	Customer Initials	newterra Initials
Email pictures of power connection, site piping connections and installed equipment to service@newterra.com Newterra Support 1.800.420.4056 ext. 1234		

Comments: Note any deficiencies or damage to the system on arrival.

In the event additional parts are required to be sent for commissioning, please provide a shipping address, contact name and cell number

Provide a list of PPE required or any additional Health and Safety or training requirements that will be required for site access.

Provide a list of other trades (with contact numbers) that will be onsite during commissioning.

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Pre-Commissioning Checklist – 2006348 – Agnico Eagle Potable Water Expansion

(Executed and Returned from Customer)

Site Address:	
Onsite Contact Name & Cell Number:	
Customer Name (print)	
Customer Sign-Off	
Date:	

For Office Use Only	newterra Initial
Has the modem been provisioned?	
Is there remote access for programmer?	
Does the technician need programming access?	
Has TSA Been returned?	

Field Aid Startup Checklist

Project # and Description: **2006348 – Agnico Eagle Potable Water Expansion**

Purpose: To ensure all items specific to a Remediation system are checked and tested
Procedure: Verify the requirements listed in the table below have been met.

PRELIMINARY SYSTEM ASSESSMENT

Requirement	Initials/Date
Trace all pipelines and ensure all manual valves are in the correct orientation and gate valves are fully open where required.	
Prime all, non-self-priming pumps and ensure water has been provided to prevent any equipment from running dry.	
Ensure any obvious spill hazards (open sample ports, tanks with open ports) are remedied.	
If applicable ensure building fan/louver shipping braces have been removed before proceeding with test.	

INSTRUMENT & IO VERIFICATION

Requirement	Initials/Date
All customer provided instruments have been spanned according to the control narrative settings	
All field wiring inputs have been checked from device through to the Control Panel	
ESTOP - Verify safety controls/ interlocks/ shutdown interlocks are functional before proceeding.	
ESTOP – Verify devices do not run in HAND or AUTO with the ESTOP pushed in	
All outputs to field wiring have been checked from the Control Panel through to the device	
All motors are rotating in the correct direction	

LEAK TEST VERIFICATION

Requirement	Initials/Date
All devices operate with no detectable set up/installation issues – i.e. uncharacteristic noise, pressures etc. Consult with production mechanical where required.	
Monitor the system equipment and piping to ensure no leaks are present. If leaks are found identify and notify production.	

Project # and Description: **2006348 – Agnico Eagle Potable Water Expansion**

SYSTEM LABELLING CHECKLIST

Requirement	Initials/Date
Customer to provide field piping labels & device labels applied (water arrows, hot surface, device tags, etc.)	

STARTUP CLOSEOUT CHECKLIST

Requirement	Initials/Date
Motor amp readings have been taken and recorded for all available motors.	
Make sure any electrical or P&ID drawing changes are communicated back to newterra for record. Photos of marked up drawings work.	

Field Aid Startup Checklist

Project # and Description: **2006348 – Agnico Eagle Potable Water Expansion**

COMPONENT TEST RECORD										
Function:		Device:			Manufacturer:					
Model #:					Device Serial #:					
Motor Manufacturer:					Area Classification Tag Checked:					
Motor Model #:					Expected Rotation - Non Drive End:					
Motor Serial #:					Rotation as Expected:					
HP:		Voltage:		SF:		Frame:		RPM:		
Phase:		FLA:		OL Setting:		ENCL.:		Temp Code:		
Factory Test:						VFD Readings:				
L1	L2	L3				L1	L2	L3		
			Amps	60Hz					Amps	60Hz
			Amps	30Hz					Amps	30Hz
L1/L2	L2/L3	L3/L1				L1/L2	L2/L3	L3/L1		
			Vac						Vac	

Function:		Device:			Manufacturer:					
Model #:					Device Serial #:					
Motor Manufacturer:					Area Classification Tag Checked:					
Motor Model #:					Expected Rotation - Non Drive End:					
Motor Serial #:					Rotation as Expected:					
HP:		Voltage:		SF:		Frame:		RPM:		
Phase:		FLA:		OL Setting:		ENCL.:		Temp Code:		
Factory Test:						VFD Readings:				
L1	L2	L3				L1	L2	L3		
			Amps	60Hz					Amps	60Hz
			Amps	30Hz					Amps	30Hz
L1/L2	L2/L3	L3/L1				L1/L2	L2/L3	L3/L1		
			Vac.						Vac.	

Field Aid Startup Checklist

Project # and Description: **2006348 – Agnico Eagle Potable Water Expansion**

COMPONENT TEST RECORD										
Function:		Device:			Manufacturer:					
Model #:					Device Serial #:					
Motor Manufacturer:					Area Classification Tag Checked:					
Motor Model #:					Expected Rotation - Non Drive End:					
Motor Serial #:					Rotation as Expected:					
HP:		Voltage:		SF:		Frame:		RPM:		
Phase:		FLA:		OL Setting:		ENCL.:		Temp Code:		
Factory Test:					VFD Readings:					
L1	L2	L3			L1	L2	L3			
			Amps	60Hz				Amps		60Hz
			Amps	30Hz				Amps		30Hz
L1/L2	L2/L3	L3/L1			L1/L2	L2/L3	L3/L1			
			Vac					Vac		

Function:		Device:			Manufacturer:					
Model #:					Device Serial #:					
Motor Manufacturer:					Area Classification Tag Checked:					
Motor Model #:					Expected Rotation - Non Drive End:					
Motor Serial #:					Rotation as Expected:					
HP:		Voltage:		SF:		Frame:		RPM:		
Phase:		FLA:		OL Setting:		ENCL.:		Temp Code:		
Factory Test:					VFD Readings:					
L1	L2	L3			L1	L2	L3			
			Amps	60Hz				Amps		60Hz
			Amps	30Hz				Amps		30Hz
L1/L2	L2/L3	L3/L1			L1/L2	L2/L3	L3/L1			
			Vac.					Vac.		

Field Aid Startup Checklist

Project # and Description: **2006348 – Agnico Eagle Potable Water Expansion**

COMPONENT TEST RECORD										
Function:		Device:			Manufacturer:					
Model #:					Device Serial #:					
Motor Manufacturer:					Area Classification Tag Checked:					
Motor Model #:					Expected Rotation - Non Drive End:					
Motor Serial #:					Rotation as Expected:					
HP:		Voltage:		SF:		Frame:		RPM:		
Phase:		FLA:		OL Setting:		ENCL.:		Temp Code:		
Factory Test:					VFD Readings:					
L1	L2	L3			L1	L2	L3			
			Amps	60Hz				Amps		60Hz
			Amps	30Hz				Amps		30Hz
L1/L2	L2/L3	L3/L1			L1/L2	L2/L3	L3/L1			
			Vac					Vac		

Function:		Device:			Manufacturer:					
Model #:					Device Serial #:					
Motor Manufacturer:					Area Classification Tag Checked:					
Motor Model #:					Expected Rotation - Non Drive End:					
Motor Serial #:					Rotation as Expected:					
HP:		Voltage:		SF:		Frame:		RPM:		
Phase:		FLA:		OL Setting:		ENCL.:		Temp Code:		
Factory Test:					VFD Readings:					
L1	L2	L3			L1	L2	L3			
			Amps	60Hz				Amps		60Hz
			Amps	30Hz				Amps		30Hz
L1/L2	L2/L3	L3/L1			L1/L2	L2/L3	L3/L1			
			Vac.					Vac.		

Field Aid Startup Checklist

Project # and Description: **2006348 – Agnico Eagle Potable Water Expansion**

Acceptance criteria has been met:	☐ **YES** ☐ **NO**
Sign/Date:	
Print Name:	

Additional items that need completion must be detailed on the Punch List Items sheet.

newterra inc.
2650 Eisenhower Ave, Bldg. 100A, Trooper, PA 19403
(610) 631-7700 / www.industrial.newterra.com

APPENDIX D

RECOMMENDED SPARE PARTS

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Spare Parts for newterra System 2006348 - Agnico Eagle Mines - 200 Man PWTP Expansion

Spare = Customer should consider having a replacement component readily available
Spare (Critical) = A spare that is designated as Critical is a component that if it were to fail the system may not be fully functional and will likely result in a full system shutdown.
Spare (Recommended) = A spare that is designated as Recommended is a component that if it were to fail the system may still be functional but it will most likely not result in a full system shutdown.
Maintenance = Component has repairable or maintenance parts that would be available from the manufacturer as part of standard O&M practices.
Consumable = Component is a consumable part or the component contains consumable parts that need to be replaced as part of standard O&M practices.
*****To order your newterra OEM parts please call 1-800-420-4056**

Category	Spare, Maintenance or Consumable	Critical or Recommended Spare	Tag	Description	Extended Description	Recommended Qty	newterra Part No.
Electrical	Spare	Critical	DISC0630A	Fuse, 15A 600V Time Delay		2	E1107
Electrical	Spare	Critical	DISC0624A, DISC0618A	Fuse, 7A 600V Time Delay		3	E1125
Electrical	Spare	Critical	DISC0604A	Fuse, 30A 600V Time Delay		3	E1157
Electrical	Spare	Recommended	REC0657A, REC0661A	GFCI 15A, 125V Duplex Receptacle		1	10185
Electrical	Spare	Recommended	L0667A, L0670A	Light, 4ft Vapourtight, LED,4000K, 40W, 120-277V, Dimmable		1	38205
Electrical	Spare	Recommended	SPD0613A	Surge Protector, 3PH, 600Y/347V, MAX 40kA Surge Suppression		1	22890
Electrical	Spare	Recommended	CB0651A	Breaker, 480/277V 20 AMP 2P C Trip Curve, 10k SCCR		1	38129
Electrical	Spare	Recommended	CB0661A, CB0667A, CB0657A, CB0672A	Breaker, 480/277V 15 AMP 1P C Trip Curve, 10k SCCR		1	38157

newterra inc.
2650 Eisenhower Ave, Bldg. 100A, Trooper, PA 19403
(610) 631-7700 / www.industrial.newterra.com

APPENDIX E

Technical Specs and Brochures for Parts and Equipment

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SD - STANDARD WALL EXHAUST FANS

Efficient, low maintenance and easy to install.

Canarm/LFI's standard fans follow a tradition of quality in design, materials and construction. All our standard fans are developed to be efficient and economically priced. Fans are available in single, two and variable speed models. All variable speed standard fans use an energy efficient variable speed, dual voltage motor and blade combination.

To determine the proper Canarm/LFI fan for your applications, use the following formula.
Number of cubic feet in room / Number of minutes per air change = Required C.F.M. Capacity

EXAMPLE: A general office, (see chart) which requires an air change every ten minutes, would require the following fan capacity.
If office is 100' x 40' x 10' = 40,000 cubic ft; 40,000 cubic ft / 10 minutes per air change = 4000 Required C.F.M.

From the chart, you would select a fan that is rated at 4000 C.F.M. at 1/8" S.P. (Static Pressure)

Application	Minutes per Air Change	Application	Minutes per Air Change	Application	Minutes per Air Change	Application	Minutes per Air Change
Assembly Hall	7	Classroom	6	Garage	5	Projection Booth	2
Auditorium	10	Dance Hall	5	General Office	10	Summer Cooling	1
Barber Shop	6	Department Store	6	Gymnasium	8	Toilet	3
Basement	8	Dry Cleaning	5	Laundry	2	Transformer Room	1
Battery Room	4	Engine Room	6	Locker Room	3	Warehouse	12
Boiler Room	1	Factory	6	Machine Shop	8	Welding Shop	2
Bowling Alley	5	Forge Room	3	Plating Room	3		
Church	15	Foundry	4	Pressing Room	1		

FEATURES

- Available in 8" to 42" sizes.
- Single, two and variable speed models are available.
- All fans use a totally enclosed, thermally protected motor.
- The rugged steel welded box housing has a durable powder coated finish.
- Aluminum louver shutters are supported by long life nylon bushings (30", 36" & 42" have PVC louvers).
- 8" - 24" models have heavy wire chrome plated OSHA guards on intake side of fan.
  30", 36" & 42" models have grey powder coated guards.
- All fans are shipped completely assembled.



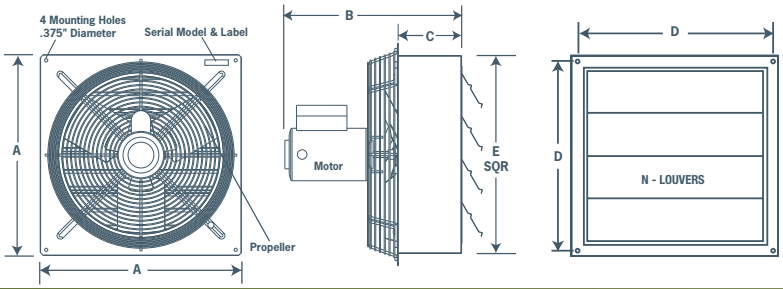
SPECIFICATIONS

MODEL	SPEED	BLADE DIAMETER	RPM	HP	VOLTAGE	AMPS (FLA)	WEIGHT (LBS)	dB(A) @5 ft	CFM @ STATIC PRESSURE				FRAMING DIMENSIONS
									0.00"	0.10"	0.125"	0.25"	
S8-B2	Two	8"	1600/1300	1/40	115	0.5	12	48	360/300	270/150	230/110	0	11" X 11"
S10-B2	Two	10"	1600/1300	1/40	115	0.5	13	56	690/580	590/460	570/390	0	13" X 13"
S12-E1	Single	12"	1625	1/4	115	1.8	28	63	1640	1540	1510	1390	15" X 15"
S12-E2	Two	12"	1725/1140	1/4	115	3.4	32	64	1650/1090	1550/950	1520/930	1390/0	15" X 15"
S12-EVD	Variable	12"	1700	1/3	115/230	5.0/2.5	32	60	1650	1540	1510	1390	15" X 15"
S14-E1	Single	14"	1625	1/4	115	1.8	30	67	2170	2070	2030	1860	17" X 17"
S14-E2	Two	14"	1725/1140	1/4	115	3.4	34	65	2180/1350	2080/1190	2060/1160	1890/0	17" X 17"
S16-E1	Single	16"	1625	1/4	115	1.8	33	68	2370	2270	2210	2060	19" X 19"
S16-E2	Two	16"	1725/1140	1/4	115	3.4	36	69	2380/1640	2280/1490	2230/1430	2070/0	19" X 19"
S16-EVD	Variable	16"	1700	1/3	115/230	5.0/2.5	36	63	2370	2270	2210	2063	19" X 19"
S18-F1	Single	18"	1625	1/3	115	4.0	37	73	3200	3090	3040	2920	21" X 21"
S18-F2	Two	18"	1725/1140	1/3	115	5.3/2.9	43	74	3200/2100	3090/1890	3040/1820	2920/0	21" X 21"
S18-FVD	Variable	18"	1700	1/3	115/230	3.8/1.9	45	74	3150	3050	2980	2860	21" X 21"
S20-F1	Single	20"	1625	1/3	115	4.0	41	77	3420	3220	3170	2920	23" X 23"
S20-F2	Two	20"	1725/1140	1/3	115	5.3/2.9	45	77	3440/2300	3240/2000	3180/1950	2930/0	23" X 23"
SD24-F1	Single	24"	1100	1/3	115	5.4	46	70	5000	4500	4300	3600	27" X 27"
SD24-GVD	Variable	24"	1100	1/3	115/230	4.4/2.2	56	72	5050	4910	4810	4400	27" X 27"
SD30-G1D	Single	30"	1100	1/3	115/230	4.4/2.2	72	82	8000	7000	6000	5000	33" X 33"
SD36-G1D	Single	36"	850	1/2	115/230	6.6/3.3	88	72	10000	8500	8000	6200	39" X 39"
SD42-H1D	Single	42"	850	1	230	11/5.5	122	83.5	14900	13550	13210	10800	45" X 45"

NOTE: RPM Min (Minimum) is determined when louvres are opened one inch.
Note: Wind has a significant effect on exhaust fans. A 10 mph wind creates a 0.05" pressure against the fan. A 20 mph wind creates 0.20" pressure and 30 mph a 0.45" pressure. These pressures are in addition to the static pressure in the building. Wind blocks or hoods should be included in all designs where fans will be subjected to winds above 10 mph.

DIMENSIONS

FAN SIZE	A X A SQUARE	B	C	D (c/c)	E	N
8"	13 1/4"	10"	4"	12"	10 3/4"	2
10"	15 1/4"	10"	4"	14"	12 3/4"	2
12"	17 1/4"	14"	6"	16"	14 3/4"	3
14"	19 1/4"	14"	6"	18"	16 3/4"	3
16"	21 1/4"	14"	6"	20"	18 3/4"	4
18"	23 1/4"	15"	6"	22"	20 3/4"	4
20"	25 1/4"	16"	6"	24"	22 3/4"	5
24"	29 1/4"	16"	6"	28"	26 3/4"	5
30"	35 1/4"	19"	6"	34"	32 3/4"	16
36"	41 1/4"	16 1/2"	6"	40"	38 3/4"	20
42"	47 1/4"	17 3/4"	6 3/4"	46"	44 3/4"	24



ACCESSORIES

- Grey plastic weather hood
- Galvanized metal hood
- MC type & wet locations controls.



BACK VIEW

For a complete listing on all available accessories, see page C15.
For a complete listing of all available hoods, see page C11.
For all available control options, see Controls & Thermostats tab.

CANARM®

Shutter Kit

Instruction Manual

READ AND SAVE THESE INSTRUCTIONS



WARRANTY

CANARM Ltd. warrants every new shutter kit to be free of defects in material and workmanship, to the extent that, within a period of one year from the date of purchase CANARM Ltd. shall either repair or replace at CANARM's option, any unit or part thereof, returned freight prepaid, and found to be defective.
This warranty does not include any labor or transportation costs incidental to the removal and reinstallation of the unit at the user's premises.
Components repaired or replaced are warranted through the remainder of the original warranty period only.
This warranty applies to the original purchaser-user only; it is null and void in case of alteration, accident, abuse, neglect, and operation not in accordance with instructions.

NOTICE: No warranty claims will be honored by CANARM Ltd. unless prior authorization is obtained.

Installation or Product problems? Do not return to store of purchase.
Contact Canarm Service at 1-800-265-1833 (CANADA) 1-800-267-4427 (U.S.A.)
1-800-567-2513 (EN FRANCAIS) Monday to Friday 8:00 - 5:00pm e.s.t.

CANARM®

ASSEMBLY INSTRUCTIONS - SHUTTER KITS

These shutter kits are easy to assemble and install. Follow the steps listed below. They can be fitted into a wall opening from the inside or over an opening on the outside. (See sizing chart)

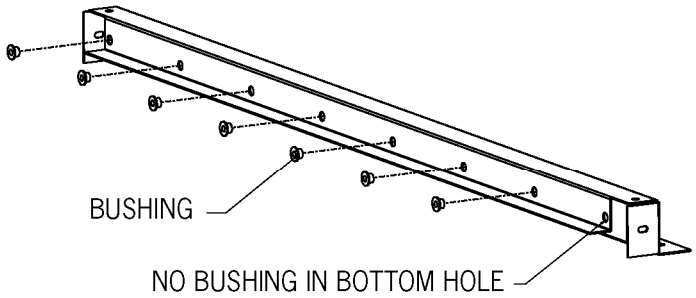
See the table below to verify that your kit has all components and hardware.

	KDS12-SS	KDS16-SS	KDS18-SS	KDS20-SS	KDS24-SS	KDS36-GV	KDS36-SS	KDS48-GV	KDS48-SS
Sides	2	2	2	2	2	2	2	2	2
Top/Bottom	2	2	2	2	2	2	2	2	2
Center Bar	-	-	-	-	1	1	1	1	1
Louvers	4	5	6	6	14	22	22	26	26
Louver Pins	4	5	6	6	7	11	11	13	13
Corner Clip	4	4	4	4	4	4	4	4	4
#6 Sheet Metal Screw	10	10	10	10	11	12	12	13	13
#10 Sheet Metal Screw	-	-	-	-	2	2	2	2	2
Louver Stop	-	-	-	-	1	1	1	1	1
Bushings	-	-	-	-	-	46	-	55	-

ASSEMBLY STEPS:

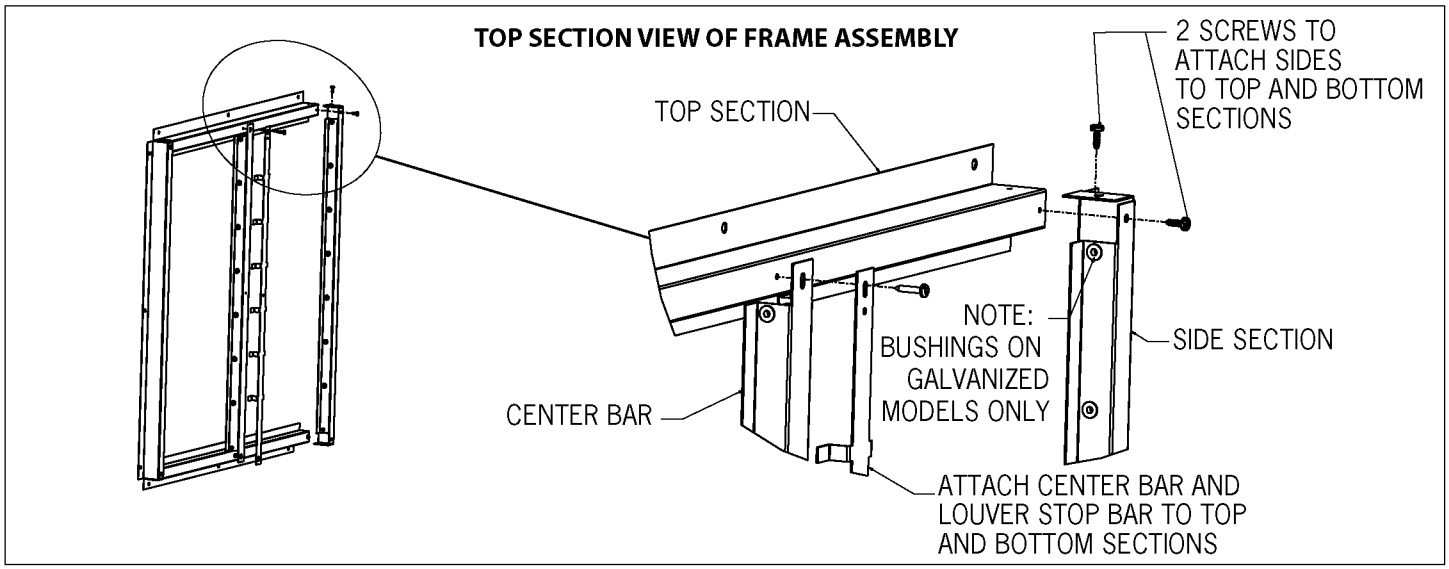
1. **Insert the bushings**:
   Push nylon pin bushings into all the 1/4" holes in the sides and center bars except for the lower most hole. Louvers are not required in the bottom holes.

NOTE: Stainless steel models do not use bushings.



2. **Assemble the frame section**:
   Use 2 - side sections and 2 - top & bottom sections and 8 - smaller #6 screws. Lay the top & bottom down on a flat surface then place the sides on to the top & bottom. Put 2 - screws in each corner with a Phillips or square screw driver. Use 1 - screw on the front or top and 1- screw on the side.

3. **Assemble the center bars and louver stops**. (Note: For 24", 36", 48".)
   Use 2 - #10- screws; one into the top and one into the bottom. Notice their is an extra hole punched below one of the assembly holes on the louver stop bracket. This hole indicates the top.



4. **Assemble the pins and louvers**:

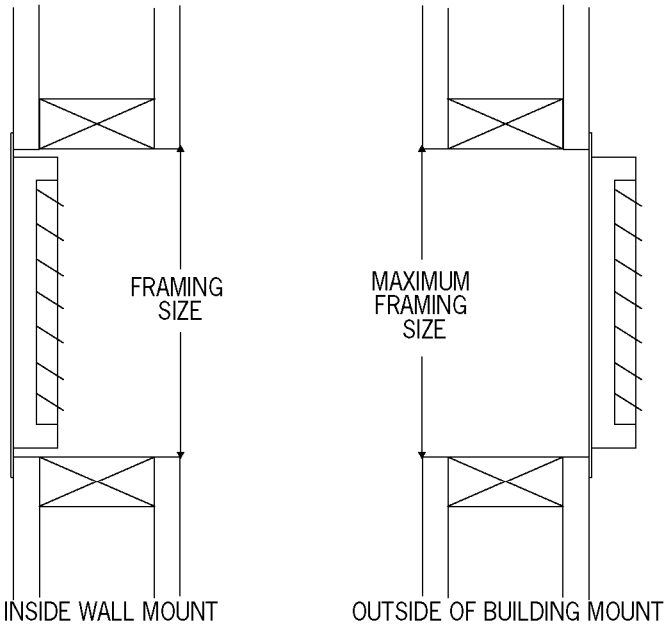
a) Kits without center bars - slide louver onto pin. Insert pin into bushing of one side (starting at bottom) and then flex the louver and pin to insert the pin into the bushing on the opposite side. Repeat for all louvers.

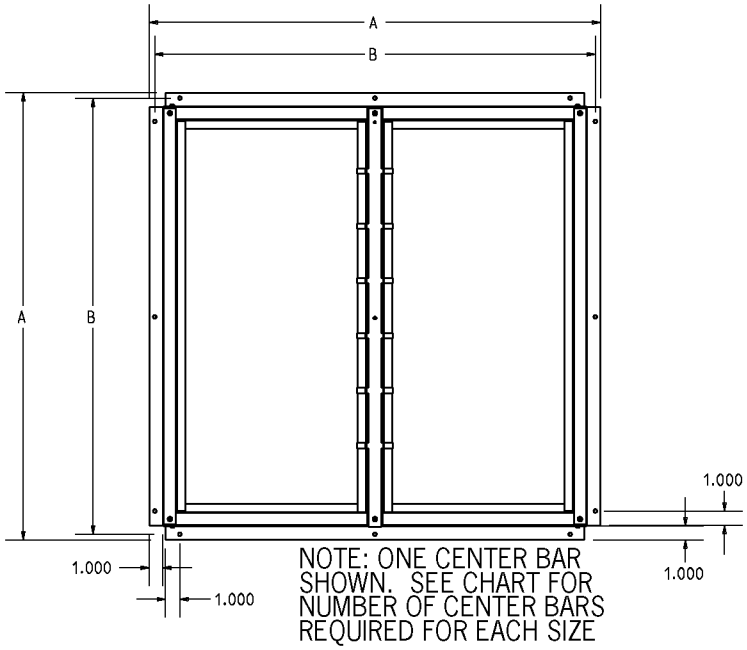
b) Kits with one center bar - Insert the pins through the center bar until roughly centered. Slide a louver onto each side of the bottom pin. Slide the pin into one side. Flex the pin and louver to insert the pins into the opposite side. Repeat for all louvers.

5. **Mounting to wall**:

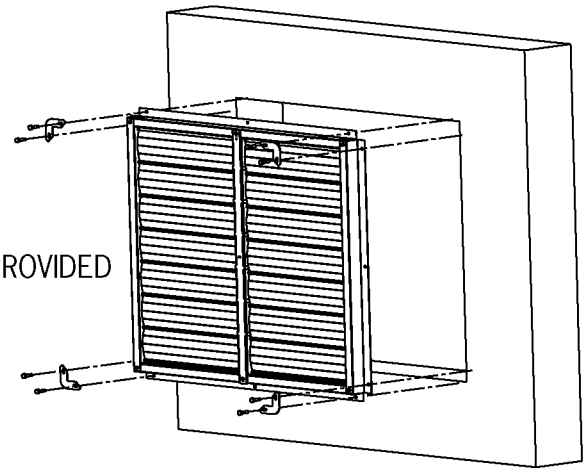
The assembled shutter can be mounted into a wall opening from the inside of the wall or over an opening on the outside of the wall. See wall mount sizing chart for framing dimensions. 5/16" mounting holes are provided around the flange. Any appropriate fastening hardware (not supplied) can be used to secure the assembly to the wall.

For better appearance, assemble with corner brackets provided (see diagram below).





Shutter Size	A	B	Number of Center Bars	Inside Wall Mount Framing Dimensions	Outside Wall Mount Maximum Opening
12"	19-1/8"	18-3/8"	0	17-5/8" Sqr.	17" Sqr.
16"	23-1/8"	22-3/8"	0	21-5/8" Sqr.	21" Sqr.
18"	25-1/8"	24-3/8"	0	23-5/8" Sqr.	23" Sqr.
20"	27-1/8"	26-3/8"	0	25-5/8" Sqr.	25" Sqr.
24"	31-1/8"	30-3/8"	1	29-5/8" Sqr.	29" Sqr.
36"	43-1/8"	42-3/8"	1	41-5/8" Sqr.	41" Sqr.
48"	55-1/8"	54-3/8"	1	53-5/8" Sqr.	53" Sqr.



NOTE:
LAG SCREWS NOT PROVIDED

CANARM®

Ensemble De Volets

Mode d'Emploi

VEUILLEZ LIRE ET GARDER CES INSTRUCTIONS



GARANTIE

Canarm Ltée., garantie ce nouvel Ensemble De Volets contre toutes défectuosités dans la fabricaton et la main d'oeuvre pour une période de un an de la date d'achat. Durant cette période, Canarm Ltée. aura l'option de réparer ou remplacer l'unité ou une pièce de l'unité si l'unité nous est retourné frais de port payé et nous constatons une défectuosité. Cette garantie exclue tous les frais de réparation et de manutention qui pourraient survenir lors du démontage et de la réinstallation de l'unité sur les lieux. Les pièces réparées ou remplacées seront garanties pour la période restante de la garantie originale. Cette garantie s'applique à l'acheteur original seulement; elle est nulle dans le cas d'altérations, d'accident, d'abus, de négligence ou lors d'une opération qu n'est pas conforme aux instructions.

AVIS: Aucune réclamation sur garantie ne sera honorée sans réception d'une autorisation au préalable de Canarm Ltée.

Problèmes d'installation ou d'utilisation? Ne retournez pas au magasin. Communiquez avec le service à la clientèle chez Canarm au 1-800-265-1833 (Canada) 1-800-267-4427 (USA) ou 1-800-567-2513 (français) du lundi au vendredi entre 8:00h et 17:00h HNE

CANARM®

ASSEMBLAGE DE L'ENSEMBLE DE VOLETS

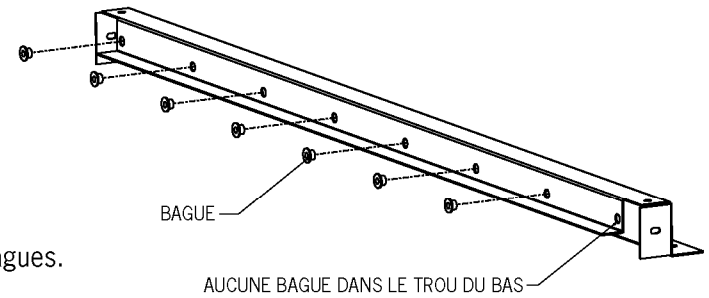
Cet ensemble de volets est très facile à assembler et installer. Suivez les étapes ci-dessous. Il peut être installé dans l'ouverture d'un mur de l'intérieur ou sur l'ouverture de l'extérieur. (Voir tableau des grandeurs.)

Vérifiez le tableau ci-dessous afin de vous assurer que vous avez toutes les pièces et la quincaillerie nécessaires.

	KDS12-SS	KDS16-SS	KDS18-SS	KDS20-SS	KDS24-SS	KDS36-GV	KDS36-SS	KDS48-GV	KDS48-SS
Côtés	2	2	2	2	2	2	2	2	2
Dessus/Dessous	2	2	2	2	2	2	2	2	2
Barre Centrale	-	-	-	-	1	1	1	1	1
Volets	4	5	6	6	14	22	22	26	26
Goupilles des Volets	4	5	6	6	7	11	11	13	13
Pinces des Coins	4	4	4	4	4	4	4	4	4
Vis à Métal #6	10	10	10	10	11	12	12	13	13
Vis à Métal #10	-	-	-	-	2	2	2	2	2
Arrêt des Volets	-	-	-	-	1	1	1	1	1
Bagues	-	-	-	-	-	46	-	55	-

ETAPES DE L'ASSEMBLAGE:

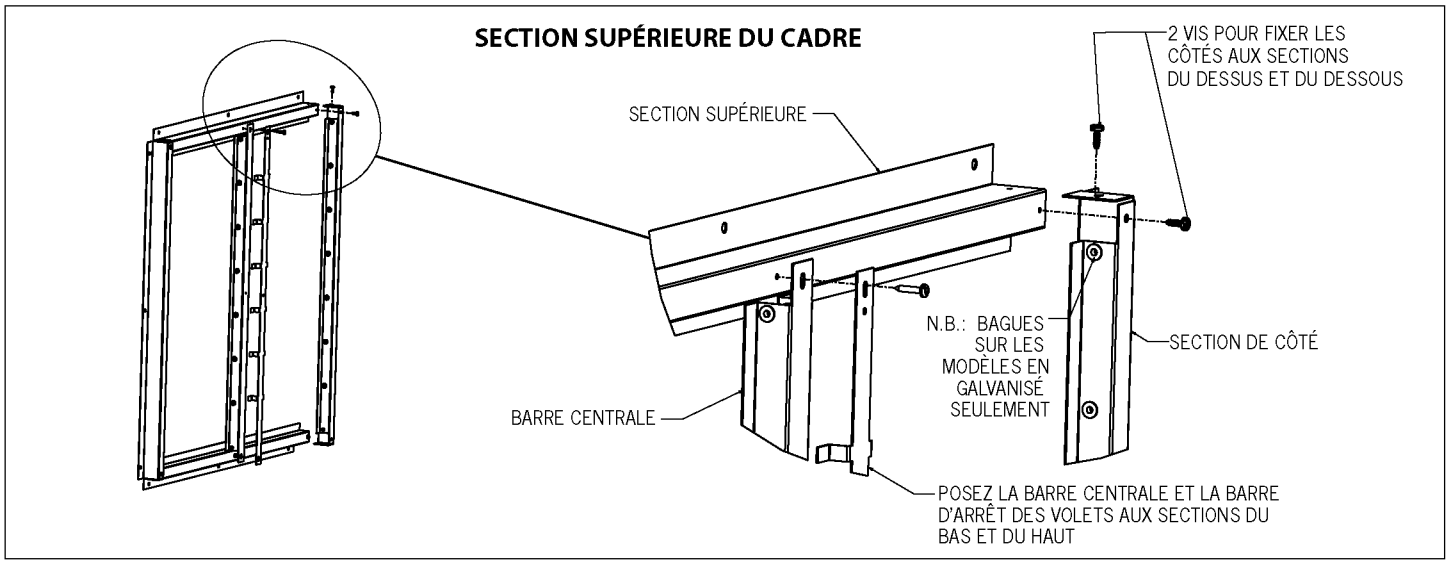
1. **Insérez les bagues**:
   Poussez les bagues de nylon dans tous les trous de 1/4" situés sur les côtés et dans la barre centrale à l'exception du trou complètement en bas. Les volets ne sont pas requis dans les trous du bas.



N.B.: Les modèles en acier inoxydable ne nécéssitent pas de bagues.

2. **Assemblez le cadre**:
   Utilisez les 2 sections de côté et les 2 sections du haut et du bas et 8 vis #6.
   Déposez les sections du haut et du bas à leurs positions respectives sur une surface plane. Posez 2 vis dans chaque coin à l'aide d'un tournevis Phillips ou un tournevis à bout carré. Utilisez 1 vis sur le devant ou dessus et 1 vis sur le côté.

3. **Assemblez les barres centrales et les arrêts.** (**N.B.**: Pour 24", 36", 48".)
   Utilisez 2 vis #10; un pour le haut et l'autre pour le bas. Vous remarquerez qu'il y a un trou supplémentaire en dessous des trous dans la ferrure d'arrêt des louvres. Ce trou vous indique le haut.



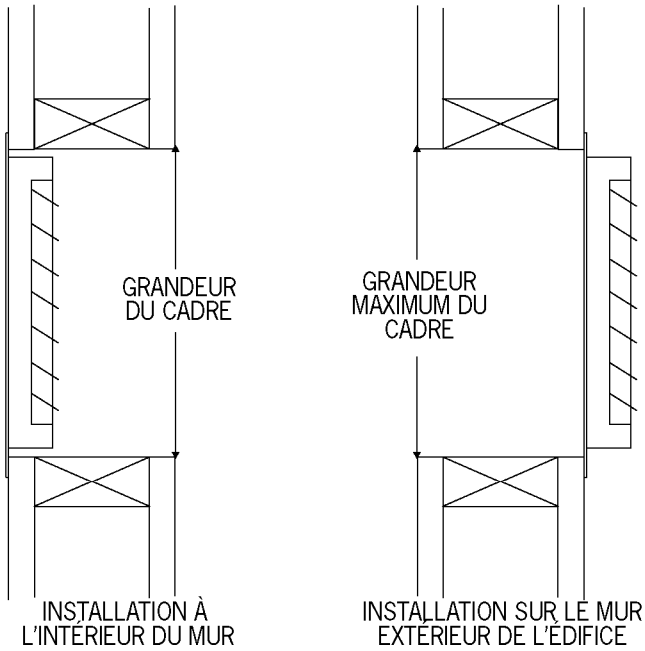
4. **Assemblez les goupilles et les volets**:

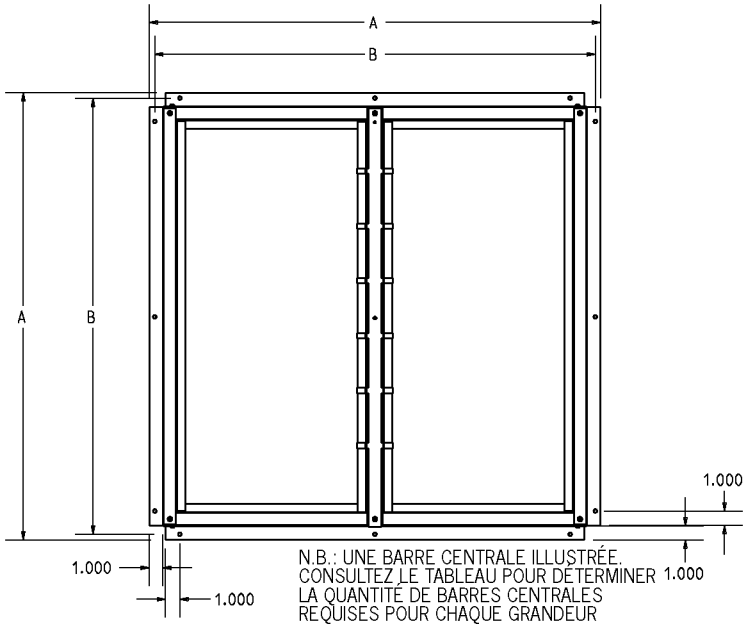
a) Ensemble sans barres centrales – glissez le volet sur la goupille. Insérez la goupille dans la bague sur un côté (débutant vers le bas) et fléchir le louvre et la goupille pour insérer la goupille dans la bague de l'autre côté.

b) Ensemble avec une barre centrale – insérez la goupille en travers de la barre centrale jusqu'à ce qu'elle soit à peu près centrée. Glissez le louvre sur chaque côté de la goupille du bas. Glissez la goupille dans le côté. Fléchissez la goupille et le louvre pour insérer la goupille dans le côté opposé. Répétez pour chaque volet.

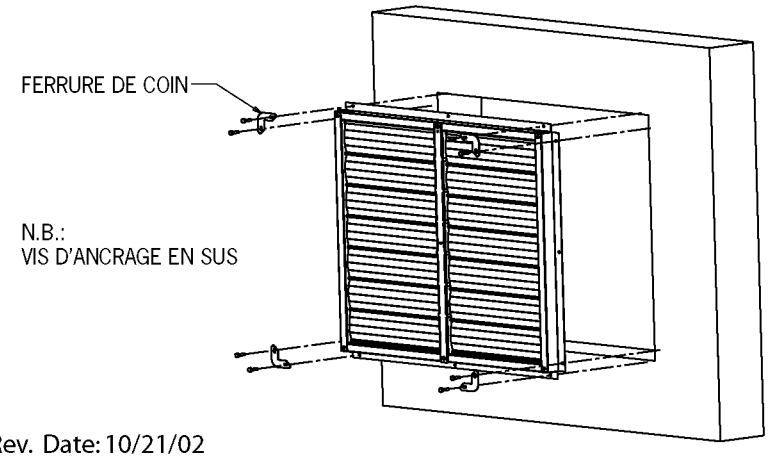
5. **Pose au mur**:
Le volet une fois assemblé peut être posé dans une ouveture du mur par l'intérieur du mur ou sur l'ouverture de l'extérieur. Voir le tableau des dimensions pour le cadre. Des trous de 5/16" sont déjà perforés autour du rebord. Utilisez une quincaillerie adéquate (pas incluse) pour l'installation au mur.

Pour une meilleure apparence, utilisez les ferrures de coin fournies (voir diagramme ci-dessous).





Grandeur Du Volet	A	B	Quantité De Barres Centrales	Dimensions Du Cadre Lorsque Installé à L'Intérieur Du Mur	Dimensions Maximum Du Cadre Lorsque Installé à L'Extérieur
12"	19-1/8"	18-3/8"	0	17-5/8" Sqr.	17" Sqr.
16"	23-1/8"	22-3/8"	0	21-5/8" Sqr.	21" Sqr.
18"	25-1/8"	24-3/8"	0	23-5/8" Sqr.	23" Sqr.
20"	27-1/8"	26-3/8"	0	25-5/8" Sqr.	25" Sqr.
24"	31-1/8"	30-3/8"	1	29-5/8" Sqr.	29" Sqr.
36"	43-1/8"	42-3/8"	1	41-5/8" Sqr.	41" Sqr.
48"	55-1/8"	54-3/8"	1	53-5/8" Sqr.	53" Sqr.



xylem
Let's Solve Water

INSTRUCTION MANUAL
IM228R08



Model e-SV

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

GOULDS
WATER TECHNOLOGY
a xylem brand

Table of Contents

SUBJECT	PAGE
e-SV Product Line Numbering System	3
Safety Instructions	7
Overview	7
Product Description	7
Applications	7
Pre-Installation Checks	7
Transportation and Storage	9
Installation	10
Start-Up	12
Operation	13
Maintenance	13
Mechanical Seal Replacement (Sizes 1SV-125SV)	14
Mechanical Seal Replacement (Sizes 33SV-125SV) Fitted with Cartridge Seals	14
Motor Replacement	15
Troubleshooting Guide	16
Engineering Data	16
Typical Plumbing and Installation	16
e-SV Major Components	17-19
Limited Warranty	21

Owner's Information

Pump Model Number: _____

Pump Serial Number: _____

Control Model Number: _____

Dealer: _____

Dealer Phone No.: _____

Date of Purchase: _____ Installation: _____

Current Readings at Startup:

1 Ø	3 Ø	L1-2	L2-3	L3-1
Amps: _____	Amps: _____	_____	_____	_____
Volts: _____	Volts: _____	_____	_____	_____

e-SV Product Line
Numbering System for 1 – 22SV Liquid End Only

The various versions of the e-SV line are identified by a product code number on the pump label. This number is also the catalog number for the pump. The meaning of each digit in the product code number is shown below. **Note:** Not all combinations are possible.

Example Product Code

22 SV 0 2 F E 3 0 _ _

Special Configurations (optional Characters)

A = Jacketed Seal only	J = Horizontal mount + Passivation
B = Jacketed Seal + Passivation	K = Horizontal mount + Low NPSH
C = Jacketed Seal + Low NPSH	L = Horizontal mount + High Pressure
E = Electro-Polished	N = Low NPSH only
F = Destaged - 1 stage	P = Passivation only
G = Destaged - 2 stage	S = Customized Configuration
H = Horizontal mount only	Z = High pressure only

Seal Material

0 = Carb-SilCar-Viton (Standard)
1 = Carb-SilCar-AFLAS (HighTemp)
2 = SilCar-SilCar-Viton
4 = SilCar-SilCar-EPR
6 = Carb-SilCar-EPR

Pole-Hz-Phase

1 = 2–50	3 = 2–60
2 = 4–50	4 = 4–60

Motor Frame (NEMA)

A = 56C	E = 280TC
B = 180TC	F = 320TSC
C = 210TC	G = 360TSC
D = 250TC	H = 140TC

Configuration

			Top / Bottom
C = Clamp-316	P = Victaulic-316	R =	(SVC) 12Suct-12Disch
F = Round-304 (SVB)	T = Oval-304 (SVA)	W =	(SVC) 12Suct-03Disch
G = CI-304		X =	(SVC) 12Suct-06Disch
N = Round-316 (SVD)		Y =	(SVC) 12Suct-09Disch

Suction discharge location

Total Number of Impeller Stages (may be 1 or 2 characters)

Product Line:

SV – Stainless Vertical

Nominal Flow:

1 = 5 GPM	10 = 53 GPM
3 = 16 GPM	15 = 80 GPM
5 = 26 GPM	22 = 116 GPM

e-SV Product Line
Numbering System for 33 – 125SV Liquid End Only

The various versions of the e-SV line are identified by a product code number on the pump label. This number is also the catalog number for the pump. The meaning of each digit in the product code number is shown below. **Note:** Not all combinations are possible.

Example Product Code

125 SV 8 1 2 B F E 2 0 __

Special Configurations (optional Characters)

E = Electro-Polished
F = Destaged - 1 stage
G = Destaged - 2 stage
H = Horizontal mount only
J = Horizontal mount + Passivation
K = Horizontal mount + Low NPSH (33, 46, and 66 only)
L = Horizontal mount + High Pressure
N = Low NPSH only (33, 46, and 66 only)
P = Passivation only
S = Customized Configuration
Z = High pressure (250/300# pump body)

Seal Material

0 = Carb-SilCar-Viton
2 = SilCar-SilCar-Viton
4 = SilCar-SilCar-EPR
6 = Carb-SilCar-EPR
7 = Carb-SilCar-Viton (Cart)
8 = SilCar-SilCar-EPR (Cart)

Pole-Hz-Phase

1 = 2–50
2 = 4–50
3 = 2–60
4 = 4–60

Motor Frame (NEMA)

A = 56C
B = 180TC
C = 210TC
D = 250TC
E = 280TC
F = 320TSC
G = 360TSC
H = 140TC

Configuration

G = Round-CI-304
N = Round-316

125SV ONLY

Reduced Trim Diameter A = 141 mm B = 136 mm C = 145 mm (full dia.)
Blank if 33-92SV

Number of Reduced Trim Impellers (0, 1, 2)

Total Number of Impellers/Stages

Product Line: SV – Stainless Vertical

Nominal Flow:

33 = 175 GPM
46 = 240 GPM
66 = 350 GPM
92 = 485 GPM
125 = 660 GPM

e-SV Product Line
Numbering System for 1 – 22SV Pump & Motor Combination

The various versions of the e-SV line are identified by a product code number on the pump label. This number is also the catalog number for the pump. The meaning of each digit in the product code number is shown below. **Note:** Not all combinations are possible.

Example Product Code

2 SV 2 2 F A 2 F 5 1 A H

Special Configurations (1 or 2 Characters)

A = Jacketed Seal only	K = Horizontal mount + Low NPSH
B = Jacketed Seal + Passivation	L = Horizontal mount + High Pressure
C = Jacketed Seal + Low NPSH	M = i-Alert
E = Electro-Polished	N = Low NPSH only
F = Destaged - 1 stage	P = Passivation only
G = Destaged - 2 stage	S = Customized Configuration
H = Horizontal mount only	Z = High Press (250/300# pump body)
J = Horizontal mount + Passivation	

Seal Material

0 = Carb-SilCar-Viton	4 = SilCar-SilCar-EPR
1 = Carb-SilCar-AFLAS (HighTemp)	6 = Carb-SilCar-EPR
2 = SilCar-SilCar-Viton	

Motor Enclosure

1 = ODP	5 = Prem-ODP	9 = Marine
2 = TEFC	6 = Prem-TEFC	A = Chem
3 = X-Proof	7 = Prem-XP	B = Prem-Chem
4 = WD - Tropical	8 = Prem-WD	C = Class 1 Div 2

Voltage

A = 115/230	H = 190/380	R = 220
B = 230	J = 115/208-230	S = 415
C = 230/460	K = 208	T = 220/380 WYE
D = 460	L = 208-230	U = 380-660 WYE
E = 575	M = 190-380/415	V = 208-230/460 WYE
F = 208-230/460	N = 380	
G = 200	P = 110/220	

Pole-Hz-Phase

1 = 2-50-1	4 = 2-60-3	7 = 4-60-1
2 = 2-50-3	5 = 4-50-1	8 = 4-60-3
3 = 2-60-1	6 = 4-50-3	

HP Rating

A = 0.50	F = 3	L = 20
B = 0.75	G = 5	M = 25
C = 1.00	H = 7.5	N = 30
D = 1.50	J = 10	P = 40
E = 2	K = 15	

Configuration OPTION

C = Clamp-316	
F = Round-304 (SVB)	
G = CI-304	
N = Round-316 (SVD)	
P = Victaulic-316	
T = Oval-304 (SVA)	

Top / Bottom

R =	(SVC) 12Suct-12Disch	Suction discharge location
W =	(SVC) 12Suct-03Disch	
X =	(SVC) 12Suct-06Disch	
Y =	(SVC) 12Suct-09Disch	

Total Number of Impeller Stages (may be 1 or 2 characters)

Product Line:

SV – Stainless Vertical

Nominal Flow:

1 = 5 GPM	10 = 53 GPM
3 = 16 GPM	15 = 80 GPM
5 = 26 GPM	22 = 116 GPM

e-SV Product Line
Numbering System for 33 – 125SV Pump & Motor Combination

The various versions of the e-SV line are identified by a product code number on the pump label. This number is also the catalog number for the pump. The meaning of each digit in the product code number is shown below. **Note:** Not all combinations are possible.

Example Product Code

125 SV 8 2 A G K 3 F 2 0 _ _

Special Configurations (1 or 2 Characters)

E = Electro-Polished	L = Horizontal mount + High Pressure
F = Destaged - 1 stage	M = i-Alert
G = Destaged - 2 stage	N = Low NPSH only (33, 46 and 66 only)
H = Horizontal mount only	P = Passivation only
J = Horizontal mount + Passivation	S = Customized Configuration
K = Horizontal mount + Low NPSH	Z = High Press (250/300# pump body/Casing)

Seal Material

0 = Carb-SilCar-Viton	6 = Carb-SilCar-EPR
2 = SilCar-SilCar-Viton	7 = Carb-SilCar-Viton (Cart)
4 = SilCar-SilCar-EPR	8 = SilCar-SilCar-EPR (Cart)

Motor Enclosure

1 = ODP	5 = Prem-ODP	9 = Marine
2 = TEFC	6 = Prem-TEFC	A = Chem
3 = X-Proof	7 = Prem-XP	B = Prem-Chem
4 = WD - Tropical	8 = Prem-WD	C = Class 1 Div 2

Voltage

A = 115/230	H = 190/380	R = 220
B = 230	J = 115/208-230	S = 415
C = 230/460	K = 208	T = 220/380 WYE
D = 460	L = 208-230	U = 380-660 WYE
E = 575	M = 190-380/415	V = 208-230/460 WYE
F = 208-230/460	N = 380	
G = 200	P = 110/220	

Pole-Hz-Phase

1 = 2-50-1	4 = 2-60-3	7 = 4-60-1
2 = 2-50-3	5 = 4-50-1	8 = 4-60-3
3 = 2-60-1	6 = 4-50-3	

HP Rating

A = 0.50	G = 5	N = 30
B = 0.75	H = 7.5	P = 40
C = 1.00	J = 10	R = 50
D = 1.50	K = 15	S = 60
E = 2	L = 20	T = 75
F = 3	M = 25	U = 100

Configuration

G = Round-CI-304
N = Round-316

125SV ONLY

Reduced Trim Diameter A = 141 mm B = 136 mm C = 145 mm (full dia.)
Blank if 33-92SV

Number of Reduced Trin Impeller (0, 1, 2)

Total Number of Impeller Stages (may be 1 or 2 characters)

Product Line:

SV – Stainless Vertical

Nominal Flow:

33 = 175 GPM	92 = 485 GPM
46 = 240 GPM	125 = 660 GPM
66 = 350 GPM	

SAFETY INSTRUCTIONS

TO AVOID SERIOUS OR FATAL PERSONAL INJURY OR MAJOR PROPERTY DAMAGE, READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN MANUAL AND ON PUMP.

THIS MANUAL IS INTENDED TO ASSIST IN THE INSTALLATION AND OPERATION OF THIS UNIT AND MUST BE KEPT WITH THE PUMP.

This is a **SAFETY ALERT SYMBOL.** When you see this symbol on the pump or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.

⚠ DANGER Warns of hazards that **WILL** cause serious personal injury, death or major property damage.

⚠ WARNING Warns of hazards that **CAN** cause serious personal injury, death or major property damage.

⚠ CAUTION Warns of hazards that **CAN** cause personal injury or property damage.

NOTICE: INDICATES SPECIAL INSTRUCTIONS WHICH ARE VERY IMPORTANT AND MUST BE FOLLOWED.

THOROUGHLY REVIEW ALL INSTRUCTIONS AND WARNINGS PRIOR TO PERFORMING ANY WORK ON THIS PUMP.

MAINTAIN ALL SAFETY DECALS.

⚠ WARNING



Hazardous fluids can cause fire, burns or death.

UNIT NOT DESIGNED FOR USE WITH HAZARDOUS LIQUIDS OR FLAMMABLE GASES. THESE FLUIDS MAY BE PRESENT IN CONTAINMENT AREAS.

OVERVIEW

The purpose of this manual is to provide the necessary information for proper installation, operation and maintenance of the e-SV pump. The instructions and warnings provided below concern the standard version, as described in the sale documents. Special versions may be supplied with supplementary instructions leaflets. Please refer to the sale contract for any modifications or special version characteristics. Always specify the exact pump type and identification code when requesting technical information or spare parts from our Sales and Service department. For instructions, situations or events not considered in this manual or in the sale documents, please contact your distributor.

Read this manual before installing and using the product. Improper use may cause personal injury and damage to property and lead to the forfeiture of the warranty coverage.

PRODUCT DESCRIPTION

The e-SV pump is a vertical multistage, non-self priming pump which can be coupled to standard electric motors. For the pump sizes 1SV-22SV, some of the metal parts that are in contact with the pumped liquid are made of stainless steel, others are made of cast iron. They are available in different versions according to the position of the suction and delivery ports and the shape of the connection flanges. For the sizes 33SV-125SV, some of the metal parts in contact with the pumped liquid are made of stainless steel, others are made of cast iron. A special version is available, in which all the metal parts in contact with the pumped liquid are made of stainless steel. If you purchase a pump without the electric motor, make sure that the motor you use is suitable for coupling to the pump. All e-SV pumps are equipped with a special mechanical seal designed for easy replacement without having to disassemble the entire pump.

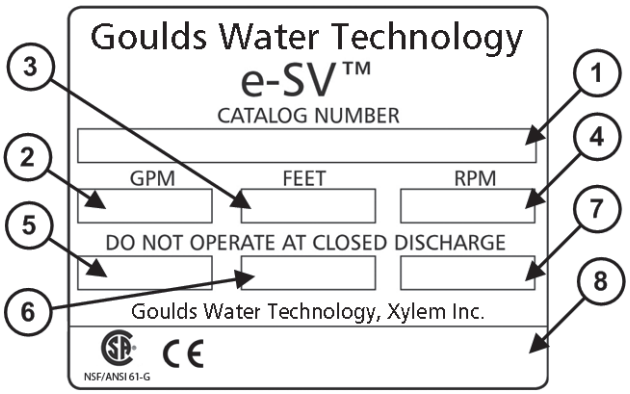
APPLICATIONS

These pumps are suitable for civil and industrial water distribution systems, pressure booster, irrigation (agriculture, sporting facilities), water treatment, boiler feed, parts washing, cooling - air conditioning - refrigeration and fire fighting applications. The factory may be able to configure certain models for pumping liquids having atypical water and/or wastewater characteristics (e.g., acidic, basic, petrochemical or other non-aqueous liquids, etc.). Any such specialty use requires consultation with factory and engineering personnel for a detailed application-specific evaluation.

1. NAMEPLATE

Do not use this pump/electric pump unit to handle flammable and/or explosive liquids.

⚠ WARNING Do not use this pump to handle liquids containing abrasive, solid or fibrous substances.



1	Goulds Water Technology Catalog Number
2	Capacity Range
3	TDH Range
4	Rated Speed
5	Rated Horsepower
6	Maximum Operating Pressure
7	Maximum Operating Temperature
8	Pump Serial Number

PRE-INSTALLATION CHECKS

Confirm that the pump is capable of meeting the desired operating conditions.

1. MINIMUM INLET (SUCTION) PRESSURE

In general, the minimum suction pressure required is that which provides adequate $NPSH_A$ necessary to feed the pump. The required NPSHr, expressed in feet, can be found on the performance curve for the pump at the specific duty point. It is recommended

that the $NPSH_A$ exceeds the NPSHr by a minimum of (2) two feet as a safety margin and to insure long term reliable performance of your e-SV pump.

$$P_{S_{MIN}} = NPSHr + 2\ ft.$$

NOTE: THE $NPSH_A$ MUST BE CALCULATED FOR THE SPECIFIC SYSTEM TO WHICH THE e-SV PUMP IS TO BE INSTALLED. PLEASE CONTACT YOUR DEALER/DISTRIBUTOR IF YOU REQUIRE ASSISTANCE.

2. SUCTION

In theory, a pump could suck water from a source located 10.33 meters lower than the pump's own installation level, but this does not happen because the pump offers its own intrinsic flow resistance, moreover the suction capacity is reduced as a result of flow resistance in the piping, height difference, liquid temperature and elevation above sea level.

A wrong choice in the altimetric placement of the pump could lead to cavitation.

With reference to Figure below and given Z as the maximum height the pump can be installed to, with reference to the level of the liquid source it can be stated the following:

In SI Units:

$Z = P_b \bullet 10,2 - NPSH - H_f - H_v - 0,5$ [m]

P_b = Barometric pressure [bar] (absolute)

$NPSH_r$ = NPSH required by pump [m]

H_f = Losses [m] in suction piping

H_v = Vapor pressure [m] at application temp [C]

1,5 = 1,5 [m] safety factor

In English Units:

$Z = P_b - NPSH_r - H_f - H_v - 1.5$

P_b = Barometric pressure [ft] (absolute)

$NPSH_r$ = NPSH required by pump [ft]

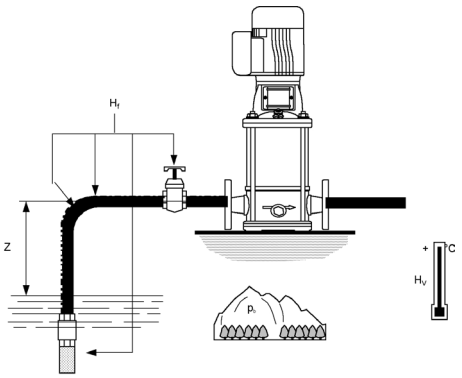
H_f = Losses [ft] in suction piping

H_v = Vapor pressure [ft] at application temp [F]

1.5 = 1.5 [ft] safety factor

With meanings given in the above table it can be stated that:
If $Z \geq 0$ pump can work with a maximum suction height equal to Z.

If $Z < 0$ pump must be provided of an inlet pressure equal to –Z.



Temp		Hv	
C	F	m	ft
20	68	0.23	0.75
30	86	0.43	1.41
40	104	0.75	2.46
50	122	1.26	4.13
60	140	2.03	6.66
70	158	3.18	10.43
80	176	4.83	15.84
90	194	7.15	23.45
100	212	10.34	33.92
110	230	14.61	47.92
120	248	20.27	66.49

⚠WARNING Do not use the pump if cavitation occurs, as its internal components could be damaged.

⚠WARNING If hot water is pumped, guarantee an appropriate condition on the suction side to prevent cavitation.

⚠WARNING Make sure that the sum of the pressure on the suction side (water system, gravity tank) and the maximum pressure delivered by the pump does not exceed the maximum working pressure allowed (nominal pressure PN) for the pump.

3. MAXIMUM INLET PRESSURE, 60 HZ

$p_{1max} \leq PN - pmax$

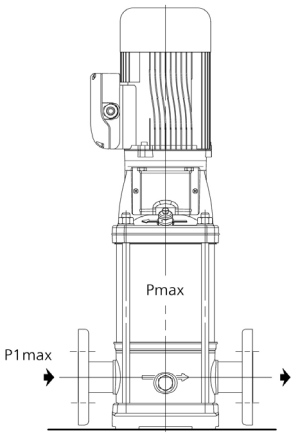
Having the following meaning of the symbols:

p_{max} = Maximum pressure delivered by the pump

p_{1max} = Maximum inlet pressure

PN = Maximum operating pressure

If a motor with an axially locked shaft (standard) is used, be sure that the above formula is fulfilled, if not please contact the Sales and Service Department.



The following table shows the maximum permissible inlet pressure. However, the actual inlet pressure + pressure against a closed valve must always be lower than the maximum permissible operating pressure.

Pump	Stages	P_{1max} (psig)
1SV	2-5 6-10 11-30	145 218 PN-Pmax
3SV	2-3 4-7 8-30	145 218 PN-Pmax
5SV	2-3 4-6 7-27	145 290 PN-Pmax
10SV	1-2 3-5 6-20	145 290 PN-Pmax
15SV	1-2 3 4-15	145 290 PN-Pmax
22SV	1-2 3 4-12	145 290 PN-Pmax

Pump	Stages	P_{1max} (psig)
33SV	1/1-2/2 2/1-5/2 5/1-7/2 7/1-10	45 145 218 PN-Pmax
46SV	1/1-1 2/2-2 3/2-4/1 4-10/2	145 218 290 PN-Pmax
66SV	1/1-3/2 3/1-4/1 4-5/1 5-6	72 145 218 PN-Pmax
92SV	1/1-2/2 2/1-3/2 3/1-3 4/2-5/1	72 145 218 PN-Pmax
125SV	1-3/3B 3-5/5A	290 PN-Pmax

4. MAXIMUM OPERATING PRESSURE

(staging at 3500 RPM)

Pump	Stages	PSI / Bar
1SV	1-29	362 / 25
	30	580 / 40
3SV	1-23	362 / 25
	24-30	580 / 40
5SV	1-23	362 / 25
	24-27	580 / 40
10SV	1-14	362 / 25
	15-20	580 / 40
15SV	1-11	362 / 25
	12-15	580 / 40
22SV	1-11	362 / 25
	12	580 / 40
33SV	1-6	362 / 25
	7-10	580 / 40
46SV	1-5	362 / 25
	6-10	580 / 40
66SV	1-5	362 / 25
	6	580 / 40
92SV	1-5	362 / 25
125SV	1-6	362 / 25

NOTE: Oval flange (1-22SV) maximum working pressure is 232 psi (16 bar).

5. TEMPERATURE CAPABILITY

The e-SV pump is capable of pumping liquids within the below temperature range:

Standard Seal

1SV-22SV -22°F to 250°F (-30°C to 120°C)

33SV-125SV -22°F to 250°F (-30°C to 120°C)

High Temperature Seal

1SV-22SV -22°F to 300°F (-30°C to 149°C)

33SV-125SV N/A

NOTE: In order to provide adequate cooling for the electric motor, the ambient temperature must be 32° F to 104° F and the relative humidity at 104° F must not exceed 50%.

For temperatures above 104° F and for installations sites located at elevation in excess at 3000 feet above sea level it may be necessary to derate the motor performance. Please contact your distributor/dealer for assistance.

6. MINIMUM NOMINAL FLOW RATE

To prevent overheating of the internal pump components, make sure that a minimum water flow is always guaranteed when the pump is running.

For continuous operation the minimum flow rate recommended is specified below.

Pump Size	Minimum Flow GPM			
	3500 RPM	1750 RPM	2900 RPM	1450 RPM
1SV	2	1	2	1
3SV	3	2	3	2
5SV	7	4	6	3
10SV	9	5	8	4
15SV	18	9	15	7
22SV	21	11	18	9
33SV	35	18	8	4
46SV	40	20	10	5
66SV	70	35	14	7
92SV	100	50	20	10
125SV	128	64	106	53

NOTE: If this cannot be achieved, then a bypass/ recirculate line is recommended.

⚠WARNING **Do not run the pump against a closed discharge for longer than a few seconds.**

7. NUMBER OF STARTS PER HOUR

For electric pumps coupled to motors supplied by Goulds Water Technology, the maximum number of work cycles (starts and stops) in one hour are as follows:

HP	Max. Starts Per Hour*	Min. Run Time Between Starts (sec)
0.5	24	120
0.75	24	120
1	15	75
1.5	13	76
2	12	77
3	9	30
5	8	83
7.5	7	88
10	6	92
15	5	100
20	5	110
25	5	115
30	4	120
40	4	130
50	3	145
60	3	170
75	3	180

** For more details, refer to technical manual.*

⚠WARNING **If you use a different motor from the standard one supplied by Goulds Water Technology, please consult with the motor manufacturer to find out the maximum number of work cycles allowed.**

8. POWER SUPPLY REQUIREMENTS

⚠WARNING **Make sure that the supply voltages and frequencies are suited to the characteristics of the electric motor. Check the motor rating plate.**

In general, the supply voltage tolerances for motor operation are as follows:

Hz	Phase	U_N	
		V	±%
60	1	230	10
60	3	230 / 460	10
60	3	460	10

TRANSPORTATION AND STORAGE

1. TRANSPORTATION AND HANDLING OF PACKED PRODUCT

⚠WARNING The e-SV pump is packed in cartons or wooden crates having different dimensions and shapes.

Some cartons (the supporting base is made of wood) are designed to be transported and handled in the vertical position. Other cartons, as well as the wooden crates, are designed to be transported and handled in the horizontal position. Protect the product against humidity, heat sources and mechanical damage (collisions, falls, ...). Do not place heavy weights on the cartons.

Lift and handle the product carefully, using suitable lifting equipment. Observe all the accident prevention regulations.

When you receive the pump, check the outside of the package for evident signs of damage. If the product bears visible signs of damage, notify our distributor within 8 days from the delivery date.

2. STORING THE PACKED PRODUCT

Ambient temperature 32° F to 104° F.

Short Term: (Less than 6 months) Goulds Water Technology normal packaging procedure is designed to protect the pump during shipping. Upon receipt, store in a covered and dry location.

Long Term: (More than 6 months) Rotate shaft several times every 3 months. Refer to driver and coupling manufacturers for their long term storage procedures. Store in a covered dry location.

3. UNPACKING THE PRODUCT

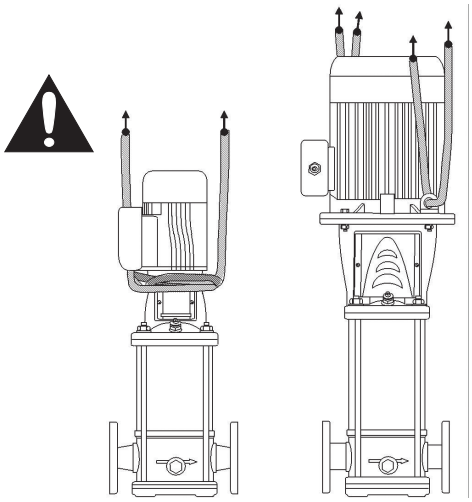
Use suitable equipment. Observe all the accident prevention regulations in force. Lift and handle the product carefully, using suitable lifting equipment.

When you receive the pump, check the outside of the package for evident signs of damage. If the product bears visible signs of damage, notify our distributor within 8 days from the delivery date.

4. HANDLING THE PRODUCT

Lift and handle the product carefully, using suitable lifting equipment. Observe the accident prevention regulations in force.

The product must be securely harnessed for lifting and handling. Some electric pumps have eyebolts that can be used for this purpose.



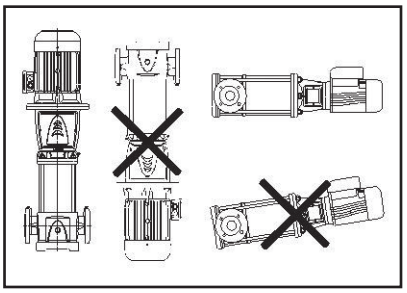
INSTALLATION

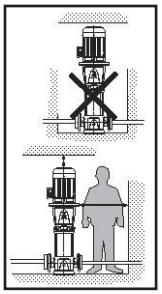
The installation operations must be carried out by qualified and experienced personnel. Use suitable equipment and protections. Observe the accident prevention regulations in force.

Always refer to the local and/or national regulations, legislation and codes in force relating to the selection of the installation site and the water and power connections.

1. SITE SELECTION

Make sure that no obstructions or obstacles hinder the normal flow of the cooling air delivered by the motor fan. Make sure there is adequate clearance around the pump for the maintenance operations. Whenever possible, raise the pump slightly from the level of the floor. See the figures below and at the top of the next column for possible installation configurations. Horizontal operation requires special mounting with a horizontally configured pump.

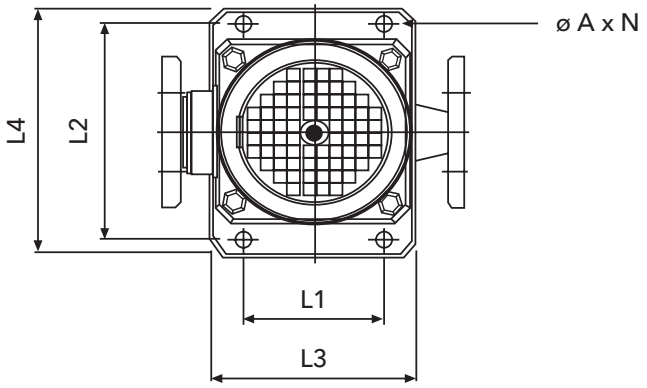




2. ANCHORING

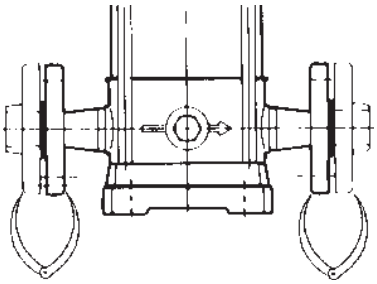
The pump must be anchored securely with bolts to a concrete foundation or equivalent metal structure (shelf or platform). If the pump is large-sized and needs to be installed near rooms inhabited by people, suitable vibration-damping supports should be provided to prevent the transmission of the vibrations from the pump to the reinforced concrete structure. The dimensions of the pump base and anchoring holes are shown.

	1SV-5SV	10SV-22SV	33SV	46SV-92SV	125SV
	in (mm)				
L1	3.94 (100)	5.12 (130)	6.69 (170)	7.48 (190)	10.83 (275)
L2	7.09 (180)	8.46 (215)	9.45 (240)	10.43 (265)	14.96 (380)
L3	5.91 (150)	7.28 (185)	8.66 (220)	9.45 (240)	12.99 (330)
L4	8.27 (210)	9.65 (245)	11.42 (290)	12.4 (315)	17.72 (450)
Ø A	0.51 (13)		0.59 (15)		0.75 (19)
N	0.16(4)				

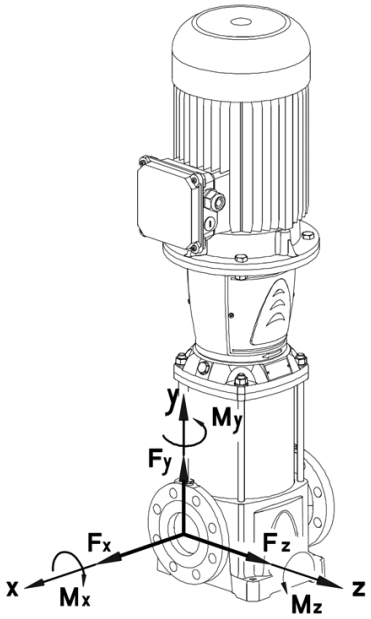


3. FLANGE ALIGNMENT AND LOADING

Angular alignment of the suction and discharge flanges can best be accomplished using calipers at the bolt locations. See figure below.



NOTICE: DO NOT DRAW PIPING INTO PLACE BY FORCING THE PUMP SUCTION OR DISCHARGE CONNECTIONS.



4. PIPING

Discharge and suction piping should be no smaller than the respective pump opening and should be kept as short as possible, avoiding unnecessary fittings to minimize friction losses.

NOTICE: PIPING MUST BE INDEPENDENTLY SUPPORTED AND NOT PLACE ANY PIPING LOADS ON THE PUMP.

If suction piping larger than pump suction is required, an eccentric pipe reducer, **WITH THE STRAIGHT SIDE UP**, must be installed at the pump suction.

If the pump is installed below the liquid source, install a full flow isolation valve in the suction piping for pump inspection or maintenance.

NOTICE: DO NOT USE THE ISOLATION VALVE ON THE SUCTION SIDE OF THE PUMP TO THROTTLE PUMP. THIS MAY CAUSE LOSS OF PRIME, EXCESSIVE TEMPERATURES, DAMAGE TO PUMP AND VOID WARRANTY.

If pump is installed above the liquid source, the following **MUST** be provided:

To avoid air pockets, no part of the suction piping should be above the pump suction.

On any horizontal piping sections, slope piping upward from liquid source.

All suction pipe joints **MUST** be airtight.

Use a foot valve for priming, or for holding prime during intermittent duty.

The suction strainer or suction bell **MUST** be at least 3 times the suction pipe diameter.

Insure that the size and minimum liquid submergence, over the suction inlet, is sufficient to prevent air from entering through a suction vortex. See typical suction piping Figures 1 through 4.

Install a discharge check valve, suitable to handle the flow and liquids, to prevent backflow.

Install an appropriately sized gate valve, **AFTER** the discharge valve, to regulate the pump capacity, for pump inspection and for maintenance.

When a pipe increaser is required, install between the check valve and the pump discharge.

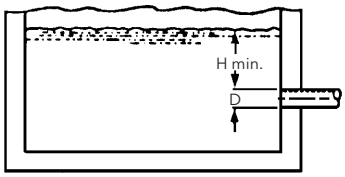


Figure 1

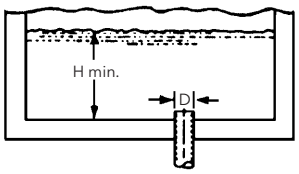


Figure 2

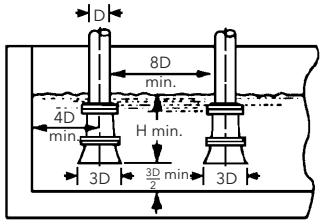


Figure 3

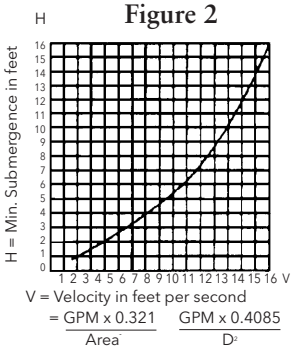


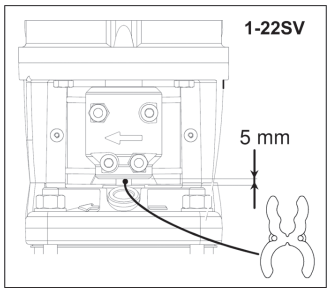
Figure 4

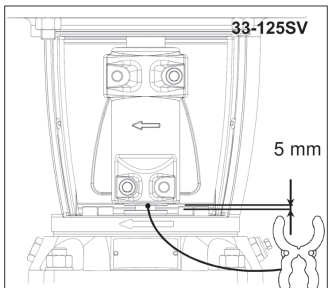
5. SHAFT ALIGNMENT – MOTOR TO PUMP

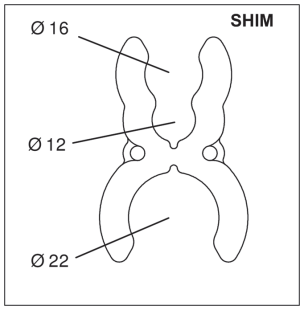
When the pump is purchased less motor, the pump will be supplied with a motor assembly shim positioned between the motor adapter and the coupling.

To assemble the motor to the pump remove the plastic shipping straps, the 2 stainless steel coupling guard halves, and the expanded polyurethane.

Insure that the motor assembly shim is properly positioned between the coupling and the motor adapter. If the motor assembly shim is not available, a 0.203" (5 mm) shim may be used to locate the pump shaft assembly and to set the correct height. See figures below.







For 1-22SV pumps using motor frame sizes 213TC – 256TC, place adapter ring on top flange of motor adapter. For 33-125SV pumps using motor frame sizes 284TC – 286TC, motor frame sizes 213TC and larger, attach the motor adapter flange to the motor using 4 hex cap screws. Torque to values shown in the **"ENGINEERING DATA"** section of this manual.

Loosen the 4 coupling socket head screws enough to provide an adequate opening in the coupling to receive the motor shaft.

With an adequately sized crane, carefully lower the motor assembly onto the pump motor adapter and into the coupling. Secure the 4 motor hex cap screws, torquing to the value provided in the **"ENGINEERING DATA"** section of this manual.

Torque the 4 coupling socket head screws to the value provided in **"ENGINEERING DATA"** section of this manual. After assembly, the gap between the coupling halves should be equal.

For the 33 through 125SV sizes using a cartridge seal, after coupling bolts have been properly torqued, there are four set screws on the collar of the cartridge seal that require tightening before removing the shim. The four hex head set screws require a 1/8" allen wrench and are to be tightened hand-tight approximately 5 lbs.-ft. (7 N·m).

Remove the motor assembly shim and retain for future use.

Install the 2 coupling guard halves.

START-UP

1. WATER CONNECTION

The water connections must be made by qualified installation technicians in compliance with the regulations in force.

In case of connection to the water system, the regulations issued by the competent authorities (municipal, public utility company) must be observed. Authorities often require the installation of a backflow prevention device, such as a disconnector, check valve or disconnection tank.

2. WIRING AND GROUNDING



Install, ground and wire according to local and National Electrical Code requirements.

Install an all leg disconnect switch near pump.

Disconnect and lockout electrical power before installing or servicing pump.

Electrical supply **MUST** match pump's nameplate specifications. Incorrect voltage can cause fire, damage motor and voids warranty.

Motors equipped with automatic thermal protectors open the motor's electrical circuit when an overload exists. This can cause the pump to start unexpectedly and without warning.

Use only stranded copper wire to motor and ground. Wire size **MUST** limit the maximum voltage drop to 10% of the motor nameplate voltage, at the motor terminals. Excessive voltage drop will affect performance and void motor warranty. The ground wire must be at least as large as the wires to the motor. Wires should be color coded for ease of maintenance.

Three phase motors require all leg protection with properly sized magnetic starters and thermal overloads.

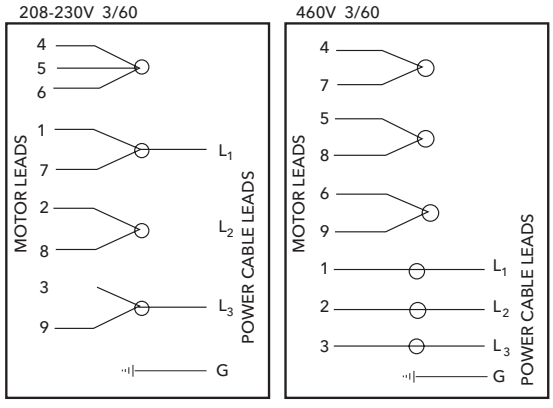
WARNING Hazardous voltage

PERMANENTLY GROUND THE PUMP, MOTOR AND CONTROLS PER NEC OR LOCAL CODES BEFORE CONNECTING TO ELECTRICAL POWER. FAILURE TO DO SO CAN CAUSE SHOCK, BURNS OR DEATH.

Connect the electrical leads to the motor, as follows:

Single Phase Motors – Connect the BLACK wire to the BLACK motor wire. Connect the WHITE wire to the WHITE motor wire. Connect the GREEN wire to the GREEN motor wire.

Three Phase Motors – See figure below.



THREE PHASE MOTOR WIRING DIAGRAM

NOTICE: UNIT ROTATION IS DETERMINED WHEN VIEWED FROM MOTOR END. SEE PAGE 17 FOR MOTOR ROTATION DETAIL. INCORRECT ROTATION MAY CAUSE DAMAGE TO THE PUMP AND VOIDS WARRANTY.

Check pump rotation by observing the motor fan or the coupling **THROUGH** the coupling guard. **DO NOT** confuse the flow arrows, stamped on the pump body, with the rotation arrows on the coupling and motor adapter. Three phase motors only – If rotation is incorrect, have a qualified electrician interchange any two of the three power cable leads.

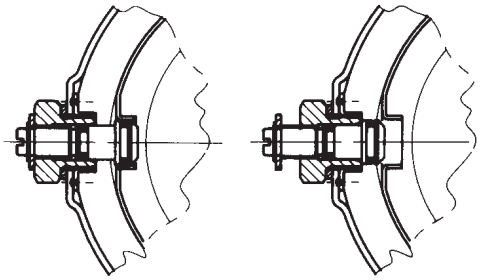
3. PRIMING/VENTING

For installations with the liquid level above the pump:

Close the discharge valve.

Remove the vent plug.

For models 1SV, 3SV and 5SV only, it is necessary to fully unscrew the pin located in the drain plug. See figures below.



DRAIN PLUG WITH PIN CLOSED

DRAIN PLUG WITH PIN OPEN

For sizes 10SV-125SV the vent plug is supplied with an internal needle valve, so it is not necessary to remove the vent plug. Simply unscrew the needle valve half way to open the valve to allow air to escape. (For sizes 33SV-92SV, if the pump is supplied with a cartridge seal, remove the vent plug located on the gland plate beneath the coupling.)

Open the suction valve until liquid flows out of the vent plug opening.

NOTICE: DO NOT REMOVE AND REPLACE DRAIN PLUG WITH ANOTHER PLUG OR PIPING FIXTURE FROM ANY OTHER MANUFACTURER, OR SIGNIFICANT LOSS OF PUMP PERFORMANCE MAY OCCUR AS A RESULT.

NOTE: Place a loose rag over the open vent port to prevent large amounts of liquid from being sprayed on the pump and adjacent equipment.

Care should be exercised if you are pumping hot water or chemicals to avoid personal injury.

Install and torque the vent plug to the values provided in the **"ENGINEERING DATA"** section of this manual. Close the drain plug pin (1SV, 3SV and 5SV only) and open the discharge valve.

For installations with the liquid level below the pump:

Install foot valve at suction end.

For models 1SV, 3SV and 5SV only, it is necessary to fully unscrew the pin located in the drain plug. See figures above.

With the provided plastic funnel, completely fill the casing with liquid.

Install and torque the vent plug, close the drain plug pin (1SV, 3SV and 5SV only) and open the suction valve.

OPERATION



DO NOT OPERATE UNIT WITHOUT SAFETY GUARD IN PLACE. TO DO SO CAN CAUSE SEVERE PERSONAL INJURY.

NOTICE: PUMP MUST BE COMPLETELY PRIMED BEFORE OPERATION.



DO NOT OPERATE PUMP AT OR NEAR ZERO FLOW. TO DO SO CAN CAUSE EXTREME HEAT, DAMAGE TO THE PUMP, INJURY OR PROPERTY DAMAGE.

Start the pump, keeping the on-off valve downstream from the pump closed. Open the on-off valve gradually. The pump must run smoothly and noiselessly. If necessary, reprime the pump. Check the current absorbed by the motor and, if necessary, adjust the setting of the thermal relay. Any air pockets trapped inside the pump may be released by loosening the air screw for all e-SV pumps.

⚠WARNING **If a pump installed in a location where freezing may occur remains inactive, you must drain it through the drain plugs. This operation is not necessary if a suitable antifreeze has been added to the water.**

Make sure that the drained liquid does not cause damage or injuries.

After stabilizing the system at normal operating conditions, check piping for correct alignments. If necessary, adjust pipe supports.



HAZARDOUS MACHINERY. MOTOR THERMAL PROTECTORS CAN RESTART MOTOR UNEXPECTEDLY AND WITHOUT WARNING, CAUSING SEVERE PERSONAL INJURY.

See the **"ENGINEERING DATA"** section in this manual for the recommended maximum pump starts per hour.

MAINTENANCE



DISCONNECT AND LOCKOUT ELECTRICAL POWER BEFORE ATTEMPTING ANY MAINTENANCE. FAILURE TO DO SO CAN CAUSE SHOCK, BURNS OR DEATH.

MOTOR LUBRICATION

Recommended Motor Bearing Lubrication Intervals

Interval	Service Environment
1 – 2 Years	Light Duty in Clean Atmosphere
1 Year	8 – 16 hours/day – Clean, Dry Atmosphere
6 Months	12 – 24 hours/day – Moisture Present
3 Months	12 – 24 hours/day – Dirty, High Moisture

When lubricants are operated at elevated temperatures, the lubrication frequency should be increased.

DO NOT intermix grease bases (lithium, sodium, etc.). Completely purge old grease if changing grease base.

Over greasing can cause excessive bearing temperatures, lubricant and bearing failure.

MECHANICAL SEAL REPLACEMENT

(e-SV 1–125)

1. Close all necessary suction and discharge valves to isolate the pump from the system.
2. Drain the liquid from the pump by removing the drain plug and opening the needle valve on the vent plug.
3. Remove the coupling guards, the 4 coupling hex cap screws, the coupling and coupling drive pin. See 1-3, Figure 5.
4. Remove the 4 motor hex cap screws (inner screws) on the seal housing. See step 4.
5. Remove the seal housing plate on 33-125SV models, using the two tapped holes provided. Threading 2 of the hex cap screws into these holes and evenly tightening the screws. Lift and remove the seal housing between the pump and motor shaft. Exercise care when sliding the seal housing between the shaft to prevent damage to the stationary seat. See step 5.
6. Turn the seal housing upside down and remove the stationary seat and o-ring. Remove and discard the large o-ring used to seal the seal housing to the pump head. Inspect the seal seat for any burrs or debris. Make sure that the seat is clean. Lubricate the shaft or sleeve lightly. Use a water-based lubricant. Install the new seat by pressing the seal housing with your thumb. DO NOT USE EXCESSIVE FORCE and, if possible, place a clean soft cloth over the seal face to protect the seal faces during installation.
7. Remove the rotary portion at the mechanical seal by sliding the rotary unit axially upwards along the pump shaft. Inspect the pump shaft for any burns or debris. Any burrs should be ground smooth with (fine grit) emery paper. See step 7 in Figure 5.
8. Lubricate the o-ring located in the ID of the rotary unit of the mechanical seal with a lubricant compatible with the seal elastomers. Carefully slide the rotary unit of the mechanical seal down the shaft. Rotate the seal to locate the pin on the bottom of the seal with the holes in the shaft sleeve (33-125SV only). Cycle seal up and down to lubricate o-ring and prevent seal from sticking to shaft. See step 8 in Figure 5.
9. Install a new seal housing o-ring on the seal housing. A lubricant can be used to hold the o-ring on the diameter of the seal housing.

   Carefully reinstall the seal housing between the pump and motor shaft and slide the seal housing down the shaft into position. **Use caution when mounting the seal housing between the pump/motor shaft so that the seal face on the stationary seat is not damaged.** See step 9 in Figure 5.
10. Reinstall the 4 hex cap screws, tightening the screws evenly and then torquing them to the values given in the engineering data. See step 10 in Figure 5.
11. Reinstall the coupling pin and locate the space shim on the shaft on the seal housing. **If the shim is not available, a 5 mm spacer can be used.** See step 11 in Figure 5.
12. Reinstall the coupling halves and evenly tighten the coupling bolts and torque them to the values given in the coupling section. Remove the spacer shim and save for future use. See step 12 in Figure 5.
13. Rotate the shaft by hand to insure that the pump and motor rotate freely. Reinstall the coupling guard.
14. The pump and system should be vented prior to starting the pump. See Section 3, page 13, for venting procedures.

MECHANICAL SEAL REPLACEMENT

(Sizes 33SV-125SV) Fitted with Cartridge Seals

1. Complete steps 1-4 as defined above for conventional seals.
2. Loosen the 4 set screws located around the ID of the pump shaft.
3. Remove the cartridge seal using the two tapped holes provided on the gland of the cartridge seal by threading two of the hex cap screws into these holes and evenly tightening these screws. Lift and remove the cartridge seal between the pump and motor shaft.
4. Inspect the pump shaft for any burrs or debris. Any burrs should be ground smooth with (fine grit) emery paper.
5. Install a new o-ring on the turned fit of the new cartridge seal. Lubricate the o-ring located in the ID of the cartridge seal. Use a lubricant compatible with the seal elastomers to hold the o-ring.
6. Install the new cartridge seal on the pump by carefully sliding it between the pump and motor shaft and then sliding it into position.
7. Complete steps 11-14 as defined above for the conventional seals.
8. After installing the coupling, tighten the four set screws located in the collar of the cartridge seal to secure the seal to the pump shaft.
9. Rotate the shaft by hand to insure that the pump and motor rotate freely. Reinstall the coupling guard.
10. Use vent connections on cartridge seal for proper venting.

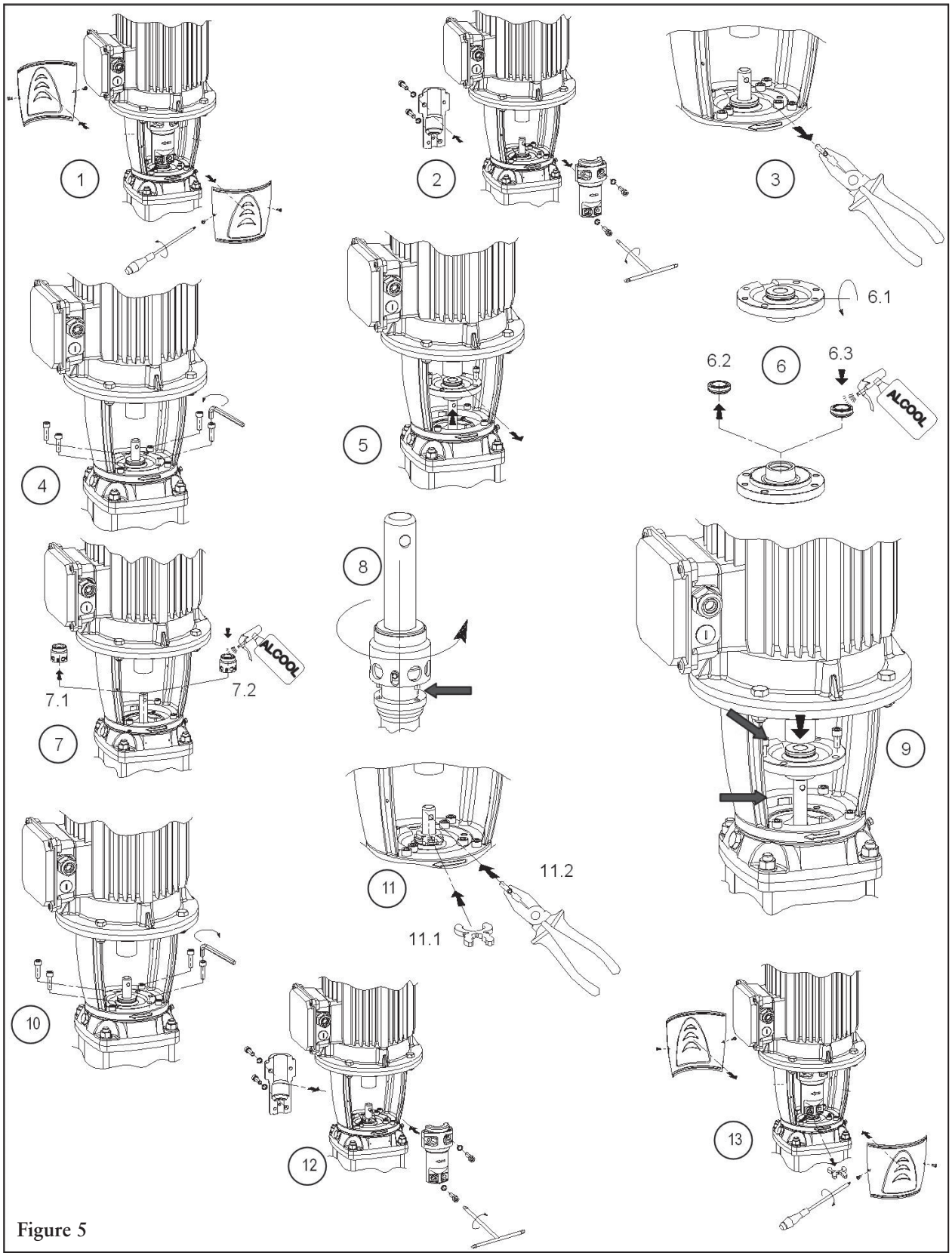


Figure 5

MOTOR REPLACEMENT

To remove the motor follow steps 1 through 4, as provided in the **"MECHANICAL SEAL REPLACEMENT"** section of this manual.

For motor frames 213TC and larger, remove the 4 motor hex cap screws and the motor adapter.

Install the motor adapter flange onto the new motor, torquing the 4 hex cap screws to the values provided in the **"ENGINEERING DATA"** section of this manual.

Complete the reassembly following steps 17 through 22 in the **"MECHANICAL SEAL REPLACEMENT"** section of this manual.

All additional unit service or maintenance, not addressed in this manual, should be performed at a qualified service location. Contact your local dealer or Goulds Water Technology distributor for assistance.

TROUBLESHOOTING GUIDE

⚠WARNING
Hazardous voltage

DISCONNECT AND LOCKOUT ELECTRICAL POWER BEFORE ATTEMPTING ANY MAINTENANCE. FAILURE TO DO SO CAN CAUSE SHOCK, BURNS OR DEATH.

SYMPTOM

MOTOR NOT RUNNING
See Probable Cause – 1 through 5

LITTLE OR NO LIQUID DELIVERED BY PUMP
See Probable Cause – 6 through 12

POWER CONSUMPTION TOO HIGH
See Probable Cause – 3, 12, 13, 15

EXCESSIVE NOISE AND VIBRATION
See Probable Cause – 3, 6 - 8, 10, 12, 13, 16

PROBABLE CAUSE

1. Motor thermal protector tripped.
2. Open circuit breaker or blown fuse.
3. Impellers binding.
4. Motor improperly wired.
5. Defective motor.
6. Pump is not primed, air or gases in liquid.
7. Discharge, suction plugged or valve closed.
8. Incorrect rotation (three phase only).
9. Low voltage or phase loss.
10. Impellers worn or plugged.
11. System head too high.
12. $NPSH_A$ too low – excessive suction lift or losses.
13. Discharge head too low – excessive flow rate.
14. Fluid viscosity, specific gravity too high.
15. Worn bearing.
16. Pump, motor or piping loose.

ENGINEERING DATA

TORQUE VALUES

HP	Motor Bolt	Adapter Flange	Coupling		
			1-5SV	10-22SV	33-92SV
0.75-7.5 HP	20 lbs ft (27 N·m)	–	15 lbs ft (20 N·m)	40 lbs ft (54 N·m)	37 lbs ft (50 N·m)
10-75 HP	45 lbs ft (61 N·m)	48 lbs ft (65 N·m)*	15 lbs ft (20 N·m)	40 lbs ft (54 N·m)	48 lbs ft (65 N·m)

*213TC and 215TC Adapter Flange use 30 lbs ft (40 N m)

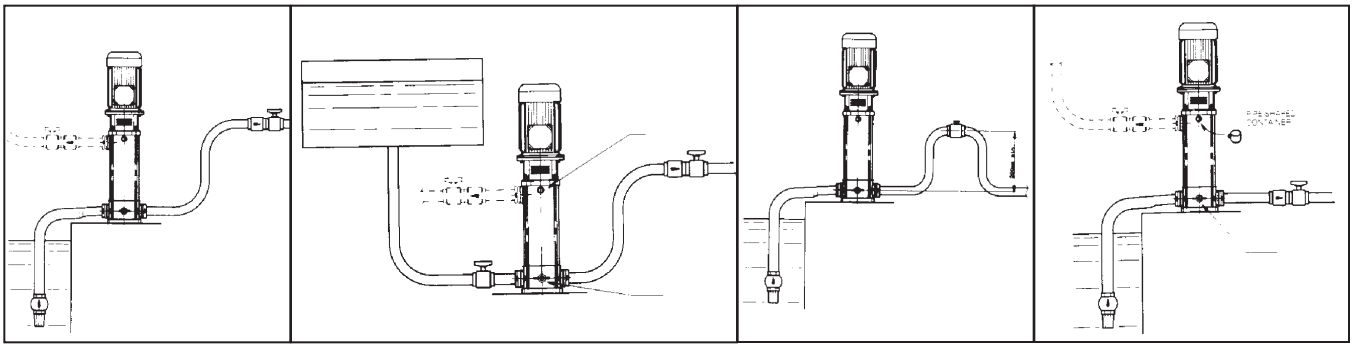
TORQUE VALUES

Pump Size	Tie Rod Nuts	Vent and Drain
1-5SV	18 lbs ft (24 N·m)	18 lbs ft (24 N·m)
10-22SV	22 lbs ft (30 N·m)	18 lbs ft (24 N·m)
33-125SV	44 lbs ft (60 N·m)	30 lbs ft (41 N·m)

VENT NEEDLE

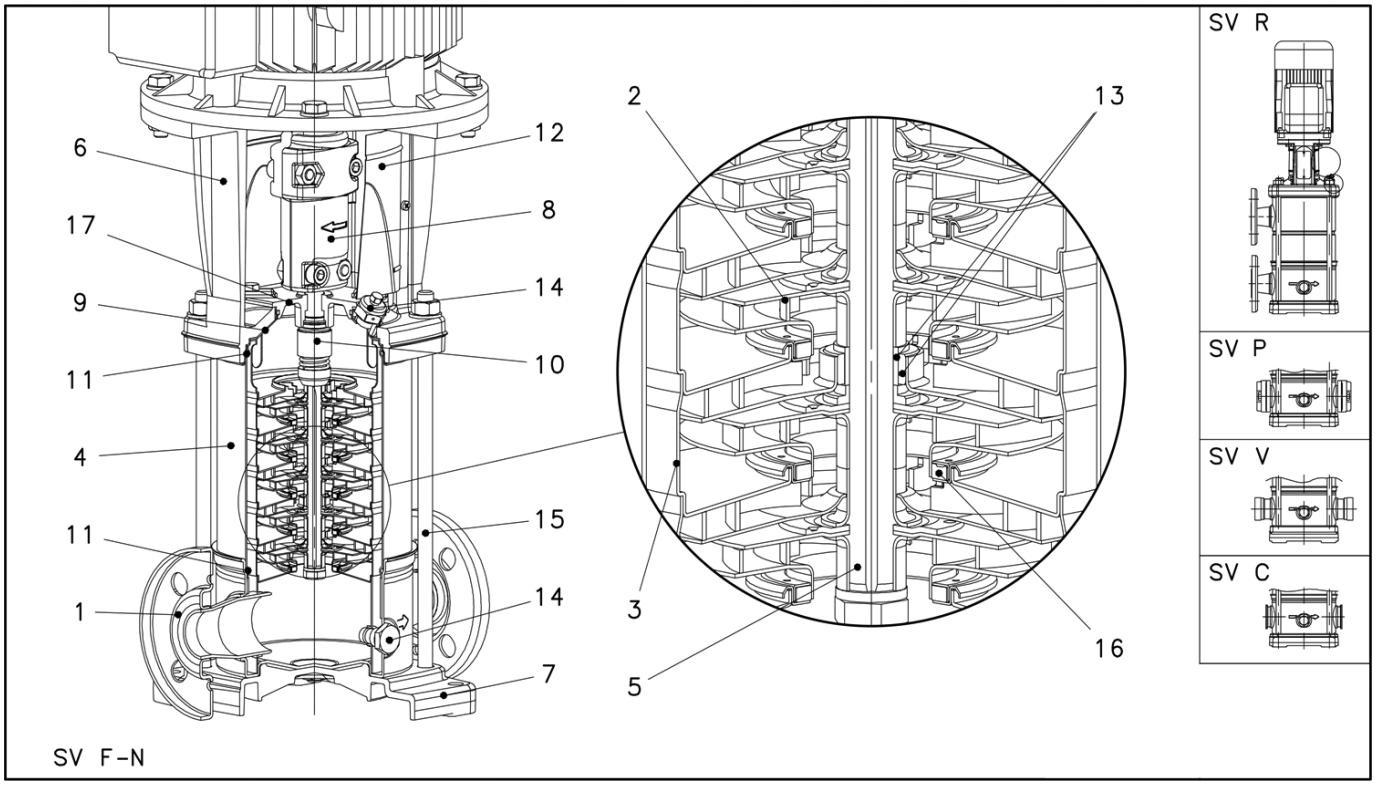
Pump Size	
1-5SV	7 lbs ft (9.5 N·m)
10-22SV	
33-125SV	

TYPICAL PLUMBING AND INSTALLATION



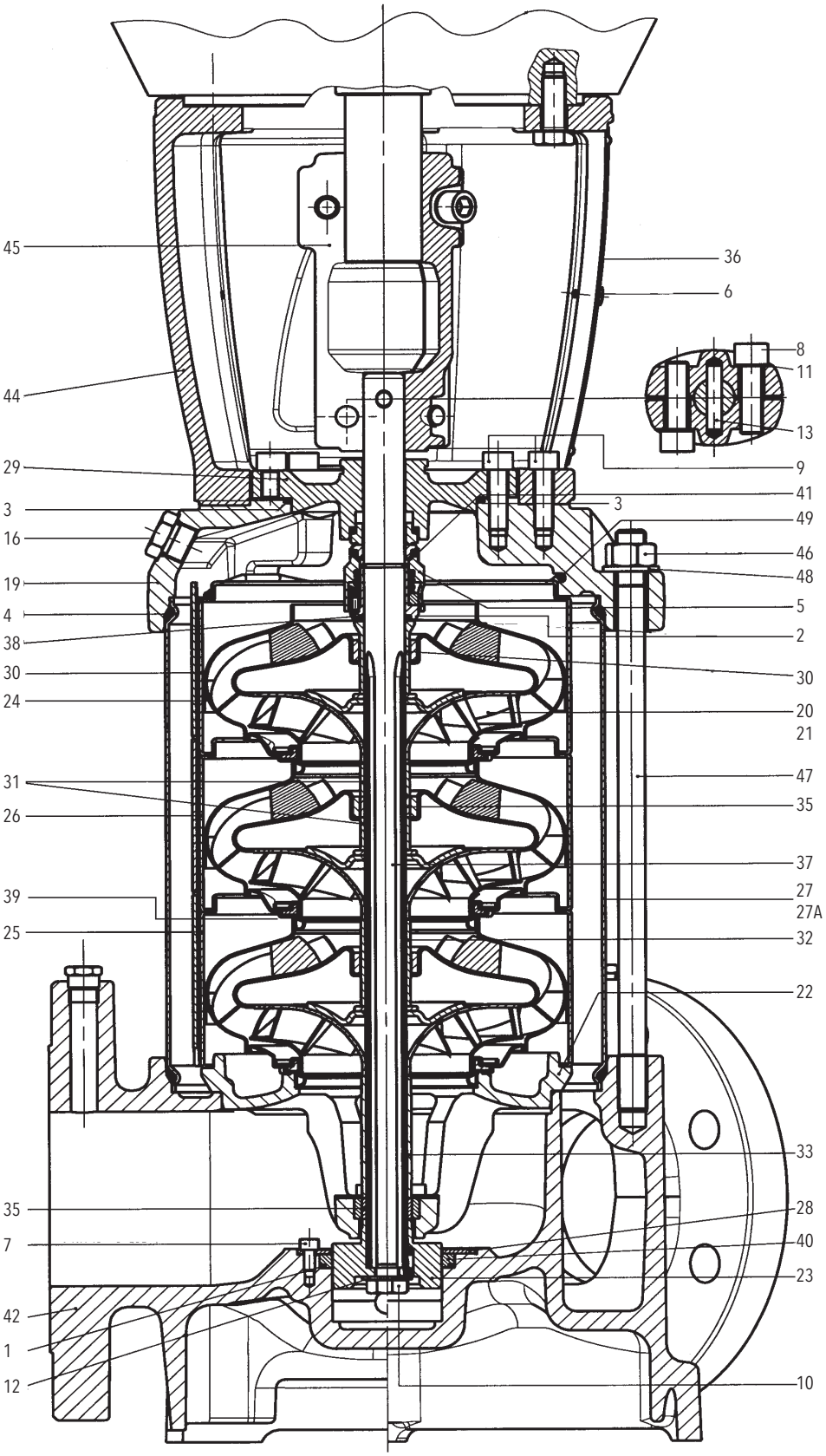
NOTE: Discharge loop must be high enough to keep liquid in the bottom stages during shut-down.

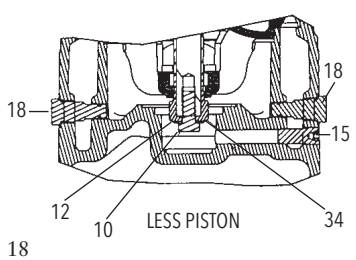
1-22SV MAJOR COMPONENTS

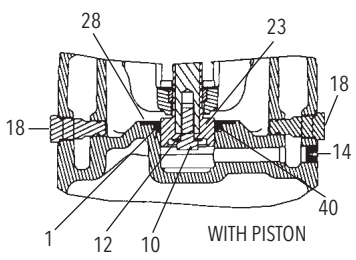


1 Pump Body
2 Impeller
3 Diffuser
4 Casing
5 Shaft
6 Adapter
7 Base
8 Coupling
9 Seal Plate
10 Mechanical Seal
11 Elastomers
12 Coupling Guard
13 Shaft Sleeve and Bushing
14 Fill/Drain Plugs
15 Tie Rods
16 Wear Ring
17 Seal Gland

33SV - 92SV MAJOR COMPONENTS

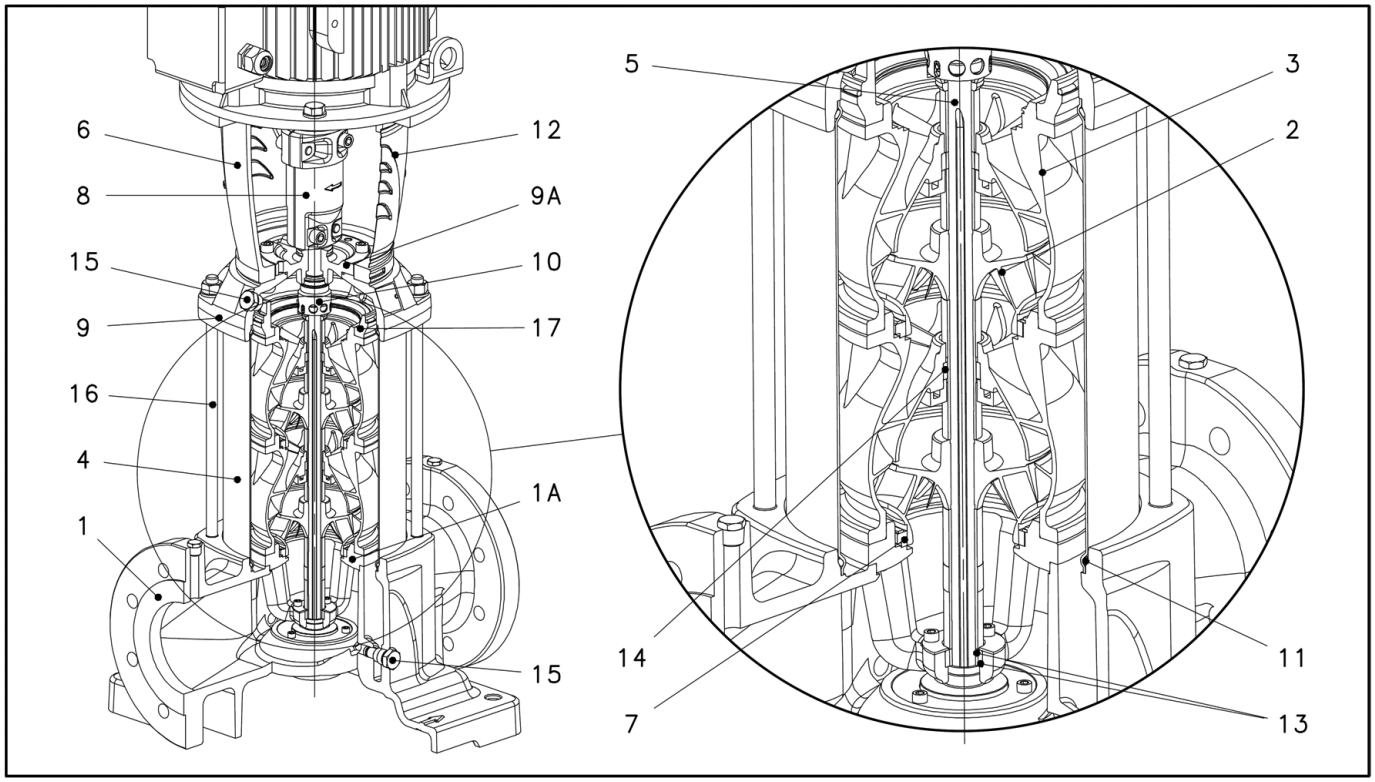






1 O-Ring, Piston Seal
2 O-Ring, Mechanical Seal
3 O-Ring, Seal housing
4 O-Ring, Sleeve
5 Mechanical Seal
5A Cartridge Seal (not shown)
6 Screw, Guard
7 Screw, Piston Holding Disc
8 Screw, Coupling
9 Screw, MA and Seal Housing
10 Screw, Impeller
11 Washer, Coupling
12 Washer, Impeller
13 Pin, Coupling
14 Plug, with Piston
15 Plug, without Piston
16 Plug, Fill
17 Plug, Vent (not shown)
18 Plug, Drain
19 Pump Head
20 Impeller, Full Diameter
21 Impeller, Reduced Diameter
22 Lower Bearing Assembly
23 Piston
24 Diffuser, Final
25 Diffuser with Carbon Bushing
26 Diffuser with Tungsten Bushing
27 Outer Sleeve, 25 Bar
27A Outer Sleeve, 40 Bar
28 Holding Disc, Piston Seal
29 Seal Housing
30 Spacer, Impeller Final
31 Spacer, Shaft Bushing
32 Spacer, Impeller
33 Spacer, Impeller Lower (66-92SV)
34 Bushing, Non-Piston
35 Tungsten Carbide Bushing
36 Coupling Guard
37 Shaft
38 Mechanical Seal Shaft Sleeve
39 Wear Ring, Impeller
40 Piston Seal
41 Stop Ring, Impeller
42 Pump Body
43 Motor Adapter Plate (not shown)
44 Motor Adapter
45 Coupling, Half
46 Nut, Tie-Rod
47 Tie-Rod
48 Washer, Tie-Rod
49 Spring, Final Diffuser

125SV MAJOR COMPONENTS



1 Pump Body
2 Impeller
3 Diffuser
4 Casing
5 Shaft
6 Adapter
7 Elastomer O-ring
8 Coupling
9 Seal Plate
10 Mechanical Seal
11 Elastomer O-ring
12 Coupling Guard
13 Shaft Sleeve and Bushing
14 Shaft Bushing
15 Fill/Drain Plugs
16 Tie Rods
17 Elastomer O-ring

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We at,
Xylem Inc./Goulds Water Technology
1 Goulds Drive
Auburn, NY 13021

Declare that the following products: NPE, MCS, MCC, 3656, 3656 SP, GB, e-SV, SVI, NPO, Prime Line SP, HB, HMS, LC, NPV, LB, LBS comply with Machine Directive 06/42/EC. This equipment is intended to be incorporated with machinery covered by this directive, but must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the actual provisions of the directive.

COMMERCIAL WARRANTY

For goods sold to commercial buyers, Seller warrants the goods sold to Buyer hereunder (with the exception of membranes, seals, gaskets, elastomer materials, coatings and other "wear parts" or consumables all of which are not warranted except as otherwise provided in the quotation or sales form) will be (i) be built in accordance with the specifications referred to in the quotation or sales form, if such specifications are expressly made a part of this Agreement, and (ii) free from defects in material and workmanship for a period of one (1) year from the date of installation or twelve (12) months from the date of shipment (which date of shipment shall not be greater than eighteen (18) months after receipt of notice that the goods are ready to ship), whichever shall occur first, unless a longer period is specified in the product documentation (the "Warranty").

Except as otherwise required by law, Seller shall, at its option and at no cost to Buyer, either repair or replace any product which fails to conform with the Warranty provided Buyer gives written notice to Seller of any defects in material or workmanship within ten (10) days of the date when any defects or non-conformance are first manifest. Under either repair or replacement option, Seller shall not be obligated to remove or pay for the removal of the defective product or install or pay for the installation of the replaced or repaired product and Buyer shall be responsible for all other costs, including, but not limited to, service costs, shipping fees and expenses. Seller shall have sole discretion as to the method or means of repair or replacement. Buyer's failure to comply with Seller's repair or replacement directions shall terminate Seller's obligations under this Warranty and render the Warranty void. Any parts repaired or replaced under the Warranty are warranted only for the balance of the warranty period on the parts that were repaired or replaced. Seller shall have no warranty obligations to Buyer with respect to any product or parts of a product that have been: (a) repaired by third parties other than Seller or without Seller's written approval; (b) subject to misuse, misapplication, neglect, alteration, accident, or physical damage; (c) used in a manner contrary to Seller's instructions for installation, operation and maintenance; (d) damaged from ordinary wear and tear, corrosion, or chemical attack; (e) damaged due to abnormal conditions, vibration, failure to properly prime, or operation without flow; (f) damaged due to a defective power supply or improper electrical protection; or (g) damaged resulting from the use of accessory equipment not sold or approved by Seller. In any case of products not manufactured by Seller, there is no warranty from Seller; however, Seller will extend to Buyer any warranty received from Seller's supplier of such products.

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MANUAL DE INSTRUCCIÓN
IM228R08



Modelo e-SV

INSTRUCCIONES DE INSTALACIÓN, OPERACIÓN Y MANTENIMIENTO

GOULDS
WATER TECHNOLOGY
a xylem brand

Tabla de contenido

TEMA	PÁGINA
Sistema de numeración de la línea de productos e-SV	3
Instrucciones de seguridad	7
Reseña General	7
Descripción del producto	7
Aplicaciones	7
Verificaciones previas a la instalación	7
Transporte y almacenamiento	9
Instalación	10
Arranque	12
Operación	13
Mantenimiento	13
Recambio de sellos mecánicos (tamaños 1SV-125SV)	13
Recambio de sellos mecánicos (tamaños 33SV-125SV) con sellos de cartucho	14
Recambio del motor	14
Resolución de problemas	16
Datos de ingeniería	17
Plomería e instalación habituales	17
Componentes principales de e-SV	18
Garantía limitada	22

Información del propietario

Número de modelo de la bomba: _____

Número de serie de la bomba: _____

Número de modelo de control: _____

Distribuidor: _____

No. de teléfono del distribuidor: _____

Fecha de compra: _____ Instalación: _____

Lecturas de corriente en el arranque:

1 Ø	3 Ø	L1-2	L2-3	L3-1
Amps: _____	Amps: _____	_____	_____	_____
Voltios: _____	Voltios: _____	_____	_____	_____

Línea de productos e-SV
Sistema de numeración sólo para 1 – 22SV extremo líquido

Las diversas versiones de la línea e-SV están identificadas por un número de código de producto en la etiqueta de la bomba. Este número es, también, el número de catálogo de la bomba. Se indica el significado de cada dígito en el número de código de producto a continuación.
Nota: No todas las combinaciones son posibles.

Ejemplo de código de producto

22 SV 0 2 F E 3 0 _ _

Configuraciones especiales (caracteres opcionales)

A = solo sello encamisado
B = sello encamisado + pasivación
C = sello encamisado + baja NPSH (carga de succión positiva neta)
E = electropulido
F = con anulación de etapas - 1 etapa
G = con anulación de etapas - 2 etapas
H = solo montaje horizontal
J = montaje horizontal + pasivación
K = montaje horizontal + baja NPSH
L = montaje horizontal + alta presión
N = solo baja NPSH
P = solo pasivación
S = configuración modificada para requisitos particulares
Z = solo alta presión

Material del sello

0 = Grafito-grafito y silicona-Viton (estándar)
1 = Grafito-grafito y silicona-AFLAS (alta temperatura)
2 = Grafito y silicona-grafito y silicona-Viton
4 = Grafito y silicona-grafito y silicona-EPR
6 = Grafito-grafito y silicona-EPR

Polo-Hz-Fase

1 = 2–50
2 = 4–50
3 = 2–60
4 = 4–60

Armazón del motor (NEMA)

A = 56C
B = 180TC
C = 210TC
D = 250TC
E = 280TC
F = 320TSC
G = 360TSC
H = 140TC

Configuración

C = Abrazadera-316
F = Redondo-304 (SVB)
G = CI-304
N = Redondo-316 (SVD)
P = Victaulic-316
T = Ovalado-304 (SVA)

Tapa/parte inferior

		succión descarga ubicación
R =	(SVC) 12Succ-12Desc	
W =	(SVC) 12Succ-03Desc	
X =	(SVC) 12Succ-06Desc	
Y =	(SVC) 12Succ-09Desc	

Número total de etapas de la turbina (puede tener 1 o 2 caracteres)

Línea de productos:

SV: vertical de acero inoxidable

Flujo nominal:

1 = 5 GPM
3 = 16 GPM
5 = 26 GPM
10 = 53 GPM
15 = 80 GPM
22 = 116 GPM

Línea de productos e-SV
Sistema de numeración sólo para 33 – 125SV extremo líquido

Las diversas versiones de la línea e-SV están identificadas por un número de código de producto en la etiqueta de la bomba. Este número es, también, el número de catálogo de la bomba. Se indica el significado de cada dígito en el número de código de producto a continuación.
Nota: No todas las combinaciones son posibles.

Ejemplo de código de producto

125 SV 8 1 2 B F E 2 0 _ _

Configuraciones especiales (caracteres opcionales)

E = electropulido
F = con anulación de etapas - 1 etapa
G = con anulación de etapas - 2 etapas
H = solo montaje horizontal
J = montaje horizontal + pasivación
K = montaje horizontal + baja NPSH (solo 33, 46 y 66)
L = montaje horizontal + alta presión
N = solo baja NPSH (solo 33, 46 y 66)
P = solo pasivación
S = configuración modificada para requisitos particulares
Z = alta presión (cuerpo de la bomba # 250/300)

Material del sello

0 = Grafito-grafito y silicona-Viton
2 = Grafito y silicona-grafito y silicona-Viton
4 = Grafito y silicona-grafito y silicona-EPR
6 = Grafito-grafito y silicona-EPR
7 = Grafito-grafito y silicona-Viton (carro)
8 = Grafito y silicona-grafito y silicona-EPR (carro)

Polo-Hz-Fase

1 = 2–50
2 = 4–50
3 = 2–60
4 = 4–60

Armazón del motor (NEMA)

A = 56C
B = 180TC
C = 210TC
D = 250TC
E = 280TC
F = 320TSC
G = 360TSC
H = 140TC

Configuración

G = Redondo-CI-304
N = Redondo-316

SOLO 125SV

Diámetro reducido de la moldura A = 141 mm B = 136 mm C = 145 mm (Diám. total)
En blanco si es 33-92SV

Número de turbinas con moldura reducida (0, 1, 2)

Total de turbinas/etapas

Línea de productos: SV: vertical de acero inoxidable

Flujo nominal:

33 = 175 GPM
46 = 240 GPM
66 = 350 GPM
92 = 485 GPM
125 = 660 GPM

Línea de productos e-SV
Sistema de numeración para combinación de bomba y motor de 1 – 22SV

Las diversas versiones de la línea e-SV están identificadas por un número de código de producto en la etiqueta de la bomba. Este número es, también, el número de catálogo de la bomba. Se indica el significado de cada dígito en el número de código de producto a continuación.
Nota: No todas las combinaciones son posibles.

Ejemplo de código de producto

2 SV 2 2 F A 2 F 5 1 A H

Configuraciones especiales (1 o 2 caracteres)

A = solo sello encamisado
B = sello encamisado + pasivación
C = sello encamisado + baja NPSH (carga de succión positiva neta)
E = electropulido
F = con anulación de etapas - 1 etapa
G = con anulación de etapas - 2 etapas
H = solo montaje horizontal
J = montaje horizontal + pasivación
K = montaje horizontal + baja NPSH
L = montaje horizontal + alta presión
M = i-Alert
N = solo baja NPSH
P = solo pasivación
S = configuración modificada para requisitos particulares
Z = alta presión (cuerpo de la bomba # 250/300)

Material del sello

0 = Grafito-grafito y silicona-Viton
1 = Grafito-grafito y silicona-AFLAS (alta temperatura)
2 = Grafito y silicona-grafito y silicona-Viton
4 = Grafito y silicona-grafito y silicona-EPR
6 = Grafito-grafito y silicona-EPR

Caja del motor

1 = ODP	5 = Prem-ODP	9 = Marine
2 = TEFC	6 = Prem-TEFC	A = Chem
3 = X-Proof	7 = Prem-XP	B = Prem-Chem
4 = WD - Tropical	8 = Prem-WD	C = Clase 1 Div 2

Voltaje

A = 115/230	H = 190/380	R = 220
B = 230	J = 115/208-230	S = 415
C = 230/460	K = 208	T = 220/380 WYE
D = 460	L = 208-230	U = 380-660 WYE
E = 575	M = 190-380/415	V = 208-230/460 WYE
F = 208-230/460	N = 380	
G = 200	P = 110/220	

Polo-Hz-Fase

1 = 2-50-1	4 = 2-60-3	7 = 4-60-1
2 = 2-50-3	5 = 4-50-1	8 = 4-60-3
3 = 2-60-1	6 = 4-50-3	

Clasificación de HP

A = 0.50	F = 3	L = 20
B = 0.75	G = 5	M = 25
C = 1.00	H = 7.5	N = 30
D = 1.50	J = 10	P = 40
E = 2	K = 15	

OPCIÓN de configuración

C = Abrazadera-316
F = Redondo-304 (SVB)
G = CI-304
N = Redondo-316 (SVD)
P = Victaulic-316
T = Ovalado-304 (SVA)

Tapa/parte inferior

R = (SVC) 12Succ-12Desc	Succión descarga ubicación
W = (SVC) 12Succ-03Desc	
X = (SVC) 12Succ-06Desc	
Y = (SVC) 12Succ-09Desc	

Número total de etapas de la turbina (puede tener 1 o 2 caracteres)

Línea de productos:

SV: vertical de acero inoxidable

Flujo nominal:

1 = 5 GPM	10 = 53 GPM
3 = 16 GPM	15 = 80 GPM
5 = 26 GPM	22 = 116 GPM

Línea de productos e-SV
Sistema de numeración para combinación de bomba y motor de 33 – 125SV

Las diversas versiones de la línea e-SV están identificadas por un número de código de producto en la etiqueta de la bomba. Este número es, también, el número de catálogo de la bomba. Se indica el significado de cada dígito en el número de código de producto a continuación.
Nota: No todas las combinaciones son posibles.

Ejemplo de código de producto

125 SV 8 2 A G K 3 F 2 0 _ _

Configuraciones especiales (1 o 2 caracteres)

E = electropulido	L = montaje horizontal + alta presión
F = con anulación de etapas - 1 etapa	M = i-Alert
G = con anulación de etapas - 2 etapas	N = solo baja NPSH (solo 33, 46 y 66)
H = solo montaje horizontal	P = solo pasivación
J = montaje horizontal + pasivación	S = configuración modificada para requisitos particulares
K = montaje horizontal + baja NPSH	Z = alta presión (cuerpo/carcasa de la bomba# 250/300)

Material del sello

0 = Grafito-grafito y silicona-Viton	6 = Grafito-grafito y silicona-EPR
2 = Grafito y silicona-grafito y silicona-Viton	7 = Grafito-grafito y silicona-Viton (carro)
4 = Grafito y silicona-grafito y silicona-EPR	8 = Grafito y silicona-grafito y silicona-EPR (carro)

Caja del motor

1 = ODP	5 = Prem-ODP	9 = Marine
2 = TEFC	6 = Prem-TEFC	A = Chem
3 = X-Proof	7 = Prem-XP	B = Prem-Chem
4 = WD - Tropical	8 = Prem-WD	C = Clase 1 Div 2

Voltaje

A = 115/230	H = 190/380	R = 220
B = 230	J = 115/208-230	S = 415
C = 230/460	K = 208	T = 220/380 WYE
D = 460	L = 208-230	U = 380-660 WYE
E = 575	M = 190-380/415	V = 208-230/460 WYE
F = 208-230/460	N = 380	
G = 200	P = 110/220	

Polo-Hz-Fase

1 = 2-50-1	4 = 2-60-3	7 = 4-60-1
2 = 2-50-3	5 = 4-50-1	8 = 4-60-3
3 = 2-60-1	6 = 4-50-3	

Clasificación de HP

A = 0.50	G = 5	N = 30
B = 0.75	H = 7.5	P = 40
C = 1.00	J = 10	R = 50
D = 1.50	K = 15	S = 60
E = 2	L = 20	T = 75
F = 3	M = 25	U = 100

Configuración

G = Redondo CI-304
N = Redondo-316

SOLO 125SV

Diámetro reducido de la moldura A = 141 mm B = 136 mm C = 145 mm (Diám. total)
En blanco si es 33-92SV

Número de turbinas con moldura reducida (0, 1, 2)

Número total de etapas de la turbina (puede tener 1 o 2 caracteres)

Línea de productos:

SV: vertical de acero inoxidable

Flujo nominal:

33 = 175 GPM	92 = 485 GPM
46 = 240 GPM	125 = 660 GPM
66 = 350 GPM	

INSTRUCCIONES DE SEGURIDAD

PARA EVITAR LESIONES PERSONALES GRAVES O FATALES O DAÑOS IMPORTANTES A LA PROPIEDAD, LEA Y SIGA TODAS LAS INSTRUCCIONES DE SEGURIDAD EN EL MANUAL Y EN LA BOMBA.

LA FINALIDAD DE ESTE MANUAL ES PROPORCIONAR AYUDA PARA LA INSTALACIÓN Y OPERACIÓN DE ESTA UNIDAD Y DEBE GUARDARSE CON LA BOMBA.

Este es un SÍMBOLO DE ALERTA DE SEGURIDAD. Al ver este símbolo en la bomba o en el manual, busque una de las siguientes palabras de señal y esté alerta al potencial de lesión personal o daños a la propiedad.

⚠ PELIGRO Advierte sobre peligros que CAUSARÁN lesión personal grave, muerte o daños extensos a la propiedad.

⚠ ADVERTENCIA Advierte sobre peligros que PUEDEN causar lesión personal grave, muerte o daños extensos a la propiedad.

⚠ PRECAUCIÓN Advierte sobre peligros que PUEDEN causar lesión personal grave o daños a la propiedad.

AVISO: INDICA INSTRUCCIONES ESPECIALES QUE SON MUY IMPORTANTES Y DEBEN SER SEGUIDAS.

LEA DETENIDAMENTE TODAS LAS INSTRUCCIONES Y ADVERTENCIAS ANTES DE REALIZAR CUALQUIER TRABAJO EN ESTA BOMBA.

MANTENGA TODAS LAS CALCOMANÍAS DE SEGURIDAD.

⚠ ADVERTENCIA



Los fluidos peligrosos pueden causar incendios, quemaduras o la muerte.

LA UNIDAD NO FUE DISEÑADA PARA SER USADA CON LÍQUIDOS PELIGROSOS O GASES INFLAMABLES. ESTOS FLUIDOS PUEDEN ESTAR PRESENTES EN LAS ÁREAS DE CONTENCIÓN.

RESEÑA GENERAL

La finalidad de este manual es brindar la información necesaria para la instalación, la operación y el mantenimiento adecuados de la bomba e-SV. Las instrucciones y advertencias que se brindan a continuación se refieren a la versión estándar, como se describe en los documentos de venta. Las versiones especiales pueden venir con folletos de instrucciones complementarios. Consulte el contrato de venta para ver cualquier modificación o características especiales de la versión. Siempre especifique el tipo exacto de bomba y el código de identificación al solicitar información técnica o repuestos a nuestro departamento de Ventas y Servicios. Para obtener instrucciones, situaciones o sucesos no tomados en cuenta en este manual o en los documentos de venta, comuníquese con su distribuidor.

Lea este manual antes de instalar y utilizar el producto. El uso indebido puede causar lesiones personales y daños a la propiedad e invalidar la cobertura de la garantía.

DESCRIPCIÓN DEL PRODUCTO

La bomba e-SV es una bomba vertical multietapa sin autocebado que puede ser acoplada a motores eléctricos estándar. En los tamaños de bomba 1SV-22SV, algunas de las piezas metálicas que están en contacto con el líquido bombeado están hechas de acero inoxidable y otras de hierro fundido. Están disponibles en diferentes versiones según la posición de los puertos de succión y salida y la forma de las bridas de conexión. En los tamaños 33SV-125SV, algunas de las piezas metálicas que están en contacto con el líquido bombeado están hechas de acero inoxidable y otras, de hierro fundido. Existe una versión especial en la que todas las piezas metálicas en contacto con el líquido bombeado están hechas de acero inoxidable. Si usted compra una bomba sin el motor eléctrico, asegúrese de que el motor que utiliza sea adecuado para acoplarse a la bomba. Todas las bombas e-SV vienen equipadas con un sello mecánico especial diseñado para ser reemplazado fácilmente sin tener que desarmar toda la bomba.

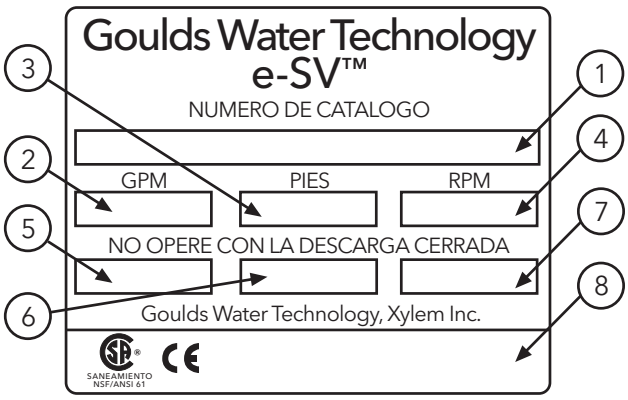
APLICACIONES

Estas bombas son adecuadas para sistemas civiles e industriales de distribución de agua y aplicaciones de refuerzo de presión, irrigación (agricultura, instalaciones deportivas), tratamiento de agua, alimentación de caldera, lavado de piezas, refrigeración (aire acondicionado) y apagado de incendios. La fábrica puede poder configurar ciertos modelos para los líquidos de bombeo que tienen características anormales del agua y/o de las aguas residuales (e.g., ácido, básico, el producto petroquímico o los otros líquidos, etc. no acuosos). Cualquier uso de la especialidad requiere la consulta con la fábrica y los personales de ingeniería para una evaluación específica a la aplicación detallada.

1. PLACA DE IDENTIFICACIÓN

No use esta bomba/unidad eléctrica de bombeado para manipular líquidos inflamables y/o explosivos.

⚠ ADVERTENCIA No use esta bomba para manipular líquidos con sustancias abrasivas, sólidas o fibrosas.



1	Número de catálogo Goulds Water Technology
2	Rango de capacidad
3	Rango de carga dinámica total (TDH)
4	Velocidad calculada
5	Caballos de fuerza calculados
6	Presión máxima de trabajo
7	Temperatura operativa máxima
8	Número de serie de la bomba

VERIFICACIONES PREVIAS A LA INSTALACIÓN

Confirme que la bomba sea capaz de funcionar en las condiciones de operación deseadas.

1. PRESIÓN MÍNIMA DE ENTRADA (SUCCIÓN)

En general, la presión mínima de succión necesaria es la que suministra la carga de succión positiva neta disponible (NPSHA, por su sigla en inglés) necesariapara alimentar la bomba. La carga de succión positiva neta requerida (NPSHr, por su sigla en inglés) puede consultarse en la curva de desempeño correspondiente a la bomba en el punto de funcionamiento específico. Se recomienda que la NPSHA supere la NPSHr por un mínimo de (2) dos pies como margen de seguridad y para asegurar el desempeño confiable a largo plazo de su bomba e-SV.

$$Ps_{MIN} = NPSHr + 2 \text{ pies}$$

NOTA: LA NPSHA DEBE CALCULARSE PARA EL SISTEMA ESPECÍFICO AL QUE SE CONECTARÁ LA BOMBA e-SV. COMUNÍQUESE CON SU VENDEDOR/DISTRIBUIDOR SI NECESITA ASISTENCIA.

2. SUCCIÓN

En teoría, una bomba puede absorber agua de una fuente ubicada 10,33 metros por debajo del nivel de instalación de la bomba, pero esto no sucede porque la bomba ofrece su propia resistencia al flujo intrínseca. Además, la capacidad de succión se reduce como resultado de resistencia al flujo en las tuberías, la diferencia de altura, la temperatura del líquido y la elevación sobre el nivel del mar.

Una mala elección en la colocación altimétrica de la bomba puede provocar cavitación.

Con referencia a la Figura que aparece a continuación y tomando a Z como la altura máxima en que se puede instalar la bomba respecto del nivel de la fuente de líquido, se puede afirmar lo siguiente:

En Unidades SI:

$Z = P_b \bullet 10,2 - NPSH - H_f - H_v - 0,5$ [m]

P_b = Presión barométrica [bar] (absoluta)

$NPSH_r$ = NPSH requerida por la bomba [m]

H_f = Pérdidas [m] en las tuberías de succión

H_v = Presión de vapor [m] a la temperatura de aplicación [C]

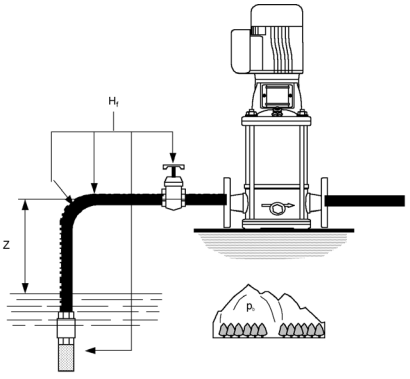
1,5 = factor de seguridad 1, 5 [m]

En unidades inglesas:

$Z = P_b - NPSH_r - H_f - H_v - 1.5$

P_b = Presión barométrica [pies] (absoluta)

$NPSH_r$ = NPSH requerida por la bomba [pies]



Temp		Hv	
C	F	m	Pies
20	68	0.23	0.75
30	86	0.43	1.41
40	104	0.75	2.46
50	122	1.26	4.13
60	140	2.03	6.66
70	158	3.18	10.43
80	176	4.83	15.84
90	194	7.15	23.45
100	212	10.34	33.92
110	230	14.61	47.92
120	248	20.27	66.49

H_f = Pérdidas [pies] en las tuberías de succión

H_v = Presión de vapor [pies] a la temperatura de aplicación [F]

1.5 = factor de seguridad 1.5 [pies]

Con los significados dados en la tabla de arriba, se puede afirmar que:

Si $Z \geq 0$, la bomba puede funcionar con una altura máxima de succión igual a Z.

Si $Z < 0$, la bomba debe recibir una presión de entrada igual a –Z.

ADVERTENCIA No use la bomba si se produce cavitación, ya que se pueden dañar sus componentes internos.

ADVERTENCIA Si se bombea agua caliente, asegúrese de que el lado de succión tenga condiciones apropiadas para evitar la cavitación.

ADVERTENCIA Asegúrese de que el total de la presión del lado de succión (sistema de agua, tanque de gravedad) y la presión máxima suministrada por la bomba no superen la presión de trabajo máxima permitida (presión nominal, PN) de la bomba.

3. PRESIÓN MÁXIMA DE ENTRADA, 60 HZ

$p_{1max} \leq PN - pmáx$

Los símbolos tienen los siguientes significados:

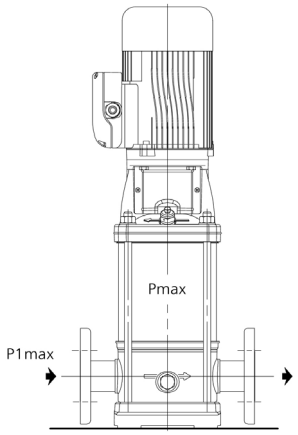
p_{max} = Presión máxima suministrada por la bomba

p_{1max} = Presión máxima de entrada

PN = Presión máxima de trabajo

Si se usa un motor con un eje de cierre axial (estándar), asegúrese de que se cumpla la fórmula de arriba. De no ser así, comuníquese con el Departamento de Ventas y Servicios.

La siguiente tabla muestra la presión de entrada máxima permisible. No obstante, la presión de entrada real + la presión contra una válvula cerrada siempre debe ser inferior a la presión de trabajo máxima permisible.



Bomba	Etapas	P_{1max} (psig)
1SV	2-5 6-10 11-30	145 218 PN-Pmax
3SV	2-3 4-7 8-30	145 218 PN-Pmax
5SV	2-3 4-6 7-27	145 290 PN-Pmax
10SV	1-2 3-5 6-20	145 290 PN-Pmax
15SV	1-2 3 4-15	145 290 PN-Pmax
22SV	1-2 3 4-12	145 290 PN-Pmax

Bomba	Etapas	P_{1max} (psig)
33SV	1/1-2/2 2/1-5/2 5/1-7/2 7/1-10	45 145 218 PN-Pmax
46SV	1/1-1 2/2-2 3/2-4/1 4-10/2	145 218 290 PN-Pmax
66SV	1/1-3/2 3/1-4/1 4-5/1 5-6	72 145 218 PN-Pmax
92SV	1/1-2/2 2/1-3/2 3/1-3 4/2-5/1	72 145 218 PN-Pmax
125SV	1-3/3B 3-5/5A	290 PN-Pmax

4. PRESIÓN MÁXIMA DE TRABAJO

(POR ETAPAS A 3500 RPM)

Bomba	Etapas	PSI / Bar
1SV	1-29	362 / 25
	30	580 / 40
3SV	1-23	362 / 25
	24-30	580 / 40
5SV	1-23	362 / 25
	24-27	580 / 40
10SV	1-14	362 / 25
	15-20	580 / 40
15SV	1-11	362 / 25
	12-15	580 / 40
22SV	1-11	362 / 25
	12	580 / 40
33SV	1-6	362 / 25
	7-10	580 / 40
46SV	1-5	362 / 25
	6-10	580 / 40
66SV	1-5	362 / 25
	6	580 / 40
92SV	1-5	362 / 25
125SV	1-6	362 / 25

NOTA: La presión de trabajo máxima de la brida ovalada (1-22SV) es de 232 psi (16 bar).

5. CAPACIDAD DE TEMPERATURA

La bomba e-SV es capaz de bombear líquidos dentro del siguiente rango de temperatura:

Sello estándar

1SV-22SV -22°F to 250°F (-30°C to 120°C)
33SV-125SV -22°F to 250°F (-30°C to 120°C)

Sello de alta temperatura

1SV-22SV -22°F to 300°F (-30°C to 149°C)
33SV-125SV N/A

NOTA: Para brindar la refrigeración correcta al motor eléctrico, la temperatura ambiente debe estar entre 32°F y 104°F y la humedad relativa a 104°F no debe superar el 50 por ciento.

En temperaturas superiores a 104°F y en lugares de instalación ubicados a una elevación superior a los 3000 pies sobre el nivel del mar, puede ser necesario reducir el desempeño del motor. Comuníquese con su distribuidor/vendedor si necesita asistencia.

6. ÍNDICE MÍNIMO DE FLUJO NOMINAL

Para evitar el sobrecalentamiento de los componentes internos de la bomba, asegúrese de que siempre exista un flujo mínimo de agua cuando la bomba se encuentre en funcionamiento. Para un funcionamiento continuo, el índice de flujo mínimo recomendado se especifica a continuación.

Tamaño de bomba	Flujo mínimo GPM			
	3500 RPM	1750 RPM	2900 RPM	1450 RPM
1SV	2	1	2	1
3SV	3	2	3	2
5SV	7	4	6	3
10SV	9	5	8	4
15SV	18	9	15	7
22SV	21	11	18	9
33SV	35	18	8	4
46SV	40	20	10	5
66SV	70	35	14	7
92SV	100	50	20	10
125SV	128	64	106	53

NOTA: Si esto no se puede lograr, se recomienda un desvío/ línea de recirculación.

⚠ ADVERTENCIA **No haga funcionar la bomba con una descarga cerrada por más de unos segundos.**

7. NÚMERO DE ARRANQUES POR HORA

En bombas eléctricas acopladas a motores suministrados por Goulds Water Technology, el número máximo de ciclos de trabajo (arranques y detenciones) en una hora es el siguiente:

HP Máx.	Arranques por hora*	Tiempo Mín. de funcionamiento entre arranques (seg)
0.5	24	120
0.75	24	120
1	15	75
1.5	13	76
2	12	77
3	9	30
5	8	83
7.5	7	88
10	6	92
15	5	100
20	5	110
25	5	115
30	4	120
40	4	130
50	3	145
60	3	170
75	3	180

Para obtener más detalles, consulte el manual técnico.

⚠ ADVERTENCIA **Si usa un motor diferente al estándar suministrado por Goulds Water Technology, consulte al fabricante del motor para averiguar el máximo de ciclos de trabajo permitidos.**

8. REQUISITOS DE ALIMENTACIÓN ELÉCTRICA

⚠ ADVERTENCIA **Asegúrese de que los voltajes y frecuencias de alimentación sean adecuados para las características del motor eléctrico. Verifique la placa de clasificación del motor.**

En general, las tolerancias de voltaje de alimentación para la operación del motor son las siguientes:

Hz	Fase	UN	
		V	±%
60	1	230	10
60	3	230 / 460	10
60	3	460	10

TRANSPORTE Y ALMACENAJE

1. TRANSPORTE Y MANIPULACIÓN DEL PRODUCTO EMPACADO

La bomba e-SV es empacada en cajas de cartón o cajones de madera de diferentes dimensiones y formas.

⚠ ADVERTENCIA **Algunas cajas de cartón (la base de apoyo está hecha de madera) están diseñadas para ser transportadas y manipuladas en posición vertical. Otras cajas de cartón, y también los cajones de madera, están diseñados para ser transportados y manipulados en posición horizontal. Proteja el producto contra la humedad, las fuentes de calor y los daños mecánicos (choques, caídas...). No coloque pesos pesados en las cajas de cartón.**

Levante y manipule el producto con cuidado, usando equipos de elevación adecuados. Cumpla con todas las normas de prevención de accidentes.

Cuando reciba la bomba, controle la parte externa del paquete en busca de signos evidentes de daños. Si el producto posee signos visibles de daños, notifique a nuestro distribuidor en los 8 días posteriores a la fecha de entrega.

2. ALMACENAJE DEL PRODUCTO EMPACADO

Temperatura ambiente entre 32°F y 104°F.

A corto plazo: (Menos de 6 meses) El procedimiento normal de embalaje de Goulds Water Technology está diseñado para proteger la bomba durante el transporte. Al recibir la bomba, almacénela en un lugar cubierto y seco.

A largo plazo: (Más de 6 meses) Rote el eje varias veces cada 3 meses. Consulte a los fabricantes del motor y el acoplamiento para que le informen sus procedimientos de almacenamiento a largo plazo. Almacene en un lugar cubierto y seco.

3. DESEMPAQUE DEL PRODUCTO

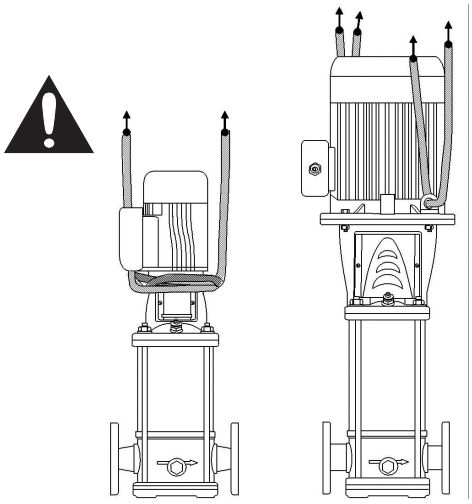
Use equipos adecuados. Cumpla con todas las normas vigentes de prevención de accidentes. Levante y manipule el producto con cuidado, usando equipos de elevación adecuados.

Cuando reciba la bomba, controle la parte externa del paquete en busca de signos evidentes de daños. Si el producto posee signos visibles de daños, notifique a nuestro distribuidor en los 8 días posteriores a la fecha de entrega.

4. MANIPULACIÓN DEL PRODUCTO

Levante y manipule el producto con cuidado, usando equipos de elevación adecuados. Cumpla con las normas vigentes de prevención de accidentes.

El producto debe estar sujeto con arneses para tareas de elevación y manipulación. Algunas bombas eléctricas poseen cáncamos que pueden ser usados con este fin.



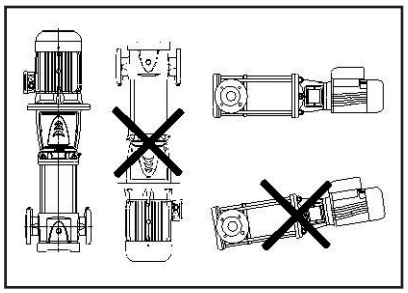
INSTALACIÓN

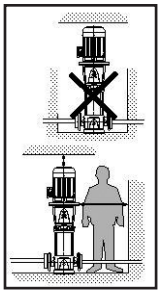
Las operaciones de instalación deben ser realizadas por personal calificado y experimentado. Use equipos y protecciones adecuadas. Cumpla con las normas vigentes de prevención de accidentes.

Consulte las normas, la legislación y los códigos locales y/o nacionales vigentes relacionados con la selección del lugar de instalación y las conexiones de agua y electricidad.

1. SELECCIÓN DEL LUGAR

Asegúrese de que no haya obstrucciones u obstáculos que afecten el flujo normal del aire refrigerante suministrado por el ventilador del motor. Asegúrese de que exista un espacio libre adecuado alrededor de la bomba para operaciones de mantenimiento. Siempre que sea posible, eleve ligeramente la bomba del nivel del piso. Consulte las figuras que aparecen a continuación y en la parte superior de la próxima columna para ver configuraciones posibles de instalación. La operación horizontal requiere un montaje especial con una bomba configurada horizontalmente.

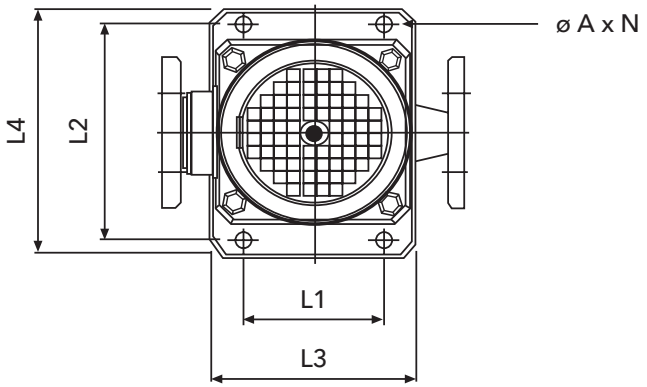




2. ANCLAJE

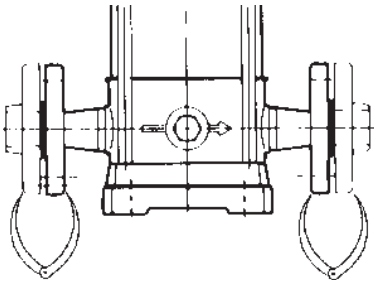
La bomba debe ser anclada firmemente con pernos a una base de concreto o una estructura metálica equivalente (repisa o plataforma). Si la bomba es de gran tamaño y necesita ser instalada cerca de cuartos habitados por personas, se deben brindar soportes adecuados de amortiguación de vibración para evitar la transmisión de vibraciones de la bomba a la estructura reforzada de concreto. A continuación se muestran las dimensiones de la base de la bomba y los agujeros de anclaje.

	1SV-5SV	10SV-22SV	33SV	46SV-92SV	125SV
	in (mm)				
L1	3,94 (100)	5,12 (130)	6,69 (170)	7,48 (190)	10,83 (275)
L2	7,09 (180)	8,46 (215)	9,45 (240)	10,43 (265)	14,96 (380)
L3	5,91 (150)	7,28 (185)	8,66 (220)	9,45 (240)	12,99 (330)
L4	8,27 (210)	9,65 (245)	11,42 (290)	12,4 (315)	17,72 (450)
Ø A	0,51 (13)		0,59 (15)		0,75 (19)
N	0,16 (4)				

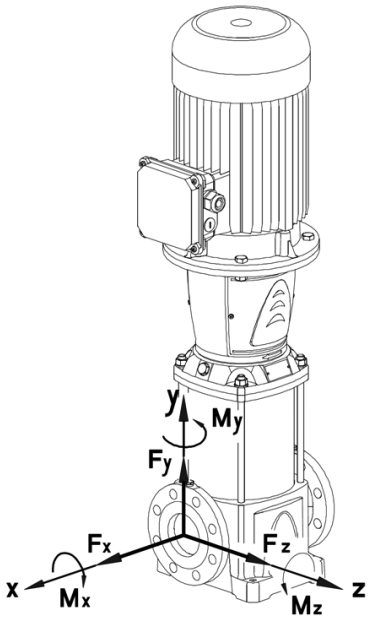


3. ALINEACIÓN Y CARGA DE BRIDAS

La mejor manera de lograr la alineación angular de las bridas de succión y descarga es usar calibres en las ubicaciones de los pernos. Ver la figura que aparece a continuación.



AVISO: NO COLOQUE LA TUBERÍA EN SU LUGAR FORZANDO LAS CONEXIONES DE SUCCIÓN O DESCARGA DE LA BOMBA.



4. TUBERÍAS

Las tuberías de descarga y succión no deben ser inferiores a la apertura respectiva de la bomba y deben mantenerse lo más cortas posibles y evitarse los accesorios innecesarios para minimizar las pérdidas de fricción.

AVISO: LAS TUBERÍAS DEBEN TENER SOPORTES INDEPENDIENTES Y NO SE DEBEN COLOCAR CARGAS HIDRÁULICAS EN LA BOMBA.

Si se requieren tuberías de succión más grandes, se debe instalar un reductor de tuberías excéntrico, **CON EL LADO RECTO HACIA ARRIBA**, en la succión de la bomba.

Si se instala la bomba debajo de la fuente de líquido, instale la válvula de aislamiento de flujo completo en la tubería de succión para inspección o mantenimiento de la bomba.

AVISO: NO USE LA VÁLVULA DE AISLAMIENTO EN EL LADO DE SUCCIÓN DE LA BOMBA PARA ESTRANGULAR LA BOMBA. ESTO PUEDE CAUSAR PÉRDIDA DE CEBADO, TEMPERATURAS EXCESIVAS Y DAÑOS A LA BOMBA Y ANULAR LA GARANTÍA.

Si se instala la bomba arriba de la fuente de líquido, se **DEBE** proveer lo siguiente:

Para evitar bolsas de aire, ninguna parte de la tubería de succión debe estar arriba de la succión de la bomba.

En cualquier sección de tuberías horizontales, incline las tuberías hacia arriba a partir de la fuente de líquido.

Todas las juntas de las tuberías de succión **DEBEN** ser herméticas.

Use una válvula de contención para cebar o para retener el cebado cuando el funcionamiento es intermitente.

El filtro de succión o campana de succión **DEBE** tener por lo menos el triple del diámetro de la tubería de succión.

Asegúrese de que el tamaño y la sumergencia mínima de líquido sobre la entrada de succión sean suficientes para evitar que ingrese aire a la bomba a través de un vórtice de succión. Vea las tuberías de succión habituales en las Figuras 1-4.

Instale una válvula de verificación de descarga adecuada para manejar el flujo y los líquidos y prevenir el flujo de retorno.

Instale una válvula de compuerta del tamaño adecuado, DESPUÉS de la válvula de descarga, para regular la capacidad de la bomba, para inspección de la bomba y para tareas de mantenimiento.

Cuando se requiere un amplificador de tubos, instálelo entre la válvula de verificación y la descarga de la bomba.

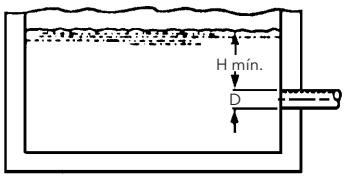


Figura 1

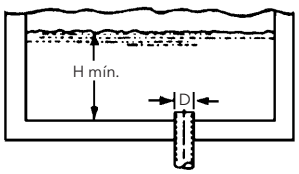


Figura 2

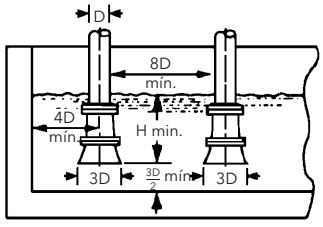


Figura 3

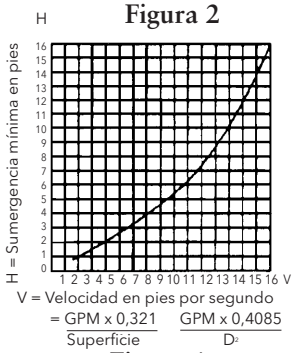


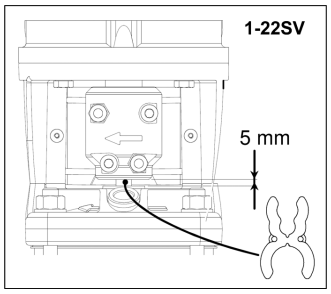
Figura 4

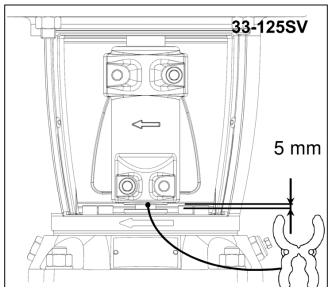
5. ALINEACIÓN DEL EJE: DEL MOTOR A LA BOMBA

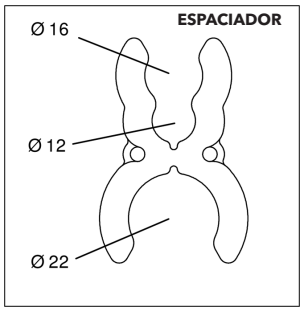
Cuando la bomba es comprada sin motor, viene con un espaciador del montaje del motor posicionado entre el adaptador del motor y el acoplamiento.

Para montar el motor a la bomba, remueva las tiras plásticas de envío, las 2 mitades del protector de acoplamiento de acero inoxidable y el poliuretano expandido.

Asegúrese de que el espaciador del montaje del motor esté correctamente posicionado entre el acoplamiento y el adaptador del motor. Si no está disponible el espaciador del montaje del motor, se puede usar un espaciador de 0,203" (5 mm) para ubicar el montaje del eje de la bomba y fijar la altura correcta. Ver las figuras que aparecen.







En bombas 1-22SV con tamaños de armazón de motor entre 213TC y 256TC, coloque el anillo del adaptador en la brida superior del adaptador del motor. En bombas 33-125SV con tamaños de armazón de motor entre 284TC y 286TC, y tamaños de armazón de motor de 213TC en adelante, conecte la brida del adaptador del motor al motor usando 4 tornillos hexagonales. Haga torque hasta los valores mostrados en la sección de **"DATOS DE INGENIERÍA"** de este manual.

Afloje los 4 tornillos de cabeza hueca del acoplamiento lo suficiente para que el eje del motor pueda entrar en la apertura en el acoplamiento.

Con una grúa de tamaño adecuado, baje el montaje del motor con cuidado sobre el adaptador del motor de la bomba y dentro del acoplamiento. Ajuste los 4 tornillos hexagonales del motor, haciendo torque hasta el valor dado en la sección de **"DATOS DE INGENIERÍA"** de este manual.

Ajuste los 4 tornillos de cabeza hueca del acoplamiento hasta el valor dado en la sección de **"DATOS DE INGENIERÍA"** de este manual. Después del ensamblaje, el espacio libre entre las mitades del acoplamiento debe ser igual.

En los tamaños de 33 a 125SV con sello de cartucho, después de hacer torque correctamente en los pernos de acoplamiento, hay que ajustar cuatro tornillos de fijación en el collar del sello de cartucho antes de remover el espaciador. Los cuatro tornillos de fijación de cabeza hexagonal requieren una llave Allen de ⅛" y deben ser bien ajustados aproximadamente a 5 lbs./pie (7 N•m).

Quite el espaciador del montaje del motor y guárdelo para uso posterior.

Instale las 2 mitades del protector de acoplamiento.

ARRANQUE

1. CONEXIÓN DE AGUA

Las conexiones de agua deben ser realizadas por técnicos de instalación calificados en cumplimiento con las normas vigentes.

En el caso de la conexión al sistema de agua, se deben cumplir las normas emitidas por las autoridades competentes (municipales, empresa de servicios públicos). Las autoridades a menudo exigen la instalación de un dispositivo de prevención de flujo de retorno, como un desconector, una válvula de verificación o un tanque de desconexión.

2. CABLEADO Y CONEXIÓN A TIERRA



⚠ Instale, haga la conexión a tierra y realice el cableado de acuerdo con las exigencias locales y del Código Nacional de Electricidad.

⚠ Instale un interruptor de desconexión de todos los circuitos derivados cerca de la bomba.

⚠ Desconecte y bloquee la energía eléctrica antes de instalar la bomba o realizarle tareas de mantenimiento.

⚠ El suministro eléctrico **DEBE** ser compatible con las especificaciones de la placa de identificación de la bomba. Un voltaje incorrecto puede provocar un incendio o daños al motor y anular la garantía.

⚠ Los motores equipados con protectores térmicos automáticos abren el circuito eléctrico del motor cuando se produce una sobrecarga. Esto puede hacer que la bomba arranque inesperadamente y sin aviso previo.

Use solo cable de cobre trenzado al motor y a tierra. El tamaño del cable **DEBE** limitar la caída máxima de voltaje al 10% del voltaje indicado en la placa de identificación del motor en los terminales del motor. Una caída excesiva de voltaje afectará el desempeño e invalidará la garantía del motor. El cable a tierra debe ser por lo menos del mismo tamaño que los cables al motor. Los cables deben ser codificados con colores para facilitar el mantenimiento.

Los motores trifásicos requieren protección para todos los circuitos derivados con arrancadores magnéticos y sobrecargas térmicas del tamaño adecuado.

⚠ ADVERTENCIA
Voltaje peligroso

CONECTE A TIERRA PERMANENTEMENTE LA BOMBA, EL MOTOR Y LOS CONTROLES SEGÚN LOS CÓDIGOS NEC O LOCALES ANTES DE CONECTAR AL SUMINISTRO ELÉCTRICO. DE NO HACERLO, SE PUEDEN PROVOCAR DESCARGAS ELÉCTRICAS, QUEMADURAS O LA MUERTE.

Conecte los conductores eléctricos al motor como se indica a continuación:

Motores monofásicos: conecte el cable NEGRO al cable NEGRO del motor. Conecte el cable BLANCO al cable BLANCO del motor. Conecte el cable VERDE al cable VERDE del motor.

Motores trifásicos: ver la figura que aparece a continuación.

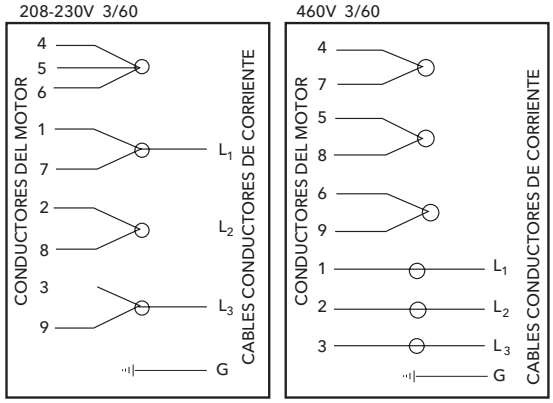


DIAGRAMA DEL CABLEADO DEL MOTOR TRIFÁSIO

AVISO: LA ROTACIÓN DE LA UNIDAD ESTÁ DETERMINADA SEGÚN LA VISIÓN DESDE EL EXTREMO DEL MOTOR. CONSULTE LA PÁGINA 17 PARA VER UN DETALLE DE LA ROTACIÓN DEL MOTOR. UNA ROTACIÓN INCORRECTA PUEDE CAUSAR DAÑOS A LA BOMBA Y ANULA LA GARANTÍA.

Verifique la rotación de la bomba observando el ventilador del motor o el acoplamiento **A TRAVÉS** del protector de acoplamiento. **NO** confunda las flechas de flujo, estampadas en el cuerpo de la bomba, con las flechas de rotación en el acoplamiento y el adaptador del motor. Solo motores trifásicos: si la rotación es incorrecta, haga que un electricista calificado intercambie dos de los tres conductores de suministro de energía.

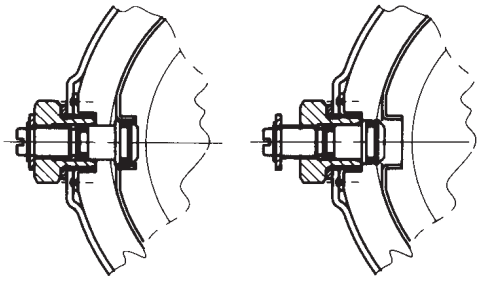
3. CEBADO/RESPIRACIÓN

Para instalaciones con el nivel de líquido sobre la bomba:

Cierre la válvula de descarga.

Quite el tapón del respiradero.

Solo en el caso de los modelos 1SV, 3SV y 5SV, es necesario aflojar completamente la clavija ubicada en el tapón de drenaje. Ver la figura que aparece a continuación.



TAPÓN DE DRENAJE CON LA CLAVIJA CERRADA

TAPÓN DE DRENAJE CON LA CLAVIJA ABIERTA

En los tamaños 10SV-125SV, el tapón de ventilación se suministra con una válvula de aguja interna, por lo que no es necesario remover el tapón de ventilación. Simplemente debe aflojar hasta la mitad la válvula de aguja para abrirla y que el aire se pueda escapar. (En los tamaños 33SV-92SV, si la bomba se entrega con un sello de cartucho, remueva el tapón de ventilación ubicado en la placa del prensaestopas debajo del acoplamiento).

Abra la válvula de succión hasta que salga líquido de la abertura del tapón de ventilación.

AVISO: NO RETIRE Y SUSTITUYA EL TAPÓN DE DRENAJE CON CUALQUIER OTRO TAPÓN O ACCESORIO DE TUBERÍA DE CUALQUIER OTRO FABRICANTE, YA QUE PUEDE AFECTAR SIGNIFICATIVAMENTE EL DESEMPEÑO DE LA BOMBA.

NOTA: Coloque un trapo suelto sobre el puerto de ventilación abierto para evitar que se rocíen grandes cantidades de líquido sobre la bomba y los equipos adyacentes.

Se debe tener cuidado si se está bombeando agua caliente o agentes químicos para evitar lesiones personales.

Instale y haga torque en el tapón de ventilación hasta los valores dados en la sección de **"DATOS DE INGENIERÍA"** de este manual. Cierre la clavija del tapón de drenaje (solo 1SV, 3SV y 5SV) y abra la válvula de descarga.

Para instalaciones con el nivel de líquido por debajo de la bomba:

Instale una válvula de contención en el extremo de succión.

Solo en el caso de los modelos 1SV, 3SV y 5SV, es necesario aflojar completamente la clavija ubicada en el tapón de drenaje. Ver la figura en la página anterior.

Con el embudo de plástico suministrado, llene por completo la carcasa con líquido.

Instale y haga torque en el tapón de ventilación, cierre la clavija del tapón de drenaje (solo 1SV, 3SV y 5SV) y abra la válvula de succión.

OPERACIÓN



NO OPERE LA UNIDAD SIN HABER COLOCADO LAS PROTECCIONES DE SEGURIDAD. SI LO HACE, SE PUEDEN PROVOCAR LESIONES PERSONALES GRAVES.

AVISO: LA BOMBA DEBE SER CEBADA COMPLETAMENTE ANTES DE OPERARLA.



NO OPERE LA BOMBA CON FLUJO CERO O CASI CERO. AL HACERLO, SE PUEDE GENERAR CALOR EXTREMO Y PROVOCAR DAÑOS A LA BOMBA, LESIONES O DAÑOS A LA PROPIEDAD.

Arranque la bomba, manteniendo cerrada la válvula de encendido-apagado que está aguas abajo respecto de la bomba. Abra gradualmente la válvula de encendido-apagado. La bomba debe funcionar suavemente y sin hacer ruido. De ser necesario, vuelva a cebar la bomba. Verifique la corriente absorbida por el motor y, de ser necesario, ajuste la configuración del relé térmico. Cualquier bolsa de aire atrapada dentro de la bomba puede liberarse aflojando el tornillo de aire en todas las bombas e-SV.

⚠ADVERTENCIA **Si una bomba instalada en un lugar donde se pueden producir heladas permanece inactiva, debe drenarla a través de los tapones de drenaje. Esta operación no es necesaria si se ha agregado al agua un anticongelante adecuado.**

Asegúrese de que el líquido drenado no cause daños o lesiones.

Después de estabilizar el sistema en condiciones normales de funcionamiento, controle las tuberías para verificar que estén bien alineadas. De ser necesario, ajuste los soportes de las tuberías.

⚠ADVERTENCIA
Máquina Peligrosa

MAQUINARIA PELIGROSA. LOS PROTECTORES TÉRMICOS DEL MOTOR PUEDEN HACER QUE EL MOTOR VUELVA A ARRANCAR DE MANERA INESPERADA Y SIN PREAVISO, LO QUE PUEDE PROVOCAR LESIONES PERSONALES GRAVES.

Consulte la sección de **"DATOS DE INGENIERÍA"** de este manual para ver el máximo de arranques recomendados de la bomba por hora.

MANTENIMIENTO

⚠ADVERTENCIA
Voltaje peligroso

DESCONECTE Y BLOQUEE LA ENERGÍA ELÉCTRICA ANTES DE INTENTAR REALIZAR CUALQUIER TAREA DE MANTENIMIENTO. DE NO HACERLO, SE PUEDEN PROVOCAR DESCARGAS ELÉCTRICAS, QUEMADURAS O LA MUERTE.

LUBRICACIÓN DEL MOTOR
Intervalos recomendados de lubricación del cojinete del motor

Intervalo de mantenimiento	Ambiente
1 – 2 años	Servicio liviano en una atmósfera limpia
1 año	8-16 horas/día – Atmósfera limpia y seca
6 meses	12-24 horas/día – Humedad presente
3 meses	12-24 horas/día – Sucio, alta humedad

Cuando se usan lubricantes a temperaturas elevadas, la frecuencia de lubricación debe incrementarse.

NO mezclar bases de grasa (litio, sodio, etc.). Purgar completamente la grasa usada si cambia la base de grasa.

Si se engrasa en exceso, se pueden generar temperaturas excesivas en el cojinete y fallos en el lubricante y el cojinete.

RECAMBIO DE SELLOS MECÁNICOS
(e-SV 1–125)

1. Cierre todas las válvulas de succión y descarga necesarias para aislar la bomba del sistema.
2. Drene el líquido de la bomba quitando el tapón de drenaje y abriendo la válvula de aguja del tapón de ventilación.
3. Quite los protectores del acoplamiento, los 4 tornillos hexagonales del acoplamiento, el acoplamiento y la uña de arrastre del acoplamiento. Ver los pasos 1-3.
4. Quite los 4 tornillos hexagonales del motor (tornillos internos) del alojamiento del sello. Consultar el paso 4.
5. Quite la placa del alojamiento del sello en los modelos 33-125SV usando los dos agujeros roscados provistos. Enrosque 2 de los tornillos hexagonales en estos agujeros y ajústelos de manera pareja. Levante y quite el alojamiento del sello entre la bomba y el eje del motor. Tenga cuidado al deslizar el alojamiento del sello entre el eje para evitar dañar el asiento fijo. Consultar el paso 5.
6. Dé vuelta el alojamiento del sello y remueva el asiento fijo y la junta tórica. Quite y deseche la junta tórica grande usada para sellar el alojamiento del sello al cabezal de la bomba. Inspeccione el asiento del sello en busca de rebabas o suciedad. Asegúrese de que el asiento esté limpio. Lubrique el eje o la funda ligeramente. Utilice un lubricante a base de agua. Instale el nuevo asiento presionando la caja de sellado con su pulgar. NO HAGA DEMASIADA FUERZA y, de ser posible, coloque un trapo limpio y suave sobre la cara del sello para protegerla durante la instalación.
7. Remueva la parte giratoria del sello mecánico deslizando la unidad giratoria axialmente hacia arriba por el eje de la bomba. Inspeccione el eje de la bomba en busca de rebabas o suciedad. Lije cualquier rebaba con una lija (fina) hasta dejarla lisa. Ver el paso 7 en la Figura 5.
8. Lubrique la junta tórica ubicada en la identificación de la unidad giratoria del sello mecánico con un lubricante compatible con los elastómeros del sello. Deslice con cuidado la unidad giratoria del sello mecánico hacia abajo por el eje. Rote el sello para ubicar el pasador en la parte inferior del sello junto a los agujeros del manguito del eje (solo 33-125SV). Suba y baje el sello para lubricar la junta tórica y evitar que el sello se pegue al eje. Ver el paso 8 en la Figura 5.
9. Instale la nueva junta tórica del alojamiento del sello. Se puede usar un lubricante para sostener la junta tórica en el diámetro del alojamiento del sello. Reinstale con cuidado el alojamiento del sello entre la bomba y el eje del motor y deslícelo hacia abajo por el eje hasta su posición. **Tenga cuidado al montar el alojamiento del sello entre la bomba/el eje del motor para que la cara del sello en el asiento fijo no se dañe.** Ver el paso 9 en la Figura 5.
10. Reinstale los 4 tornillos hexagonales, ajustándolos de manera pareja y luego haciendo torque hasta los valores dados en los datos de ingeniería. Ver el paso 10 en la Figura 5.
11. Reinstale el pasador de acoplamiento y ubique la cuña espaciadora en el eje del alojamiento del sello. **Si no tiene la cuña, se puede usar un espaciador de 5 mm.** Ver el paso 11 en la Figura 5.
12. Reinstale las mitades del alojamiento y ajuste de manera pareja los pernos del alojamiento y haga torque hasta los valores dados en la sección del acoplamiento. Quite la cuña espaciadora y guárdela para uso posterior. Ver el paso 12 en la Figura 5.
13. Rote el eje manualmente para asegurarse de que la bomba y el motor roten libremente. Reinstale el protector del acoplamiento.

14. La bomba y el sistema deben ser ventilados antes de arrancar la bomba. Ver la Sección 3, página 8, para consultar procedimientos de ventilación.

RECAMBIO DE SELLOS MECÁNICOS

(tamaños 33SV-125SV) con sellos de cartucho

1. Realice los pasos 1-4 definidos anteriormente para los sellos convencionales.
2. Afloje los 4 tornillos de fijación ubicados alrededor de la identificación del eje de la bomba.
3. Quite el sello de cartucho usando los dos agujeros roscados del prensaestopas del sello de cartucho enroscando dos de los tornillos hexagonales en estos agujeros y ajustándolos de manera pareja. Levante y quite el sello de cartucho entre la bomba y el eje del motor.
4. Inspeccione el eje de la bomba en busca de rebabas o suciedad. Lije cualquier rebaba con una lija (fina) hasta dejarla lisa.
5. Instale la nueva junta tórica en el montaje invertido del nuevo sello de cartucho. Lubrique la junta tórica ubicada en la identificación del sello de cartucho. Use un lubricante compatible con los elastómeros del sello para sostener la junta tórica.
6. Instale el nuevo sello de cartucho en la bomba deslizándolo con cuidado entre la bomba y el eje del motor y luego deslizándolo hasta su posición.
7. Realice los pasos 11-14 definidos anteriormente para los sellos convencionales.
8. Después de instalar el acoplamiento, ajuste los cuatro tornillos de fijación ubicados en el collar del sello de cartucho para unir el sello al eje de la bomba.
9. Rote el eje manualmente para asegurarse de que la bomba y el motor roten libremente. Reinstale el protector del acoplamiento.
10. Use las conexiones de ventilación en el sello de cartucho para ventilar correctamente.

RECAMBIO DEL MOTOR

Para quitar el motor, siga los pasos de 1 a 4, como se explica en la sección de **"RECAMBIO DE SELLOS MECÁNICOS"** de este manual.

Para armazones de motor de 213TC en adelante, remueva los 4 tornillos hexagonales del motor y el adaptador del motor.

Instale la brida del adaptador del motor en el nuevo motor, haciendo torque en los 4 tornillos hexagonales dados en la sección de **"DATOS DE INGENIERÍA"** de este manual.

Complete el rearmado siguiendo los pasos 17 a 22 de la sección de **"RECAMBIO DE SELLOS MECÁNICOS"** de este manual.

Todas las demás tareas de servicio o mantenimiento de la unidad, no tratadas en este manual, deben ser realizadas en un establecimiento calificado de servicio. Comuníquese con su distribuidor local o el distribuidor de Goulds Water Technology para recibir asistencia.

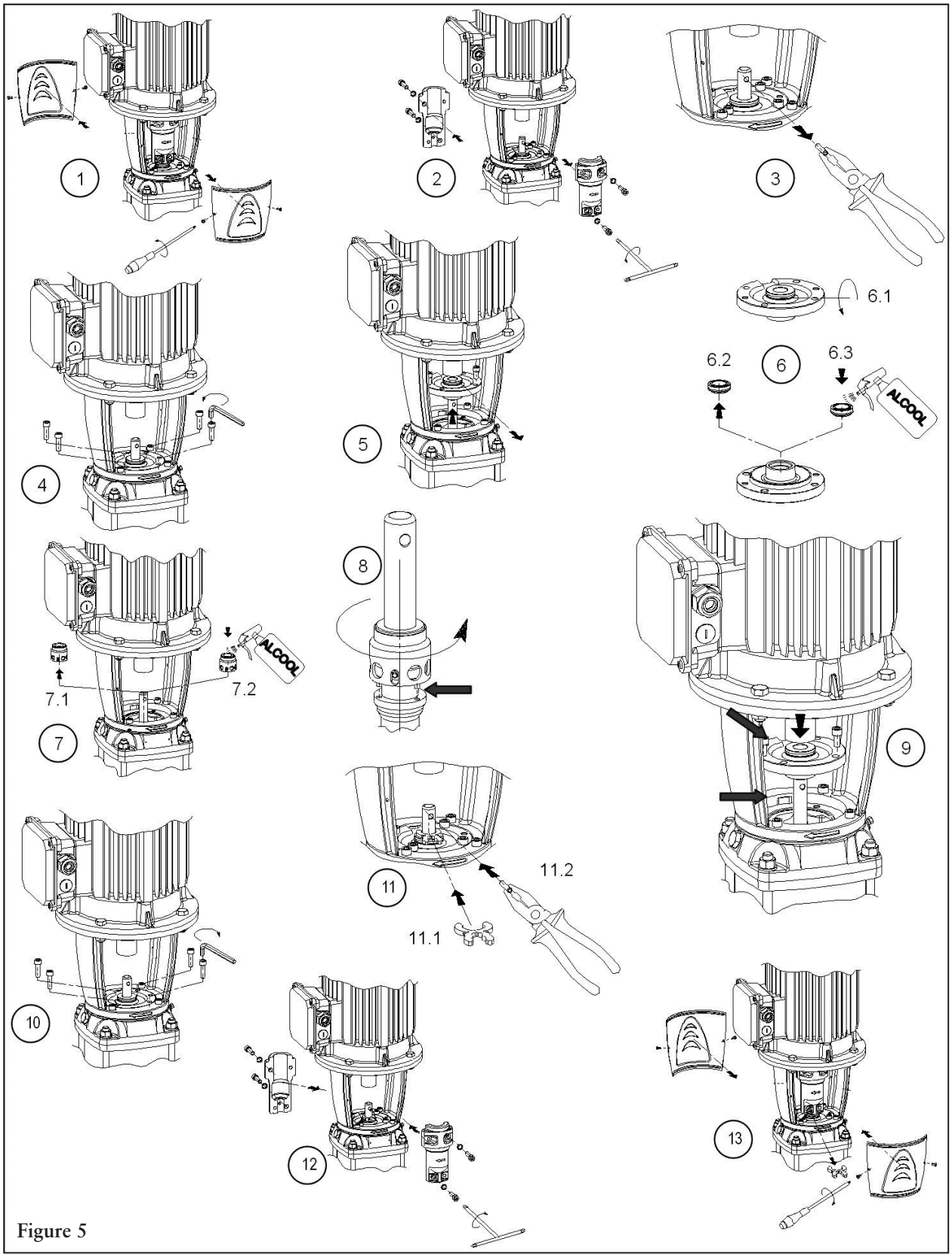


Figure 5

GUÍA DE RESOLUCIÓN DE PROBLEMAS

⚠ADVERTENCIA
Tensión peligrosa

DESCONECTE Y BLOQUEE LA ENERGÍA ELÉCTRICA ANTES DE INTENTAR REALIZAR CUALQUIER TAREA DE MANTENIMIENTO. DE NO HACERLO, SE PUEDEN PROVOCAR DESCARGAS ELÉCTRICAS, QUEMADURAS O LA MUERTE.

SÍNTOMA

EL MOTOR NO FUNCIONA
Vea Causa probable: 1 a 5

FLUYE POCO O NINGÚN LÍQUIDO DE LA BOMBA
Vea Causa probable: 6 a 12

CONSUMO DE ENERGÍA DEMASIADO ALTO
Vea Causa probable: 3, 12, 13, 15

RUIDO Y VIBRACIÓN EXCESIVOS
Vea Causa probable: 3, 6-8, 10, 12, 13, 16

CAUSA PROBABLE

1. Saltó el protector térmico del motor.
2. Disyuntor abierto o fusible quemado.
3. Se pegan las turbinas.
4. Motor mal cableado.
5. Motor defectuoso.
6. La bomba no está cebada, hay aire o gas en el líquido.
7. Descarga o succión tapados, o válvula cerrada.
8. Rotación incorrecta (sólo trifásico).
9. Baja tensión o pérdida de fase.
10. Turbinas desgastadas o tapadas.
11. La carga del sistema es demasiado alta.
12. NSPHa demasiado baja: exceso de altura o pérdida de succión.
13. Altura de descarga demasiado baja: índice de flujo excesivo.
14. Viscosidad y gravedad específica del líquido demasiado altas.
15. Cojinete desgastado.
16. Bomba, motor o tubería flojos.

DATOS DE INGENIERÍA

VALORES DE TORQUE

HP	Perno del motor	Brida del adaptador	Acoplamiento		
			1-5SV	10-22SV	33-92SV
0,75-7,5 HP	20 lbs pie (27 N·m)	–	15 lbs pie (20 N·m)	40 lbs pie (54 N·m)	37 lbs pie (50 N·m)
10-75 HP	45 lbs pie (61 N·m)	48 lbs pie (65 N·m)*	15 lbs pie (20 N·m)	40 lbs pie (54 N·m)	48 lbs pie (65 N·m)

* La brida del adaptador de 213TC y 215TC usan 30 lbs pie (40 N m)

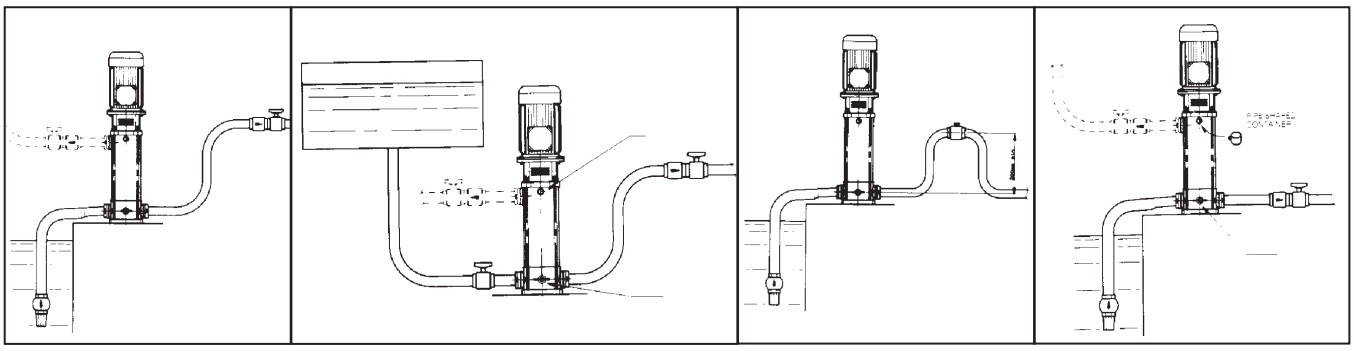
VALORES DE TORQUE

Tamaño de bomba	Tuercas de la barra de acoplamiento	Ventilación y drenaje
1-5SV	18 lbs pie (24 N·m)	18 lbs pie (24 N·m)
10-22SV	22 lbs pie (30 N·m)	18 lbs pie (24 N·m)
33-125SV	44 lbs pie (60 N·m)	30 lbs pie (41 N·m)

AGUJA DE VACÍO

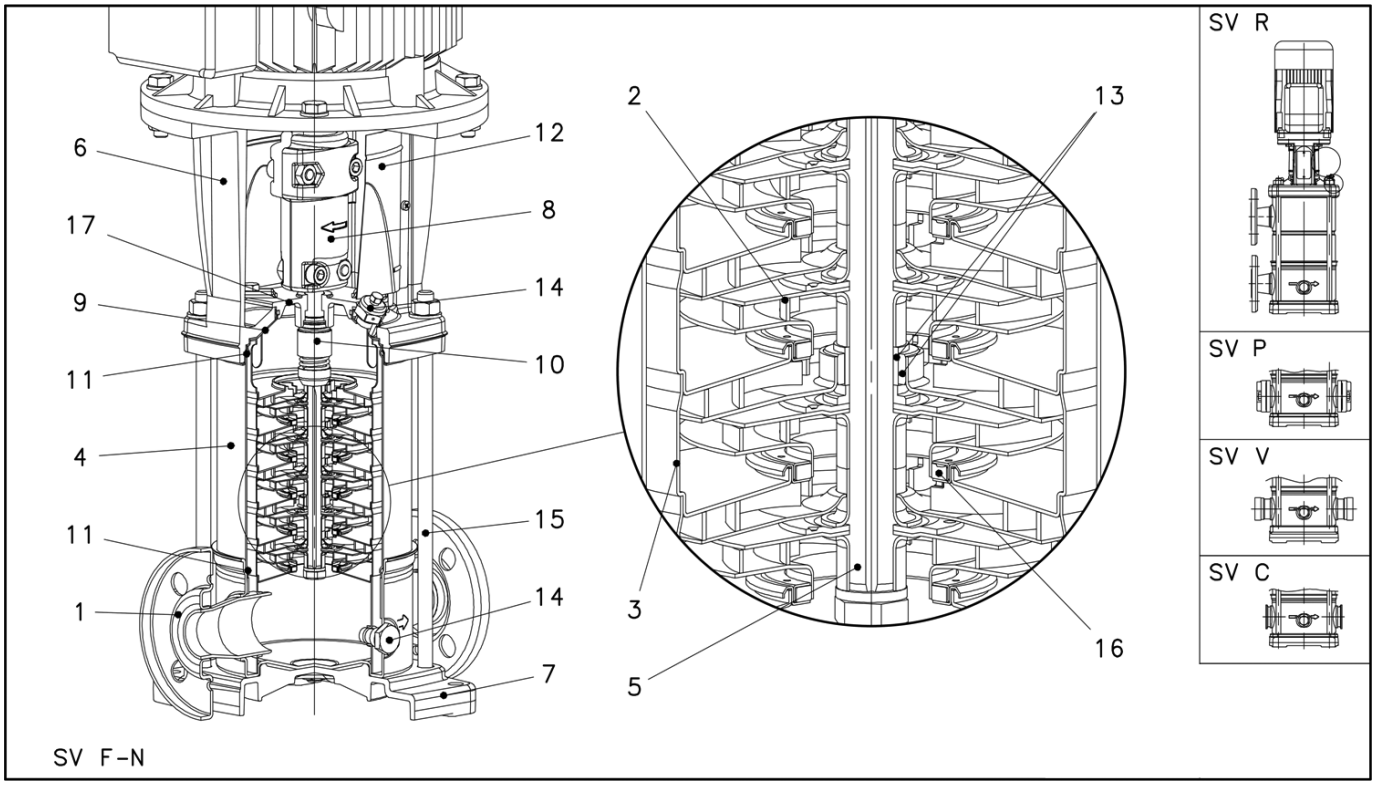
Tamaño de bomba	
1-5SV	7 lbs pie (9.5 N·m)
10-22SV	
33-125SV	

PLOMERÍA E INSTALACIÓN HABITUALES

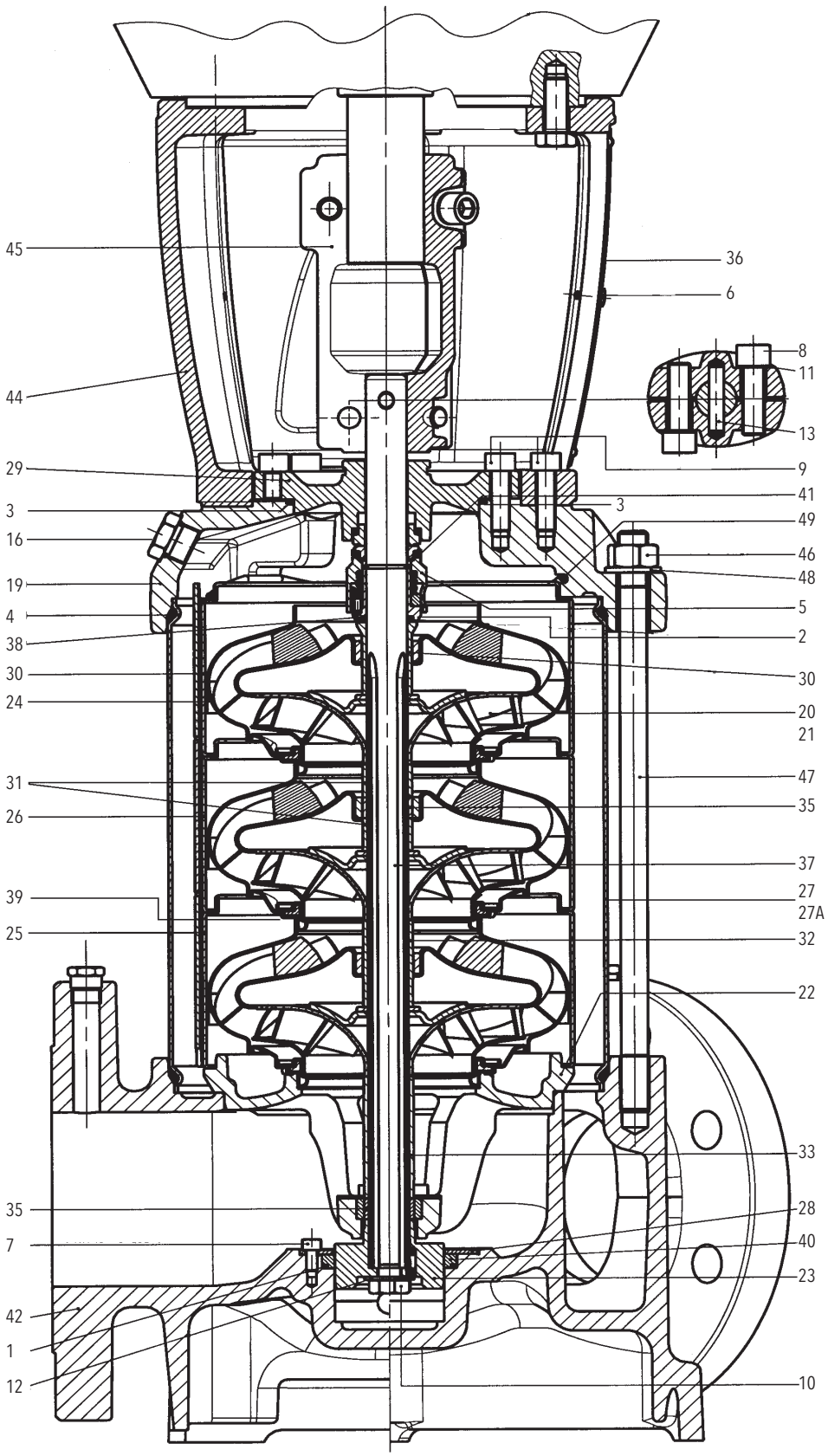


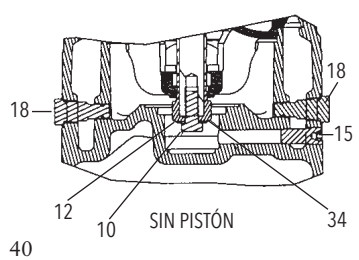
NOTA: El bucle de descarga debe estar lo suficientemente alto para mantener el líquido en las etapas inferiores durante el apagado.

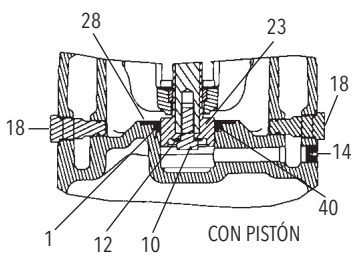
PRINCIPALES COMPONENTES 1-22SV



1 Cuerpo de la bomba
2 Turbina
3 Difusor
4 Carcasa
5 Eje
6 Adaptador
7 Base
8 Acoplamiento
9 Placa del sello
10 Sello mecánico
11 Elastómeros
12 Protector del acoplamiento
13 Manguito del eje y buje
14 Tapones de llenado/drenaje
15 Barras de acoplamiento
16 Anillo de desgaste
17 Prensaestopas del sello

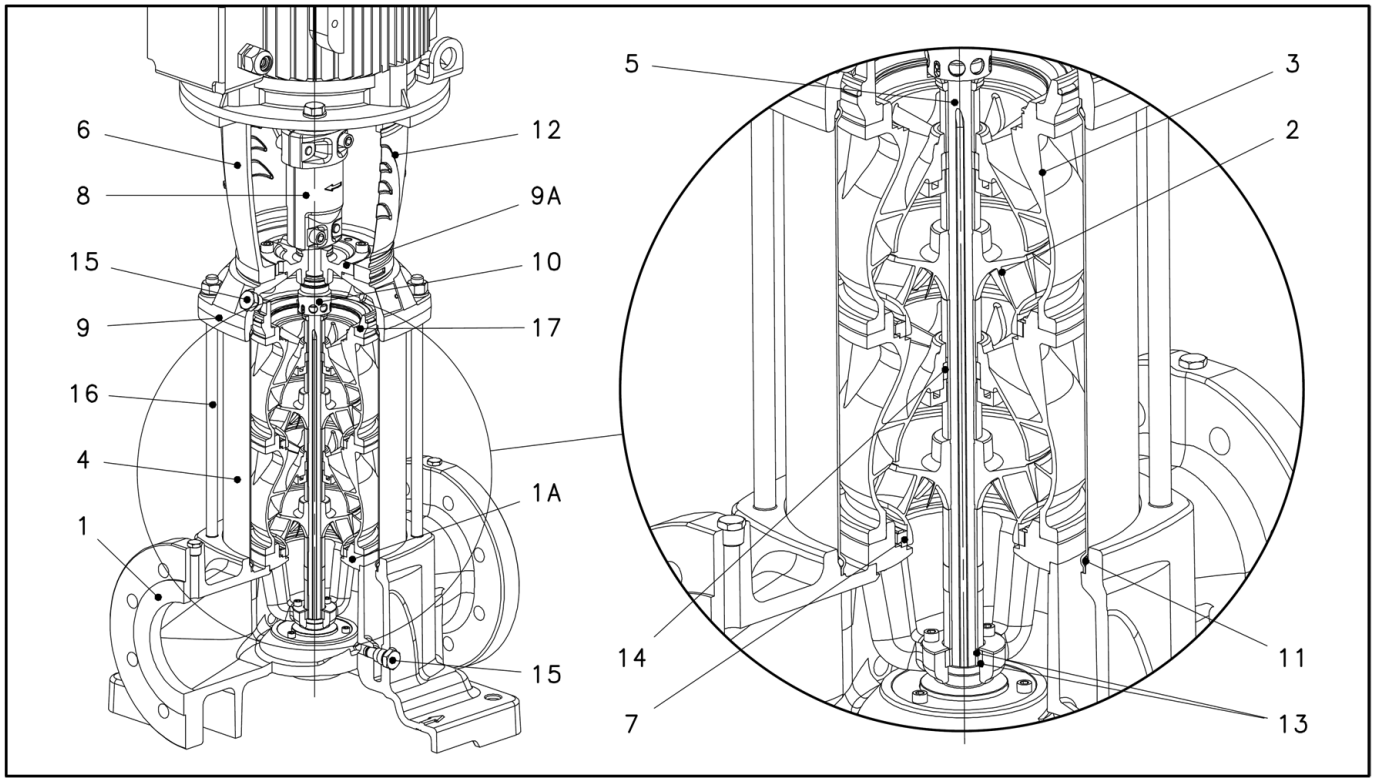






1 Junta tórica, sello de pistón
2 Junta tórica, sello mecánico
3 Junta tórica, alojamiento del sello
4 Junta tórica, manguito
5 Sello mecánico
5A Sello de cartucho (no se muestra)
6 Tornillo, protector
7 Tornillo, disco de retención del pistón
8 Tornillo, acoplamiento
9 Tornillo, adaptador medio y alojamiento del sello
10 Tornillo, turbina
11 Arandela, acoplamiento
12 Arandela, turbina
13 Pasador, acoplamiento
14 Tapón, con pistón
15 Tapón, sin pistón
16 Tapón de llenado
17 Tapón de ventilación (no se muestra)
18 Tapón de drenaje
19 Carga de la bomba
20 Turbina, diámetro completo
21 Turbina, diámetro reducido
22 Montaje inferior de cojinetes
23 Pistón
24 Difusor, final
25 Difusor con buje de grafito
26 Difusor con buje de tungsteno
27 Manguito externo, 25 bar
27A Manguito externo, 40 bar
28 Disco de retención, sello de pistón
29 Alojamiento del sello
30 Espaciador, turbina final
31 Espaciador, buje del eje
32 Espaciador, turbina
33 Espaciador, turbina inferior (66-92SV)
34 Buje, sin pistón
35 Buje de carburo al tungsteno
36 Protector del acoplamiento
37 Eje
38 Manguito del eje del sello mecánico
39 Anillo de desgaste, turbina
40 Sello de pistón
41 Anillo de cierre, turbina
42 Cuerpo de la bomba
43 Placa del adaptador del motor (no se muestra)
44 Adaptador del motor
45 Acoplamiento, mitad
46 Tuerca, barra de acoplamiento
47 Barra de acoplamiento
48 Arandela, barra de acoplamiento
49 Resorte, difusor final

COMPONENTES PRINCIPALES DE 125SV



1 Cuerpo de la bomba
2 Turbina
3 Difusor
4 Carcasa
5 Eje
6 Adaptador
7 Anillo o del elastómero
8 Acoplamiento
9 Placa del sello
10 Sello mecánico
11 Elastómeros
12 Protector del acoplamiento
13 Manguito del eje y buje
14 Buje del eje
15 Tapones de llenado/drenaje
16 Barras de acoplamiento
17 Anillo o del elastómero

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1 Goulds Drive
Auburn, NY 13021

Declaramos que los siguientes productos: NPE, MCS, MCC, 3656, 3656 SP, GB, e-SV, SVI, NPO, Prime Line SP, HB, HMS, LC, NPV, LB, LBS cumplen con las Directivas para Maquinarias 06/42/ECC. Este equipo ha sido diseñado para ser incorporado a la maquinaria cubierta por esta directiva pero no debe ponerse en funcionamiento hasta que se declare que la maquinaria en la que será incorporado cumple con las disposiciones reales de la directiva.

GARANTÍA COMERCIAL

Para los productos vendidos a compradores comerciales, el Vendedor garantiza que los productos vendidos al Comprador en virtud del presente (con excepción de membranas, sellos, juntas, materiales de elastómero, revestimientos y otras "partes de desgaste" o consumibles, que no se garantizan, con excepción de lo dispuesto por el contrario en la cotización o formulario de venta) (i) se construirán de acuerdo con las especificaciones referidas en la cotización o formulario de venta, si tales especificaciones se realizan expresamente como parte de este Acuerdo, y (ii) están libres de defectos en material y mano de obra por un período de un (1) año desde la fecha de instalación o doce (12) meses desde la fecha de envío (y tal fecha de envío no deberá ser posterior a dieciocho (18) meses posteriores a la recepción del aviso que los productos están listos para ser enviados), lo que ocurra primero, a menos que se especifique un período mayor en la documentación del producto (la "Garantía").

Con excepción de lo requerido por ley, el Vendedor, a su opción y sin costo alguno para el Comprador, reparará o reemplazará el producto que no se ajuste a la Garantía en tanto que el Comprador envíe un aviso escrito al Vendedor sobre todo defecto en material o mano de obra dentro de diez (10) días de la fecha en que aparecen por primera vez los defectos o no conformidades. Según la opción de reparación o reemplazo, el Vendedor no estará obligado a remover o pagar la remoción del producto defectuoso ni instalar o pagar la instalación del producto reemplazado o reparado y el Comprador será responsable de todos los demás costos, que incluyen, entre otros, los costos de servicio, aranceles y gastos de envío. El Vendedor tendrá la exclusiva facultad de decisión con respecto al método o medio de reparación o reemplazo. El incumplimiento del Comprador de las instrucciones de reparación o reemplazo del Vendedor rescindirá las obligaciones del Vendedor en virtud de esta Garantía y anulará esta Garantía. Toda pieza reparada o reemplazada en virtud de la Garantía es garantizada solo por el resto del período de garantía por las piezas reparadas o reemplazadas. El Vendedor no tendrá obligaciones de garantía frente al Comprador con respecto a ningún producto o pieza de un producto que haya sido: (a) reparado por terceros que no sean el Vendedor o sin la aprobación escrita del Vendedor; (b) sujeto a uso incorrecto, aplicación incorrecta, descuido, alteración, accidente o daño físico; (c) usado de forma contraria a las instrucciones del Vendedor para la instalación, operación y mantenimiento; (d) dañado por el uso y desgaste normal, corrosión o ataque químico; (e) dañado debido a condiciones anormales, vibración, falta de cebado correcto o funcionamiento sin flujo; (f) dañado debido a una fuente de alimentación defectuosa o protección eléctrica incorrecta; o (g) dañado debido al uso de equipos accesorios no vendidos o aprobados por el Vendedor. En el caso de productos no fabricados por el Vendedor, no hay garantía del Vendedor; sin embargo, el Vendedor extenderá al Comprador toda garantía recibida del proveedor del Vendedor de tales productos.

LA GARANTÍA ANTERIOR ES EXCLUSIVA Y REEMPLAZA TODA OTRA GARANTÍA, CONDICIÓN O TÉRMINO EXPRESO O IMPLÍCITO DE CUALQUIER NATURALEZA RELACIONADO CON LOS PRODUCTOS PROVISTOS EN VIRTUD DEL PRESENTE, INCLUYENDO, SIN CARÁCTER LIMITATIVO, LAS GARANTÍAS IMPLÍCITAS DE COMERCIABILIDAD E IDONEIDAD PARA UN PROPÓSITO EN PARTICULAR, QUE POR EL PRESENTE SE RECHAZAN Y EXCLUYEN EXPRESAMENTE. CON EXCEPCIÓN DE LO DISPUESTO POR LA LEY EN CONTRARIO, EL EXCLUSIVO REMEDIO DEL COMPRADOR Y LA RESPONSABILIDAD TOTAL DEL VENDEDOR POR EL INCUMPLIMIENTO DE ALGUNA DE LAS GARANTÍAS ANTERIORES SE LIMITA A REPARAR O REEMPLAZAR EL PRODUCTO Y EN TODO CASO SE LIMITARÁ AL IMPORTE PAGADO POR EL COMPRADOR POR EL PRODUCTO DEFECTUOSO. EN NINGÚN CASO EL VENDEDOR SERÁ RESPONSABLE POR OTRA FORMA DE DAÑOS, YA SEA DIRECTOS, INDIRECTOS, LIQUIDADOS, INCIDENTALES, RESULTANTES, PUNITIVOS, EJEMPLARES O ESPECIALES, INCLUYENDO, ENTRE OTROS, LA PÉRDIDA DE GANANCIAS, LA PÉRDIDA DE AHORROS ANTICIPADOS O GANANCIAS, LA PÉRDIDA DE INGRESOS, LA PÉRDIDA DEL NEGOCIO, LA PÉRDIDA DE PRODUCCIÓN, LA PÉRDIDA DE OPORTUNIDAD O LA PÉRDIDA DE REPUTACIÓN.

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MANUEL D'UTILISATION
IM228R08



Modèle e-SV

DIRECTIVES D'INSTALLATION, D'UTILISATION ET D'ENTRETIEN

GOULDS
WATER TECHNOLOGY
a xylem brand

Table des matières

SUJET	PAGE
Gamme et codification des e-SV	46
Consignes de sécurité	50
Aperçu	50
Description des e-SV	50
Usages	50
Vérifications avant installation	50
Transport et entreposage	52
Installation	53
Mise en service	55
Utilisation	56
Entretien	57
Remplacement de la garniture mécanique (1SV à 125SV)	57
Remplacement de la garniture mécanique à cartouche d'étanchéité (33SV à 125SV)	57
Remplacement du moteur	58
Guide de dépannage	59
Données techniques	59
Plomberie et installations types	59
Dessins et principaux composants des e-SV	60 à 62
Garantie limitée	64

Informations pour le propriétaire

Numéro de modèle de la pompe : _____

Numéro de série de la pompe : _____

N° de modèle de la commande : _____

Détaillant : _____

N° de téléphone du détaillant : _____

Date d'achat : _____ d'installation : _____

Courant mesuré au démarrage :

1Ø		3Ø	L1 et 2	L2 et 3	L3 et 1
A :	_____	A :	_____	_____	_____
V :	_____	V :	_____	_____	_____

Gamme de produits e-SV
Codification des 1SV à 22SV – pompes seulement

Chaque version de l'e-SV est désignée par un code de produit, inscrit sur la plaque signalétique de la pompe. Définis ci-dessous, les caractères du code constituent le numéro d'article (catalogue) de la pompe. ***Nota*** : certaines combinaisons de caractères sont impossibles.

Exemple de code de produit

22 SV 0 2 F E 3 0

Versions spéciales (caractères en option)

A = logement de garniture à chambre régulatrice seulement
B = logement de garniture à chambre régulatrice + passivation
C = logement de garniture à chambre régulatrice + faible hauteur nette d'aspiration
E = polissage électrolytique
F = étages sans roue – 1 étage
G = étages sans roue – 2 étages
H = montage horizontal seulement
J = montage horizontal + passivation
K = montage horizontal + faible hauteur nette d'aspiration
L = montage horizontal + haute pression
N = faible hauteur nette d'aspiration seulement
P = passivation seulement
S = Configuration personnalisée
Z = haute pression seulement

Matériaux de la garniture mécanique

0 = carbone, carbure de silicium, Viton (standard)
1 = carbone, carbure de silicium, élastomère fluoré Aflas (hautes températures)
2 = carbure de silicium, carbure de silicium, Viton
4 = carbure de silicium, carbure de silicium, caoutchouc éthylène-propylène
6 = carbone, carbure de silicium, caoutchouc éthylène-propylène

Pôles • Hz

1 = 2 • 50
2 = 4 • 50
3 = 2 • 60
4 = 4 • 60

Carcasse de moteur (NEMA)

A = 56C
B = 180TC
C = 210TC
D = 250TC
E = 280TC
F = 320TSC
G = 360TSC
H = 140TC

Types de raccords

C = coquilles serre-raccords, inox 316
F = brides rondes, inox 304 (SVB)
G = brides rondes, fonte ou inox 304
N = brides rondes, inox 316 (SVD)
P = raccords Victaulic, inox 316
T = raccords ovales, inox 304 (SVA)

		Orifices d'aspiration et de refoulement (position horaire)
R =	fonte et inox 304	(SVC), aspir. (12 h), refoul. (12 h)
W =	fonte et inox 304	(SVC), aspir. (12 h), refoul. (3 h)
X =	fonte et inox 304	(SVC), aspir. (12 h), refoul. (6 h)
Y =	fonte et inox 304	(SVC), aspir. (12 h), refoul. (9 h)

Nombre d'étages munis d'une roue (1 ou 2 caractères)

Gamme de produits

SV = pompe verticale en inox

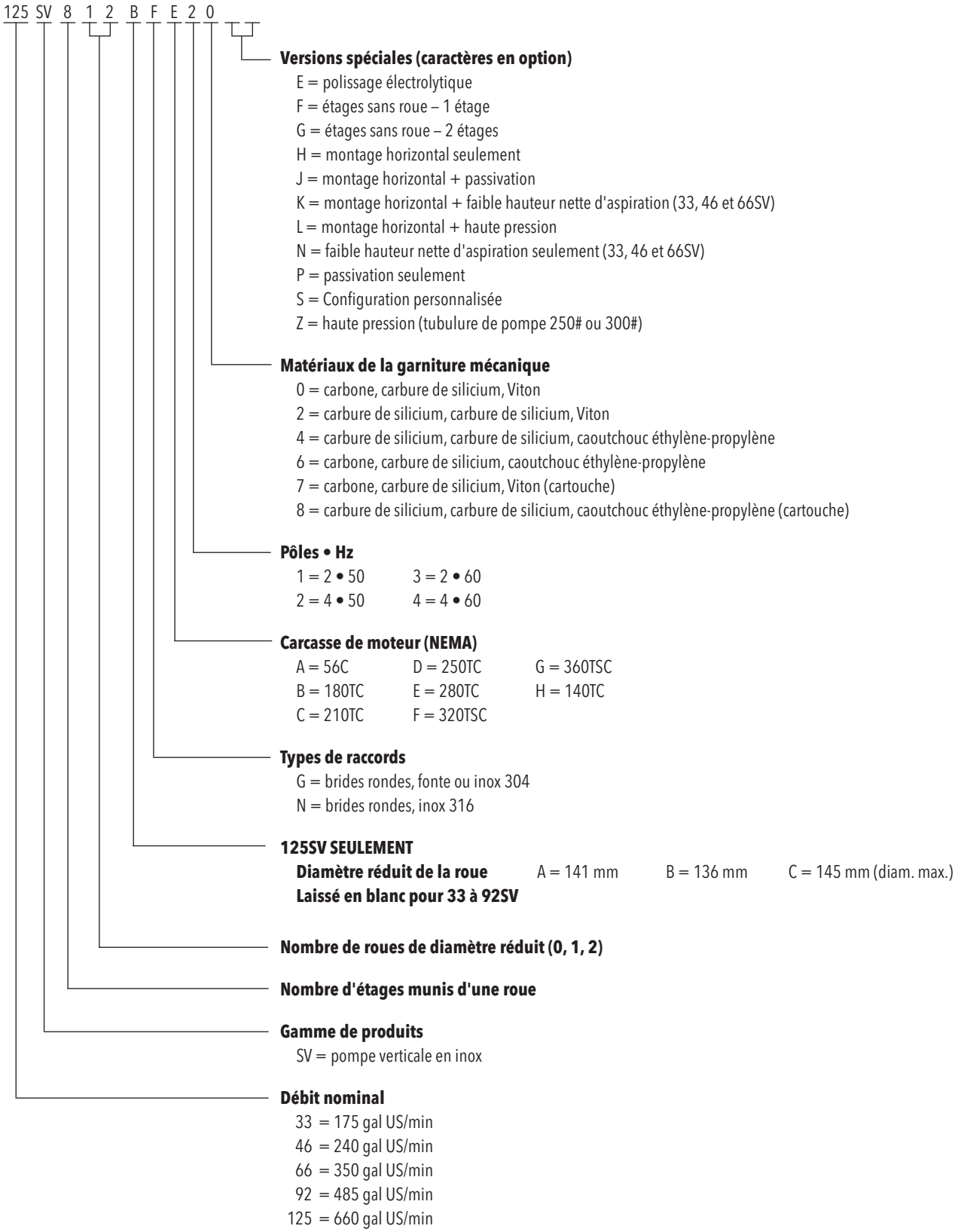
Débit nominal

1 = 5 gal US/min
3 = 16 gal US/min
5 = 26 gal US/min
10 = 53 gal US/min
15 = 80 gal US/min
22 = 116 gal US/min

Gamme de produits e-SV
Codification des 33SV à 125SV – pompes seulement

Chaque version de l'e-SV est désignée par un code de produit, inscrit sur la plaque signalétique de la pompe. Définis ci-dessous, les caractères du code constituent le numéro d'article (catalogue) de la pompe. ***Nota*** : certaines combinaisons de caractères sont impossibles.

Exemple de code de produit



Gamme de produits e-SV
Codification des 1SV à 22SV – combinaison pompe-moteur

Chaque version de l'e-SV est désignée par un code de produit, inscrit sur la plaque signalétique de la pompe. Définis ci-dessous, les caractères du code constituent le numéro d'article (catalogue) de la pompe. ***Nota*** : certaines combinaisons de caractères sont impossibles.

Exemple de code de produit

2 SV 2 2 F A 2 F 5 1 A H

Versions spéciales (1 ou 2 caractères)
- A = logement de garniture à chambre régulatrice seulement
- B = logement de garniture à chambre régulatrice + passivation
- C = logement de garniture à chambre régulatrice + faible hauteur nette d'aspiration
- E = polissage électrolytique
- F = étages sans roue – 1 étage
- G = étages sans roue – 2 étages
- H = montage horizontal seulement
- J = montage horizontal + passivation
- K = montage horizontal + faible hauteur nette d'aspiration
- L = montage horizontal + haute pression
- M = i-Alert
- N = faible hauteur nette d'aspiration seulement
- P = passivation seulement
- S = Configuration personnalisée
- Z = haute pression (tubulure de pompe 250# ou 300#)

Matériaux de la garniture mécanique
- 0 = carbone, carbure de silicium, Viton
- 1 = carbone, carbure de silicium, élastomère fluoré Aflas (hautes températures)
- 2 = carbure de silicium, carbure de silicium, Viton
- 4 = carbure de silicium, carbure de silicium, caoutchouc éthylène-propylène
- 6 = carbone, carbure de silicium, caoutchouc éthylène-propylène

Carcasse de moteur
- 1 = abritée (à ouvertures de ventilation protégées, ODP)
- 2 = fermée autoventilée (TEFC)
- 3 = antidéflagrante (X-Proof, XP)
- 4 = lavage, climat tropical
- 5 = rendement supérieur, abritée (ODP)
- 6 = rendement supérieur, fermée autoventilée (TEFC)
- 7 = rendement supérieur, antidéflagrante (X-Proof, XP)
- 8 = rendement supérieur, lavage
- 9 = milieu marin
- A = produits chimiques
- B = rendement supérieur , produits chimiques
- C = Classe 1 Div 2

Tension (volts)
- A = 115 à 230
- B = 230
- C = 230 à 460
- D = 460
- E = 575
- F = 208 à 230 ou 460
- G = 200
- H = 190 ou 380
- J = 115 ou 208 à 230
- K = 208
- L = 208 à 230
- M = 190, 380 ou 415
- N = 380
- P = 110 ou 220
- R = 220
- S = 415
- T = 220 ou 380, montage en étoile
- U = 380 à 660, montage en étoile
- V = 208 à 230 ou 460, montage en étoile

Pôles • Hz • phases (Ø)
- 1 = 2 • 50 • 1
- 2 = 2 • 50 • 3
- 3 = 2 • 60 • 1
- 4 = 2 • 60 • 3
- 5 = 4 • 50 • 1
- 6 = 4 • 50 • 3
- 7 = 4 • 60 • 1
- 8 = 4 • 60 • 3

Puissance (hp) nominale
- A = 0,5
- B = 0,75
- C = 1
- D = 1,5
- E = 2
- F = 3
- G = 5
- H = 7,5
- J = 10
- K = 15
- L = 20
- M = 25
- N = 30
- P = 40

Types de raccords
- C = coquilles serre-raccords, inox 316
- F = brides rondes, inox 304 (SVB)
- G = brides rondes, fonte ou inox 304
- N = brides rondes, inox 316 (SVD)
- P = raccords Victaulic, inox 316
- T = raccords ovales, inox 304 (SVA)

Orifices d'aspiration et de refoulement (position horaire)
- R = fonte et inox 304 (SVC), aspir. (12 h), refoul. (12 h)
- W = fonte et inox 304 (SVC), aspir. (12 h), refoul. (3 h)
- X = fonte et inox 304 (SVC), aspir. (12 h), refoul. (6 h)
- Y = fonte et inox 304 (SVC), aspir. (12 h), refoul. (9 h)

Nombre d'étages munis d'une roue (1 ou 2 caractères)

Gamme de produits
- SV = pompe verticale en inox

Débit nominal
- 1 = 5 gal US/min
- 3 = 16 gal US/min
- 5 = 26 gal US/min
- 10 = 53 gal US/min
- 15 = 80 gal US/min
- 22 = 116 gal US/min

Gamme de produits e-SV
Codification des 33SV à 125SV – combinaison pompe-moteur

Chaque version de l'e-SV est désignée par un code de produit, inscrit sur la plaque signalétique de la pompe. Définis ci-dessous, les caractères du code constituent le numéro d'article (catalogue) de la pompe. ***Nota*** : certaines combinaisons de caractères sont impossibles.

Exemple de code de produit

125 SV 8 2 A G K 3 F 2 0 _ _

Versions spéciales (1 ou 2 caractères)

- E = polissage électrolytique
- F = étages sans roue – 1 étage
- G = étages sans roue – 2 étages
- H = montage horizontal seulement
- J = montage horizontal + passivation
- K = montage horizontal + faible hauteur nette d'aspiration (33, 46 et 66SV)
- L = montage horizontal + haute pression
- M = i-Alert
- N = faible hauteur nette d'aspiration seulement (33, 46 et 66SV)
- P = passivation seulement
- S = Configuration personnalisée
- Z = haute pression (tubulure de pompe 250# ou 300#)

Matériaux de la garniture mécanique

- 0 = carbone, carbure de silicium, Viton
- 2 = carbure de silicium, carbure de silicium, Viton
- 4 = carbure de silicium, carbure de silicium, caoutchouc éthylène-propylène
- 6 = carbone, carbure de silicium, caoutchouc éthylène-propylène
- 7 = carbone, carbure de silicium, Viton (cartouche)
- 8 = carbure de silicium, carbure de silicium, caoutchouc éthylène-propylène (cartouche)

Carcasse de moteur

- 1 = abritée (à ouvertures de ventilation protégées, ODP)
- 2 = fermée autoventilée (TEFC)
- 3 = antidéflagrante (X-Proof, XP)
- 4 = lavage, climat tropical
- 5 = rendement supérieur, abritée (ODP)
- 6 = rendement supérieur, fermée autoventilée (TEFC)
- 7 = rendement supérieur, antidéflagrante (X-Proof, XP)
- 8 = rendement supérieur, lavage
- 9 = milieu marin
- A = produits chimiques
- B = rendement supérieur, produits chimiques
- C = Classe 1 Div 2

Tension (volts)

- A = 115 / 230
- B = 230
- C = 230 / 460
- D = 460
- E = 575
- F = 208 à 230 ou 460
- G = 200
- H = 190 ou 380
- J = 115 ou 208 à 230
- K = 208
- L = 208 à 230
- M = 190, 380 ou 415
- N = 380
- P = 110 ou 220
- R = 220
- S = 415
- T = 220 ou 380, montage en étoile
- U = 380 à 660, montage en étoile
- V = 208 à 230 ou 460, montage en étoile

Pôles • Hz • phases (Ø)

- 1 = 2 • 50 • 1
- 2 = 2 • 50 • 3
- 3 = 2 • 60 • 1
- 4 = 2 • 60 • 3
- 5 = 4 • 50 • 1
- 6 = 4 • 50 • 3
- 7 = 4 • 60 • 1
- 8 = 4 • 60 • 3

Puissance (hp) nominale

- A = 0,5
- B = 0,75
- C = 1
- D = 1,5
- E = 2
- F = 3
- G = 5
- H = 7,5
- J = 10
- K = 15
- L = 20
- M = 25
- N = 30
- P = 40
- R = 50
- S = 60
- T = 75
- U = 100

Types de raccords

- G = brides rondes, fonte ou inox 304
- N = brides rondes, inox 316

125SV SEULEMENT

Diamètre réduit de la roue A = 141 mm B = 136 mm C = 145 mm (diam. max.)
Laissé en blanc pour 33 à 92SV

Nombre de roues de diamètre réduit (0, 1, 2)

Nombre d'étages munis d'une roue (1 ou 2 caractères)

Gamme de produits

SV – pompe verticale en inox

Débit nominal

- 33 = 175 gal US/min
- 46 = 240 gal US/min
- 66 = 350 gal US/min
- 92 = 485 gal US/min
- 125 = 660 gal US/min

CONSIGNES DE SÉCURITÉ

AFIN DE PRÉVENIR LES BLESSURES GRAVES OU MORTELLES ET LES DOMMAGES MATÉRIELS IMPORTANTS, LIRE ET SUIVRE TOUTES LES CONSIGNES DE SÉCURITÉ FIGURANT DANS LE MANUEL ET SUR LA POMPE.

LE PRÉSENT MANUEL A POUR BUT DE FACILITER L'INSTALLATION ET L'UTILISATION DE LA POMPE ET DOIT RESTER PRÈS DE CELLE-CI.

Le symbole ci-contre est un **SYMBOLE DE SÉCURITÉ** employé pour signaler les mots-indicateurs dont on trouvera la description ci-dessous. Sa présence sert à attirer l'attention afin d'éviter les blessures et les dommages matériels.

⚠ DANGER Prévient des risques qui **VONT** causer des blessures graves, la mort ou des dommages matériels importants.

⚠ AVERTISSEMENT Prévient des risques qui **PEUVENT** causer des blessures graves, la mort ou des dommages matériels importants.

⚠ ATTENTION Prévient des risques qui **PEUVENT** causer des blessures ou des dommages matériels.

AVIS : SERT À ÉNONCER LES DIRECTIVES SPÉCIALES DE GRANDE IMPORTANCE QUE L'ON DOIT SUIVRE.

LIRE SOIGNEUSEMENT CHAQUE DIRECTIVE ET AVERTISSEMENT AVANT D'EFFECTUER TOUT TRAVAIL SUR LA POMPE.

N'ENLEVER AUCUN AUTOCOLLANT DE SÉCURITÉ.

⚠ AVERTISSEMENT



Les fluides dangereux peuvent causer un incendie, des brûlures ou la mort.

APPAREIL NON CONÇU POUR LES LIQUIDES DANGEREUX NI POUR LES GAZ INFLAMMABLES. CES FLUIDES POURRAIENT ÊTRE PRÉSENTS DANS LES INSTALLATIONS DE CONFINEMENT (PUITS COLLECTEURS).

APERÇU

L'objet du présent manuel est de fournir les informations nécessaires pour bien installer, utiliser et entretenir la pompe e-SV. Les directives et les avertissements ci-après visent la version e-SV standard, telle qu'elle est décrite dans la documentation de vente. Les versions spéciales, dont les caractéristiques sont énoncées dans le contrat de vente, peuvent être accompagnées de directives additionnelles. Pour obtenir des informations techniques ou des pièces de rechange du service ventes et après-vente, on doit toujours préciser le type de pompe et son code d'identification (numéro d'article). On communiquera avec le distributeur pour toute directive ou situation ne figurant pas dans le présent manuel ni dans la documentation de vente.

Lire le présent document avant d'installer et d'utiliser le produit.

Un usage inapproprié peut causer des blessures et des dommages matériels et entraîner la déchéance de la garantie.

DESCRIPTION DES E-SV

Les e-SV sont des pompes verticales, multi-étagées, non autoamorçantes, fixables à un moteur électrique standard. Dans le cas de la série 1SV à 22SV, certaines pièces métalliques en contact avec le liquide pompé sont en inox ou en fonte. La série est offerte en différentes versions, selon la position et la forme des raccords d'aspiration et de refoulement. Quant à la série 33SV à 125SV, certaines pièces en contact avec le liquide pompé sont en inox ou en fonte, mais elles sont toutes en inox dans une version spéciale. Si l'on achète uniquement la pompe, s'assurer que le moteur utilisé pourra être monté sur la pompe. La série e-SV est munie d'une garniture mécanique spéciale conçue pour être remplacée facilement sans avoir à démonter la pompe.

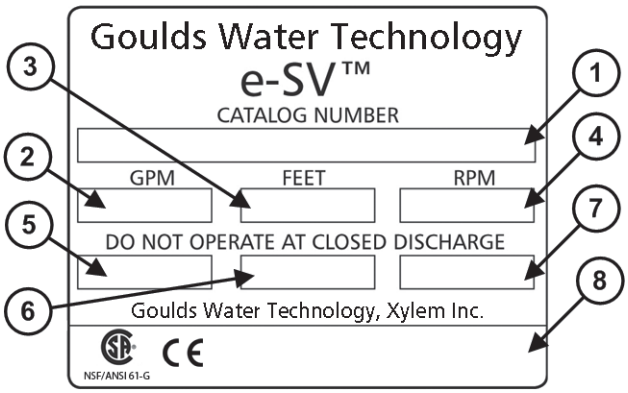
USAGES

Les e-SV conviennent aux réseaux de distribution d'eau publics et industriels, aux systèmes de surpression, d'irrigation (installations agricoles et sportives), de traitement d'eau, d'alimentation de chaudières, de lavage de pièces, de lutte contre l'incendie, ainsi qu'aux systèmes de chauffage, ventilation et climatisation. L'usine peut pouvoir configurer certains modèles pour les liquides de pompage ayant des caractéristiques atypiques de l'eau et/ou d'eau usagée (par exemple, acide, de base, produit pétrochimique ou tous autres liquides, etc. non aqueux). Une telle utilisation de spécialité exige la consultation avec l'usine et le personnel d'ingénierie pour une évaluation spécifique à l'application détaillée.

1. PLAQUE SIGNALÉTIQUE

Ne pas employer la pompe ni l'électropompe pour les liquides inflammables ou explosifs.

⚠ AVERTISSEMENT Ne pas utiliser la pompe pour les liquides contenant des matières abrasives, solides ou fibreuses.



1	Numéro d'article de Goulds Water Technology
2	Plage de débit (gal US/min)
3	Plage de hauteur manométrique totale (pi)
4	Vitesse de rotation nominale (r/min)
5	Puissance nominale (hp)
6	Pression de service maximale
7	Température de service maximale
8	Numéro de série de la pompe

VÉRIFICATIONS AVANT INSTALLATION

Confirmer que la pompe convient aux conditions de service prévues.

1. PRESSION D'ASPIRATION MINIMALE

En général, la pression d'aspiration minimale requise égale la hauteur nette d'aspiration disponible (NPSHA) suffisant à alimenter la pompe. La hauteur nette d'aspiration requise (NPSHR) est indiquée dans les courbes de performances de la pompe au point de fonctionnement déterminé. Une NPSHA dépassant la NPSHR d'au moins deux (2) pieds est recommandée comme marge de sécurité pour maintenir des performances durables et constantes de l'e-SV.

Pression d'aspir. min. = NPSHR + 2 pi

NOTA : ON DOIT CALCULER LA NPSHA POUR LE SYSTÈME À DOTER DE L'E-SV. POUR TOUTE ASSISTANCE, S'ADRESSER AU DÉTAILLANT OU AU DISTRIBUTEUR.

2. ASPIRATION

Une pompe pourrait en théorie aspirer l'eau d'une source située à 10,33 m plus bas, mais ce n'est pas possible à cause de la résistance intrinsèque de la pompe à l'écoulement. De plus, le pouvoir d'aspiration est réduit par le frottement dans la tuyauterie, la différence de hauteur, la température du liquide et l'altitude par rapport au niveau de la mer.

Un mauvais choix d'emplacement en hauteur de la pompe pourrait causer de la cavitation.

Dans la figure ci-dessous, si Z est la hauteur maximale d'installation de la pompe par rapport au niveau de la source de liquide, on peut affirmer ce qui suit.

En unités SI :

$Z = Pb \times 10,2 - NPSHR - Hf - Hv - 1,5$

P_b = pression barométrique absolue (bar x 100 = kPa)

NPSHR = NPSH requise (m) par la pompe

H_f = pertes (m) dans le tuyau d'aspiration

H_v = tension de vapeur (m) à la temp. de serv. (°C)

1,5 = facteur de sécurité de 1,5 m

En unités impériales :

$Z = Pb - NPSHR - Hf - Hv - 1,5$

P_b = pression barométrique absolue (pi)

NPSHR = NPSH requise (pi) par la pompe

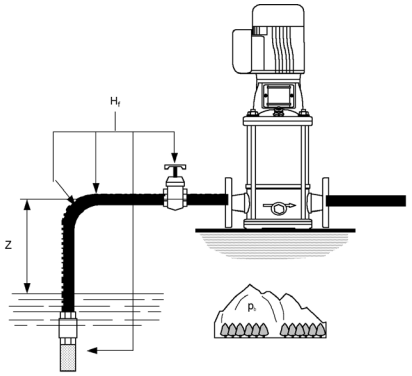
H_f = pertes (pi) dans le tuyau d'aspiration

H_v = tension de vapeur (pi) à la temp. de serv. (°F)

1,5 = facteur de sécurité de 1,5 pi

La double formule ci-dessus permet d'affirmer que :

Si $Z \geq 0$, la pompe pourra fonctionner avec une hauteur d'aspiration minimale égale à Z.



Temp.		H_v	
°C	°F	m	pi
20	68	0,23	0,75
30	86	0,43	1,41
40	104	0,75	2,46
50	122	1,26	4,13
60	140	2,03	6,66
70	158	3,18	10,43
80	176	4,83	15,84
90	194	7,15	23,45
100	212	10,34	33,92
110	230	14,61	47,92
120	248	20,27	66,49

Si $Z < 0$, la pompe devra avoir une pression d'aspiration inférieure à Z.

⚠ AVERTISSEMENT S'il y a cavitation, arrêter la pompe pour ne pas en endommager les composants internes.

⚠ AVERTISSEMENT Pour le pompage d'eau chaude, s'assurer que les conditions d'aspiration conviennent pour prévenir la cavitation.

⚠ AVERTISSEMENT S'assurer que la somme de la pression d'aspiration (système d'alimentation en eau, réservoir en charge [par gravité]) et de la pression de refoulement maximale de la pompe ne dépasse pas la pression de service maximale admissible (pression nominale, PN) de la pompe.

3. PRESSION D'ASPIRATION MAX. À 60 HZ

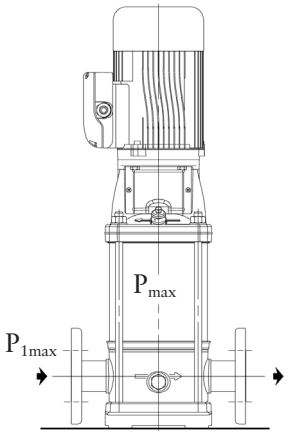
$P_{1max} \leq PN - P_{max}$

P_{max} = pression de refoulement max. de la pompe

P_{1max} = pression d'aspiration maximale

PN = pression de service nominale maximale

Pour le moteur à arbre standard (à serrage axial), vérifier si le résultat de la formule précitée convient. Si non, s'adresser au service ventes et après-vente (Sales and Service Department).



La table qui suit donne la pression d'aspiration maximale permissible, mais la pression d'aspiration réelle + la pression de marche à débit nul doivent être moindres que la pression de service maximale permissible.

Pompe	Étages	P_{1max} (lbf/po²)
1SV	2 à 5 6 à 10 11 à 30	145 218 PN - P_{max}
3SV	2 ou 3 4 à 7 8 à 30	145 218 PN - P_{max}
5SV	2 ou 3 4 à 6 7 à 27	145 290 PN - P_{max}
10SV	1 ou 2 3 à 5 6 à 20	145 290 PN - P_{max}
15SV	1 ou 2 3 4 à 15	145 290 PN - P_{max}
22SV	1 ou 2 3 4 à 12	145 290 PN - P_{max}

Pompe	Étages/ RDR*	P_{1max} (lbf/po²)
33SV	1/1 ou 2/2 2/1 à 5/2 5/1 à 7/2 7/1 à 10	45 145 218 PN - P_{max}
46SV	1/1 ou 1* 2/2 ou 2* 3/2 ou 4/1 4 à 10/2	145 218 290 PN - P_{max}
66SV	1/1 à 3/2 3/1 ou 4/1 4 ou 5/1 5 ou 6	72 145 218 PN - P_{max}
92SV	1/1 ou 2/2 2/1 ou 3/2 3/1 ou 3* 4/2 ou 5/1	72 145 218 PN - P_{max}
125SV	1 à 3/3B* 3 à 5/5A*	290 PN - P_{max}

* RDR = roue(s) de diamètre réduit, 1/1 ou 1 = 1 étage à RDR ou sans RDR, 2/2 ou 2 = 2 étages à 2 RDR ou sans RDR, 3/1 ou 3 = 3 étages à 1 RDR ou sans RDR, 3B = 3 RDR à 136 mm, 5A = 5 RDR à 141 mm.

4. PRESSION DE SERVICE MAXIMALE

(à 3 500 r/min)

Pompe	Étages	kPa (lbf/po²)
1SV	1 à 29	2 500 (363)
	30	4 000 (580)
3SV	1 à 23	2 500 (363)
	24 à 30	4 000 (580)
5SV	1 à 23	2 500 (363)
	24 à 27	4 000 (580)
10SV	1 à 14	2 500 (363)
	15 à 20	4 000 (580)
15SV	1 à 11	2 500 (363)
	12 à 15	4 000 (580)
22SV	1 à 11	2 500 (363)
	12	4 000 (580)
33SV	1 à 6	2 500 (363)
	7 à 10	4 000 (580)
46SV	1 à 5	2 500 (363)
	6 à 10	4 000 (580)
66SV	1 à 5	2 500 (363)
	6	4 000 (580)
92SV	1 à 5	2 500 (363)
125SV	1 à 6	2 500 (363)

NOTA : la pression de service maximale pour les raccords ovales des 1SV à 22SV est de 1 600 kPa (232 lbf/po²).

5. PLAGE DE TEMPÉRATURE

L'e-SV peut pomper des liquides dont la température se situe dans la plage pertinente ci-après :

Garniture mécanique standard
1SV à 125SV – 30 à 120 °C (– 22 à 250 °F)

Garniture mécanique pour hautes températures
1SV à 22SV – 30 à 149 °C (– 22 à 300 °F)
33SV à 125SV sans objet

NOTA : pour que le moteur électrique puisse bien se refroidir, la température ambiante doit se situer entre 32 et 104 °F, à une humidité relative maximale de 50 % à 104 °F.

Si la température excède 104 °F et que l'installation soit à une altitude supérieure à 3 000 pi par rapport au niveau de la mer, il faudra peut-être réduire la puissance de la pompe. Au besoin, joindre le distributeur ou le détaillant.

6. DÉBIT NOMINAL MINIMAL

Pour prévenir la surchauffe des composants de pompe internes, s'assurer que la pompe fournira toujours un débit minimal.

Le débit minimal pertinent ci-dessous est recommandé pour les e-SV fonctionnant sans arrêt.

Pompe	Débit minimal (gal US/min)			
	3 500 r/min	1 750 r/min	2 900 r/min	1 450 r/min
1SV	2	1	2	1
3SV	3	2	3	2
5SV	7	4	6	3
10SV	9	5	8	4
15SV	18	9	15	7
22SV	21	11	18	9
33SV	35	18	8	4
46SV	40	20	10	5
66SV	70	35	14	7
92SV	100	50	20	10
125SV	128	64	106	53

NOTA : une conduite de dérivation ou de recirculation est recommandée si le débit nominal minimal ne peut être maintenu.

AVERTISSEMENT **Ne pas faire marcher la pompe durant plus de quelques secondes si le robinet de refoulement est fermé.**

7. NOMBRE DE DÉMARRAGES PAR HEURE

Si le moteur de la pompe est fourni par Goulds Water Technology, le nombre maximal de cycles de travail (démarrages et arrêts) par heure est le suivant.

hp	Démarrages/h (max.)*	Durée de marche min. (en s) après démarrage
0,5	24	120
0,75	24	120
1	15	75
1,5	13	76
2	12	77
3	9	30
5	8	83
7,5	7	88
10	6	92
15	5	100
20	5	110
25	5	115
30	4	120
40	4	130
50	3	145
60	3	170
75	3	180

** Pour plus de détails, voir le manuel technique.*

AVERTISSEMENT **Si Goulds Water Technology n'a pas fourni le moteur, en consulter le fabricant pour le nombre maximal de cycles de travail permis.**

8. ALIMENTATION ÉLECTRIQUE

AVERTISSEMENT **S'assurer que le courant d'alimentation est conforme aux valeurs de fréquence et de tension sur la plaque signalétique du moteur.**

En général, la tension d'alimentation du moteur est conforme à la valeur pertinente ci-après.

Hz	Ø	Différence de potentiel nomin.	
		V	± %
60	1	230	10
60	3	230 et 460	10
60	3	460	10

TRANSPORT ET ENTREPOSAGE

1. TRANSPORT ET MANUTENTION DU PRODUIT EMBALLÉ

L'e-SV est emballée dans des caisses en carton ou en bois de dimensions et de formes différentes.

AVERTISSEMENT **Certaines caisses en carton dont la base est en bois sont conçues pour être transportées et manutentionnées à la verticale, et d'autres, y compris les caisses en bois, à l'horizontale. Garder le produit loin des sources de chaleur et le protéger contre l'humidité et les chocs. Ne pas déposer d'objets lourds sur les caisses en carton.**

Lever et manutentionner le produit soigneusement avec le matériel de levage approprié. Observer tout règlement de prévention des accidents.

Dès réception de la pompe, vérifier si l'emballage est endommagé. Si le produit a visiblement subi des dommages, en aviser le distributeur dans les huit (8) jours suivant la date de livraison.

2. ENTREPOSAGE DU PRODUIT EMBALLÉ

Température d'entreposage : 32 à 104 °F.

Entreposage court (moins de six mois) — l'emballage normal de Goulds Water Technology est conçu pour protéger la pompe durant son expédition. Dès réception de l'appareil, l'entreposer en un endroit sec et abrité.

Entreposage long (six mois et plus) — aux trois mois, faire tourner l'arbre plusieurs fois. Pour le long entreposage de l'accouplement et de la machine d'entraînement, en consulter le fabricant. Entreposer l'appareil en un endroit sec et abrité.

3. DÉBALLAGE DU PRODUIT

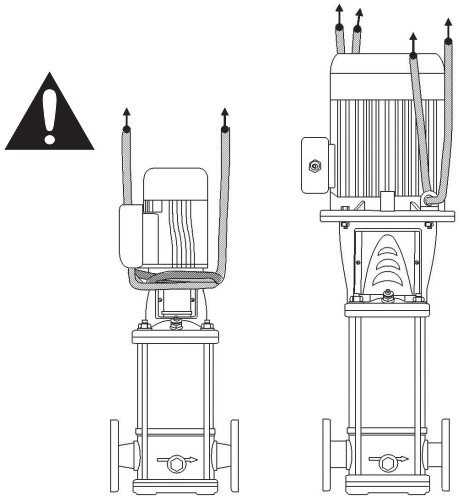
Employer le matériel approprié. Observer tout règlement de prévention des accidents en vigueur. Lever et manutentionner le produit soigneusement avec le matériel de levage approprié.

Dès réception de la pompe, vérifier si l'emballage est endommagé. Si le produit a visiblement subi des dommages, en aviser le distributeur dans les huit (8) jours suivant la date de livraison.

4. MANUTENTION DU PRODUIT

Lever et manutentionner le produit soigneusement avec le matériel de levage approprié. Observer tout règlement de prévention des accidents en vigueur.

Le produit doit être attaché solidement pour les opérations de levage et de manutention. Certaines pompes à moteur électrique sont pourvues de boulons à œil à cette fin.



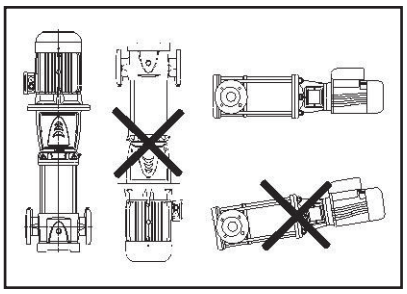
INSTALLATION

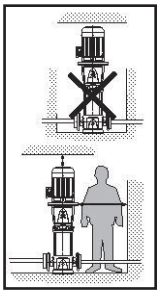
L'installation doit être effectuée par du personnel habilité et compétent. Employer les protections et le matériel appropriés. Observer tout règlement de prévention des accidents en vigueur.

Il faut toujours se référer aux lois et aux codes provinciaux et nationaux pertinents ainsi qu'aux règlements locaux en vigueur quant au choix du site de l'installation, au branchement électrique et au raccordement de la tuyauterie.

1. CHOIX DU SITE

S'assurer qu'aucun obstacle ne nuit à la circulation de l'air de refroidissement venant du ventilateur de moteur et qu'il y a assez d'espace libre autour de la pompe pour l'entretien. Dans la mesure du possible, installer la pompe un peu plus haut que le plancher. Se référer aux illustrations ci-après pour l'installation de la pompe. Le montage horizontal requiert une fixation spéciale pour la pompe.

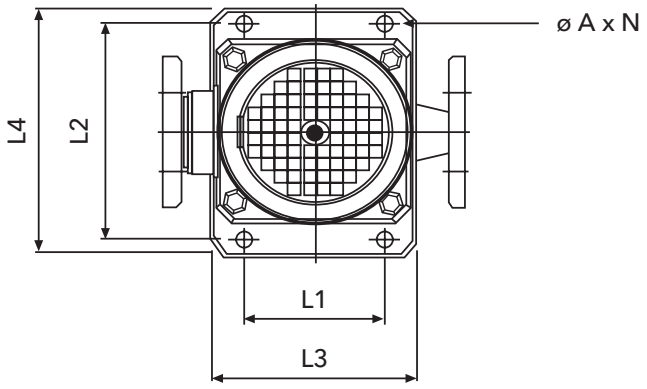




2. ANCRAGE DE LA POMPE

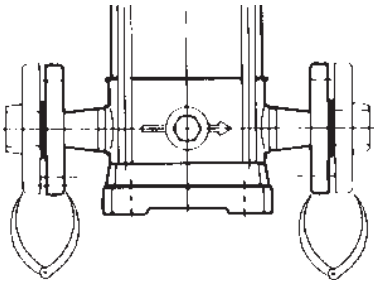
La pompe doit être boulonnée solidement à un massif de béton ou à une structure métallique équivalente (plateau ou plateforme). Si la pompe est de grande dimension et doit être installée près de locaux d'habitation, des supports antivibrants adéquats devraient être utilisés pour empêcher la transmission des vibrations au béton ou à la structure. On trouvera ci-dessous les dimensions relatives au socle de pompe et aux trous d'ancrage.

	1SV à 5SV	10SV à 22SV	33SV	46SV à 92SV	125SV
	mm (po)				
L1	100 (3,94)	130 (5,12)	170 (6,69)	190 (7,48)	275 (10,83)
L2	180 (7,09)	215 (8,46)	240 (9,45)	265 (10,43)	380 (14,96)
L3	150 (5,91)	185 (7,28)	220 (8,66)	240 (9,45)	330 (12,99)
L4	210 (8,27)	245 (9,65)	290 (11,42)	315 (12,40)	450 (17,72)
øA	13 (0,51)		15 (0,59)		19 (0,75)
N	4 (0,16)				

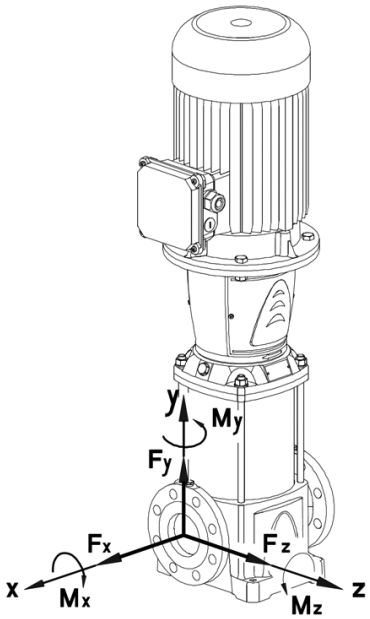


3. ALIGNEMENT ET CHARGE DES BRIDES

Un compas d'épaisseur placé du côté extérieur des trous de vis (v. fig.) donnera un meilleur alignement angulaire des brides d'aspiration et de refoulement.



AVIS : POSER LA TUYAUTERIE DE SORTE QU'ELLE N'APPLIQUE AUCUNE CHARGE SUR LES RACCORDS D'ASPIRATION ET DE REFOULEMENT.



4. TUYAUTERIE

Réduire la perte de charge (par frottement) au minimum en gardant les tuyaux d'aspiration et de refoulement aussi courts que possible, sans raccord ni accessoire superflus ou calibre inférieur à celui des orifices correspondants de la pompe.

AVIS : LA TUYAUTERIE DOIT POSSÉDER SES PROPRES SUPPORTS ET N'APPLIQUER AUCUNE CHARGE SUR LA POMPE.

S'il faut un tuyau d'aspiration plus gros que l'orifice de la pompe, poser près de l'orifice un raccord réducteur excentré, **LE CÔTÉ EXCENTRÉ EN BAS**.

Si la pompe est plus bas que la source de liquide, poser un robinet d'isolement à passage intégral sur le tuyau d'aspiration pour l'inspection et l'entretien.

AVIS : AFIN DE NE PAS DÉSAMORCER, FAIRE SURCHAUFFER NI ABÎMER LA POMPE, NI EN ANNULER LA GARANTIE, NE PAS RÉDUIRE LE PASSAGE VERS LA POMPE AVEC LE ROBINET D'ISOLEMENT.

Si la pompe est plus haut que la source de liquide, on **DOIT** procéder comme suit.

Prévenir les poches d'air : pas d'élément du tuyau d'aspiration plus haut que l'orifice d'aspiration de la pompe.

Donner à la tuyauterie horizontale une légère pente montante à partir de la source de liquide.

Tout joint du tuyau d'aspiration **DOIT** être étanche.

Utiliser un clapet de pied pour amorcer la pompe ou la maintenir amorcée à l'arrêt.

La section de passage de la crépine ou de la tulipe d'aspiration **DOIT** être au moins 3 fois celle du tuyau d'aspiration.

S'assurer que le diamètre (*d*) et la hauteur d'immersion minimale (*h* min.) de l'entrée du tuyau d'aspiration sont suffisants pour empêcher l'aspiration d'air par vortex (v. fig. 1 à 4).

Fixer au tuyau de refoulement un clapet de non-retour adapté au débit et au liquide et empêchant le retour du liquide.

Installer, **EN AVAL** du clapet précité, un robinet-vanne de calibre approprié permettant la régulation du débit ainsi que l'inspection et l'entretien.

Si un raccord agrandisseur est requis, le poser entre le clapet précité et l'orifice de refoulement de la pompe.

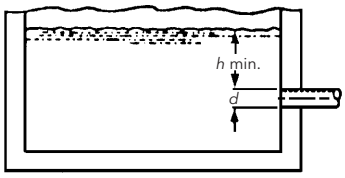


Figure 1

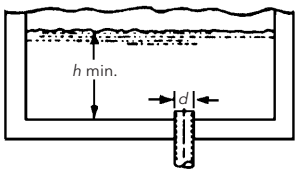


Figure 2

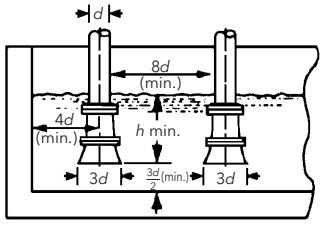


Figure 3

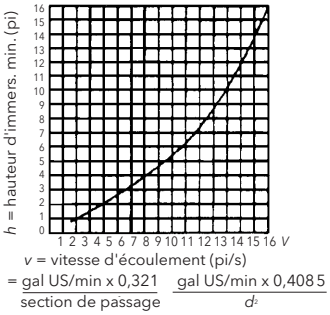


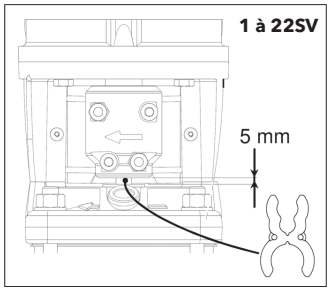
Figure 4

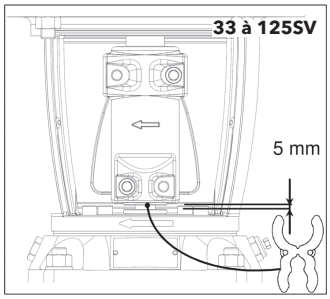
5. ESPACEMENT DE L'ARBRE DE POMPE

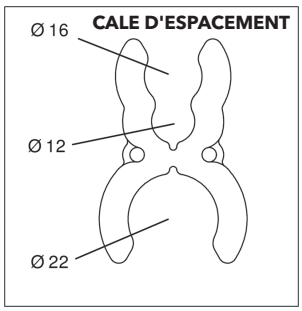
La pompe livrée sans moteur vient avec une cale d'espacement placée entre l'accouplement et l'adaptateur de moteur (v. illustrations ci-dessous).

Enlever les bandes de fixation en plastique, les deux carters d'accouplement en inox et les morceaux de polyuréthane expansé.

S'assurer que la cale est placée correctement entre l'adaptateur et l'accouplement. S'il n'y a pas de cale, en poser une de 5 mm (0,203 po) d'épaisseur pour que l'arbre de pompe ait le bon espacement.







Pour les 1 à 22SV à moteur à carcasses 213TC à 256TC, placer l'anneau-adaptateur sur l'adaptateur côté moteur et, pour les 33 à 125SV à moteur à carcasses 284TC à 286TC et 213TC et plus grosses, fixer la bride d'adaptateur au moteur avec 4 vis à tête hexagonale serrées au couple indiqué (v. **DONNÉES TECHNIQUES**).

Desserrer l'accouplement (4 vis d'assemblage) assez pour pouvoir y insérer l'arbre de moteur.

Avec un palan assez solide, abaisser le moteur avec soin jusqu'à ce que son arbre soit en place dans l'accouplement et que le moteur repose sur l'adaptateur. Fixer celui-ci au moteur avec 4 vis à tête hexagonale serrées au couple indiqué (v. **DONNÉES TECHNIQUES**).

Serrer les 4 vis d'assemblage de l'accouplement au couple stipulé (v. **DONNÉES TECHNIQUES**). L'écart entre les demi-accouplements devrait être égal.

Quant aux 33 à 125SV à garniture mécanique à cartouche, une fois les vis d'accouplement bien serrées au couple, mais avant d'enlever la cale d'espacement, serrer les 4 vis de pression du collet de la cartouche à la main à environ 7 N·m (5 lbf·pi) avec une clé hexagonale coudée de $^1/_8$ po.

Ôter et conserver la cale.

Poser les deux (2) carters d'accouplement.

MISE EN SERVICE

1. RACCORDEMENT À LA TUYAUTERIE

Un technicien-installateur qualifié doit effectuer le raccordement à la tuyauterie selon les règlements en vigueur.

Pour le raccordement à un système d'alimentation en eau, suivre les règlements des autorités compétentes (municipalités, entreprises de services publics, etc.), qui requièrent souvent la pose d'un dispositif antire-foulement : disconnecteur hydraulique, clapet de retour ou réservoir-disconnecteur.

2. CÂBLAGE ET MISE À LA TERRE



⚠ Installer la pompe, la mettre à la terre et la brancher suivant les prescriptions du code provincial ou national de l'électricité pertinent et les règlements locaux.

⚠ Poser un sectionneur tout conducteur près de la pompe.

⚠ Verrouiller la source de courant en position hors circuit avant de procéder à l'installation ou à l'entretien de la pompe.

⚠ L'alimentation électrique **DOIT** être conforme aux spécifications de la plaque signalétique de la pompe. Une tension inappropriée peut causer un incendie ou des dommages au moteur et annule la garantie.

⚠ Le protecteur thermique de certains moteurs coupe le courant lorsqu'il y a surcharge et le rétablit automatiquement, redémarrant ainsi la pompe inopinément.

N'utiliser que du fil de cuivre torsadé pour la mise à la terre et l'alimentation du moteur. Le calibre du fil **DOIT** limiter la chute de tension maximale, aux bornes du moteur, à 10 % de la tension indiquée sur la plaque signalétique du moteur. Les chutes de tension excessives altèrent les performances et annulent la garantie du moteur. Le calibre du fil de terre doit être au moins égal à celui des fils d'alimentation. Les fils devraient tous être chromocodés pour faciliter l'entretien.

Les moteurs triphasés requièrent une protection tout conducteur contre les surcharges thermiques et un démarreur magnétique appropriés.

⚠AVERTISSEMENT
Tension dangereuse

AVANT LEUR CONNEXION À LA SOURCE DE COURANT, METTRE LA POMPE, LE MOTEUR ET LA COMMANDE À LA TERRE DE FAÇON PERMANENTE SELON LES PRESCRIPTIONS DU CODE PROVINCIAL OU NATIONAL DE L'ÉLECTRICITÉ PERTINENT ET LES RÈGLEMENTS LOCAUX. OMETTRE CELA PEUT CAUSER UN CHOC ÉLECTRIQUE, DES BRÛLURES ET LA MORT.

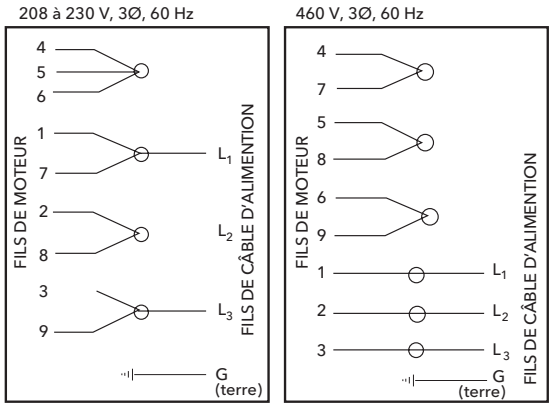
Brancher les fils d'alimentation au moteur comme suit :

Moteurs monophasés — connecter le fil d'alimentation NOIR au fil NOIR du moteur, le BLANC au BLANC et le VERT au VERT.

Moteurs triphasés — voir ci-dessous.

AVIS : LA POMPE TOURNE DANS LE SENS VISIBLE DE L'EXTRÉMITÉ DU MOTEUR (V. PARAGRAPHE SUIVANT). LA ROTATION EN SENS INVERSE PEUT ENDOMMAGER LA POMPE ET ANNULE LA GARANTIE.

Vérifier le sens de rotation de la pompe sur l'accouplement (**PAR** les orifices des carters) ou le ventilateur de moteur. **NE PAS** confondre les flèches du sens d'écoulement, sur la tubulure de pompe, avec les flèches du sens de rotation, sur



SCHÉMAS DE CÂBLAGE DES MOTEURS TRIPHASÉS

l'accouplement et l'adaptateur de moteur. En triphasé, faire intervertir deux des trois fils d'alimentation par un électricien si le sens de rotation n'est pas le bon.

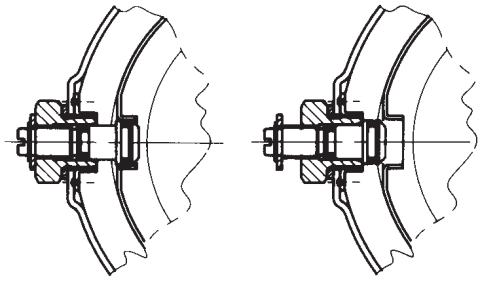
3. AMORÇAGE ET MISE À L'AIR LIBRE

Source de liquide plus haute que la pompe :

Fermer le robinet de refoulement.

Enlever le bouchon de mise à l'air libre.

Dévisser entièrement la cheville du bouchon de vidange des 1SV, 3SV et 5SV (v. illustrations ci-dessous).



CHEVILLE DE VIDANGE VISSÉE — CHEVILLE DE VIDANGE DÉVISSÉE

Le bouchon de mise à l'air libre des 10SV à 125SV est muni d'un pointeau (aiguille), que l'on dévisse simplement à moitié pour évacuer l'air, sans avoir à ôter le bouchon. Quant aux 33SV à 125SV à cartouche d'étanchéité, on doit dévisser le bouchon de mise à l'air libre situé sur la plaque de fixation du fouloir de cartouche, sous l'accouplement.

Ouvrir le robinet d'aspiration jusqu'à ce que le liquide sorte du bouchon de mise à l'air libre.

AVIS : NE PAS ÔTER NI REMPLACER LE BOUCHON DE VIDANGE PAR UN BOUCHON OU UN APPAREIL DE TUYAUTERIE D'UN AUTRE FABRICANT, SINON UNE PERTE NOTABLE DE RENDEMENT POURRAIT SURVENIR.

NOTA : placer un chiffon sur l'orifice de mise à l'air libre pour empêcher l'éclaboussement du liquide sous pression.

Agir avec précaution pour prévenir les blessures si le liquide pompé est chaud ou corrosif.

Poser le bouchon de mise à l'air libre et le serrer au couple stipulé (v. DONNÉES TECHNIQUES). Visser la cheville du bouchon de vidange (1SV, 3SV et 5SV). Ouvrir le robinet de refoulement.

Source de liquide plus basse que la pompe :

Poser un clapet de pied à l'entrée du tuyau d'aspiration.

Dévisser entièrement la cheville du bouchon de vidange des 1SV, 3SV et 5SV (v. illustrations ci-dessus).

Avec l'entonnoir en plastique fourni, remplir entièrement la pompe de liquide.

Poser et serrer le bouchon de mise à l'air libre au couple. Visser la cheville du bouchon de vidange (1SV, 3SV et 5SV). Ouvrir le robinet d'aspiration.

UTILISATION



PRÉVENIR DE GRAVES BLESSURES : NE PAS UTILISER LA POMPE SANS SES CARTERS D'ACCOUPLEMENT.

AVIS : BIEN AMORCER LA POMPE AVANT SA MISE EN SERVICE.



NE PAS UTILISER LA POMPE À DÉBIT PRESQUE NUL POUR ÉVITER LA SURCHAUFFE, L'ENDOMMAGEMENT DE LA POMPE, LES BLESSURES ET LES DOMMAGES MATÉRIELS.

Démarrer la pompe sans ouvrir le robinet tout ou rien en aval de celle-ci. Ouvrir le robinet progressivement. La pompe doit tourner en douceur et sans bruit excessif. Au besoin, amorcer la pompe à nouveau. Vérifier le courant absorbé par le moteur et, s'il le faut, régler le relais thermique. On peut évacuer l'air de la pompe en desserrant la vis de mise à l'air libre (toute e-SV).

AVERTISSEMENT **Si une pompe installée en un lieu où il y a risque de gel n'est pas utilisée, en ôter le bouchon de vidange et la vider. Cela ne sera pas nécessaire si l'on ajoute à l'eau un antigel approprié.**

S'assurer que le liquide vidangé ne peut causer ni blessures ni dommages.

Une fois le système stabilisé dans des conditions de service normales, vérifier l'alignement de la tuyauterie et en régler les supports au besoin.



MACHINERIE DANGEREUSE — LE PROTECTEUR THERMIQUE PEUT REDÉMARRER LE MOTEUR INOPINÉMENT ET CAUSER DE GRAVES BLESSURES.

Pour le nombre de démarrages/h maximal recommandé, voir **NOMBRE DE DÉMARRAGES PAR HEURE**.

ENTRETIEN

⚠AVERTISSEMENT
Tension dangereuse

PRÉVENIR CHOCS ÉLECTRIQUES, BRÛLURES ET BLESSURES MORTELLES: VERROUILLER LA SOURCE DE COURANT EN POSITION HORS CIRCUIT AVANT DE PROCÉDER À L'ENTRETIEN DE LA POMPE.

LUBRIFICATION DU MOTEUR

Fréquence de lubrification recommandée pour paliers et roulements

Intervalle	Conditions de service
1 à 2 ans	Service léger dans un lieu propre
1 an	8 à 16 h/jour dans un lieu propre et sec
6 mois	12 à 24 h/jour dans un lieu humide
3 mois	12 à 24 h/jour dans un lieu sale et très humide

Si la température de service est plus haute, on devrait augmenter la fréquence de lubrification stipulée.

NE PAS mélanger les types de graisses (lithium, sodium, etc.). Enlever entièrement l'ancienne graisse remplacée par un autre type de graisse.

Trop de graisse peut dégrader celle-ci et causer la surchauffe et la défaillance des paliers et roulements.

REMPLACEMENT DE LA GARNITURE MÉCANIQUE (1 à 125SV)

1. Fermer les robinets d'aspiration et de refoulement pour isoler la pompe.
2. Enlever le bouchon de vidange, dévisser le pointeau du bouchon de mise à l'air libre et vider la pompe.
3. Enlever les carters d'accouplement, les 4 vis des demi-accouplements, ces derniers et la goupille d'accouplement (v. 1 à 3, fig. 5).
4. Ôter de la plaque-logement de garniture les 4 vis de fixation à tête hexagonale du moteur (v. 4, fig. 5).
5. Dans les trous taraudés de la plaque-logement (33 à 125SV), visser uniformément deux (2) des vis de fixation pour dégager la plaque. La lever et la retirer par l'espace libre entre les arbres, mais avec précaution pour ne pas abîmer le siège de l'élément fixe de la garniture (v. 5, fig. 5).
6. Retourner la plaque et en ôter l'élément fixe, son joint torique et le grand joint torique du collet en saillie, entre la tête de pompe et la plaque. S'assurer que le siège et la plaque sont propres et exempts d'arêtes vives. Lubrifiez l'axe ou la douille légèrement. Utilisez un lubrifiant à base d'eau. Installez le nouveau siège en appuyant le logement de joint avec votre pouce. MAIS PAS TROP FORT, et, si cela est possible, mettre un chiffon doux et propre sur la surface d'étanchéité de l'élément pour la protéger pendant la pose (v. 6, fig. 5).
7. Retirer de l'arbre de pompe l'élément mobile de la garniture. Vérifier si l'arbre est exempt d'arêtes vives et de corps étrangers. Les arêtes vives devraient être lissées avec une toile d'émeri à grains fins (v. 7, fig. 5).
8. Appliquer sur le joint torique du pourtour intérieur de l'élément mobile un lubrifiant convenant aux élastomères de la garniture. Enfiler l'élément avec précaution sur l'arbre de pompe et le tourner pour aligner la goupille au bas de l'élément sur l'un des trous de la chemise d'arbre (33 à 125SV). Imprimer un va-et-vient à la garniture pour en lubrifier le joint torique et l'empêcher de gripper à l'arbre (v. 8, fig. 5).
9. Poser un joint torique neuf sur le collet en saillie de la plaque-logement. Le lubrifiant précité peut servir à poser le joint.

   Placer la plaque-logement entre l'arbre de moteur et l'arbre de pompe et enfiler la plaque sur ce dernier. **Procéder avec précaution pour ne pas endommager la surface d'étanchéité de l'élément fixe de la garniture** (v. 9, fig. 5).
10. Reposer les 4 vis de fixation de la plaque-logement et les serrer uniformément au couple stipulé dans les Données techniques (v. 10, fig. 5).
11. Poser la goupille d'accouplement dans son orifice et placer la cale d'espacement sur la saillie centrale de la plaque-logement. **S'il n'y a pas de cale, en utiliser une de 5 mm d'épaisseur** (v. 11, fig. 5).
12. Reposer les demi-accouplements et en serrer les vis d'assemblage uniformément au couple indiqué (v. Données techniques). Ôter et conserver la cale d'espacement (v. 12, fig. 5).
13. Tourner l'arbre à la main pour s'assurer qu'il n'y a aucun grippage. Reposer les carters d'accouplement (v. 13, fig. 5).
14. La pompe et le système devraient être mis à l'air libre avant leur mise en service (v. AMORÇAGE ET MISE À L'AIR LIBRE).

REMPLACEMENT DE LA GARNITURE MÉCANIQUE à cartouche d'étanchéité (33 à 125SV)

1. Effectuer les opérations 1 à 4 décrites pour la garniture standard.
2. Desserrer les 4 vis de pression du collet de la cartouche d'étanchéité.
3. Dans les trous taraudés du fouloir de la cartouche, visser uniformément deux des vis de fixation à tête hexagonale pour dégager la cartouche. La lever et la retirer par l'espace libre entre les arbres.
4. Vérifier si l'arbre de pompe est exempt d'arêtes vives et de corps étrangers. Lisser les arêtes vives avec une toile d'émeri à grains fins.
5. Utiliser un lubrifiant convenant aux élastomères de la cartouche pour poser des joints toriques neufs sur le guide usiné et le pourtour intérieur de la cartouche neuve.
6. Placer la cartouche neuve entre l'arbre de moteur et l'arbre de pompe et l'enfiler sur ce dernier avec précaution.
7. Effectuer les opérations 11 à 14 décrites pour la garniture standard.
8. Serrer les 4 vis de pression du collet de la cartouche pour fixer celle-ci à l'arbre de pompe.
9. Tourner l'arbre à la main pour s'assurer qu'il n'y a aucun grippage. Reposer les carters d'accouplement.
10. Utiliser le bouchon de la plaque de fixation du fouloir de cartouche pour mettre la pompe à l'air libre de manière adéquate.

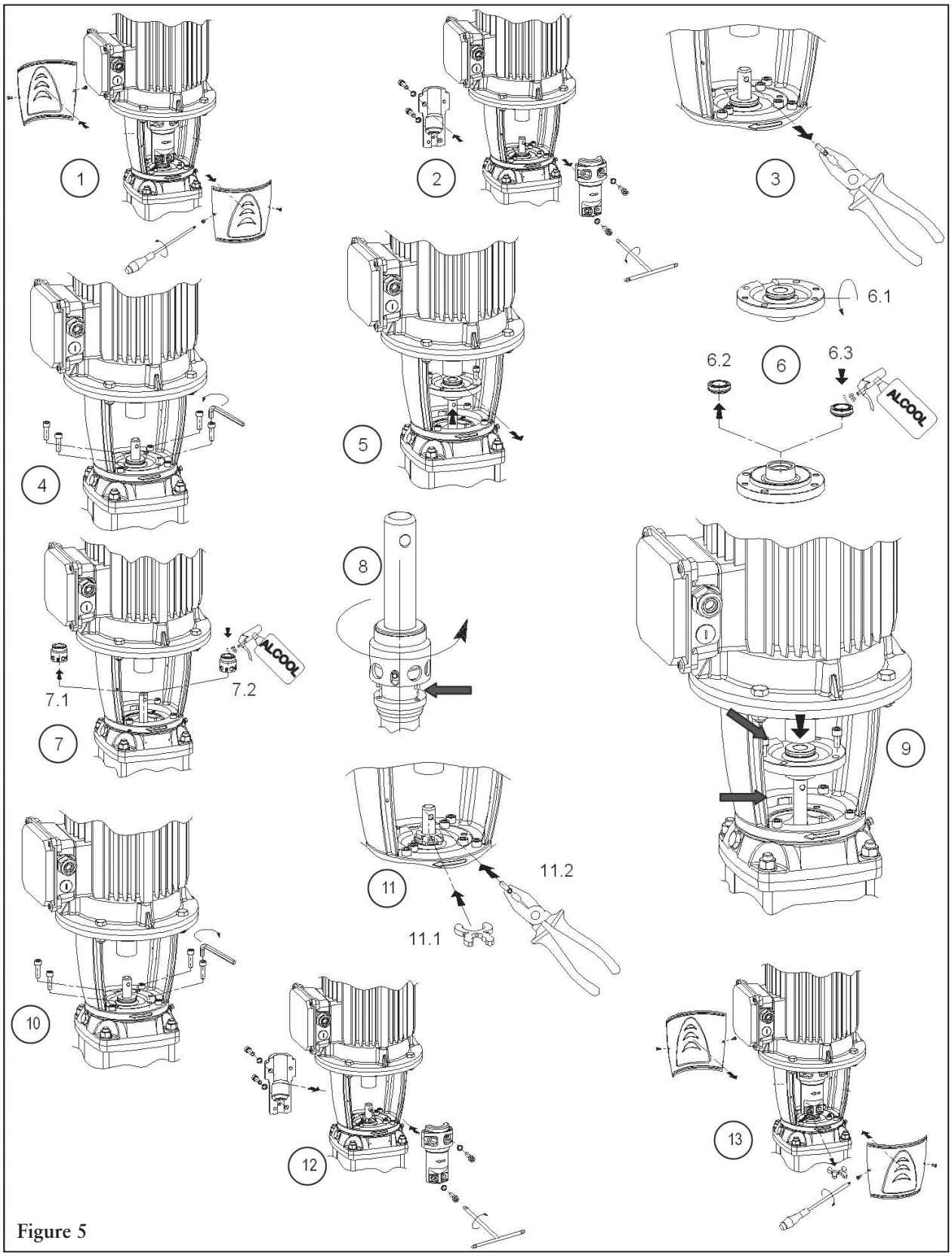


Figure 5

REMPLACEMENT DU MOTEUR

Pour ôter le moteur, faire les tâches 1 à 4 de **remplacement de la garniture mécanique** standard.

Pour les moteurs 213TC et plus gros, enlever les 4 vis de fixation à tête hex. du moteur et son adaptateur.

Fixer la bride d'adaptateur de moteur au moteur neuf avec 4 vis à tête hexagonale serrées au couple indiqué (v. **DONNÉES TECHNIQUES**).

Achever le remontage en exécutant les tâches 10 à 14 de **remplacement de la garniture mécanique** standard.

Les travaux d'entretien non décrits dans le présent manuel devraient être réalisés par un centre de service agréé. Pour toute assistance, s'adresser au détaillant local ou au distributeur Goulds Water Technology.

GUIDE DE DÉPANNAGE

⚠AVERTISSEMENT
Tension dangereuse

PRÉVENIR CHOCS ÉLECTRIQUES, BRÛLURES ET BLESSURES MORTELLES : VERROUILLER LA SOURCE DE COURANT EN POSITION HORS CIRCUIT AVANT DE PROCÉDER À L'ENTRETIEN DE LA POMPE.

ANOMALIE

NON-FONCTIONNEMENT DU MOTEUR
(V. causes probables 1 à 5)

DÉBIT DE REFOULEMENT FAIBLE OU NUL
(V. causes probables 6 à 12)

CONSOMMATION D'ÉNERGIE EXCESSIVE
(V. causes probables 3, 12, 13 et 15)

VIBRATION ET BRUIT EXCESSIFS
(V. causes probables 3, 6 à 8, 10, 12, 13 et 16)

CAUSE PROBABLE

1. Protecteur thermique du moteur déclenché
2. Disjoncteur ouvert ou fusible sauté
3. Roue(s) bloquée(s)
4. Moteur mal connecté
5. Moteur défectueux
6. Pompe non amorcée, air ou gaz présent dans le liquide pompé
7. Tuyau d'aspiration ou de refoulement obstrué ou robinet(s) fermé(s)
8. Mauvais sens de rotation (moteurs triphasés seulement)
9. Basse tension électrique ou perte de phase
10. Roue(s) usée(s) ou engorgée(s)
11. Hauteur de charge du système trop élevée
12. Hauteur nette d'aspiration disponible (NPSHA) trop faible — hauteur ou perte d'aspiration excessives
13. Hauteur de refoulement trop faible — débit excessif
14. Viscosité ou densité trop élevées
15. Palier(s), coussinet(s) ou roulement(s) usé(s)
16. Pompe, moteur ou tuyauterie mal assujettis

DONNÉES TECHNIQUES

COUPLE DE SERRAGE

hp	Vis de fixation du moteur	Bride d'adaptateur	Accouplement		
			1 à 5SV	10 à 22SV	33 à 92SV
0,75 à 7,5	27 N·m (20 lbf·pi)		20 N·m (15 lbf·pi)	54 N·m (40 lbf·pi)	50 N·m (37 lbf·pi)
10 à 75	61 N·m (45 lbf·pi)	65 N·m (48 lbf·pi)*	20 N·m (15 lbf·pi)	54 N·m (40 lbf·pi)	65 N·m (48 lbf·pi)

* Moteurs à carcasses 213TC et 215TC : 40 N·m (30 lbf·pi)

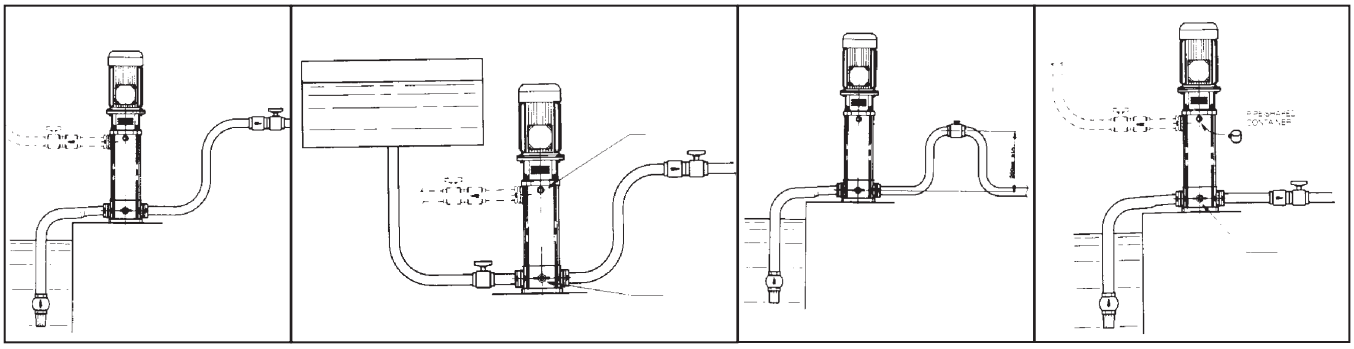
COUPLE DE SERRAGE

Pompe	Tirants d'assemblage	Bouchons (vidange et mise à l'air libre)
1-5SV	18 lbs pie (24 N·m)	18 lbs pie (24 N·m)
10-22SV	22 lbs pie (30 N·m)	18 lbs pie (24 N·m)
33-125SV	44 lbs pie (60 N·m)	30 lbs pie (41 N·m)

POINTEAU (MISE À L'AIR LIBRE)

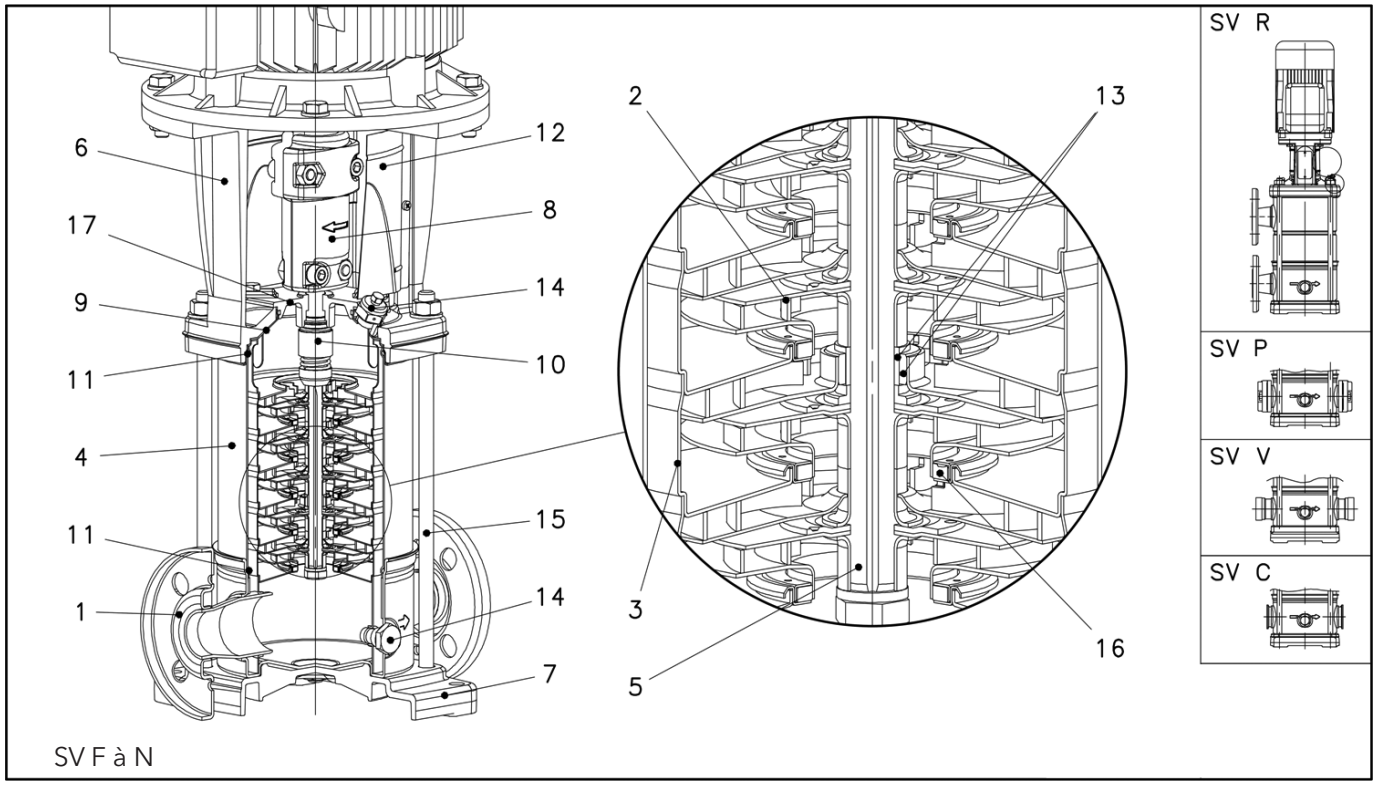
Pompe	
1 à 5SV	9,5 N·m (7 lbf·pi)
10 à 22SV	
33 à 125SV	

PLOMBERIE ET INSTALLATION TYPES



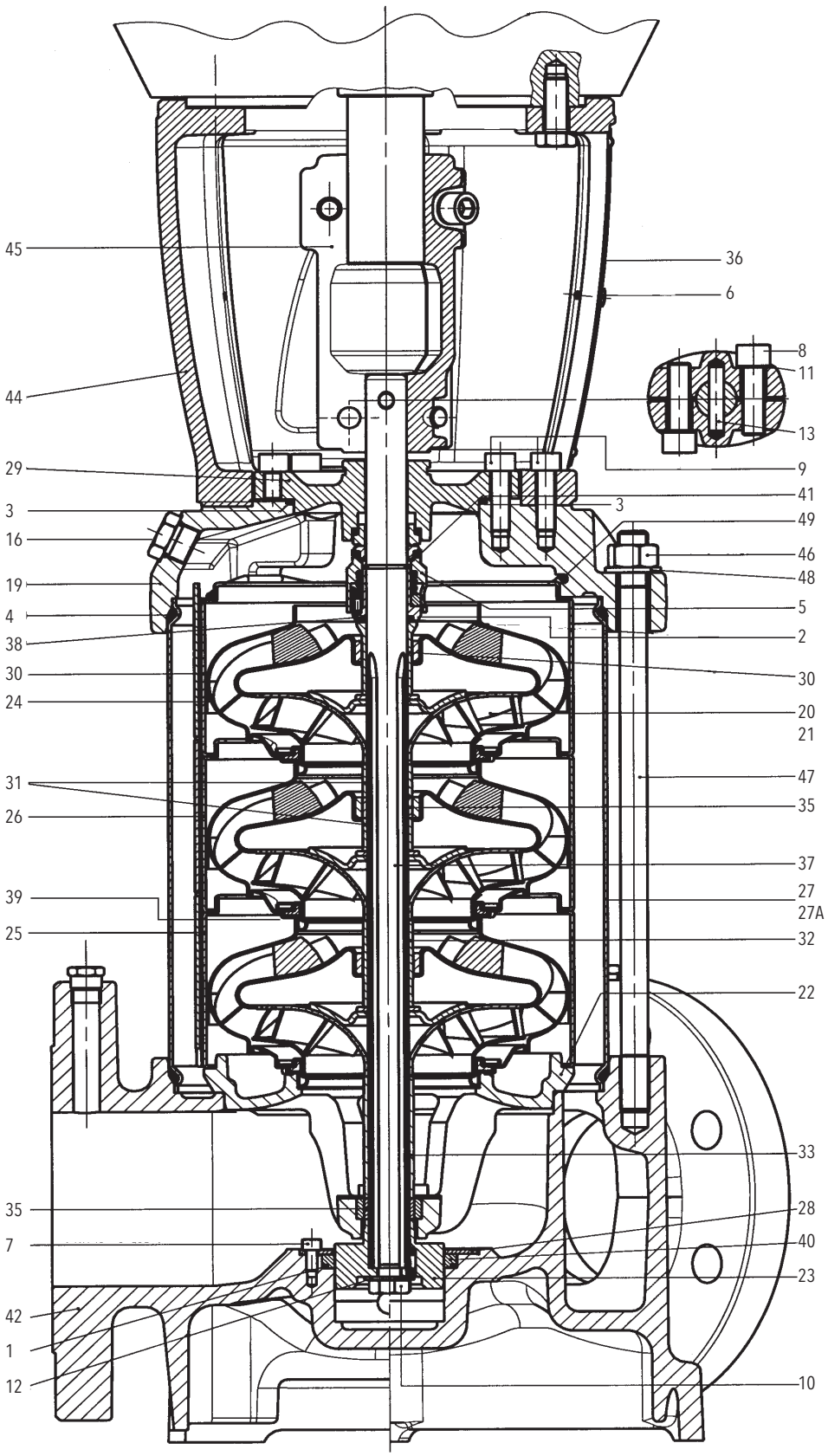
NOTA : le tuyau de refoulement doit former un S assez haut pour maintenir le liquide dans les corps d'étage inférieurs de la pompe durant les arrêts.

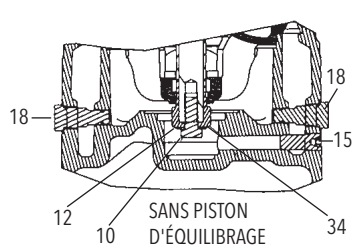
DESSIN ET PRINCIPAUX COMPOSANTS DES 1 À 22SV

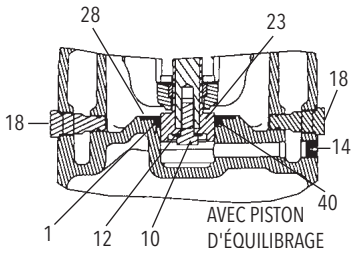


1 Tubulure de pompe
2 Roue
3 Diffuseur
4 Enveloppe extérieure
5 Arbre
6 Adaptateur
7 Socle de pompe
8 Accouplement
9 Plaque-logement de garniture mécanique
10 Garniture mécanique
11 Joints toriques
12 Carter d'accouplement
13 Coussinet et chemise d'arbre
14 Bouchons de remplissage et de vidange
15 Tirants d'assemblage
16 Bague d'usure
17 Fouloir de cartouche d'étanchéité

DESSIN ET PRINCIPAUX COMPOSANTS DES 33 À 92SV

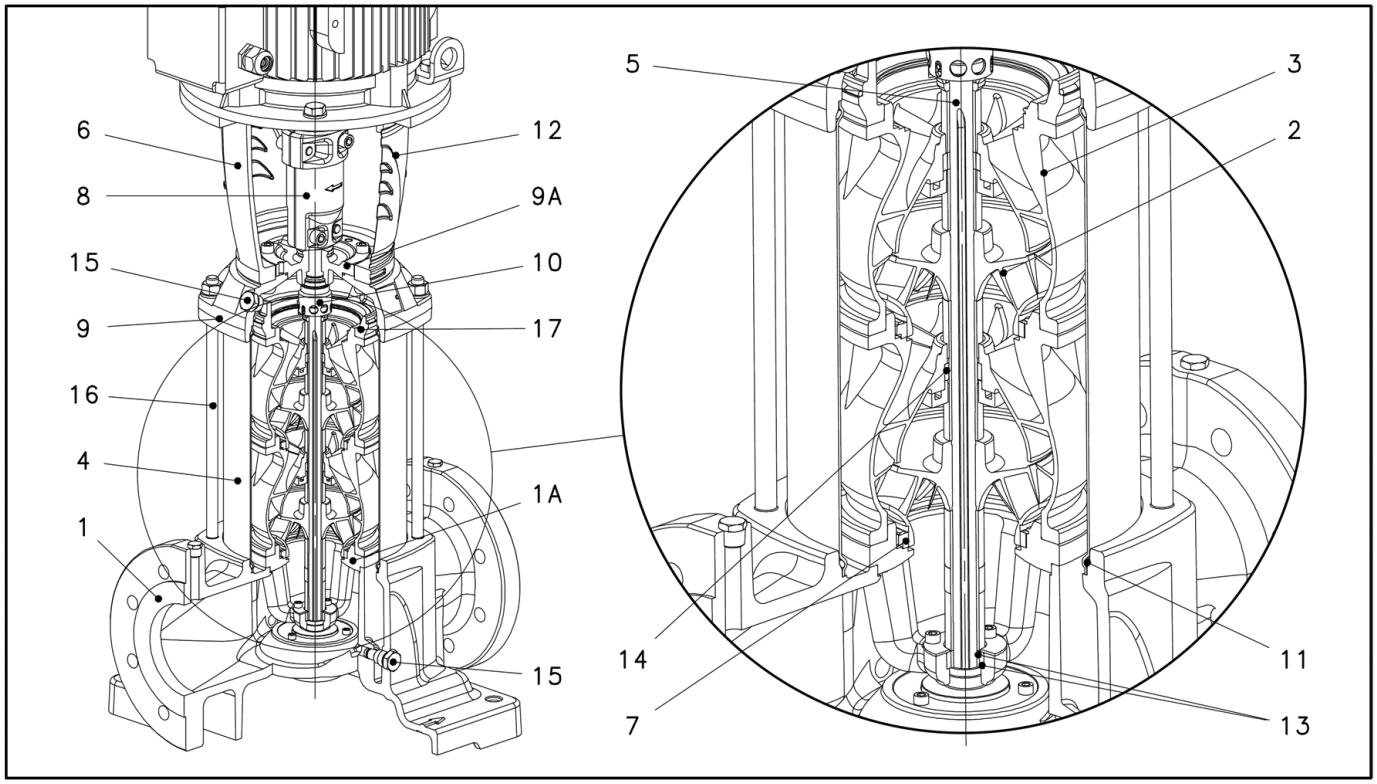






1 Joint torique de piston d'équilibrage
2 Joint torique de garniture mécanique
3 Joint torique de plaque-logement de garniture mécanique
4 Joint torique d'enveloppe extérieure
5 Garniture mécanique
5A Cartouche d'étanchéité (non montrée)
6 Vis de carter d'accouplement
7 Vis de disque de retenue de piston
8 Vis d'accouplement
9 Vis d'adaptateur de moteur et de plaque-logement
10 Vis de roue
11 Rondelle d'accouplement
12 Rondelle de roue
13 Goupille d'accouplement
14 Bouchon du passage à piston
15 Bouchon du passage sans piston
16 Bouchon de remplissage
17 Bouchon de mise à l'air libre (non montré)
18 Bouchon de vidange
19 Tête de pompec
20 Roue de plein diamètre
21 Roue de diamètre réduit
22 Corps de palier inférieur
23 Piston d'équilibrage
24 Dernier diffuseur
25 Diffuseur à coussinet en carbone
26 Diffuseur à coussinet en tungstène
27 Enveloppe extér. (2 500 kPa, 363 lbf/po²)
27A Enveloppe extér. (4 000 kPa, 580 lbf/po²)
28 Disque de retenue du piston d'équilibrage
29 Plaque-logement de garniture mécanique
30 Entretoise de dernière roue
31 Entretoise de coussinet d'arbre
32 Entretoise de roue
33 Entretoise de roue infér. (66 à 92SV)
34 Coussinet (pompe sans piston d'équil.)
35 Coussinet en carbure de tungstène
36 Carter d'accouplement
37 Arbre
38 Chemise d'arbre pour garniture méc.
39 Bague d'usure pour roue
40 Dispositif d'étanchéité de piston d'équil.
41 Bague de retenue de roue
42 Socle-tubulure de pompe
43 Bride d'adaptateur de moteur (non montrée)
44 Adaptateur de moteur
45 Demi-accouplement
46 Écrou de tirant d'assemblage
47 Tirant d'assemblage
48 Rondelle de tirant d'assemblage
49 Ressort de pression des étages

DESSIN ET PRINCIPAUX COMPOSANTS DE LA 125SV



1 Socle-tubulure de pompe
2 Roue
3 Diffuseur
4 Enveloppe extérieure
5 Arbre
6 Adaptateur
7 Joint torique (élastomère)
8 Accouplement
9 Plaque-logement de garniture mécanique
10 Garniture mécanique
11 Joint torique (élastomère)
12 Carter d'accouplement
13 Coussinet et chemise d'arbre
14 Coussinet d'arbre
15 Bouchons de remplissage et de vidange
16 Tirants d'assemblage
17 Joint torique (élastomère)

Licence d'utilisation de logiciel

EN UTILISANT LE DISPOSITIF DE SURVEILLANCE D'ÉTAT i-AlertMC, VOUS CONVENEZ QUE VOUS ÊTES LIÉ(E) PAR LES CONDITIONS DE LA LICENCE D'UTILISATION SUIVANTE. VEUILLEZ LA LIRE AVEC SOIN.

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Vous convenez également que ledit logiciel est la propriété d'ITT et qu'il est protégé par les traités internationaux et les lois des États-Unis d'Amérique sur le droit d'auteur. Vous reconnaissez que la structure, l'organisation et le code du logiciel constituent de précieux secrets commerciaux pour ITT et ses tiers fournisseurs, ainsi que le logiciel dans sa forme code source pour ITT. À propos du logiciel et de n'importe laquelle de ses parties, vous acceptez de ne pas en faire de décompilation, de désassemblage, de modification, d'assemblage ou d'ingénierie inverses ni de création de produits dérivés. Vous convenez de ne pas exporter ni de réexporter le logiciel dans d'autres pays en violation des lois des États-Unis d'Amérique sur le contrôle des exportations.

Déclaration de conformité

Nous, à
Xylem Inc. et Goulds Water Technology
1 Goulds Drive
Auburn, NY, U.S.A. 13021,

déclarons que les produits NPE, MCS, MCC, 3656, 3656 SP, GB, e-SV, SSV, SVI, NPO, Prime Line SP, HB, HMS, LC, NPV, LB, LBS sont conformes à la directive 06/42/EC (législation relative aux machines). Ils sont destinés à être intégrés dans la machinerie faisant l'objet de ladite directive, mais ne doivent pas être mis en service tant que la machinerie en question ne sera pas déclarée conforme aux stipulations de la directive.

GARANTIE POUR UTILISATION COMMERCIALE

Pour les biens vendus aux acheteurs commerciaux, le vendeur garantit les biens vendus ci-dessous (sauf pour les membranes, joints d'étanchéités, joints, matériaux en élastomère, revêtements et autres « pièces d'usure » ou articles consomptibles, ces derniers n'étant pas garantissable sauf indication contraire sur le formulaire de soumission ou de vente) seront (i) intégrés selon les spécifications indiquées sur la soumission ou le formulaire de vente, si ces spécifications font partie intégrantes de cette entente, et (ii) sont libres de toute défectuosité matériel et de fabrication pendant une période de un (1) an depuis la date d'installation ou douze (12) mois depuis la date d'expédition (la date d'expédition ne sera pas ultérieure à dix-huit (18) mois après la réception de l'avis que les biens sont prêts à être expédiés), la première instance à survenir, à moins qu'une période plus longue n'ait été indiquée sur la documentation du produit (la « Garantie »).

Sauf mention contraire dans les lois, le vendeur, à son choix et sans frais pour l'acheteur, réparera ou remplacera tout produit défectueux en vertu de la garantie pour autant que l'acheteur donne un avis écrit au vendeur de toutes défectuosités matérielles ou de maind'oeuvre dans les dix (10) jours de la première occurrence d'un défaut ou non conformité. En vertu de l'option de réparation ou de remplacement, le vendeur n'est soumis à aucune obligation de retirer ou de faire retirer le produit défectueux ni d'installer ou de payer pour l'installation du produit réparé ou remplacé. L'acheteur ne peut être tenu responsable de tout autre frais, incluant, entre autre, frais de réparation, d'expéditions et dépenses. Le vendeur à son entière discrétion choisira la méthode ou le moyen de réparation ou de remplacement. Le défaut de l'acheteur de se conformer aux directives de réparation ou de remplacement du vendeur conclura les obligations du vendeur en vertu de la présente garantie et annulera la garantie. Toutes pièces réparées ou remplacées en vertu de la garantie seront couvertes uniquement pour la durée de la garantie restante sur les pièces ayant été réparées ou remplacées. Le vendeur n'aura aucune obligation de garantie envers l'acheteur pour tout produit ou pièces du produit ayant été : (a) réparées par une tierce partie autre que le vendeur ou sans l'approbation écrite du vendeur; (b) soumises à une mauvaise utilisation, mauvaise application, négligence, altération, accident ou dommage physique; (c) utilisées de manière contraire aux directives d'installation, d'opération et d'entretien du vendeur; (d) endommagées par une usure normale, corrosion ou produits chimiques; (e) endommagées par des conditions anormales, vibrations, défaut d'une amorce adéquate ou opération sans débit; (f) endommagées par une alimentation électrique défectueuse ou une mauvaise protection électrique; ou (g) endommagées par l'utilisation d'un accessoire n'ayant pas été vendu ou approuvé par le vendeur. Dans le cas de produits n'ayant pas été fabriqués par le vendeur, ce dernier n'offre aucune garantie; cependant le vendeur fera profiter l'acheteur de toute garantie qu'il aura reçu du fournisseur de tels produits.

LA PRÉSENTE GARANTIE EST EXCLUSIVE ET REMPLACE TOUTE AUTRE GARANTIE OU CONDITIONS EXPRESSES OU IMPLICITES DE QUELQUE NATURE SE RAPPORTANT AUX BIENS FOURNIS CI-APRÈS, INCLUSANT, SANS LIMITE, TOUTE GARANTIE IMPLICITE DE QUALITÉ MARCHANDE ET DE CONFORMITÉ À DES FINS PARTICULIÈRES, QUI SONT RÉFUTÉES EXPRESSÉMENT ET EXLUES. SAUF MENTION CONTRAIRE DANS LES LOIS, LE SEUL RECOURS DE L'ACHETEUR ET LA RESPONSABILITÉ DU VENTEUR EN CAS DE BRIS D'UNE DES GARANTIES CI-APRÈS EST LIMITÉ À LA RÉPARATION OU AU REMPLACEMENT DU PRODUIT ET SERA DANS TOUS LES CAS LIMITÉ AU MONTANT PAYÉ PAR L'ACHETEUR POUR LE PRODUIT DÉFECTUEUX. EN AUCUN CAS, LE VENDEUR NE POURRA ÊTRE TENU RESPONSABLE DE TOUTES AUTRES FORMES DE DOMMAGES, QU'IL SOIT DIRECT, INDIRECT, LIQUIDÉ, ACCIDENTEL, CONSÉCUTIF, PUNITIF, EXEMPLAIRE OU DOMMAGES SPÉCIAUX, INCLUANT, ENTRE AUTRES, PERTE DE PROFIT, PERTE D'ÉCONOMIE PRÉVUE OU DE REVENU, PERTE DE RENTRÉE MONÉTAIRE, PERTE DE CLIENTÈLE, PERTE DE PRODUCTION, PERTE D'OPPORTUNITÉ OU PERTE DE RÉPUTATION.

xylem
Let's Solve Water

Xylem Inc.
2881 East Bayard Street Ext., Suite A
Seneca Falls, NY 13148
Téléphone: (866) 673-0445
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www.gouldswatertechnology.com

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GOULDS WATER TECHNOLOGY
a xylem brand

Customer	Date 18.03.2020
Contact	Project
Phone number	Project no.
Email	

Technical Data

15SV3NG4E60

Operating data

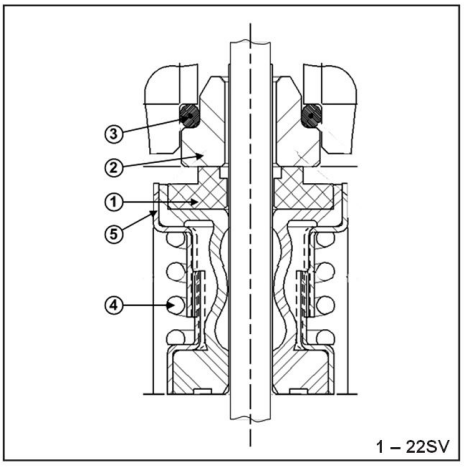
Pump type		Multi-Stage Pumps	Fluid		Water
No. of pumps / Reserve		1 / 0	Operating temperature t A	°F	39.2
Nominal flow	US g.p.m.	78.02	pH-value at t A		7
Nominal head	ft	162	Density at t A	lb/ft³	62.4
Static head	ft	0	Kin. viscosity at t A	ft²/s	1.689E-5
Inlet pressure	psi	0	Vapor pressure at t A	psi	14.5
Environmental temperature	°F	68	Solids		0
Available system NPSH	ft	0	Altitude	ft	0

Pump data

Make	Goulds Water Technology			Nominal	US g.p.m.	79.6	(79.6)
Speed	rpm	3500	Flow	Max-	US g.p.m.	127.3	
No. of stages		3		Min-	US g.p.m.		
Max. working pressure	psi	86.1		Nominal	ft	168.7	
Head H(Q=0)	ft	200	Head	at Qmax	ft	95.6	
Weight	lb	121		at Qmin	ft	198.6	
Efficiency	%	69.66	Shaft power		hp	4.7	(4.7)
NPSH 3%	ft	6.3	Max. shaft power		hp	5.6	

Shaft Seal

Single Seal	Xylem
Mechanical Seals	
1 - Rotating Face	Carbon
2 - Stationary Face	Silicon Carbide Graphite Filled
3 - Elastomers	Viton
4 - Spring	316SS
5 - Metal Components	316SS



1 – 22SV

Motor data

Manufacturer	Baldor	Electric voltage	575 V	Speed	3500 rpm	Insulation class	F
Specific design	3ph TPE			Frame size	184TC	Colour	RAL 5010
Type	575V 184TC (V10A32H5BD2S)			Degree of protection	TEPE		
Rated power	5 hp	Electric current	4.7 A				

Remarks:

GOULDS WATER TECHNOLOGY
a xylem brand

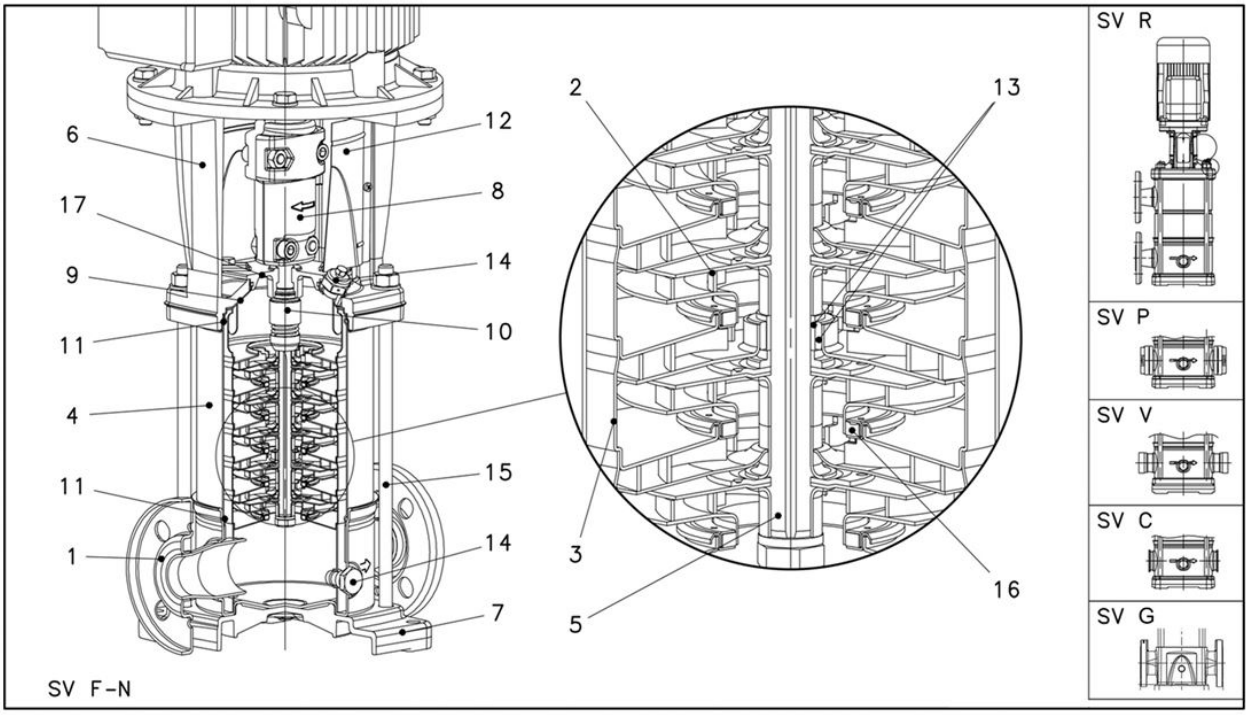
Customer	Date 18.03.2020
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Phone number	Project no.
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Construction Data

15SV3NG4E60

Pump Materials

1 - Pump Body	Stainless Steel (AISI 316L)
2 - Impeller	Stainless Steel (AISI 316L)
3 - Diffuser	Stainless Steel (AISI 316L)
4 - Casing	Stainless Steel (AISI 316L)
5 - Shaft	Stainless Steel (AISI 316)
6 - Adapter	Cast Iron (ASTM Class 35/40B)
7 - Base	Aluminum (A384 .0-F)
8 - Coupling	Aluminum (A384 .0-F)
9 - Seal Plate	Stainless Steel (AISI 316L)
10 - Mechanical Seal	Refer Mechanical Seals
11 - Elastomers	Refer Mechanical Seals
12 - Coupling Guard	Stainless Steel (AISI 304)
13 - Shaft Sleeve and Bushing	Tungsten carbide
14 - Fill/Drain Plugs	Stainless Steel (AISI 316)
15 - Tie Rods	Carbon Steel / Zinc Plated (A29 Gr.1045)
16 - Wear Ring	PPS
17 - Seal Gland	Stainless Steel (AISI 316)



Remarks:

GOULDS WATER TECHNOLOGY
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Tender Hydraulic

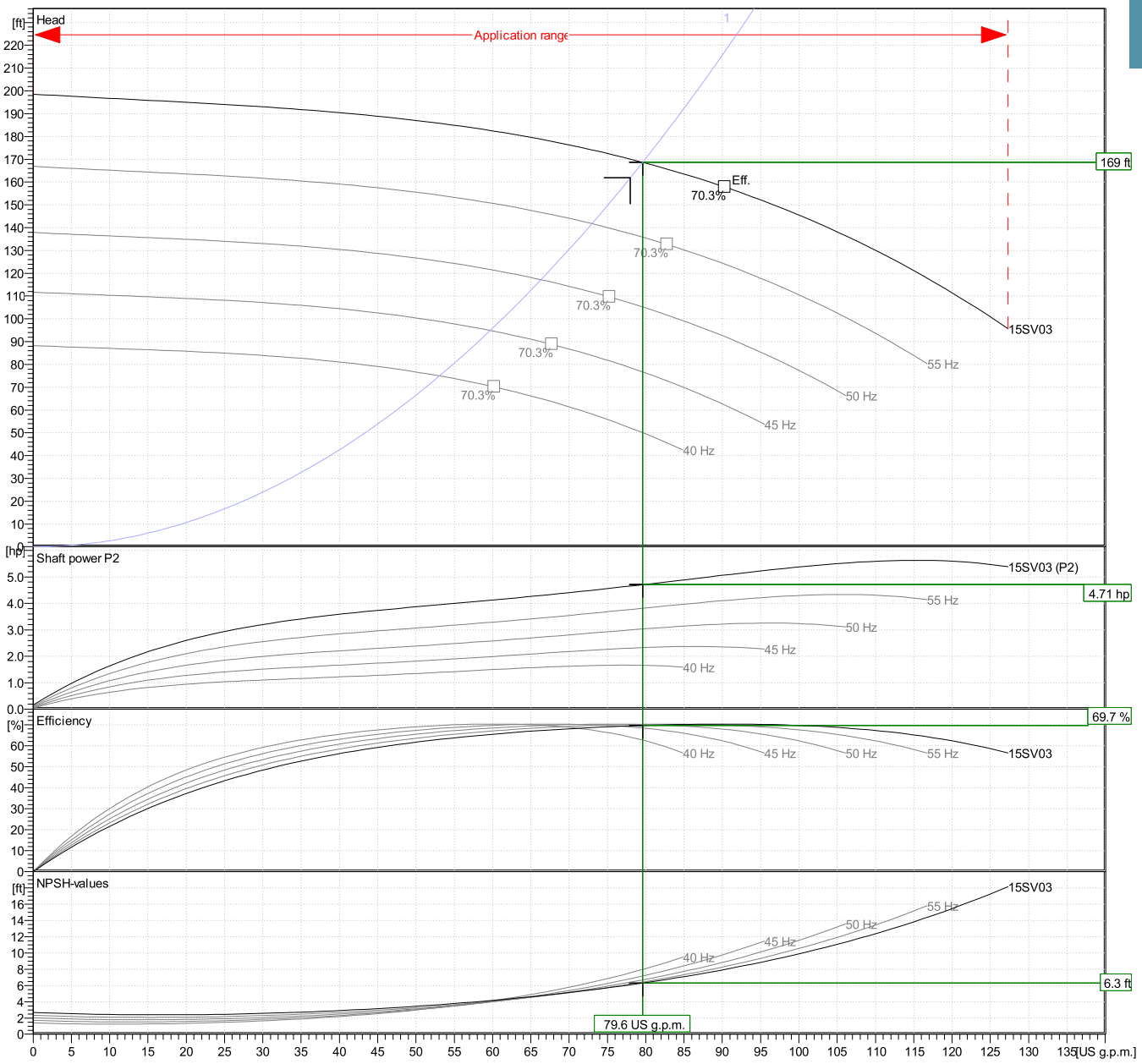
Customer	Date 18.03.2020
Contact	Project
Phone number	Project no.
Email	

15SV3NG4E60

Hydraulic Data

Operating Data Specification		Hydraulic data (duty point)		Impeller design	
Flow	78 US g.p.m.			Impeller R	"
Head	162 ft	Flow	79.6 US g.p.m.	Frequency	60 Hz
Static head	0 ft	Head	169 ft	Speed	3500 rpm

Power datas referced to:
Water [100%] ; 39.2°F; 62.4lb/ft³; 1.69E-5ft²/s
Performance according to ISO 9906 - Annex A

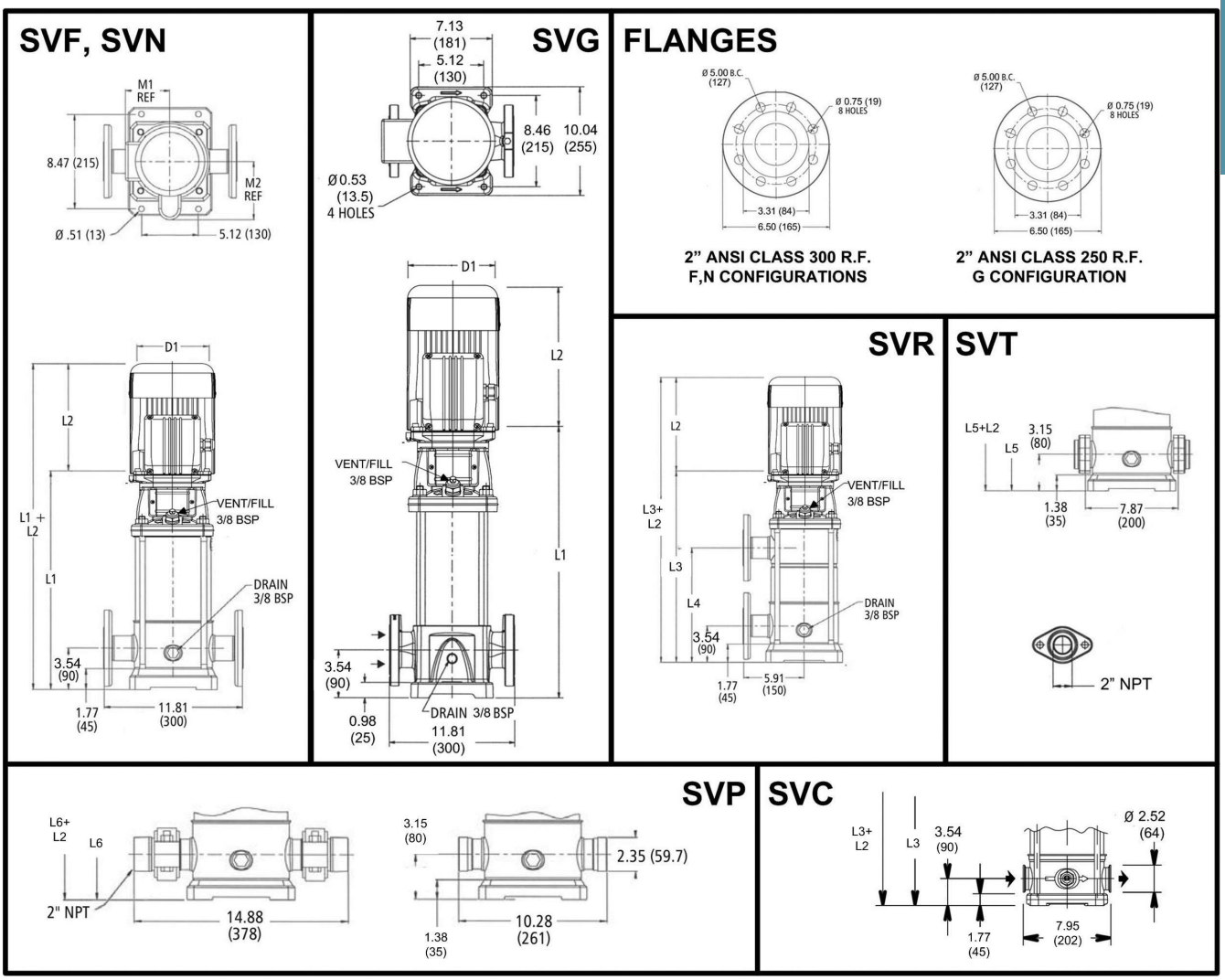


GOULDS WATER TECHNOLOGY
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Customer	Date 18.03.2020
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Email	

15SV3NG4E60

Drawing



Dimensions inch

D1 max	$8^{1}/_{2}$					Weight
D2	$8^{7}/_{8}$					121 lb
L1	$20^{5}/_{8}$					
L2	$15^{3}/_{16}$					
L5	$20^{3}/_{16}$					
L6	$20^{3}/_{16}$					
M.Ref	$6^{7}/_{8}$					
NEMA Frame	184TC					



Vertical Storage Tanks

Vertical storage tanks are most frequently used for bulk storage and mobile nursing applications. NORWESCO vertical tanks feature tie-down slots, built-in graduated gallon indicators, an offset fill-well and a self-vented, slosh-proof lid.

All NORWESCO vertical tanks are equipped with an outlet fitting and siphon tube.

Gallon Capacity	Diameter	Height	Fill Opening	Outlet/Drain Specification	Premium Weight Part No. White	Heavy Weight Part No. Blue
25 ∞	18"	29"	5"	¾"	41867	—
50 ∞	18"	53"	5"	¾"	41865	—
65 ∞	23"	42"	8"	1¼"	45192	—
75	23"	50"	8"	1¼"	41863	—
100	28"	43"	8"	1¼"	41861	
105	23"	63"	8"	2"	40803	—
150	30"	56"	8"	1¼"	41859	—
165	31"	55"	16"	2"	40281	—
200	30"	72"	8"	2"	41856	—
210	31"	69"	16"	2"	47401	—
250	30"	89"	8"	2"	41854	—
300	36"	78"	16"	2"	40213	—
305	46"	49"	16"	2"	40302	—
500	48"	72"	16"	2"	40148	40150
550	67"	42"	16"	2"	40023	—
750	48"	102"	16"	2"	40606	—
1000	64"	79"	16"	2"	40152	40154
1100	87"	51"	16"	2"	40070	40081
1350	71"	87"	16"	2"	40861	—
1500	64"	115"	16"	2"	40144	40146
1550	87"	65"	16"	2"	40235	40236
1700	87"	72"	16"	2"	40010	40012
2100	87"	87"	16"	2"	40178	40241
2100	102"	69"	16"	2"	41399	—
2500	95"	89"	16"	2"	40051	40052
3000	95"	107"	16"	2"	40754	40755
4000	102"	125"	16"	3"/2"	40312	—
4200	102"	131"	16"	2"	41403	—
5000	102"	152"	16"	3"/2"	40164	40166
5800	141"	97"	16"	3"/2"	40071	—
6000	102"	182"	16"	3"/2"	40226	40233
6100	120"	139"	16"	3"/2"	40659	40661
6500	120"	150"	16"	3"/2"	40224	40232
7800	120"	176"	16"	3"/2"	40663	40665
9000	141"	146"	16"	3"/2"	40543	40231
10000	141"	160"	16"	3"/2"	40545	40353
12000	141"	192"	16"	3" *	40539	40541
15000	141"	244"	16"	3" *	41334	41336

∞ Within UPS dimensional limits *316 Stainless Steel Bolted Fitting

PLEASE NOTE: Tank availability may vary according to manufacturing location. Please contact NORWESCO Customer Service or your NORWESCO distributor for specific details. Tank dimensions and capacities may vary slightly and are subject to change without notice.

OAS Suspended Unit Heater



Horizontal mounting



Features

Color
- Standard: almond.

Finish
- Standard: epoxy/polyester powder paint.

Voltage
- 208V, 240V, 277V, 347V, 480V, 600V, 1 or 3-phase.
- Some units may be field converted from 3 to 1-phase.

Construction
- 18 and 20-gauge steel.
- Adjustable louvres to direct air flow.
- High-limit temperature control with automatic reset.

Fan
- Motor mounted in cold compartment.
- Thermally-protected motor.
- Totally enclosed and factory-lubricated ball bearing motor (except for 15 to 25kW at 208/240V).
- 58 dBA fan (2 to 10kW), 67 dBA fan (15 to 30kW) and 77 dBA fan (40 to 60kW).
- Fan delay purges heater of residual heat.

Heating element
- Durable tubular heating elements; stainless steel (2 to 10kW); finned (15 to 60kW).
- Concentric disposition of heating elements.
- Factory sealed element upon request.

Control
- All models have a factory-installed contactor.
- 240/208V control circuit standard (with transformer if necessary).
- 24V relay, with or without transformer available.
- Built-in thermostat available.
- 120V control circuit available.

Ouellet highly recommends to use a wall thermostat for greater comfort. Any remote thermostat or relay must be connected to the heater control terminal block.

Installation
- Horizontal wall or ceiling mounting using one of two supplied brackets which allow 360° rotation.
  (Horizontal mounting only for 40kW, 50kW and 60kW secured by 4 hooks [ceiling only].)
- Vertical mounting using 4 threaded rods 1/2 in. X 13 UNC (not included) (except option -MD).
- Diffuser cones available (except option -MD).
- Large and easily accessible control compartment.
- Maximum recommended height (horizontal): 2 to 10kW: 8 ft. (2.4 m); 15 to 30kW: 10 ft. (3 m); 40 to 60kW: 15 ft. (4.5 m).
- Protective screen allows lower mounting height (except 40 to 60kW).
- Minimum height of 8 ft. (2.4 m) for 40 to 60kW heaters.
- 30 °C (85 °F) maximum operating ambient temperature.

Warranty
- 1-year warranty against defects.

Application
- Commercial hall, warehouse, stairwell, factory.

OAS

Models

kW (BTU/hr)	Volts (ph)	Product #	Price	cfm	Temperature Rise		Motor	
					°C	°F	HP	rpm
2.0 (6824)	208 (1)	OAS02008	772.00	510	7	13	1/30	1550
2.0 (6824)	208 (3/1[1])	OAS02038	772.00	510	7	13	1/30	1550
3.0 (10236)	208 (1)	OAS03008	766.00	510	10	18	1/30	1550
3.0 (10236)	208 (3/1[1])	OAS03038	766.00	510	10	18	1/30	1550
4.0 (13648)	208 (1)	OAS04008	784.00	510	14	25	1/30	1550
4.0 (13648)	208 (3/1[1])	OAS04038	784.00	510	14	25	1/30	1550
5.0 (17060)	208 (1)	OAS05008	904.00	700	13	23	1/30	1550
5.0 (17060)	208 (3/1[1])	OAS05038	904.00	700	13	23	1/30	1550
7.5 (25590)	208 (3/1[1])	OAS07538	1301.00	700	19	34	1/30	1550
10.0 (34120)	208 (1)	OAS10008	1373.00	700	25	45	1/30	1550
10.0 (34120)	208 (3)	OAS10038	1373.00	700	25	45	1/30	1550
15.0 (51180)	208 (3/1[1])	OAS15038	1871.00	1300	20	36	1/8	1550
20.0 (68240)	208 (3/1[1])	OAS20038	2059.00	1300	27	49	1/8	1550
25.0 (85300)	208 (3/1[1])	OAS25038	2335.00	1300	34	61	1/8	1550
2.0 (6824)	240 (1)	OAS02000	772.00	510	7	13	1/30	1550
3.0 (10236)	240 (1)	OAS03000	766.00	510	10	18	1/30	1550
4.0 (13648)	240 (1)	OAS04000	784.00	510	14	25	1/30	1550
5.0 (17060)	240 (1)	OAS05000	904.00	700	13	23	1/30	1550
7.5 (25590)	240 (1)	OAS07500	1301.00	700	19	34	1/30	1550
10.0 (34120)	240 (1)	OAS10000	1373.00	700	25	45	1/30	1550
15.0 (51180)	240 (1)	OAS15000	1871.00	1300	20	36	1/8	1550
20.0 (68240)	240 (1)	OAS20000	2059.00	1300	27	49	1/8	1550
25.0 (85300)	240 (1)	OAS25000	2335.00	1300	34	61	1/8	1550
2.0 (6824)	347 (1)	OAS02007	920.00	510	7	13	1/30	1550
3.0 (10236)	347 (1)	OAS03007	950.00	510	10	18	1/30	1550
4.0 (13648)	347 (1)	OAS04007	974.00	510	14	25	1/30	1550
5.0 (17060)	347 (1)	OAS05007	1008.00	700	13	23	1/30	1550
7.5 (25590)	347 (1)	OAS07507	1472.00	700	19	34	1/30	1550
10.0 (34120)	347 (1)	OAS10007	1499.00	700	25	45	1/30	1550
2.0 (6824)	480 (3)	OAS02034	920.00	510	7	13	1/30	1550
3.0 (10236)	480 (3)	OAS03034	950.00	510	10	18	1/30	1550
4.0 (13648)	480 (3)	OAS04034	974.00	510	14	25	1/30	1550
5.0 (17060)	480 (3)	OAS05034	1008.00	700	13	23	1/30	1550
7.5 (25590)	480 (3)	OAS07534	1472.00	700	19	34	1/30	1550
10.0 (34120)	480 (3)	OAS10034	1499.00	700	25	45	1/30	1550
15.0 (51180)	480 (3)	OAS15034	1871.00	1400	19	34	1/3	1680
20.0 (68240)	480 (3)	OAS20034	2059.00	1400	25	45	1/3	1680
25.0 (85300)	480 (3)	OAS25034	2382.00	1400	31	56	1/3	1680
30.0 (102360)	480 (3)	OAS30034	2425.00	1400	38	68	1/3	1680
40.0 (136480)	480 (3)	OAS40034[2]	3198.00	2000	35	63	3/4	1140
50.0 (170600)	480 (3)	OAS50034[2]	3405.00	2000	44	79	3/4	1140
60.0 (204720)	480 (3)	OAS60034[2]	3743.00	2000	53	95	3/4	1140
2.0 (6824)	600 (1)	OAS02006	920.00	510	7	13	1/30	1550
2.0 (6824)	600 (3)	OAS02036	920.00	510	7	13	1/30	1550
3.0 (10236)	600 (1)	OAS03006	950.00	510	10	18	1/30	1550
3.0 (10236)	600 (3)	OAS03036	950.00	510	10	18	1/30	1550
4.0 (13648)	600 (1)	OAS04006	974.00	510	14	25	1/30	1550
4.0 (13648)	600 (3/1[1])	OAS04036	974.00	510	14	25	1/30	1550
5.0 (17060)	600 (1)	OAS05006	1008.00	700	13	23	1/30	1550
5.0 (17060)	600 (3/1[1])	OAS05036	1008.00	700	13	23	1/30	1550
7.5 (25590)	600 (3/1[1])	OAS07536	1472.00	700	19	34	1/30	1550
10.0 (34120)	600 (3/1[1])	OAS10036	1499.00	700	25	45	1/30	1550
15.0 (51180)	600 (1)	OAS15006	1871.00	1400	19	34	1/3	1725
15.0 (51180)	600 (3)	OAS15036	1871.00	1400	19	34	1/3	1680
20.0 (68240)	600 (1)	OAS20006	2059.00	1400	25	45	1/3	1725
20.0 (68240)	600 (3)	OAS20036	2059.00	1400	25	45	1/3	1680
25.0 (85300)	600 (1)	OAS25006	2382.00	1400	31	56	1/3	1725
25.0 (85300)	600 (3)	OAS25036	2382.00	1400	31	56	1/3	1680
30.0 (102360)	600 (3)	OAS30036	2425.00	1400	38	68	1/3	1725
40.0 (136480)	600 (3)	OAS40036[2]	3198.00	2000	35	63	3/4	1140
50.0 (170600)	600 (3)	OAS50036	3405.00	2000	44	79	3/4	1140
60.0 (204720)	600 (3)	OAS60036	3743.00	2000	53	95	3/4	1140

[1] Models with the indication "3/1" can be field converted from 3 to 1-phase.
[2] If the control option "Disconnect switch" is required, you must order OAS-DIS80.
Standard color is almond.
277V available upon request.

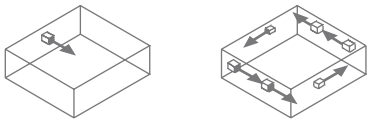
OAS

Options

Product #	Price	Description	Factory Installed	Kit
OAS1-120/XXX	101.00	120V control circuit (XXX = 208V, 240V, 277V, 347V, 480V, 600V) 2 to 10kW units	✓	-
OAS2-120/XXX	101.00	120V control circuit (XXX = 208V, 240V, 480V, 600V) 15 to 30kW units	✓	-
OAS3-120/XXX	101.00	120V control circuit (XXX = 240V, 480V, 600V) 40 to 60kW units	✓	-
OAS-3P	49.00	Triple-pole contactor	✓	✓
OAS-CD1	95.00	Diffuser cone, 2 to 10kW units	-	✓
OAS-CD2	117.00	Diffuser cone, 15 to 30kW units	-	✓
OAS-CD3	146.00	Diffuser cone, 40 to 60kW units	-	-
OAS-CV-277	47.00	Summer fan switch, with motor 240V and 277V	✓	-
OAS-CV-600	64.00	Summer fan switch , with motor 480V and 600V	✓	-
OAS-DIS40	112.00	Disconnect switch, 40A	✓	-
OAS-DIS80	134.00	Disconnect switch, 80A	✓	-
OAS-DIS100	457.00	Disconnect switch, 100A	✓	-
OAS-ES[1]	50.00	Factory sealed element	✓	-
OAS-FAN-AM	31.00	Fan blades with almond epoxy/polyester coating	✓	-
OAS-MD[2]	268.00	Mine duty	✓	-
OAS-R	98.00	24V relay, without transformer	✓	✓
OAS-R/CV-240	68.00	Summer fan relay 240V, remote control (switch not included)	✓	-
OAS-RT	107.00	24V relay, with transformer	✓	✓
OAS-T	80.00	Thermostat	✓	✓

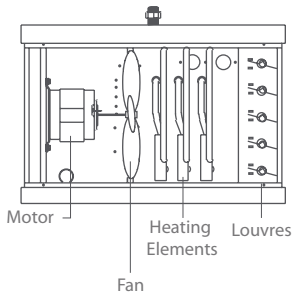
[1] The option "sealed element" increases the reliability of these in humid environments. It does not completely eliminate the leakage currents of metal shealthed heating elements.
[2] See features at page 87.
For options available as factory installed and kit, if not mentioned on the order, will automatically be shipped as a kit.

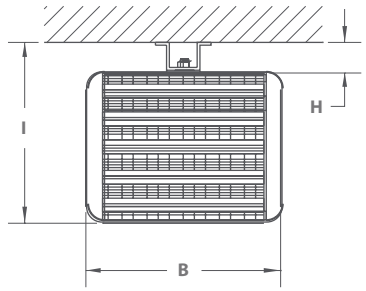
Standard Installation



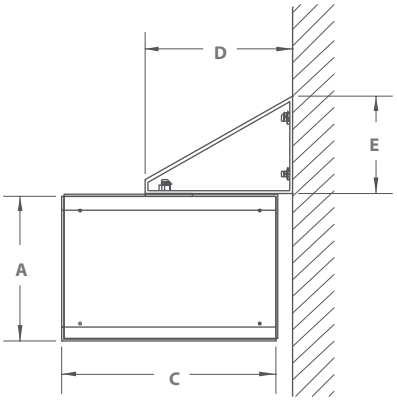
Small Area Large Area

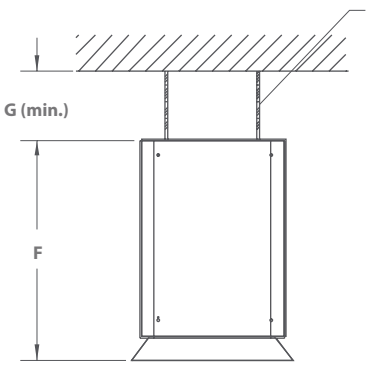
Side View
Motor in Cold Section





	2 to 10kW		15 to 30kW		40 to 60kW	
	mm	in.	mm	in.	mm	in.
A	305	12	444	17 1/2	585	23
B	419	16 1/2	556	21 7/8	641	25 1/4
C	432	17	572	22 1/2	870	34 1/4
D	357	14 1/16	470	18 1/2	-	-
E	290	11 7/16	407	16	-	-
F	490	19 5/16	630	24 13/16	924	36 3/8
G	305	12	305	12	305	12
H	123	4 7/8	148	5 13/16	305	12
I	428	16 7/8	592	23 5/16	890	35
Weight	kg	lb	kg	lb	kg	lb
	20	45	39	85	68	150



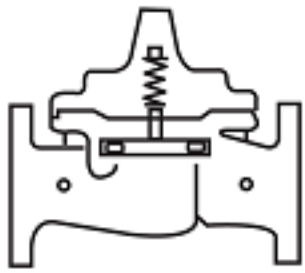


4 Threaded Rods
(1/2" - 13 UNC)
(Not Included)

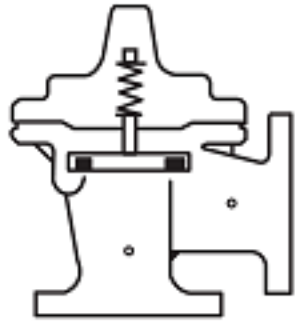
CLA-VAL
AUTOMATIC CONTROL VALVES

50-01/650-01

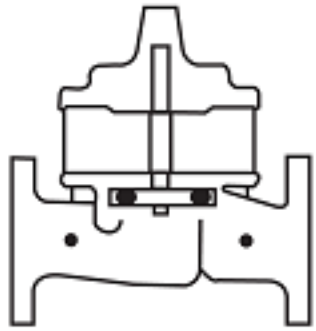
Place this manual with personnel responsible for maintenance of this valve



Installation



Operation



Maintenance

CLA-VAL • 1701 Placentia Avenue • Costa Mesa, CA 92627 • (949) 722-4800 • info@cla-val.com
CLA-VAL CANADA LTD. • 4687 Christie Drive • Beamsville, Ontario, LOR 1B4 Canada • (905) 563-4963
www.cla-val.com • info@cla-val.com

DRAWING NO. 79488 REV J

M□d□□50-01/650-01

Pr□□□□r□ R□□□□V□□□□

(E□□□□□□d □□□ C□□□□□ S□□□d C□□r□□)

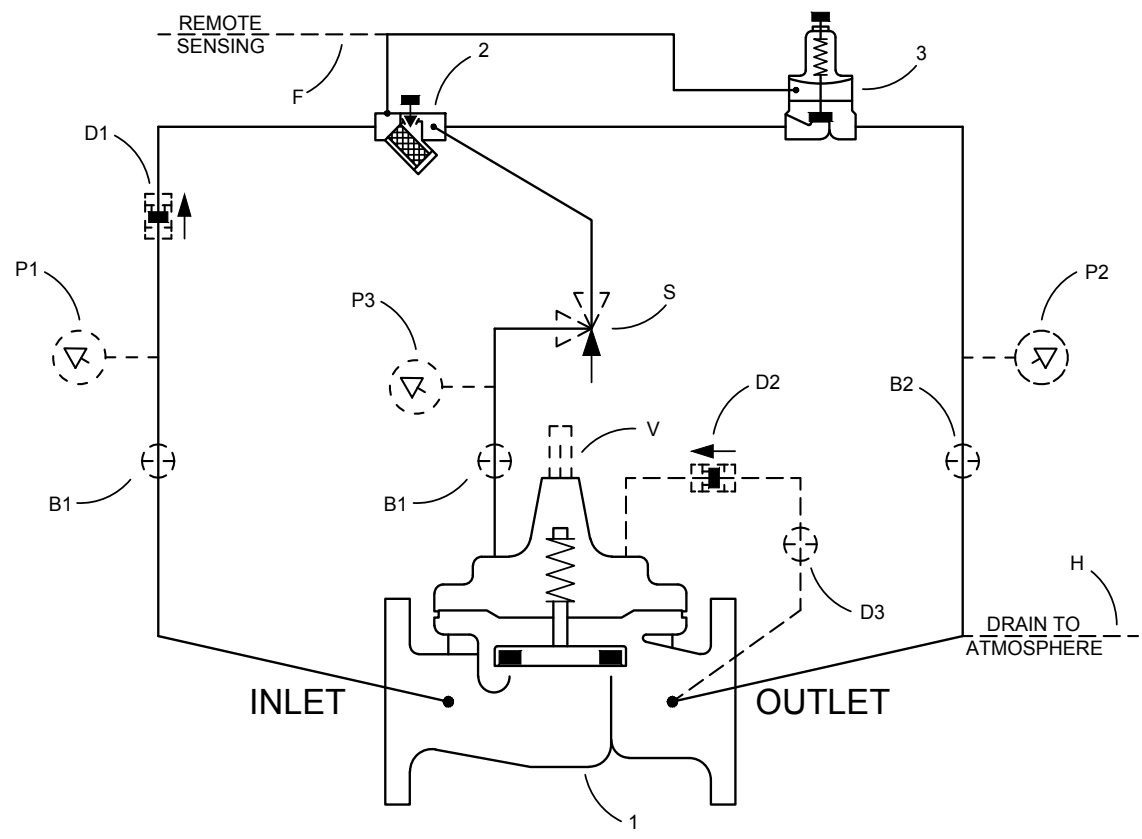
DESIGN JD 11-30-78
DRAWN CH 11-30-78
CHK'D WAL 11-30-78
APV'D

5-31-18 AV J REDRAWN IN NEW SCHEMATIC FORMAT (ECO 26780)

CAD REVISION RECORD

LTR	DESCRIPTION	BY	DATE
A-G	SEE REVISION FILE		
H	ADDED CRL60 TO COMPONENT LIST (ECO 23596)	RP	8-29-13

—— - - —— NOT FURNISHED BY CLA-VAL CO. — — — — OPTIONAL FEATURES



NO.	BASIC COMPONENTS	QTY
1	100-01 HYTROL (50-01) MAIN VALVE/100-20 HYTROL (650-01) MAIN VALVE	1
2	X42N-2 STRAINER & NEEDLE VALVE	1
3	CRL/CRL60 PRESSURE RELIEF CONTROL	1

NO.	OPTIONAL FEATURES	QTY
B	CK2 COCK (ISOLATION VALVE)	3
D	CHECK VALVES WITH COCK	1
F	REMOTE PILOT SENSING	
H	DRAIN TO ATMOSPHERE	
P	X141 PRESSURE GAUGE ASSEMBLY	3
S	CV FLOW CONTROL (OPENING)	1
V	X101 VALVE POSITION INDICATOR	1

M□d□□50-01/650-01

Pr□□□□r□ R□□□□V□□□□
(E□□□□□□d □□□ C□□□□□ S□□□d C□□r□)

► OPERATING DATA

Pressure Relief Feature

Pressure relief control **(3)** is a normally closed control that responds to main valve inlet pressure changes. An increase in inlet pressure tends to open control **(3)** and a decrease in inlet pressure tends to close control **(3)**. This causes main valve cover pressure to vary and the main valve modulates (opens and closes) maintaining a relatively constant pressure at the main valve inlet. When inlet pressure is lower than the set point of control **(3)**, control **(3)** closes. This pressurizes the main valve cover chamber and the main valve closes. **Pressure relief control (3) adjustment:** Turn the adjusting screw clockwise to increase the setting.

Closing Speed Control

Needle valve **(2)** controls the closing speed of the main valve. Turn the adjusting stem clockwise to make the main valve close slower. **Do not close valve (2) completely or the main valve will not close.** (Suggested initial setting of needle valve is 1/4 to 1/2 turn open.)

Optional Features

(B) - Isolation Valves:
I□□□□□□□□ V□□□□□ **(B1)** □□d **(B2)** □r□ □□□d □□ □□□□□□□□ □□□□ □□□□□□□□□□□□ □r□□ □ □□□ □□□□ □r□□□□r□. T□□□□ □□□□□□□ □ □□□□□□ □□□□□d □r□□□ □□r□ □□□□□□r□□□□.

(D) - Check Valves with Isolation Valves:
W□□□ □□□□□□□□r□□□□r□ □□ □□□□□r □□□□ □□□□□□□r□□□□r□, □□□□□□ □□□□□ **(D2)** □□□□□□ □□d □□□□□□ □□□□□ **(D1)** □□□□□□. T□□□ d□r□□□ □□□□ □□□□□r □□□□□□□□r□□□□r□ □□□□ □□□□ □ □□□□ □□□□□ □□□□r □□d □□□□ □ □□□□ □□□□□ □□□□□□.

(F) - Remote Pilot Sensing:
P□□□□□□□□□□□ □r□□□□r□ □□ □□□□□□□□d □r□□ □ □□□□□□□□□□□r□□□□ □□□□□□ □ □□□□ □□□□□ □□□□□.(P□□□□□□□□□□□ □r□□□□r□ □□ □□□□□□□□d □r□□ □□□□ □ □□□□ □□□□□ □□□□□□□□□□□□□ **(F)** □□ □□□□□□□□□□□□d.)

(H) - Atmospheric Drain:
P□□□□□□□□□□ dr□□ □□□□ □□ □d□□□□□r□□d □□ □□□□ □□□□□□r□. (P□□□□□□□□□□ dr□□ □□□□ □□ □□□□□□□□□d □□ □□□□ □ □□□□ □□□□□ □□□□□□□□□□□□□□ □□□□□□□□ **(H)** □□ □□□□□□□□□□□□d.)

(P) - Pressure Gauge:
Pr□□□□r□ □□□□□□□ **(P1)**, **(P2)**, □□d **(P3)** □r□□d□ □r□□□□r□ r□□d□□□ □□ □□□□ □□□□□, □□□□□, □□d □□□□r □□□□□□□□□□□□.

(S) - Opening Speed Control:
F□□□ □□□□r□□ **(S)** □□□□r□□ □□□ □□□□□□□□ □□□□□d □□□□□□ □ □□□□ □□□□□. T□r□ □□□ □d□□□□□□□ □□□□□ □□□□□□□□ □□□ □□ □ □□□□ □□□ □ □□□□ □□□□□ □□□□□ □□□□ □r.

(V) - Valve Position Indicator:
V□□□□ □□□□□□□□ □d□□□□□r **(V)** d□□□□□□□□ □ □□□□□□□□□□□□□□□□ □□□□□□ □ □□□□ □□□□□ □□□□ .

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► OPERATING DATA - CONTINUED

► CHECK LIST FOR PROPER OPERATION

☐ S□□□□□ □□□□□ □□□□ □□□r□□□ □d d□□ □□r□□□.

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☐ P□r□d□□□□□□□□□□ □□□r□□□r **(2)** □r□□□ □ □d□d.

☐ F□□ □□□r□□**(S)** □□□ □□□□□□4 □r□□ (□□□□□□□□□□□r□).

☐ I□□□□□□ □□□□□ **(B1)**, **(B2)**, □d **(D3)** □□□ (□□□□□□□□□□□r□).

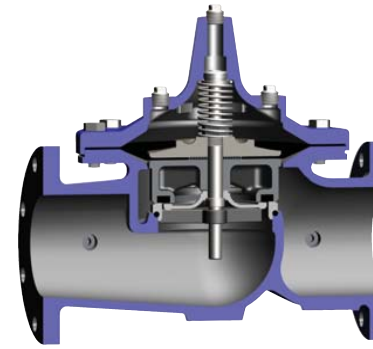
CLA-VAL

—MODEL— 100-01 Hytrol Valve

Description

The Cla-Val Model 100-01 Hytrol Valve is a main valve for Cla-Val Automatic Control Valves. It is a hydraulically operated, diaphragm-actuated, globe or angle pattern valve.

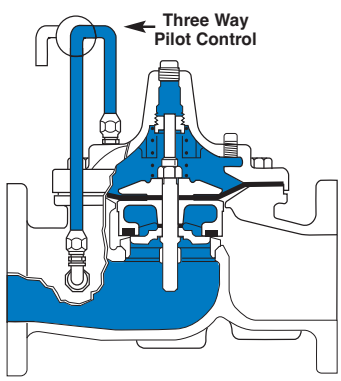
This valve consists of three major components; body, diaphragm assembly, and cover. The diaphragm assembly is the only moving part. The diaphragm assembly uses a diaphragm of nylon fabric bonded with synthetic rubber. A synthetic rubber disc, contained on three and one half sides by a disc retainer and disc guide, forms a seal with the valve seat when pressure is applied above the diaphragm. The diaphragm assembly forms a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure.



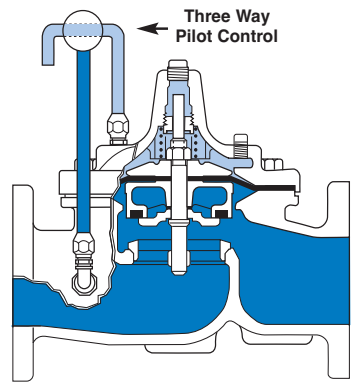
Installation

1. Before valve is installed, pipe lines should be flushed of all chips, scale and foreign matter.
2. It is recommended that either gate or block valves be installed on both ends of the 100-01 Hytrol Valve to facilitate isolating the valve for preventive maintenance and repairs.
3. Place the valve in the line with flow through the valve in the direction indicated on the inlet nameplate. (See “Flow Direction” Section) **Note: Valve can be installed in the vertical or horizontal position.**
4. Allow sufficient room around valve to make adjustments and for disassembly.
5. Cla-Val 100-01 Hytrol Valves operate with maximum efficiency when mounted in horizontal piping with the cover UP, however, other positions are acceptable. Due to size and weight of the cover and internal components of 8 inch and larger valves, installation with the cover UP is advisable. This makes internal parts readily accessible for periodic inspection.
6. Caution must be taken in the installation of this valve to insure that galvanic and/or electrolytic action does not take place. The proper use of dielectric fittings and gaskets are required in all systems using dissimilar metals.
7. If a pilot control system is installed on the 100-01 Hytrol Valve, use care to prevent damage. If it is necessary to remove fittings or components, be sure they are kept clean and replaced exactly as they were.
8. After the valve is installed and the system is first pressurized, vent air from the cover chamber and pilot system tubing by loosening fittings at all high points.

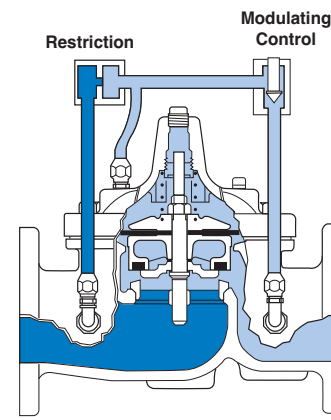
Principles of Operation



Tight Closing Operation
When pressure from the valve inlet (or an equivalent independent operating pressure) is applied to the diaphragm chamber the valve closes drip-tight.



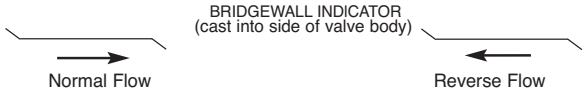
Full Open Operation
When pressure in diaphragm chamber is relieved to a zone of lower pressure (usually atmosphere) the line pressure (5 psi Min.) at the valve inlet opens the valve.



Modulating Action
Valve modulates when diaphragm pressure is held at an intermediate point between inlet and discharge pressure. With the use of a Cla-Val. "modulating control," which reacts to line pressure changes, the pressure above the diaphragm is varied, allowing the valve to throttle and compensate for the change.

Flow Direction

The flow through the 100-01 Hytrol Valve can be in one of two directions. When flow is “up-and-over the seat,” it is in “normal” flow and the valve will fail in the open position. When flow is “over-the seat-and down,” it is in “reverse” flow and the valve will fail in the closed position. There are no permanent flow arrow markings. **The valve must be installed according to nameplate data.**



Recommended Tools

1. Three pressure gauges with ranges suitable to the installation to be put at Hytrol inlet, outlet and cover connections.

2. Cla-Val Model X101 Valve Position Indicator. This provides visual indication of valve position without disassembly of valve.

3. Other items are: suitable hand tools such as screwdrivers, wrenches, etc. soft jawed (brass or aluminum) vise, 400 grit wet or dry sandpaper and water for cleaning.

Troubleshooting

The following troubleshooting information deals strictly with the Model 100-01 Hytrol Valve. This assumes that all other components of the pilot control system have been checked out and are in proper working condition. (See appropriate sections in Technical Manual for complete valve).

All trouble shooting is possible without removing the valve from the line or removing the cover. It is highly recommended to permanently install a Model X101 Valve Position Indicator and three gauges in unused Hytrol inlet, outlet and cover connections.

SYMPTOM	PROBABLE CAUSE	REMEDY
Fails to Close	Closed isolation valves in control system, or in main line.	Open Isolation valves.
	Lack of cover chamber pressure.	Check upstream pressure, pilot system, strainer, tubing, valves, or needle valves for obstruction.
	Diaphragm damaged. (See Diaphragm Check.)	Replace diaphragm.
	Diaphragm assembly inoperative. Corrosion or excessive scale build up on valve stem. (See Freedom of Movement Check)	Clean and polish stem. Inspect and replace any damaged or badly eroded part.
	Mechanical obstruction. Object lodged in valve. (See Freedom of Movement Check)	Remove obstruction.
	Worn disc. (See Tight Sealing Check)	Replace disc.
	Badly scored seat. (See Tight Sealing Check)	Replace seat.
Fails to Open	Closed upstream and/or downstream isolation valves in main line.	Open isolation valves.
	Insufficient line pressure.	Check upstream pressure. (Minimum 5 psi flowing line pressure differential.)
	Diaphragm assembly inoperative. Corrosion or excessive buildup on valve stem. (See Freedom of Movement Check)	Clean and polish stem. Inspect and replace any damaged or badly eroded part.
	Diaphragm damaged. (For valves in "reverse flow" only)	Replace diaphragm.

After checking out probable causes and remedies, the following three checks can be used to diagnose the nature of the problem before maintenance is started. They must be done in the order shown.

Three Checks

The 100-01 Hytrol Valve has only one moving part (the diaphragm and disc assembly). So, there are only three major types of problems to be considered.

First: Valve is stuck - that is, the diaphragm assembly is not free to move through a full stroke either from open to close or vice versa.

Second: Valve is free to move and can’t close because of a worn out diaphragm.

Third: Valve leaks even though it is free to move and the diaphragm isn’t leaking.

CAUTION:
Care should be taken when doing the troubleshooting checks on the 100-01 Hytrol Valve. These checks do require the valve to open fully. This will either allow a high flow rate through the valve, or the downstream pressure will quickly increase to the inlet pressure. In some cases, this can be very harmful. Where this is the case, and there are no block valves in the system to protect the downstream piping, it should be realized that ***the valve cannot be serviced under pressure.*** *Steps should be taken to remedy this situation before proceeding any further.*

Diaphragm Check (#1)

1. Shut off pressure to the Hytrol Valve by slowly closing upstream and downstream isolation valves. **SEE CAUTION**.

2. Disconnect or close all pilot control lines to the valve cover and leave only one fitting in highest point of cover open to atmosphere.

3.With the cover vented to atmosphere, slowly open upstream isolation valve to allow some pressure into the Hytrol Valve body. Observe the open cover tapping for signs of continuous flow. It is not necessary to fully open isolating valve. Volume in cover chamber capacity chart will be displaced as valve moves to open position. Allow sufficient time for diaphragm assembly to shift positions. If there is no continuous flow, you can be quite certain the diaphragm is sound and the diaphragm assembly is tight. If the fluid appears to flow continuously this is a good reason to believe the diaphragm is either damaged or it is loose on the stem. In either case, this is sufficient cause to remove the valve cover and investigate the leakage. (See "Maintenance" Section for procedure.)

COVER CHAMBER CAPACITY
(Liquid Volume displaced when valve opens)

Valve size (inches)	Displacement	
	Gallons	Liters
1 1/4	.020	.07
1 1/2	.020	.07
2	.032	.12
2 1/2	.043	.16
3	.080	.30
4	.169	.64
6	.531	2.0
8	1.26	4.8
10	2.51	9.5
12	4.00	15.1
14	6.50	24.6
16	9.57	36.2
20	12.00	45.4
24	29.00	109.8
30	42.00	197.0
36	90.00	340.0

Freedom of Movement Check (#2)

4. Determining the Hytrol Valve's freedom of movement can be done by one of two methods.

5. For most valves it can be done after completing Diaphragm Check (Steps 1, 2, and 3). **SEE CAUTION**. At the end of step 3 the valve should be fully open.

6. If the valve has a Cla-Val X101 Position Indicator, observe the indicator to see that the valve opens wide. Mark the point of maximum opening.

7. Re-connect enough of the control system to permit the application of inlet pressure to the cover. Open pilot system cock so pressure flows from the inlet into the cover.

8. While pressure is building up in the cover, the valve should close smoothly. There is a hesitation in every Hytrol Valve closure, which can be mistaken for a mechanical bind. The stem will appear to stop moving very briefly before going to the closed position. This slight pause is caused by the diaphragm flexing at a particular point in the valve's travel and is not caused by a mechanical bind.

9. When closed, a mark should be made on the X101 Valve position indicator corresponding to the "closed" position. The distance between the two marks should be approximately the stem travel shown in chart.

STEM TRAVEL
(Fully Open to Fully Closed)

Valve Size (inches)		Travel (inches)	
Inches	MM	Inches	MM
1 1/4	32	0.4	10
1 1/2	40	0.4	10
2	50	0.6	15
2 1/2	65	0.7	18
3	80	0.8	20
4	100	1.1	28
6	150	1.7	43
8	200	2.3	58
10	250	2.8	71
12	300	3.4	86
14	350	4.0	100
16	400	4.5	114
20	500	5.6	143
24	600	6.7	165
30	800	7.5	190
36	900	8.5	216

10. If the stroke is different than that shown in stem travel chart this is a good reason to believe something is mechanically restricting the stroke of the valve at one end of its travel. If the flow does not stop through the valve when in the indicated "closed" position, the obstruction probably is between the disc and the seat. If the flow does stop, then the obstruction is more likely in the cover. In either case, the cover must be removed, and the obstruction located and removed. The stem should also be checked for scale build-up. (See "Maintenance, section for procedure.)

11. For valves 6" and smaller, the Hytrol Valve's freedom of movement check can also be done after all pressure is removed from the valve. **SEE CAUTION**. After closing inlet and outlet isolation valves and bleeding pressure from the valve, check that the cover chamber and the body are temporarily vented to atmosphere. Insert fabricated tool into threaded hole in top of valve stem, and lift the diaphragm assembly manually. Note any roughness. The diaphragm assembly should move smoothly throughout entire valve stroke. The tool is fabricated from rod that is threaded on one end to fit valve stem and has a "T" bar handle of some kind on the other end for easy gripping. (See chart in Step 4 of "Disassembly" Section.)

12. Place marks on this diaphragm assembly lifting tool when the valve is closed and when manually positioned open. The distance between the two marks should be approximately the stem travel shown in stem travel chart. If the stroke is different than that shown, there is a good reason to believe something is mechanically restricting the stroke of the valve. The cover must be removed, and the obstruction located and removed. The stem should also be checked for scale build-up. (See "Maintenance" Section for procedure.)

Tight Sealing Check (#3)

13. Test for seat leakage after completing checks #1 & #2 (Steps 1 to 12). **SEE CAUTION.** Close the isolation valve downstream of the Hytrol Valve. Apply inlet pressure to the cover of the valve, wait until it closes. Install a pressure gauge between the two closed valves using one of the two ports in the outlet side of the Hytrol. Watch the pressure gauge. If the pressure begins to climb, then either the downstream isolation valve is permitting pressure to creep back, or the Hytrol is allowing pressure to go through it. Usually the pressure at the Hytrol inlet will be higher than on the isolation valve discharge, so if the pressure goes up to the inlet pressure, you can be sure the Hytrol is leaking. Install another gauge downstream of isolating valve. If the pressure between the valves only goes up to the pressure on the isolation valve discharge, the Hytrol Valve is holding tight, and it was just the isolation valve leaking.

Maintenance

Preventative Maintenance

The Cla-Val Co. Model 100-01 Hytrol Valve requires no lubrication or packing and a minimum of maintenance. However, a periodic inspection schedule should be established to determine how the operating conditions of the system are affecting the valve. The effect of these actions must be determined by inspection.

Disassembly

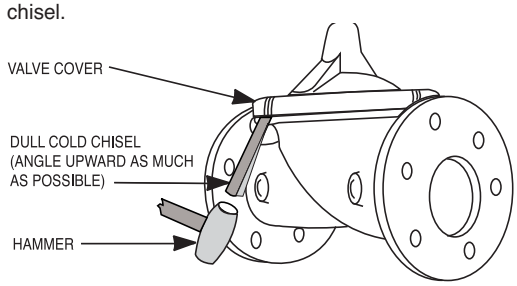
Inspection or maintenance can be accomplished without removing the valve from the line. Repair kits with new diaphragm and disc are recommended to be on hand before work begins.

WARNING: Maintenance personnel can be injured and equipment damaged if disassembly is attempted with pressure in the valve. **SEE CAUTION.**

1. Close upstream and downstream isolation valves **and independent operating pressure when used** to shut off all pressure to the valve.

2. Loosen tube fittings in the pilot system to remove pressure from valve body and cover chamber. After pressure has been released from the valve, use care to remove the controls and tubing. Note and sketch position of tubing and controls for re-assembly. The schematic in front of the Technical Manual can be used as a guide when reassembling pilot system.

3. Remove cover nuts and remove cover. If the valve has been in service for any length of time, chances are the cover will have to be loosened by driving upward along the edge of the cover with a **dull** cold chisel.



On 6” and smaller valves block and tackle or a power hoist can be used to lift valve cover by inserting proper size eye bolt in place of the center cover plug. on 8” and larger valves there are 4 holes (5/8” — 11 size) where jacking screws and/or eye bolts may be inserted for lifting purposes. **Pull cover straight up** to keep from damaging the integral seat bearing and stem.

COVER CENTER PLUG SIZE

Valve Size	Thread Size (NPT)
1 1/4"—1 1/2"	1/4"
2"—3"	1/2"
4"—6"	3/4"
8"—10"	1"
12"	1 1/4"
14"	1 1/2"
16"	2"
20” & 24"	2"
30” & 36”	2”

4. Remove the diaphragm and disc assembly from the valve body. With smaller valves this can be accomplished by hand by **pulling straight up on the stem so as not to damage the seat bearing.** On large valves, an eye bolt of proper size can be installed in the stem and the diaphragm assembly can be then lifted with a block and tackle or power hoist. Take care not to damage the stem or bearings. The valve won't work if these are damaged.

VALVE STEM THREAD SIZE

Valve Size	Thread Size (UNF Internal)
1 1/4"—2 1/2"	10—32
3"—4"	1/4—28
6"—14"	3/8—24
16"	1/2—20
20	3/4-16
24"	3/4-16
30”	3/4-16
36”	3/4-16

5. The next item to remove is the stem nut. Examine the stem threads above the nut for signs of mineral deposits or corrosion. If the threads are not clean, use a wire brush to remove as much of the residue as possible. Attach a good fitting wrench to the nut and give it a sharp “rap” rather than a steady pull. Usually several blows are sufficient to loosen the nut for further removal. On the smaller valves, the entire diaphragm assembly can be held by the stem in a vise **equipped with soft brass jaws** before removing the stem nut.

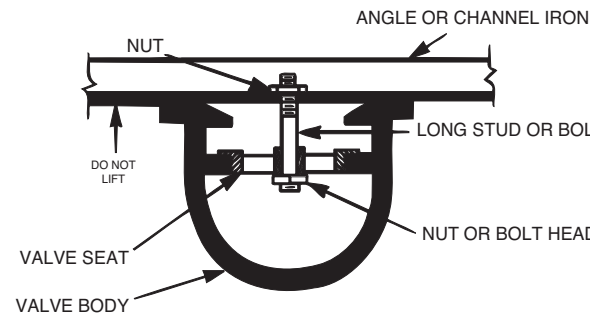
The use of a pipe wrench or a vise without soft brass jaws scars the fine finish on the stem. No amount of careful dressing can restore the stem to its original condition. Damage to the finish of the stem can cause the stem to bind in the bearings and the valve will not open or close.

6. After the stem nut has been removed, the diaphragm assembly breaks down into its component parts. Removal of the disc from the disc retainer can be a problem if the valve has been in service for a long time. Using two screwdrivers inserted along the outside edge of the disc usually will accomplish its removal. Care should be taken to preserve the spacer washers in water, particularly if no new ones are available for re-assembly.

7. The only part left in the valve body is the seat which ordinarily does not require removal. Careful cleaning and polishing of inside and outside surfaces with 400 wet/dry sandpaper will usually restore the seat’s sharp edge. If, however, it is badly worn and replacement is necessary, it can be easily removed.

Seats in valve sizes 1 1/4” through 6” are threaded into the valve body. They can be removed with accessory X109 Seat Removing Tool available from the factory. On 8” and larger valves, the seat is held in place by flat head machine screws. Use a tight-fitting, long shank screwdriver to prevent damage to seat screws. If upon removal of the screws the seat cannot be lifted out, it will be necessary to use a piece of angle or channel iron with a hole drilled in the center. Place it across the body so a long stud can be inserted through the center hole in the seat and the hole in the angle iron. By tightening the nut a uniform upward force is exerted on the seat for removal.

NOTE: Do not lift up on the end of the angle iron as this may force the integral bearing out of alignment, causing the stem to bind.



Lime Deposits

One of the easiest ways to remove lime deposits from the valve stem or other metal parts is to dip them in a 5-percent muriatic acid solution just long enough for the deposit to dissolve. This will remove most of the common types of deposits. **CAUTION: USE EXTREME CARE WHEN HANDLING ACID.** Rinse parts in water before handling. If the deposit is not removed by acid, then a fine grit (400) wet or dry sandpaper can be used with water.

Inspection of Parts

After the valve has been disassembled, each part should be examined carefully for signs of wear, corrosion, or any other abnormal condition. Usually, it is a good idea to replace the rubber parts (diaphragm and disc) unless they are free of signs of wear. These are available in a repair kit. Any other parts which appear doubtful should be replaced. WHEN ORDERING PARTS, BE SURE TO GIVE COMPLETE NAMEPLATE DATA, ITEM NUMBER AND DESCRIPTION.

NOTE: If a new disc isn't available, the existing disc can be turned over, exposing the unused surface for contact with the seat. The disc should be replaced as soon as practical.

Reassembly

1. Reassembly is the reverse of the disassembly procedure. If a new disc has been installed, it may require a different number of spacer washers to obtain the right amount of "grip" on the disc. When the diaphragm assembly has been tightened to a point where the diaphragm cannot be twisted, the disc should be compressed very slightly by the disc guide. Excessive compression should be avoided. Use just enough spacer washers to hold the disc firmly without noticeable compression.

2. MAKE SURE THE STEM NUT IS VERY TIGHT. Attach a good fitting wrench to the nut and give it a sharp "rap" rather than a steady pull. Usually several blows are sufficient to tighten the stem nut for final tightening. Failure to do so could allow the diaphragm to pull loose and tear when subjected to pressure.

3. Carefully install the diaphragm assembly by lowering the stem through the seat bearing. Take care not to damage the stem or bearing. Line up the diaphragm holes with the stud or bolt holes on the body. on larger valves with studs, it may be necessary to hold the diaphragm assembly up part way while putting the diaphragm over the studs.

4. Put spring in place and replace cover. Make sure diaphragm is lying smooth under the cover.

5. Tighten cover nuts firmly using a cross-over pattern until all nuts are tight.

6. Test Hytrol Valve before re-installing pilot valve system.

Test Procedure After Valve Assembly

There are a few simple tests which can be made in the field to make sure the Hytrol Valve has been assembled properly. Do these before installing pilot system and returning valve to service. These are similar to the three troubleshooting tests.

1. Check the diaphragm assembly for freedom of movement after all pressure is removed from the valve. **SEE CAUTION.** Insert fabricated tool into threaded hole in top of valve stem, and lift the diaphragm assembly manually. Note any roughness, sticking or grabbing. The diaphragm assembly should move smoothly throughout entire valve stroke. The tool is fabricated from rod that is threaded on one end to fit valve stem (See chart in Step 4 of "Disassembly" section.) and has a "T" Bar handle of some kind on the other end for easy gripping.

Place marks on this diaphragm assembly lifting tool when the valve is closed and when manually positioned open. The distance between the two marks should be approximately the stem travel shown in stem travel chart. (See "Freedom of Movement Check" section.) If the stroke is different than that shown, there is a good reason to believe something is mechanically restricting the stroke of the valve. The cover must be removed, the obstruction located and removed. (See "Maintenance" Section for procedure.)

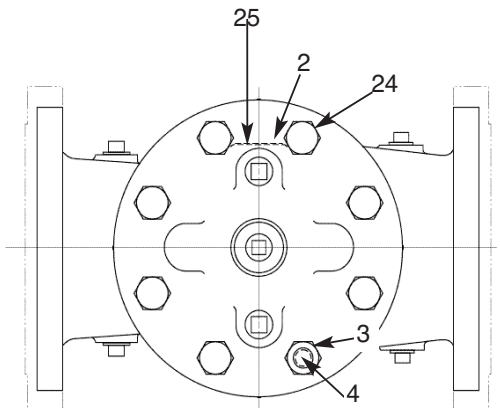
Due to the weight of the diaphragm assembly this procedure is not possible on valves 8" and larger. on these valves, the same determination can be made by carefully introducing a low pressure-less than five psi) into the valve body with the cover vented. **SEE CAUTION**. Looking in cover center hole see the diaphragm assembly lift easily without hesitation, and then settle back easily when the pressure is removed.

2. To check the valve for drip-tight closure, a line should be connected from the inlet to the cover, and pressure applied at the inlet of the valve. If properly assembled, the valve should hold tight with as low as ten PSI at the inlet. See "Tight Sealing Check" section.)

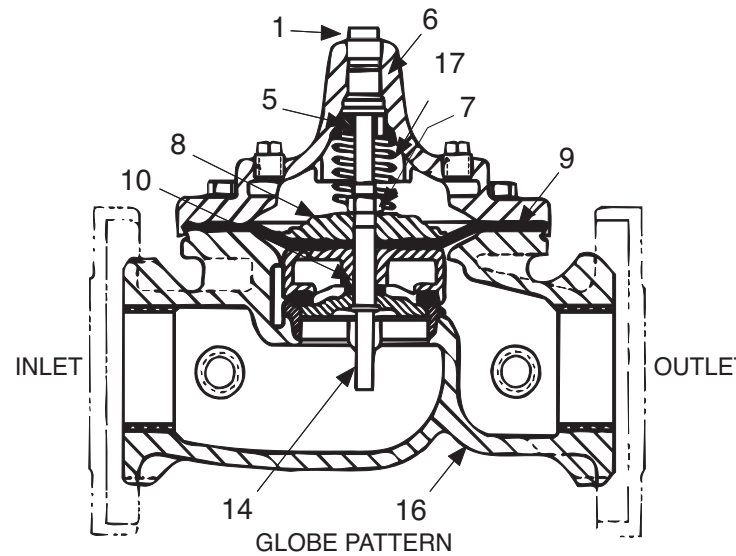
3. With the line connected from the inlet to the cover, apply full working pressure to the inlet. Check all around the cover for any leaks. Re-tighten cover nuts if necessary to stop leaks past the diaphragm.

4. Remove pressure, then re-install the pilot system and tubing exactly as it was prior to removal. **Bleed air from all high points.**

5. Follow steps under "Start-Up and Adjustment" Section in Technical Manual for returning complete valve back to service.



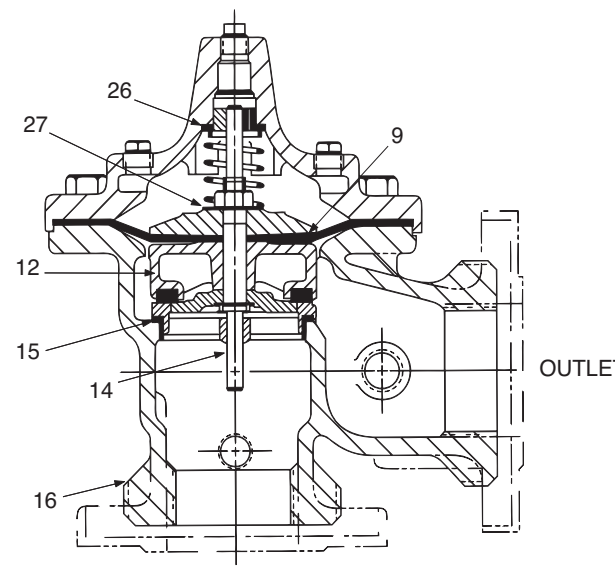
TOP VIEW



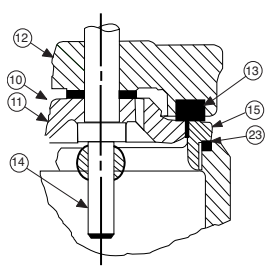
GLOBE PATTERN

PARTS LIST

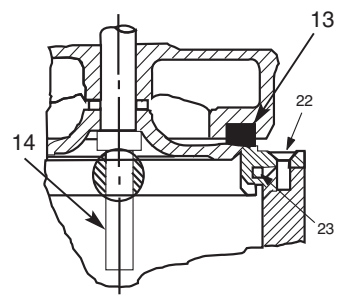
Item	Description
1.	Pipe Plug
2.	Drive Screws (for nameplate)
3.	Hex Nut (8” and larger)
4.	Stud (8” and larger)
5.	Cover Bearing
6.	Cover
7.	Stem Nut
8.	Diaphragm Washer
9.	Diaphragm
10.	Spacer Washers
11.	Disc Guide
12.	Disc Retainer
13.	Disc
14.	Stem
15.	Seat
16.	Body
17.	Spring
22.	Flat Head Screws (8” and larger)
23.	Seat O-Ring
24.	Hex head Bolt (1 1/4” thru 4”)
25.	Nameplate
26.	Upper Spring Washer (Epoxy coated valves only)
27.	Lower Spring Washer (Epoxy coated valves only)
28.	Cover Bearing Housing (16” only)
29.	Cover O-Ring (16’” only)
30.	Hex Bolt (16” only)
31.	Pipe Cap (16” only)



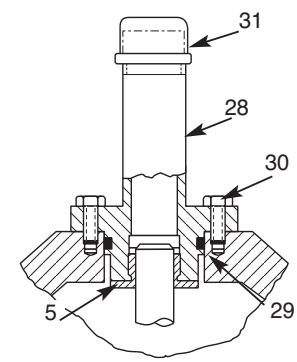
INLET
ANGLE PATTERN



1 1/4" - 6" SEAT DETAIL



8" - 24" SEAT DETAIL



16" COVER DETAIL

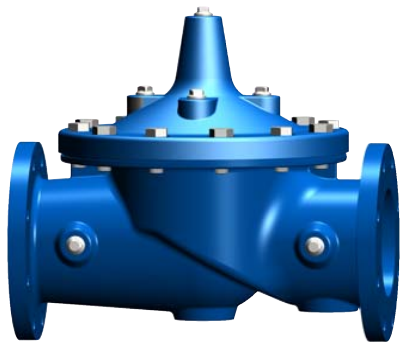
CLA-VAL

—MODEL— 100-01
Hytrol Valve Service Data

Description 100-01 Hytrol Valve

The Cla-Val Model 100-01 Hytrol Valve is a main valve for Cla-Val Automatic Control Valves. It is a hydraulically operated, diaphragm-actuated, globe or angle pattern valve.

This valve consists of three major components; body, diaphragm assembly, and cover. The diaphragm assembly is the only moving part. The diaphragm assembly uses a diaphragm of nylon fabric bonded with synthetic rubber. A synthetic rubber disc, contained on three and one half sides by a disc retainer and disc guide, forms a seal with the valve seat when pressure is applied above the diaphragm. The diaphragm assembly forms a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure.



Description 100-20 600 Series Hytrol Valve

The Cla-Val Model 100-20 Hytrol Valve (600 Series main valve) have only one part -the body- that is different from standard 100 Series Cla-Val main valve parts. The remaining parts of the 600 series main valve are standard Cla-Val main valve parts. All service and maintenance information for the standard 100 Series main valves also apply to the 600 series main valves.
The most important thing to remember when ordering main valve repair kits and replacement parts, except for the body, all other parts are going to be for a smaller size main valve. Cla-Val identifies main valve parts with the flange size of the standard 100 Series main valve. Refer to the "Main Valve Sizes" chart below.

HYTROL Service Data

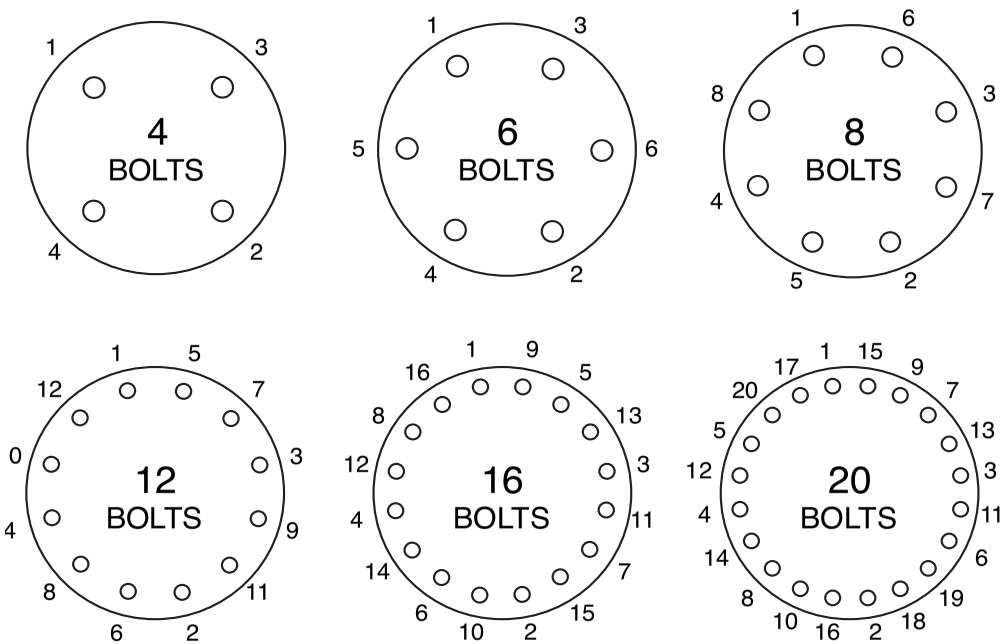
HYTROL SIZE				Stem Travel		Cover Capacity Displacement		Valve Stem Thread UNF-Internal	Cover Center Plug NPT	Cover Nut or Bolt			Cover Lifting Holes UNC	Cover Plug		Cover Torque		Stem Nut**		Stem Nut Torque (ft. Lbs.)	
100-01		100-20								Thread (Bolt)	Socket	Qty		Thread	Socket	ft. Lbs.	in. Lbs.	Thread	Socket (Long)	Lubed	DRY
inches	mm	inches	mm	inches	mm	Gallons	Liters														
1"	25			0.3	8				1/4"	1/4" - 20 (B)	7/16"	8				4	48	3/8" - 24		4	6
1 1/4"	32			0.4	10	0.020	0.07	10 - 32	1/4"	5/16" - 18 (B)	1/2"	8				8	96	7/16" -20		6	10
1 1/2"	40			0.4	10	0.020	0.07	10 - 32	1/4"	5/16" - 18 (B)	1/2"	8				8	96	7/16" -20		6	10
2"	50			0.6	15	0.032	0.12	10 - 32	1/2"	3/8" - 16 (B)	9/16"	8		3/8"	7/16"	12		1/2" - 20	3/4"	10	15
2 1/2"	65			0.7	18	0.043	0.16	10 - 32	1/2"	7/16" - 14 (B)	5/8"	8		1/2"	9/16"	20		5/8" - 18	15/16"	21	30
3"	80	4"	100	0.8	20	0.080	0.30	1/4 - 28	1/2"	1/2" - 13 (B)	3/4"	8		1/2"	9/16"	30		5/8" - 18	15/16"	21	30
4"	100	6"	150	1.1	23	0.169	0.64	1/4 - 28	3/4"	3/4" - 10 (B)	1 1/8"	8		3/4"	5/8"	110		3/4" - 16	1 1/16"	40	60
6"	150	8"	200	1.7	43	0.531	2.00	3/8 - 24	3/4"	3/4" - 10 (B)	1 1/8"	12		3/4"	5/8"	110		7/8" - 14	1 5/16"	85	125
8"	200	10"	250	2.3	58	1.26	4.80	3/8 - 24	1"	3/4" - 10	1 1/4"	16	5/8" - 11	1"	13/16"	110		1 1/8" -12	1 13/16"	125	185
10"	250	12"	300	2.8	71	2.51	9.50	3/8 - 24	1"	7/8" - 9	1 7/16"	20	3/4" - 10	1"	13/16"	160		1 1/2" -12	1 7/8"	252	375
12"	300	16"	400	3.4	86	4.0	15.10	3/8 - 24	1 1/4"	1 1/8" - 7	1 13/16"	20	3/4" - 10	1"	13/16"	390		1 1/2" -12	2 1/2"	270	400
14"	350			3.9	99	6.5	24.60	3/8 - 24	1 1/2"	1 1/4" - 7	2"	20	1" - 8	1"	13/16"	545		1 1/2" -12	2 1/2"	280	420
16"	400	20", 24"	600	4.5	114	9.6	36.20	1/2 - 20	2"	1 1/4" - 7	2"	20	1" - 8	1"	13/16"	545		2" - 16	3"	500	750
20"	500			5.63	143	12	45.40	3/4 - 16	1 1/2"	1 3/8" - 6	2 1/8"	24	1" - 8	1"	13/16"	670		2 1/4" - 16	3 1/2"	930	N/R
24"	600	30"	800	6.75	165	29.0	108.80	3/4 - 16*	3/4"	1 1/2" - 12	2 3/8"	24	1 1/8"- 7	1"	13/16"	800		3" - 12	Special	1350	N/R

* Adapter p/n 2594101E inside 1/4" - 28"

Grade 5 Bolts "Heavy" Grade Nuts Tighten cover nuts in a "star" cross-over pattern

** Must Use ONLY Cla-Val Supplied part

BOLT/NUT TORQUING PROCEDURES ON VALVE COVERS



Follow this procedure when reassembling MAIN Valve:

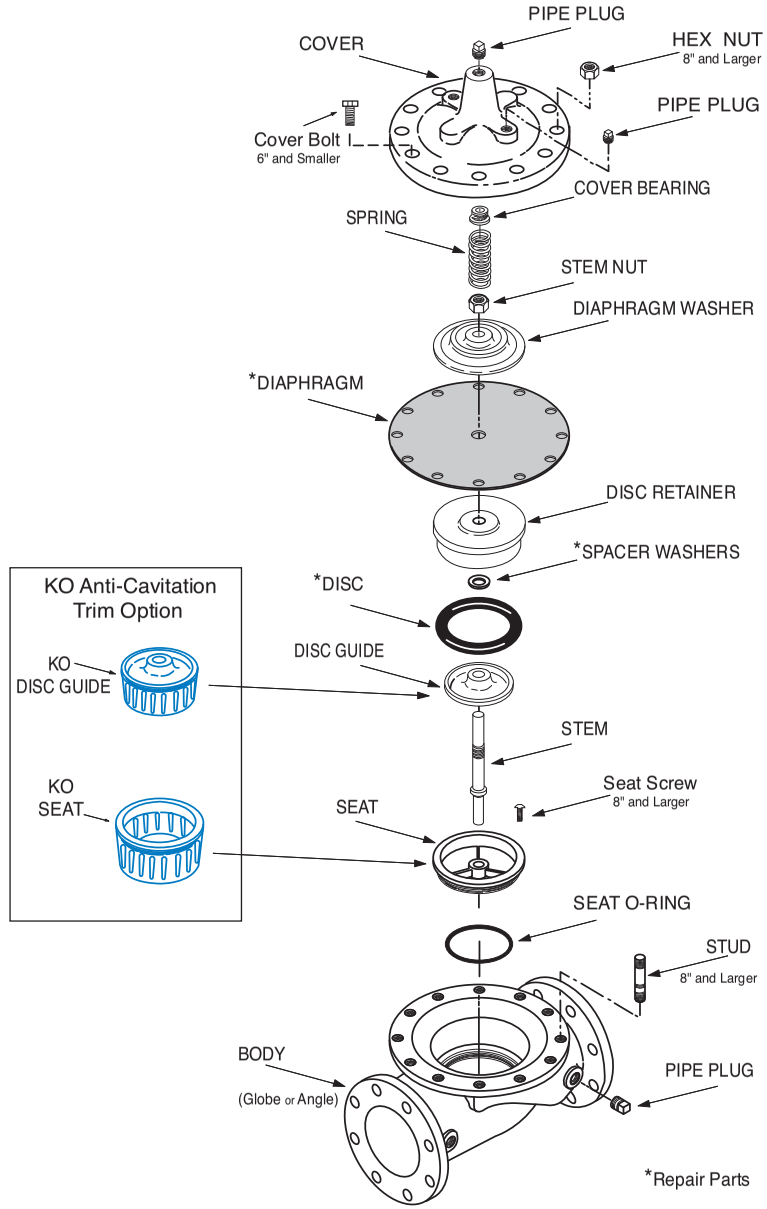
1. Tightens bolts/nuts in a “Star” or “Cross-Over” pattern following the numbers shown above to insure that cover seats evenly on the diaphragm material and body.

2. Torque the bolt/nuts in three stages with a "Star" or "Cross-Over" pattern for each stage:

   A. To approximately 10% of final torque.
   B. To approximately 75% of final torque.
   C. To final required torque.

3. Valves that are to be tested to 375 PSI or higher should be retorqued after 24 hours.

100-01 Hytrol Main Valve Assembly



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CLA-VAL

— MODEL — 100-20
(Reduced Internal Port)

600 Series Hytrol Valve

SERVICE AND MAINTENANCE OF 600 SERIES VALVES

The 600 series main valves have only one part -the body- that is different from standard 100 Series Cla-Val main valve parts. The remaining parts of the 600 series main valve are standard Cla-Val main valve parts. All service and maintenance information for the standard 100 Series main valves in this manual also apply to the 600 series main valves.

The most important thing to remember when ordering main valve repair kits and replacement parts, except for the body, all other parts are going to be for a smaller size main valve. Cla-Val identifies main valve parts with the flange size of the standard 100 Series main valve. Refer to the "Main Valve Sizes Comparison" chart. For example, if you are servicing a 6" 100-20 Hytrol and needed a repair kit, you would order a repair kit for a 4" 100-01 Hytrol. This kit is also suitable for a 6" 100-20 Hytrol. Complete Technical Manuals include a repair kit data sheet N-RK that shows this relationship.

When you order repair parts, it is a good idea to include valve nameplate data (size, catalog number, and part number) and description of the parts desired. Do this to be sure parts will fit the valve you are working on and not be too big for it. Pilot controls and repair kits maintenance information remain the same for 100 or 600 Series valves.

UNDERSTANDING THE 600 SERIES VALVES

In 1987, Cla-Val introduced the Model 100-20 Hytrol as the basic main valve for the 600 Series of automatic control valves. To identify all new valves using the 100-20 Hytrol, an existing catalog number is modified. Making a 600 Series catalog number is simply done by using a "6" in front of the two digit catalog numbers or replacing the "2" with a "6" in three digit catalog numbers. Current schematics reflect both catalog numbers together separated by a slash (i.e. - 90-01/690-01, 58-02/658-02, 210-01/610-01, etc). Since these two valves 'share' the same catalog number and schematic, they provide the same function in a system. The only difference between the two valves is the relative capacity of the two main valve series.

The 100-01 Hytrol is the basic main valve for Cla-Val automatic control valves. This valve is the current version of the Clayton Hytrol valve design originated in 1936. The 100-01 Hytrol is designed as a full flow area valve. This means that the inlet, seat and outlet openings are the same size. Thus, the pressure drop is kept to a minimum for this globe style design.

The 100-20 Hytrol valve has all of the basic features and advantages of the original 100-01 Hytrol. Only one part has been changed - the body. It is designed with different size inlet, seat and outlet openings. The 100-20 Hytrol has inlet and outlet flanges one valve size larger than the seat opening size. This results in what is sometimes called a "reduced port' main valve. For example, a 4" 100-20 valve has a 3" seat. Note: valve size is always determined by the flange size. The following chart compares the 100-01 and the 100-20 main valves.

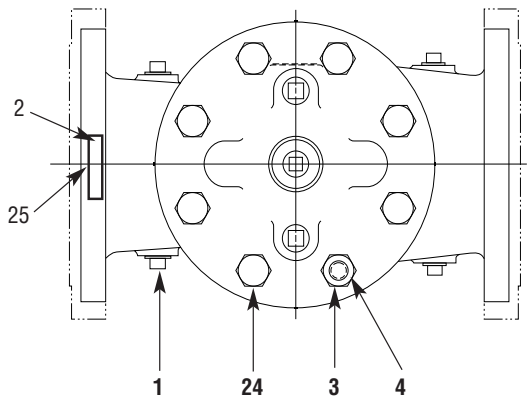
Basic Main Valve Size Comparison		
Globe Pattern Valves		
Flange Size (inch)	Seat Size	
	100-01 (100 Series)	100-20 (600 Series)
3	3	2
4	4	3
6	6	4
8	8	6
10	10	8
12	12	10
14	14	----
16	16	12
18	----	16
20	20	16
24	24	16
30	30	24
36	36	30
42	----	36
48	----	36
Angle Pattern Valves		
Flange Size (inch)	Seat Size	
	100-01 (100 Series)	100-20 (600 Series)
4	4	3
6	6	4
8	8	6

The 100-20 Hytrol is available only in ductile iron, 150 and 300 pressure class, and Bronze trim standard. Available extra cost main valve options include stainless steel trim, epoxy coating, Dura-Kleen stem, Delrin sleeved stem, and high temperature rubber parts. All four basic main valves have a 600 Series version available with all of the same benefits and size relationships. The following chart shows the relationship of Cla-Val main valve catalog numbers.

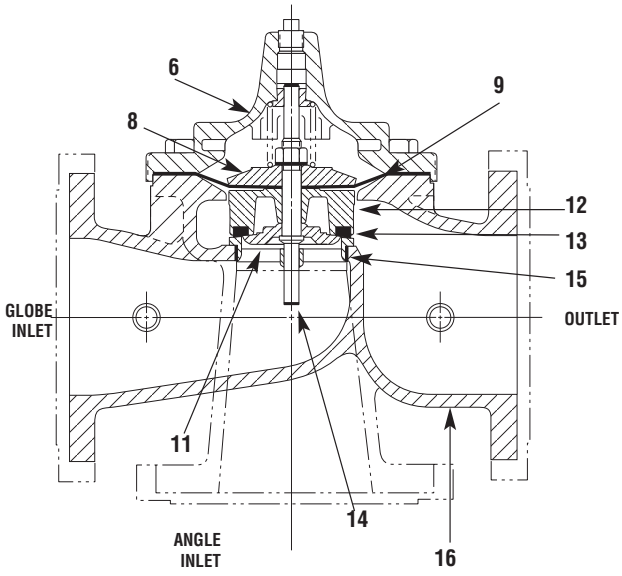
Cla-Val Main Valves

	Catalog Number		
Catalog Name	Circa 1936	100-Series	600 Series
Hytrol	100 (Angle =2100)	100-01	100-20
Powertrol	100P & 100PA	100-02	100-21
Powercheck	100PC & 100PCA	100-03	100-22
Hycheck	181	100-04	100-23

100-20

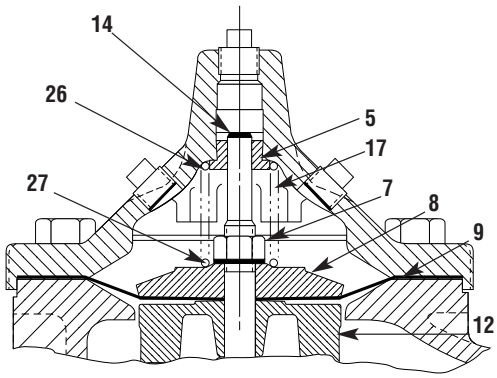


TOP VIEW

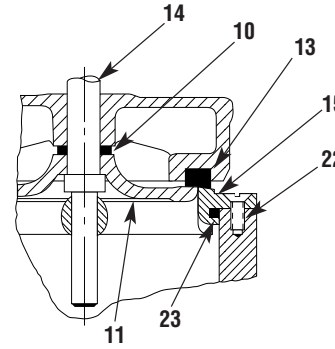


PARTS LIST	
NO.	**DESCRIPTION**
1	Pipe Plug
2	Drive Screws (for nameplate)
3	Hex Nut (8" and larger)
4	Stud (8" and larger)
5	Cover Bearing
6	Cover
7	Stem Nut
8	Diaphragm Washer
9	Diaphragm
10	Spacer Washers
11	Disc Guide
12	Disc Retainer
13	Disc
14	Stem
15	Seat
16	Body
17	Spring
22	Flat Head Screws (10" and larger)
23	Seat O-Ring
24	Hex Bolt (3 " Thru 6")
25	Nameplate (Mounted on inlet flange)
26	Upper Spring Washer (Epoxy coated valves only)
27	Lower Spring Washer (Epoxy coated valves only)
28	Cover Bearing Housing (20" & 24" & 30")
29	Cover Bearing Housing O-Ring (20"& 24" & 30")
30	Hex Bolt (20" & 24")
31	Pipe Cap (20" & 24 & 30"")

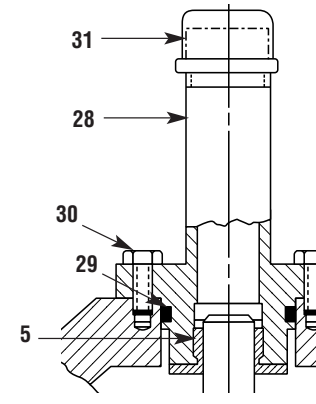
WHEN ORDERING PARTS, BE SURE TO GIVE COMPLETE NAMEPLATE DATA, ITEM NUMBER AND DESCRIPTION.



3" — 6" COVER DETAIL



10" — 24" SEAT DETAIL

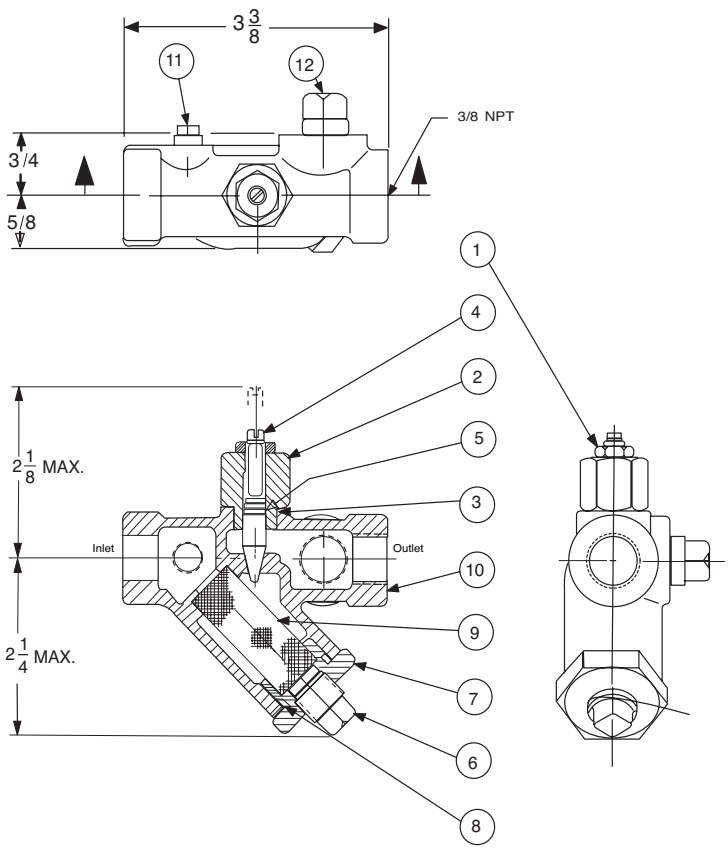


20" — 24" COVER DETAIL

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X42N-2

Strainer and Needle Valve Assembly



When ordering parts, please specify:

- All nameplate data
- Item Number
- Description

Size	Stock Number
3/8" x 3/8"	68372C

ITEM	DESCRIPTION	MATERIAL	PART NO.
1	Jam Nut - Hex	Sil Brz	6779806G
2	Bonnet	S.S.	67910A
3	O-Ring - Bonnet	Syn Rub	00713J
4	Stem	S.S.	67907G
5	O-Ring - Stem	Syn Rub	00708J
6	Plug - Pipe 1/4”	Bre.	6784702A
7	Strainer Plug	303	67911J
8	O-Ring - Plug	NBR	00751J
9	Screen	Monel	68373A
10	Body	Rd Brs	67905A
11	Plut - Pipe 1/8	Brass	6784701C
12	Plug - Pipe 3/8	Brass	67660-03F

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CLA-VAL

— MODEL — **CRL**

Pressure Relief Control

DESCRIPTION

The CRL Pressure Relief Control is a direct acting, spring loaded, diaphragm type relief valve. It may be used as a self-contained valve or as a pilot control for a Cla-Val Main valve. It opens and closes within very close pressure limits.

INSTALLATION

The CRL Pressure Relief Control may be installed in any position. The control body (7) has one inlet and one outlet port with a side pipe plug (24) at each port. These plugs are used for control connections or gauge applications. The inlet in the power unit body (6) is the sensing line port. A flow arrow is marked on the body casting.

OPERATION

The CRL Pressure Relief Control is normally held closed by the force of the compression spring above the diaphragm; control pressure is applied under the diaphragm.

When the controlling pressure exceeds the spring setting, the disc is lifted off its seat, permitting flow through the control.

When controlling pressure drops below spring setting, the spring returns the control to its normally closed position.

ADJUSTMENT PROCEDURE

The CRL Pressure Relief Control can be adjusted to provide a relief setting at any point within the range found on the nameplate.

Pressure adjustment is made by turning the adjustment screw (9) to vary the spring pressure on the diaphragm. Turning the adjustment screw clockwise increases the pressure required to open the valve. Counterclockwise decreases the pressure required to open the valve.

When pressure adjustments are complete the jam nut (10) should be tightened and the protective cap (1) replaced. If there is a problem of tampering, lock wire holes have been provided in cap and cover. Wire the cap to cover and secure with lead seal.

DISASSEMBLY

The CRL Pressure Relief Control does not need to be removed from the line for disassembly. Make sure that pressure shut down is accompanied prior to disassembly. If the CRL is removed from the line for disassembly be sure to use a soft jawed vise to hold body during work.

Refer to Parts List Drawing for Item Numbers.

1. Remove cap (1), loosen jam nut (10) and turn adjusting screw counterclockwise until spring tension is relieved.
2. Remove the eight screws (4) holding the cover (3) and powerunit body (6). Hold the cover and powerunit together and place on a suitable work surface.
   See NOTE under REASSEMBLY.
3. Remove the cover (3) from powerunit body (6). The spring (12) and two spring guides (11).
4. Remove nut (13) from stem (19) and slide off the belleville washer (14), the upper diaphragm washer (15) and the diaphragm (16).
5. Pull the stem (19) with the disc retainer assembly (21) through the bottom of powerunit. The lower diaphragm washer (17) will slide off of stem top.
6. Remove jam nut (23) and disc retainer assembly (21) from stem. Use soft jawed pliers or vise to hold stem. The polished surface of stem must not be scored or scratched.
7. The seat (22) need not be removed unless it is damaged. If removal is necessary use proper size socket wrench and turn counterclock wise.
   Note: Some models have an integral seat in the body (7).

INSPECTION

Inspect all parts for damage, or evidence of cross threading. Check diaphragm and disc retainer assembly for tears, abrasions or other damage. Check all metal parts for damage, corrosion or excessive wear.

REPAIR AND REPLACEMENT

Minor nicks and scratches may be polished out using 400 grit wet or dry sandpaper fine emery or crocus cloth. Replace all O-rings and any damaged parts.

When ordering replacement parts, be sure to specify parts list item number and all nameplate data.

REASSEMBLY

In general, reassembly is the reverse of disassembly. However, the following steps should be observed:

1. Lubricate the O-Ring (18) with a small amount of a good grade of waterproof grease, (Dow Corning 44 medium grade or equal). Use grease sparingly and install O-ring in powerunit body (6).
2. Install stem (19) in powerunit body (6). Use a rotating motion with minimum pressure to let stem pass through O-ring.

   Do Not Cut O-Ring.
3. Install O-ring (5) at top of stem (19). Place lower diaphragm washer (17) on the stem with the serrated side up. Position diaphragm (16), upper diaphragm washer (15), with serration down, and belleville washer (14) with concave side down.
4. Position powerunit body (6) as shown on parts list drawing (top view).
5. Continue reassembly as outlined in disassembly steps 1 through 3.

Note: Item (4) Screw will have a quantity of 8 for the 0-75 and 20-200psi design and a quantity of 4 for the 100-300psi design. Item (25) Screw is used on the 100-300psi design only. Install item (25), before item (4) for preload of item (12) spring.

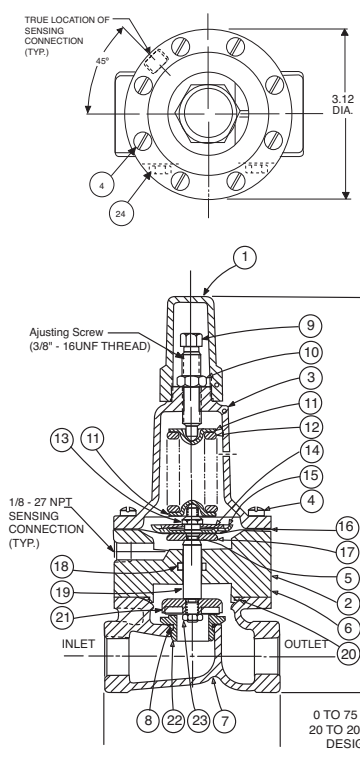
SYMPTOM	PROBABLE CAUSE	REMEDY
Fails to open.	Controlling pressure too low.	Back off adjusting screw until valve opens.
Fails to open with spring compression removed.	Mechanical obstruction, corrosion, scale build-up on stem.	Disassemble, locate,and remove obstruction, scale.
Leakage from cover vent hole when controlling pressure is applied.	Diaphragm Damage	Disassembly replace damaged diaphragm.
	Loose diaphragm assembly.	Tighten upper diaphragm washer.
Fails to close.	No spring compression.	Re-set pressure adjustment.
Fails to close with spring compressed.	Mechanical obstruction.	Disassemble, locate and remove obstruction.

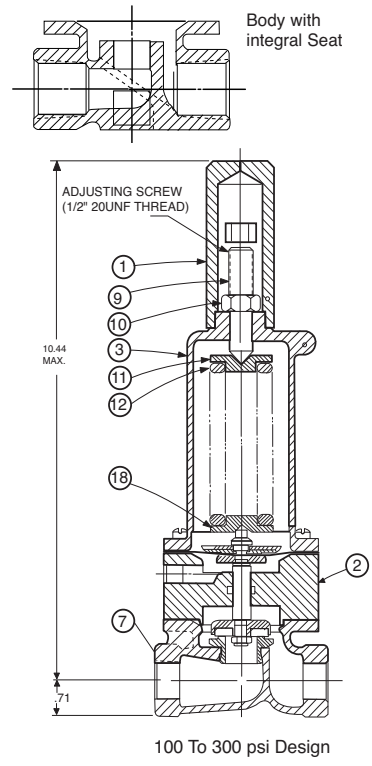
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CRL

1/2" & 3/4" PRESSURE RELIEF CONTROL

(Bronze Body with 303SS Trim)





SIZE	SPRING	PART NUMBER
1/2”	0-75 PSI	7922201E
1/2”	20-105 PSI	7922205F
1/2”	20-200 PSI	7922202C
1/2”	100-300 PSI	8280901D
3/4”	0-75 PSI	7922901K
3/4”	20-105 PSI	7922903F
3/4”	20-200 PSI	7922902H
3/4”	100-300 PSI	8600501E
For 250-600 PSI Contact Factory		

CRL Range PSI	APPROX. INCREASE FOR EACH CLOCKWISE TURN OF ADJUSTING SCREW
0 to 75	8.5 PSI
20 to 105	12.5 PSI
20 to 200	28.0 PSI
100 to 300	18.0 PSI

When ordering parts please specify:
1. All Nameplate Data
2. Item Part Number
3. Item Description

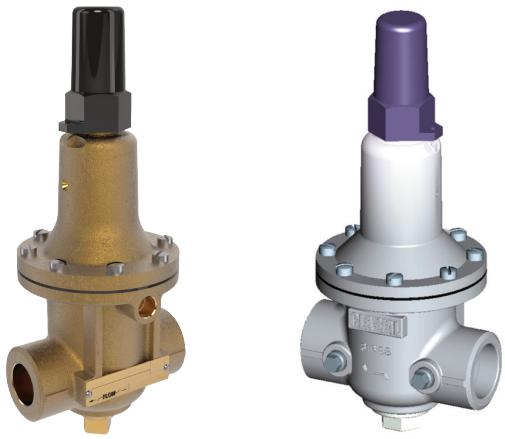
Item	Description	Material	Part Number	Part Number	Part Number	Part Number
			0-75	**20-105**	**20-200**	**100-300**
1	Cap	Plastic	67628J	67628J	67628J	1257601D
2	Nameplate	Brass	--	--	--	--
3	Cover	Bronze	C2544K	C2544K	C2544K	44587E
4*	Screw Fil. Hd. 10-32 x 1.88 (Qty 8)	303 SS	6757867E	6757867E	6757867E	6757867E
5*	O-Ring	Rubber	00902H	00902H	00902H	00902H
6	Body, Powerunit	Bronze	7920504D	7920504D	7920504D	7920504D
7	1/2” Body	Bronze	C7928K	C7928K	C7928K	C7928K
	3/4” Body	Bronze	C9083B	C9083B	C9083B	C9083B
8*	O-Ring, Seat	Rubber	00718H	00718H	00718H	00718H
9	Screw, Adjusting	Brass	7188201D	7188201D	7188201D	82811B
10	Nut Hex (Locking)	303 SS	6780106J	6780106J	6780106J	6780606H
11	Guide, Spring	303 SS	71881H	71881H	71881H	1630301J
12	Spring	CHR/VAN	71884B	20632101E	71885J	1630201A
13	Nut, Stem Upper	Bronze	73034B	73034B	73034B	73034B
14	Washer, Belleville	Steel	7055007E	7055007E	7055007E	7055007E
15	Washer, Diaphragm (upper)	303 SS	71891G	71891G	71891G	71891G
16*	Diaphragm	Rubber	C1505B	C1505B	C1505B	C1505B
17	Washer, Diaphragm (lower)	303 SS	45871B	45871B	45871B	45871B
18*	O-Ring, Stem	Rubber	00746J	00746J	00746J	00746J
19	Stem	303 SS	8982401F	8982401F	8982401F	8982401F
20*	O-Ring, Body	Rubber	00767E	00767E	00767E	00767E
21*	Retainer Assembly, Disc	303 SS	C9158B	C9158B	C9158B	C9158B
22	Seat	303Rub	62187A	62187A	62187A	62187A
23	Nut, Hex, Stem, Lower	Bronze	6779806G	6779806G	6779806G	6779806G
24	Pipe Plug	Bronze	6784701C	6784701C	6784701C	6784701C
	FACTORY SET POINT		**50 PSI**	**60 PSI**	**60 PSI**	**100 PSI**
	REPAIR KIT*		9170007A	9170007A	9170007A	9170007A

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CLA-VAL®

MODEL CRL-60

Pressure Relief Control



Available in a wide range of materials including seawater service nickel aluminum bronze and stainless steel. Certified to meet low lead requirements.

- **Direct Acting - Precise Pressure Control**
- **Positive Dependable Opening**
- **Drip Tight Closure**
- **Remote Sensing**
- **Sensitive to Small Pressure Variations**

The Cla-Val Model CRL-60 Pressure Relief Valve is a direct-acting, spring loaded, diaphragm type relief valve. Often used as a pilot control for Cla-Val Hytrol valves, it can also be used as a standalone pressure relief valve. The CRL-60 may be installed in any position. It opens and closes within very close pressure limits. The bottom plug may be removed and installed in the inlet to convert it to an angle pattern flow path.

The Model CRL-60 is normally held closed by the force of the compression spring above the diaphragm. Control pressure is applied under the diaphragm. When the controlling pressure exceeds the spring setting, the disc is lifted off its seat, permitting flow through the control. When control pressure drops below the spring setting, the spring forces the control back to its normally closed position. The controlling pressure is applied to the chamber beneath the diaphragm through a sensing port on the CRL-60 body.

Pressure adjustment is simply a matter of turning the adjusting screw to vary the spring pressure on the diaphragm. The CRL-60 is available in four pressure ranges: 0 to 75 psi, 20 - 75 psi, 20 to 105 psi, 20 to 200 psi, 40 to 200 psi and 100 to 300 psi. To prevent tampering, the adjustment cap can be wire sealed by using the lock wire holes provided in the cap and cover; or supplied with a X140-1 Locking Cap. The X140-1 is a key and six-pin cylinder locking security cap that completely encapsulates the pilot control adjustment screw and cannot be removed without the appropriate key.

Typical Application for CRL-60 Pressure Relief Control



50 Series Pressure Relief Control Valve

Model CRL-60 Pressure Relief Control is ideally suited as pilot control for Cla-Val Series 50 pressure relief or pressure sustaining automatic control valves. The 50 Series valves are hydraulically operated, pilot controlled, modulating type valves, used where pressure relief is needed in a waterworks pipeline distribution system downstream of any high pressure source, such as pressure reducing stations or pump stations, or they can also be used in a bypass to control pump delivery pressure.

Model CRL-60 is designed to maintain constant upstream pressure to close limits at a remote point in many Cla-Val pilot control systems. Cla-Val 50 Series Pressure Relief Valves use CRL-60 to sense and actuate main valve using inlet line pressure through pilot system. In event of a pressure surge in pipeline, CRL-60 remotely sensing valve inlet pressure opens quickly to control main valve opening and maintains water flow to atmosphere to dissipate pressure surge. CRL-60 closes slowly as the inlet pressure lowers to a safe pressure to prevent new surges, and finally when inlet pressure is below the pressure setting, the main valve closes drip tight. Pressure setting adjustment is made with a single adjusting screw that has a protective cap to discourage tampering.

Specifications

Size 1/2", 3/4" & 1"Threaded
Temperature Range Water, Air: to 180°F Max.
Standard Materials
Body & Cover: Low Lead Bronze
Trim: Stainless Steel 303
Rubber: Buna-N® Synthetic Rubber

Pressure Ratings Bronze 400 psi Max.
Stainless Steel 400 psi Max.
Other Materials Available on special order
Adjustment Ranges
0 to 75 psi
20 to 75 psi (1" size only)
20 to 105 psi (1/2" size only)
20 to 200 psi
20 to 400 psi (1" size only)
100 to 300 psi

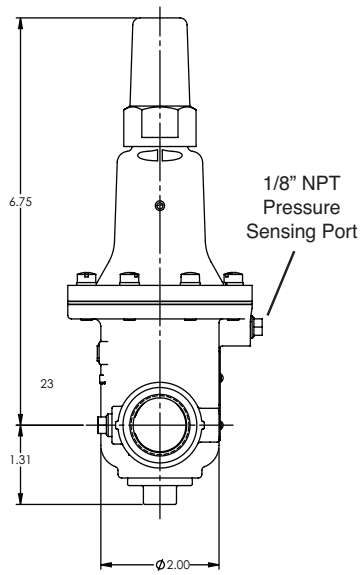
CRL-60 PSI	Approximate Increase For Each Clockwise Turn Of Adjusting Screw
0 to 75	8.5 psi
20 to 75	6.0 psi
20 to 105	12.0 psi
20 to 200	28.0 psi
40 to 200	18.0 psi
100 to 300	18.0 psi

Pressure Drop Chart (Full Open Valve)

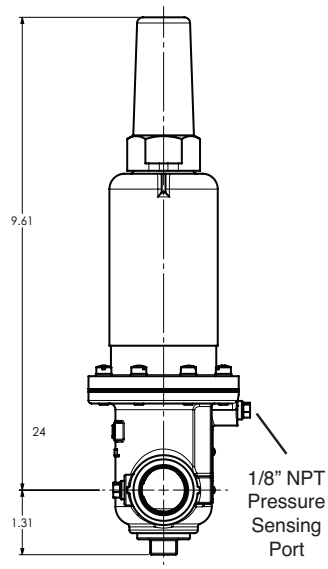
Valve Size	Cv Factor	Flow of Water - gpm					
		5	10	15	20	30	40
1/2"	6.0	0.7	2.7	6.0	11.0	- -	- -
3/4"	8.5	0.3	1.4	3.1	5.5	12.2	- -
1"	12.5	0.2	0.6	1.4	2.6	5.8	10.2

Dimensions 1/2" and 3/4" Sizes

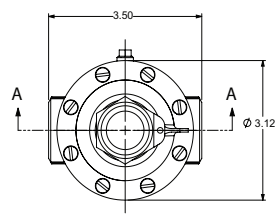
0 to 75, 20 - 105 and 20 to 200 psi design



100 to 300 psi design

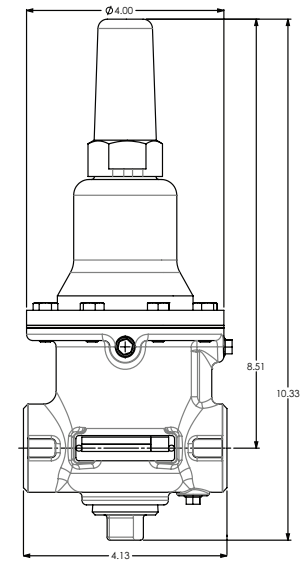


(applies to both configurations)



Dimensions 1" Size

20 - 75, 40 - 200 and 100 - 300 psi design



When Ordering, Specify:

1. Catalog No. CRL-60
2. Valve Size
3. Adjustment Range Desired
4. Optional Materials
5. Optional Security Cap

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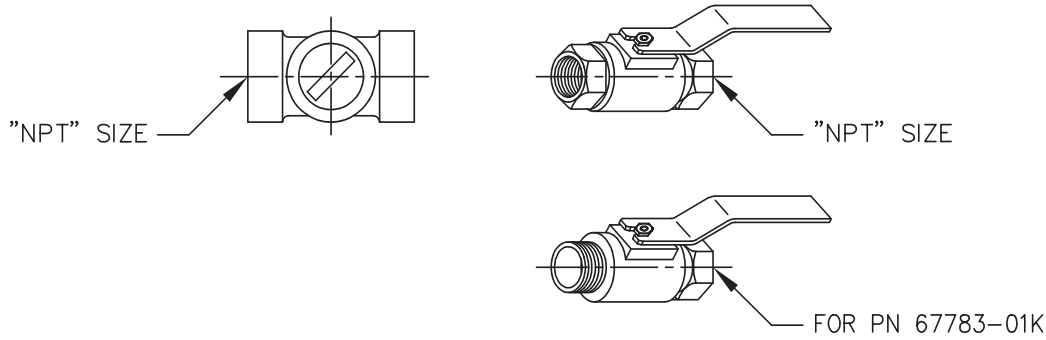
CLA-VAL CO. NEWPORT BEACH, CALIFORNIA	CATALOG NO.	DRAWING NO. 67783	REV BD

TYPE OF VALVE AND MAIN FEATURES

CK2 COCK/BALL VALVE

DESIGN		
DRAWN	MGR	4-02-80
CHK'D	KD	4-03-80
APV'D	CH	4-07-80

SCALE: NONE



CLA-VAL PART NO. AND MATERIAL

BRONZE WITH HANDLE	STEEL WITH HANDLE	IRON WITH HANDLE	316 SST WITH HANDLE	316 SST W/ LOCKING HANDLE	BRONZE WITH HANDLE	MONEL WITH HANDLE	MONEL W/ LOCKING HANDLE	SIZE "NPT"
67783-01K*	-09C	-17F	-25J SUPSD BY-26G		-41F SUPSD BY-01K			1/8"
-02H	-10A	-18D	-26G	-51E SUPSD BY-26G -52C	-42D SUPSD BY-02H	-55F		1/4"
-03F* -59H***	-11J	-19B	-27E	-46E SUPSD BY-27E -53A	-45G -57B**	-48A SUPSD BY-49J	-63K	3/8"
-04D -60F ***	-12G	-20K	-28C	-54J	-43B SUPSD BY-04D	-49J	-62B	1/2"
-05A -61D ***	-13E	-21H	-29A	-64H	-44K SUPSD BY-05A	-56D		3/4"
-06J	-14C	-22F	-30J			-58K		1"
-07G	-15K	-23D	-31G					1 1/4"
-08E	-16H	-24B	-32E					1 1/2"
-50G			-47C					2"

* SEE ENGINEERING APPROVED VENDORS TABLE (SHEET 2 OF 2).

** HAMMOND VALVE 8501 ONLY.

*** WILKINS CK2 (SEE SHEET 2 OF 2)

CAD REVISION RECORD - DO NOT REVISE MANUALLY

LTR	DESCRIPTION	BY	DATE
A-AY	SEE REVISION FILE		
BA	ADDED PN'S 67783-59H, 67783-60F & 67783-61D (ECO 20434)	AK	03-14-06
BB	ADDED PN'S 67783-62B (NED 62200)	AK	07-10-08
BC	ADDED PN'S 67783-63K (NED 62218)	AK	08-14-08
BD	ADDED PN 67783-64H (NED 62446)	PC	10-1-2008

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CLA-VAL™

— MODEL — **X141**

Cla-Val Gauge Option



Model X141
4" Pressure Gauge

- **Liquid-Filled**
- **Dual Scale (PSI / BAR)**
- **Long Life Stainless Steel Construction**
- **Tamper-Resistant Design**
- **2 ½" and 4" Diameter Sizes**
- **Isolation Valve Included**

The Cla-Val Model X141 Pressure Gauge Option consists of glycerin-filled pressure gauges with the Cla-Val Logo and ¼" CK2 Bronze Isolation Valves on the main valve inlet and outlet. Cla-Val gauges are waterproof, shock resistant, and fully enclosed with a stainless steel case and bronze wetted parts. Ambient temperature ratings are -4 Degrees F to +140 Degrees F (-20 Degrees C to +60 Degrees C).

All gauges have dual scale (PSI/BAR) and are supplied with a 1/4" NPT bottom connection. Model X141 gauges are available installed on new valves and must be specified on the customer Purchase Order. Consult factory for other available materials.

Available Pressure Ranges

X141 Gauge Assembly (2 1/2" Diameter Dial)

Pressure Range*	Part Number
0 - 60 psi	20534301 A
0 - 100 psi	20534302K
0 - 160 psi	20534311J
0 - 200 psi	20534303J
0 - 300 psi	20534304H
0 - 400 psi	20534305G

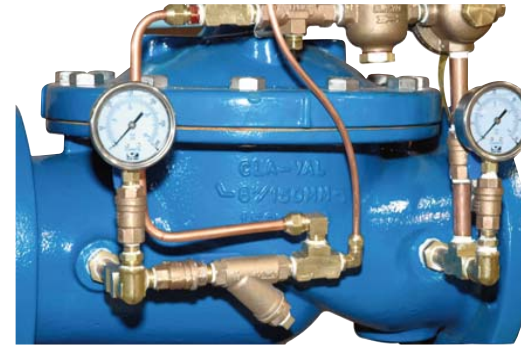
X141 Gauge Assembly (4" Diameter Dial)

Pressure Range*	Part Number
0 - 60 psi	20534306F
0 - 100 psi	20534307E
0 - 200 psi	20534308D
0 - 300 psi	20534309C
0 - 400 psi	20534310K

Typical X141 Installation



Typical Installation with two X141 Gauges

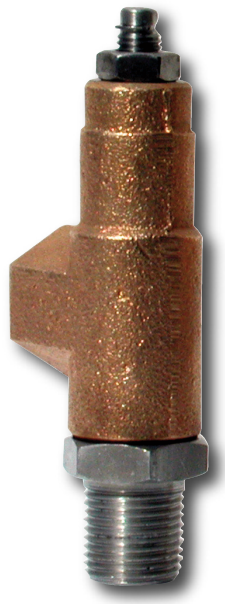


*Specify desired pressure range and valve location (inlet or outlet) on order.

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CLA-VAL

—MODEL— CV
Flow Control



DESCRIPTION
The CV Control is an adjustable restriction which acts as a needle valve when flow is in the direction of the stem. When flow is in the reverse direction, the port area opens fully to allow unrestricted flow. When installed in the control system of a Cla-Val automatic valve, it can be arranged to function as either an opening or closing speed control.

OPERATION
The CV Flow Control permits full flow from port A to B, and restricted flow in the reverse direction. Flow from port A to B lifts the disc from seat, permitting full flow. Flow in the reverse direction seats the disc, causing fluid to pass through the clearance between the stem and the disc. This clearance can be increased, thereby increasing the restricted flow, by screwing the stem out, or counter-clockwise. Turning the stem in, or clockwise reduces the clearance between the stem and the disc, thereby reducing the restricted flow.'

INSTALLATION
Install the CV Flow Control as shown in the valve schematic All connections must be tight to prevent leakage.

DISASSEMBLY
Follow the sequence of the item numbers assigned to the parts in the cross sectional illustration for recommended order of disassembly.

Use a scriber, or similar sharp-pointed tool to remove O-ring from the stem.

INSPECTION
Inspect all threads for damage or evidence of cross-threading. Check mating surface of seat and valve disc for excessive scoring or embedded foreign particles. Check spring for visible distortion, cracks and breaks. Inspect all parts for damage, corrosion and cleanliness.

CLEANING
After disassembly and inspection, cleaning of the parts can begin. Water service usually will produce mineral or lime deposits on metal parts in contact with water. These deposits can be cleaned by dipping the parts in a 5-percent muriatic acid solution just long enough for deposits to dissolve. This will remove most of the common types of deposits. **Caution: use extreme care when handling acid.** If the deposit is not removed by acid, then a fine grit (400) wet or dry sandpaper can be used with water. Rinse parts in water before handling. An appropriate solvent can clean parts used in fueling service. Dry with compressed air or a clean, lint-free cloth. Protect from damage and dust until reassembled.

REPAIR AND REPLACEMENT
Minor nicks and scratches may be polished out using a fine grade of emery or crocus cloth; replace parts if scratches cannot be removed.

Replace O-ring packing and gasket each time CV Flow Control is overhauled.

Replace all parts which are defective. Replace any parts which create the slightest doubt that they will not afford completely satisfactory operation. Use Inspection steps as a guide.

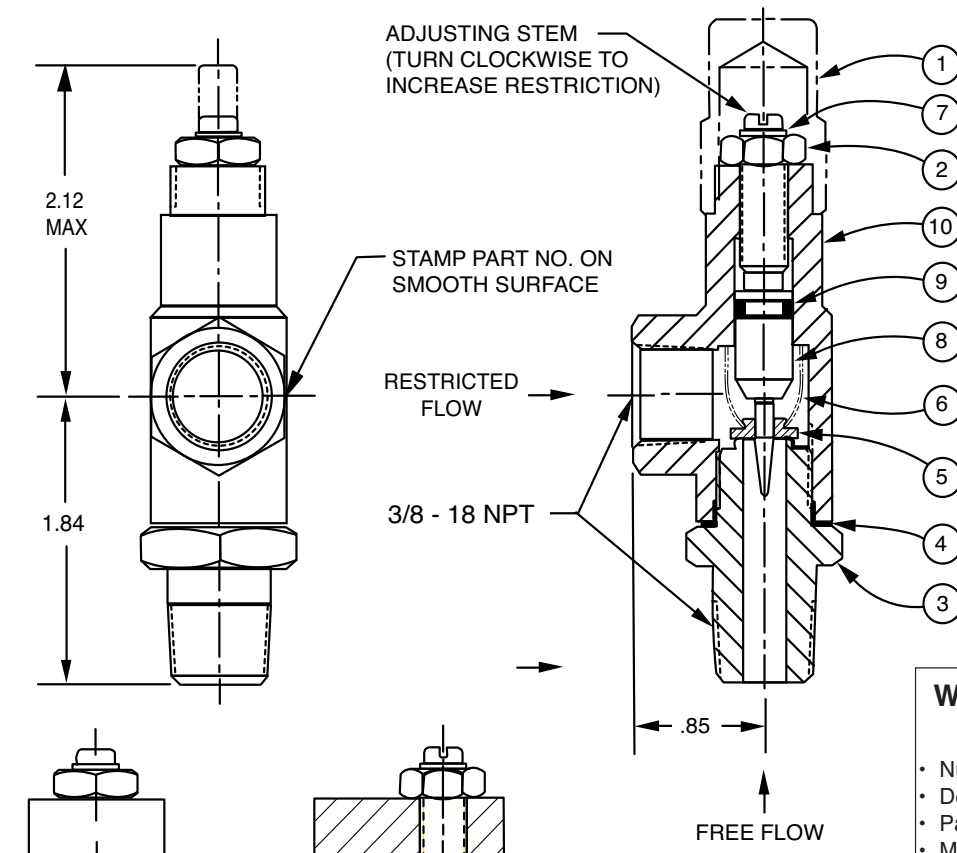
REASSEMBLY
Reassembly is the reverse of disassembly; no special tools are required.

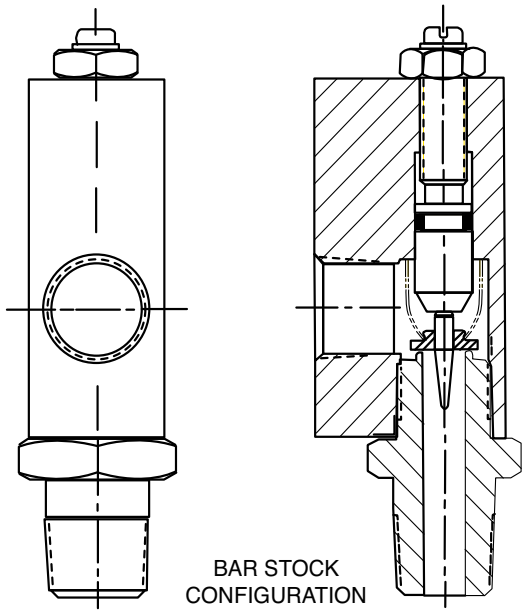
TEST PROCEDURE
No testing of the flow Control is required prior to reassembly to the pilot control system on Cla-Val Main Valve.

CLA-VAL 1701 Placentia Ave • Costa Mesa CA 92627 Phone: 949-722-4800 • Fax: 949-548-5441 • E-mail: info@cla-val.com • www.cla-val.com
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CLA-VAL

CV
3/8" Flow Control





When ordering parts, please specify:

- Number Stamped on Side
- Description (CV Flow Control)
- Part Description
- Material

ITEM	DESCRIPTION	QTY
1	Cap (SS only)	1
2	Nut, Jam	1
3	Seat	1
4	Gasket	1
5	Disc	1
6	Spring	1
7	Ring, Retaining	1
8	Stem	1
9	O-Ring	1
10	Housing	1

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CLA-VAL™

—MODEL— **X101**

Valve Position Indicator & Pilot System Components

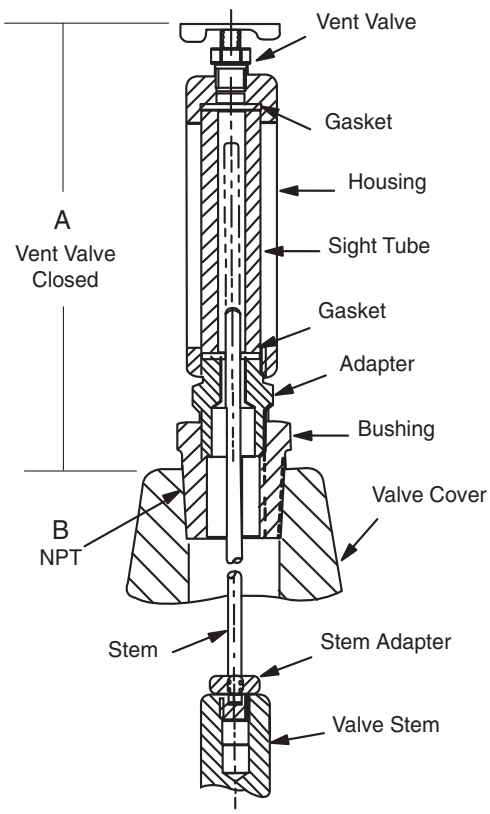


- **Positive Visual Indicator**
- **Frictionless**
- **Leak Proof**
- **Easy Maintenance and Cleaning**
- **Protected Indicator Rod**

The Cla-Val Model X101 Visual Position Indicator is designed to display Cla-Val valve position quickly and easily. A solid brass indicator rod fastened directly to the valve stem moves up and down inside a pyrex tube. The tube is contained within a brass housing which is open on two opposite sides to permit clear vision of the indicator rod.

To purge air that may be trapped in the valve cover, a vent valve in the top of the housing is provided. Model X101 valve position indicator is furnished complete for installation on specified size Cla-Val Automatic Control Valve.

Dimensions



VALVE SIZE	A INCHES	B NPT
1"	5.88	1/4"
1 1/4"	3.21	1/4"
1 1/2"	3.21	1/4"
2"	3.33	1/2"
2 1/2"	3.33	1/2"
3"	3.33	1/2"
4"	4.52	3/4"
6"	4.52	3/4"
8"	5.83	1"
10"	7.70	1"
12"	8.20	1 1/4"
14"	8.20	1 1/2"
16"	10.81	2"
18"	12.04	1"
20"	12.04	1"
24"	12.04	1"

Dimension "A" is height added to valve by indicator assembly

Specifications

Sizes:	1" thru 24"
Materials:	Brass, Pyrex Tube
Pressure Rating:	400 psi
Optional Material:	Stainless Steel

Installation

Can be installed on any Cla-Val basic main valve in a few minutes. Simply replace the fitting on top of the valve cover with the indicator assembly.

When Ordering, Please Specify

1. Valve Size
2. Catalog No. X101
3. Valve Series No. (Appears on Valve Nameplate)
4. Optional Material
   Stainless Steel

CSM-11 Solenoid Control

Body Material

Standard: Bronze with Monel Trim

Option: Bronze with Stainless Steel Trim



CDS6A Altitude Control

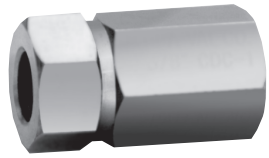
Wetted Body Material

Standard: Bronze with Stainless Steel Trim



No. of Springs	Altitude Ranges
1	5 - 40 ft
2	30 - 80 ft
3	70 - 120 ft
4	110 - 160 ft
5	150 - 200 ft

CDC-1 Check Valve



Size	Body Material	Trim Material
3/8"-1/2"	Brass	Delrin

CSC Swing Check Valve



Size	Body Material	Trim Material
3/8"-1"	Brass	Brass/Buna N

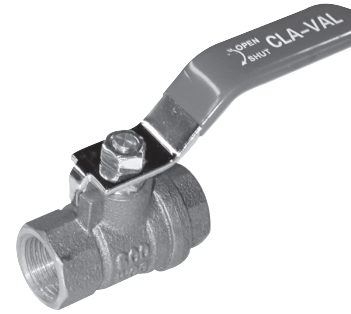
CN Series - Needle Valves





Size	Body Material		Trim Material
1/4"-1"	Standard:	Bronze	Brass
	Option:	Stainless Steel	Stainless Steel

CK Series - Isolation Valve



Size	Body Material		Trim Material
3/8"-1"	Standard:	Bronze	Stainless Steel/Teflon
	Option:	Stainless Steel	Stainless Steel/Teflon

CLA-VAL

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Lausanne, Switzerland
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Fax: 41-21-643-15-50

www.cla-val.com

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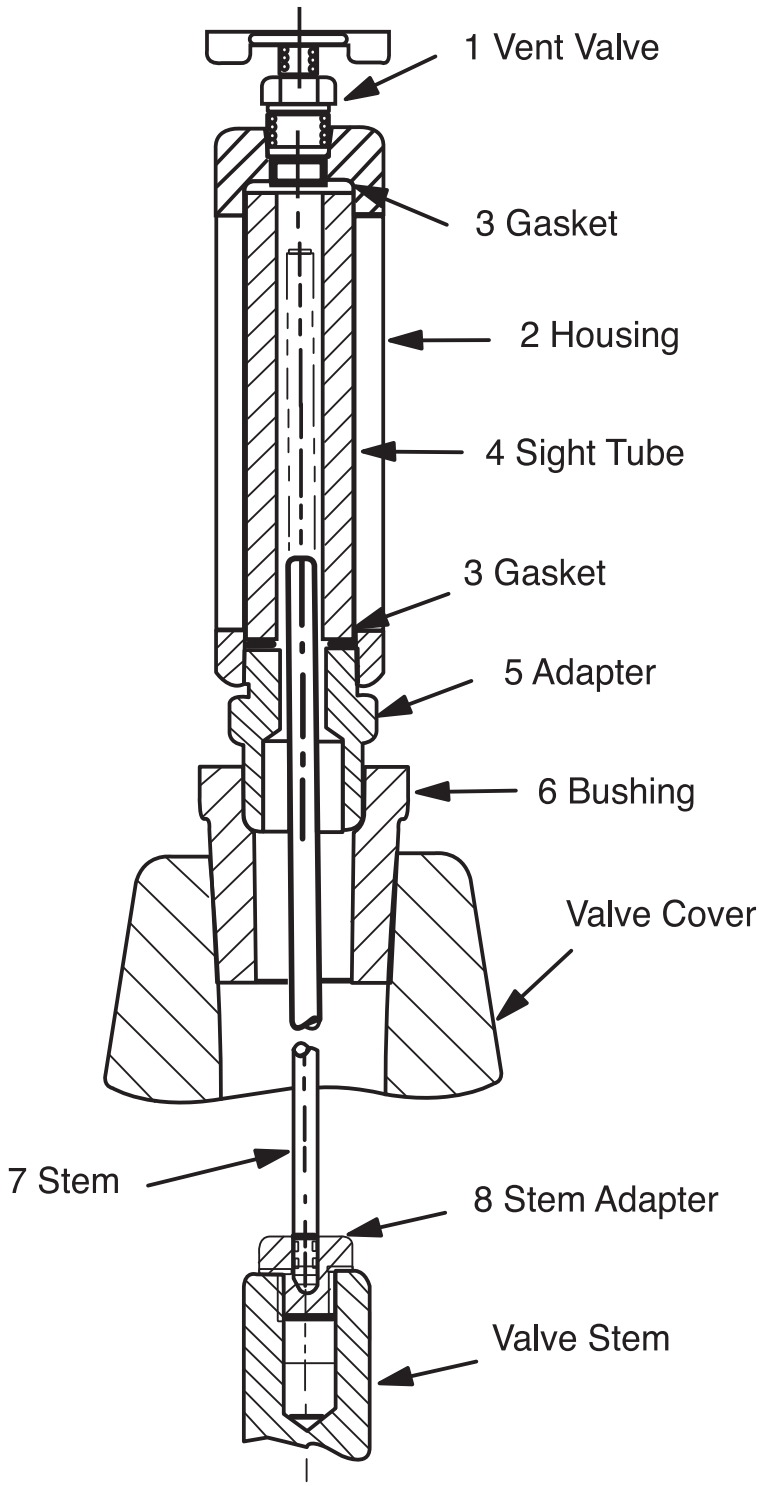
E-X101 (R-04/2018)

Represented By:

CLA-VAL

X101

Valve Position Indicator



COMPLETE X101	
Size	**Stock No.**
1 1/4 - 1 1/2	C2812A
2	C8972G
2 1/2	C2607E
3	C2609A
4	9710001A
6	9710002J
8	C8581F
10	C9187A
12	31420D
14	30256C
16	30251D

ITEM	DESCRIPTION	MATERIAL
1	Vent Valve	Brass
2	Housing	Brass
3	*Gasket (2 Required)	Buna-N®
4	*Sight Tube	Pyrex
5	Adapter	Brass
6	Busing	Brass
7	Stem	Brass
8	Stem Adapter	Brass

When ordering parts, please specify:
- All Nameplate data
- Item Number
- Description
- Material
- Part Number

CLA-VAL P.O. Box 1325 • Newport Beach, CA 92659-0325 • Phone: 949-722-4800 • Fax: 949-548-5441 • E-mail: claval@cla-val.com • Website cla-val.com
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Cla-Val Product Identification

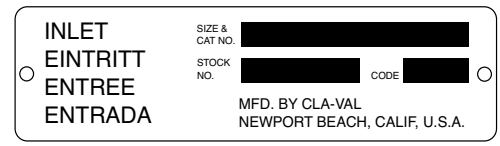
How to Order

Proper Identification

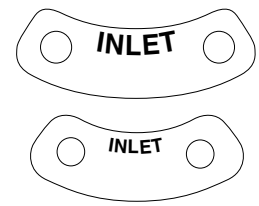
For ordering repair kits, replacement parts, or for inquiries concerning valve operation, it is important to properly identify Cla-Val products already in service by including all nameplate data with your inquiry. Pertinent product data includes valve function, size, material, pressure rating, end details, type of pilot controls used and control adjustment ranges.

Identification Plates

For product identification, cast-in body markings are supplemented by identification plates as illustrated on this page. The plates, depending on type and size of product, are mounted in the most practical position. **It is extremely important that these identification plates are not painted over, removed, or in any other way rendered illegible.**



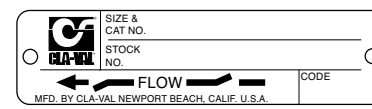
This brass plate appears on valves sized 2 1/2" and larger and is located on the top of the inlet flange.



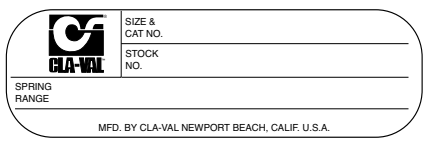
These two brass plates appear on 3/8", 1/2", and 3/4" size valves and are located on the valve cover.



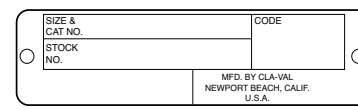
This brass plate appears on altitude valves only and is found on top of the outlet flange.



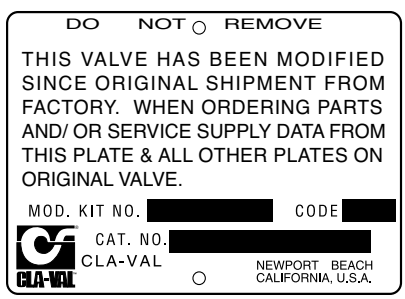
These two brass plates appear on threaded valves 1" through 3" size or flanged valves 1" through 2". It is located on only one side of the valve body.



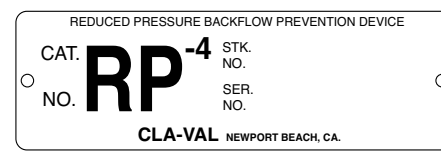
This tag is affixed to the cover of the pilot control valve. The adjustment range appears in the spring range section.



This brass plate is used to identify pilot control valves. The adjustment range is stamped into the plate.



This aluminum plate is included in pilot system modification kits and is to be wired to the new pilot control system after installation.



This brass plate is used on our backflow prevention assemblies. It is located on the side of the Number Two check (2" through 10"). The serial number of the assembly is also stamped on the top of the inlet flange of the Number One check.

HOW TO ORDER

Because of the vast number of possible configurations and combinations available, many valves and controls are not shown in published product and price lists. For ordering information, price and availability on product that are not listed, please contact your local Cla-Val office or our factory office located at:

P. O. Box 1325
Newport Beach, California 92659-0325
(949) 722-4800
FAX (949) 548-5441

SPECIFY WHEN ORDERING

- Model Number
- Globe or Angle Pattern
- Adjustment Range (As Applicable)
- Valve Size
- Threaded or Flanged
- Body and Trim Materials
- Optional Features
- Pressure Class

UNLESS OTHERWISE SPECIFIED

- Globe or angle pattern are the same price
- Ductile iron body and bronze trim are standard
- X46 Flow Clean Strainer or X43 "Y" Strainer are included
- CK2 Isolation Valves are included in price on 4" and larger valve sizes (6" and larger on 600 Series)

LIMITED WARRANTY

Automatic valves and controls as manufactured by Cla-Val are warranted for three years from date of shipment against manufacturing defects in material and workmanship that develop in the service for which they are designed, provided the products are installed and used in accordance with all applicable instructions and limitations issued by Cla-Val. Electronic components manufactured by Cla-Val are warranted for one year from the date of shipment.

We will repair or replace defective material, free of charge, that is returned to our factory, transportation charges prepaid, if upon inspection, the material is found to have been defective at time of original shipment. This warranty is expressly conditioned on the purchaser's providing written notification to Cla-Val immediate upon discovery of the defect.

Components used by Cla-Val but manufactured by others, are warranted only to the extent of that manufacturer's guarantee.

This warranty shall not apply if the product has been altered or repaired by others, Cla-Val shall make no allowance or credit for such repairs or alterations unless authorized in writing by Cla-Val.

DISCLAIMER OF WARRANTIES AND LIMITATIONS OF LIABILITY

The foregoing warranty is exclusive and in lieu of all other warranties and representations, whether expressed, implied, oral or written, including but not limited to any implied warranties or merchantability or fitness for a particular purpose. All such other warranties and representations are hereby cancelled.

Cla-Val shall not be liable for any incidental or consequential loss, damage or expense arising directly or indirectly from the use of the product. Cla-Val shall not be liable for any damages or charges for labor or expense in making repairs or adjustments to the product. Cla-Val shall not be liable for any damages or charges sustained in the adaptation or use of its engineering data and services. No representative of Cla-Val may change any of the foregoing or assume any additional liability or responsibility in connection with the product. The liability of Cla-Val is limited to material replacements F.O.B. Newport Beach, California.

TERMS OF SALE

ACCEPTANCE OF ORDERS

All orders are subject to acceptance by our main office at Newport Beach, California.

CREDIT TERMS

Credit terms are net thirty (30) days from date of invoice.

PURCHASE ORDER FORMS

Orders submitted on customer's own purchase order forms will be accepted only with the express understanding that no statements, clauses, or conditions contained in said order form will be binding on the Seller if they in any way modify the Seller's own terms and conditions of sales.

PRODUCT CHANGES

The right is reserved to make changes in pattern, design or materials when deemed necessary, without prior notice.

PRICES

All prices are F.O.B. Newport Beach, California unless expressly stated otherwise on our acknowledgement of the order. Prices are subject to change without notice. The prices at which any order is accepted are subject to adjustment to the Seller's price in effect at the time of shipment. Prices do not include sales, excise, municipal, state or any other Government taxes. Minimum order charge $100.00.

RESPONSIBILITY

We will not be responsible for delays resulting from strikes, accidents, negligence of carriers, or other causes beyond our control. Also, we will not be liable for any unauthorized product alterations or charges accruing there from.

RISK

All goods are shipped at the risk of the purchaser after they have been delivered by us to the carrier. Claims for error, shortages, etc., must be made upon receipt of goods.

EXPORT SHIPMENTS

Export shipments are subject to an additional charge for export packing.

RETURNED GOODS

1. Customers must obtain written approval from Cla-Val prior to returning any material.
2. Cla-Val reserves the right to refuse the return of any products.
3. Products more than six (6) months old cannot be returned for credit.
4. Specially produced, non-standard models cannot be returned for credit.
5. Rubber goods such as diaphragms, discs, o-rings, etc., cannot be returned for credit, unless as part of an unopened vacuum sealed repair kit which is less than six months old.
6. Goods authorized for return are subject to a 35% ($100 minimum) restocking charge and a service charge for inspection, reconditioning, replacement of rubber parts, retesting, repainting and repackaging as required.
7. Authorized returned goods must be packaged and shipped prepaid to Cla-Val, 1701 Placentia Avenue, Costa Mesa, California 92627.

CLA-VAL®

E-Product I.D. (R-3/2011)

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Represented By:

CLA-VAL

—MODEL— **REPAIR KITS**

Model 100-01 Hytrol Main Valve

BUNA-N MATERIAL				
	RUBBER KIT	REPAIR KIT	REBUILD KIT	STUD & NUT KIT
	STOCK NO.	STOCK NO.	STOCK NO.	STOCK NO.
3/8”	9169801K		21176614B	21176633J
1/2”	9169802H	21176602F	21176615A	21176634H
3/4”	9169802H	21176602F	21176615A	21176634H
1” Non-Guided	9169803F	21176601G	21176616K	21176636F
1”	9169804D	21176603E	21176617J	21176636F
1 1/4”	9169804D	21176603E	21176617J	21176636F
1 1/2”	9169804D	21176603E	21176617J	21176636F
2”	9169805A	21176608K	21176618H	21176637E
2 1/2”	9169811J	21176609J	21176619G	21176638D
3”	9169812G	21176604D	21176620D	21176639C
4”	9169813E	21176605C	21176621C	21176640K
6”	9169815K	21176606B	21176622B	21176641J
8”	9817901D	21176607A	21176623A	21176642H
10”	9817902B	21176610F	21176624K	21176643G
12”	9817903K	21176611E	21176625J	21176644F
14”	9817904H	21176612D	21176626H	21176645E
16”	9817905E	21176613C	21176627G	21176645E

Model 100-20 Hytrol Main Valve

BUNA-N MATERIAL				
	RUBBER KIT	REPAIR KIT	REBUILD KIT	STUD & NUT KIT
	STOCK NO.	STOCK NO.	STOCK NO.	STOCK NO.
3”	9169805A	21176608K	21176618H	21176637E
4”	9169812G	21176604D	21176620D	21176639C
6”	9169813E	21176605C	21176621C	21176640K
8”	9169815K	21176606B	21176622B	21176641J
10”	9817901D	21176607A	21176623A	21176642H
12”	9817902B	21176610F	21176624K	21176643G
14”	9817903K	21176611E	21176625J	21176644F
16”	9817903K	21176611E	21176625J	21176644F

Consult factory for larger sizes

Rubber Kit Includes: Diaphragm, Disc, Spacer Washers

Repair Kit Includes: Diaphragm, Disc, Spacer Washers, Epoxy Coated Disc Retainer, Epoxy Coated Diaphragm Washer, Protective Washer

Rebuild Kit Includes: Diaphragm, Disc, Spacer Washers, Epoxy Coated Disc Retainer, Epoxy Coated Diaphragm Washer, Protective Washer, Stainless Steel Bolts & Washers (6" & Below), Stainless Steel Studs, Nuts, & Washers (8" & Above), Stem, Stem Nut, Disc Guide

Stud & Nut Kit Includes: Stainless Steel Bolts & Washers (6" & Below), Stainless Steel Studs, Nuts, & Washers (8" & Above)

Repair Kits for 100-02/100-21 Powertrol and 100-03/100-22 Powercheck Main Valves

For: Powertrol and Powercheck Main Valves—**150 Pressure Class Only**

Includes: Diaphragm, Disc (or Disc Assembly) and O-rings and full set of spare Spacer Washers.

Valve Size	Kit Stock Number 100-02	Valve Size	Kit Stock Number	
			100-02 & 100-03	100-21 & 100-22
⅜"	9169901H	2½"	9169910J	N/A
½" & ¾"	9169902F	3"	9169911G	9169905J
1"	9169903D	4"	9169912E	9169911G
1¼" & 1½"	9169904B	6"	9169913C	9169912E
2"	9169905J	8"	99116G	9169913C
		10"	9169939H	99116G
		12"	9169937B	9169939H

Larger Sizes: Consult Factory.

Repair Kits for 100-04/100-23 Hy-Check Main Valves

For: Hy-Check Main Valves—**150 Pressure Class Only**

Includes: Diaphragm, Disc and O-Rings and full set of spare Spacer Washers.

Valve Size	Kit Stock Number		Valve Size	Kit Stock Number	
	100-04	100-23		100-04	100-23
4"	20210901B	N/A	12"	20210905H	20210904J
6"	20210902A	20210901B	14"	20210906G	N/A
8"	20210903K	20210902A	16"	20210907F	20210905H
10"	20210904J	20210903K	20"	N/A	20210907F
			24"	N/A	20210907F

Larger Sizes: Consult Factory.

Repair Kits for Pilot Control Valves (In Standard Materials Only)

Includes: Diaphragm, Disc (or Disc Assembly), O-Rings, Gaskets or spare Screws as appropriate.

BUNA-N® (Standard Material)				**VITON** (For KB Controls)	
Pilot Control	Kit Stock Number	Pilot Control	Kit Stock Number	Pilot Control	Kit Stock Number
CDB	9170006C	CFM-9	12223E	CDB-KB	9170012A
CDB-30	9170023H	CRA (w/bucking spring)	9170001D	CRA-KB	N/A
CDB-31	9170024F	CRD (w/bucking spring)	9170002B	CRD-KB (w/bucking spring)	9170008J
CDB-7	9170017K	CRD (no bucking spring)	9170003K	CRL-KB	9170013J
CDH-2	18225D	CRD-18	20275401K	CDHS-2BKB	9170010E
CDHS-2	44607A	CRD-22	98923G	CDHS-2FKB	9170011C
CDHS-2B	9170004H	CRL (55F, 55L)	9170007A	CDHS-18KB (no bucking spring)	9170009G
CDHS-2F	9170005E	CRL60/55L-60	9170033G	102C-KB	1726202D
CDHS-3C-A2	24657K	CRL60/55L60 1"	9170042H		
CDHS-8A	2666901A	CRL-4A	43413E		
CDHS-18	9170003K	CRL-5 (55B)	65755B		
CDS-4	9170014G	CRL-5A (55G)	20666E		
CDS-5	14200A	CRL-18	20309801C		
CDS-6	20119301A	Universal CRL	9170041K		
CDS-6A	20349401C	CV	9170019F		
CFCM-M1	1222301C	X105L (O-ring)	00951E	Buna-N®	
CFM-2	12223E	102B-1	1502201F		
CFM-7	1263901K	102C-2	1726201F	CRD Disc Ret. (Solid)	C5256H
CFM-7A	1263901K	102C-3	1726201F	CRD Disc Ret. (Spring)	C5255K

Repair Assemblies (In Standard Materials Only)

Control	Description	Stock Number
CF1-C1	Pilot Assembly Only	89541H
CF1-Cl	Complete Float Control less Ball and Rod	89016A
CFC2-C1	Disc, Distributor and Seals	2674701E
CSM 11-A2-2	Mechanical Parts Assembly	97544B
CSM 11-A2-2	Pilot Assembly Only	18053K
33A 1"	Complete Internal Assembly and Seal	2036030B
33A 2"	Complete Internal Assembly and Seal	2040830J

When ordering, please give complete nameplate data of the valve and/or control being repaired. MINIMUM ORDER CHARGE APPLIES

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APPENDIX G

GLOSSARY AND TERMS

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GLOSSARY & TERMS

The following section defines abbreviations and technical terms used within this manual and the wastewater treatment industry in general.

1. ACRONYMS & ABBREVIATIONS

ACRONYM	DEFINITION
°C	Degrees Celsius
°F	Degrees Fahrenheit
$CaCO_3$	Calcium Carbonate
CIP	Clean In Place
E-Coli	Escherichia coli - Gram-negative, rod-shaped bacterium
EQ	Equalization Tank
ft	Feet
H_2SO_4	Sulfuric acid
HCl	Hydrochloric acid
HMI	Human-Machine Interface
HOA	HAND-ON-AUTO
$KMnO_4$	Potassium Permanganate
kPa	Kilo Pascal
L	Liter
LMH	Liters per meter squared of Membrane Area per Hour (Flux)
LPM	Liter per Minute
m^3/day	Meters cubed per day
mg/L	Milligram per liter
mL	Milliliter
MSDS	Material Safety Data Sheet
NaHSO3	Sodium Bisulfite
NaOCl	Sodium Hypochlorite (Bleach)

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ACRONYM	DEFINITION
NaOH	Sodium Hydroxide (Caustic)
NTU	Nephelometric Turbidity Unit
O&M	Operations and Maintenance
ORP	Oxidation-Reduction Potential
P&ID	Process and Instrumentation Diagram
pH	Measure of Acidity
PLC	Programmable Logic Controller
ppb	parts per billion
PPE	Personal Protective Equipment
ppm	parts per million
psi	pounds per square inch
PSL	Pressure Switch Low
PVC	Polyvinyl Chloride (Plastic)
PWTP	Potable Water Treatment Plant
RO	Reverse Osmosis
SDI	Silt Density Index
TMP	Transmembrane Pressure
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TS	Total Solids
TSS	Total Suspended Solids
VFD	Variable Frequency Drive
UF	Ultrafiltration
UV	Ultraviolet

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2. TECHNICAL TERMS DEFINITION

ACID	A solution with an excess of hydrogen ions (H+) resulting in a pH below 7.0. Undergoes a neutralization reaction with bases.
ACTUATED VALVE	Valve with an actuator that is controlled by an external command.
AIR DIAPHRAGM METERING PUMP	Air diaphragm metering pump provides chemical dosing at measured rates. The dosing is set manually and it is regulated either by the amount of compressed air driving the pump or by setting the backpressure of the pumps.
AIR SCOURING	Using aeration to separate solids from membrane or filtration media surfaces.
ALARM	A visible or audible indication of abnormal situation. An alarm may be an operator interface screen message, a light, a buzzer or another form of communication to the operator.
ALKALINITY	The capacity of a solution to neutralize an acid. Alkalinity is a property of the water primarily imparted by the presence of carbonate (CO_3^{2-}), bicarbonate (HCO_3^-), and hydroxide (OH^-) ions. Alkalinity in water helps to resist changes in pH caused by addition of acids and bases. Generally expressed as a concentration of $CaCO_3$ equivalent.
ANALOG SIGNAL	An electrical signal that is proportional to the size of the variable being monitored or controlled.
ANION	An ion with a negative charge (eg. CO_3^{2-}, Cl^-, SO_4^{2-}, etc.)
ANTISCALANT	A chemical added to water to inhibit the precipitation of sparingly soluble salts. Using antiscalant allows RO systems to achieve higher recoveries than could be achievable without them.
AUTOMATIC FLOW VALVE	Valve used when regular changes are required in the state of the valve (fully open or fully closed only). It is controlled by the PLC.
BACKPULSE / BACKFLUSH / BACKWASH	A mode of operation in which the flow of filtrate is reversed through the membrane or filtration media. During backwash, accumulated solids are separated from the membrane or filtration media surface due to the combined effects of the air scouring and backwash flow.
BASE	A solution with a deficiency in hydrogen ions (H+) resulting in a pH above 7.0. Undergoes a neutralization reaction with acids.
BIOCIDE	A substance that kills living organisms.

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CATION	An ion with a positive charge (eg. Ca^{2+}, Fe^{3+}, Fe^{2+}, etc.)
CHLORAMINES	Chemical substance generated from reacting ammonia with free chlorine. It is used as a disinfectant but it is not as effective as free chlorine.
COAGULANT	A chemical substance that destabilizes negatively charged constituents in water allowing them to flocculate together into larger agglomerated particles, which can be more readily separated through clarification and filtration processes.
CONCENTRATE	Portion of the feed that is rejected by the membrane; also called “retentate”. It is the volume of water and concentrated rejected solids. Once it leaves the membrane system it is also called “reject”.
CONDUCTIVITY	A measure of a substance’s ability to transmit electricity. In water treatment it is used as a surrogate measurement of the ionic strength of a solution, and similarly, the total dissolved solids.
CONTAMINANT	Any substance in water which can negatively impact performance or quality.
DISINFECTION	The process of killing organisms in water using chemicals, heat or UV.
DISINFECTION BY-PRODUCTS (DBPs)	Unwanted products generated during the process of disinfecting water. Some DBPs have been associated detrimental health effects.
DISSOLVED SOLID	Matter that is present in water and that would pass through if filtered through a 0.45µm filter paper. The matter is fully dissolved creating a single homogeneous solution.
EQUALIZATION TANK	Tank used to accommodate variations in incoming and outgoing flows without stopping the operation of upstream or downstream processes.
FEED	Water entering a system or sub-system.
FILTRATE	Portion of the feed stream which has passed through a filter.
FLOC	Agglomerated particles as a result of a flocculation process. These particles are loosely held together acting as a larger, denser particle, which is more readily separated through clarification and filtration processes.
FLUX (or PERMEATE VELOCITY)	Flow of water passing through an area of membrane per unit time – usually expresses LMH (L/m2.h), or gfd (gal/ft2.d).

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FOULING	Processes leading to deterioration of flux due to surface or internal blockage of the membrane.
FREE CHLORINE	It is the total concentration of hypochlorous acid and hypochlorite ion. It is the reactive form of chlorine in solution, which is more effective for disinfection.
HARDNESS	The concentration of polyvalent cations (ions with a positive charge of 2 or more). For natural waters this is predominantly made up of calcium and magnesium ions. Typically expressed as mg/L as $CaCO_3$. Generally a measure of the propensity for water to form scale or to generate “soap scum”.
HYDRAULIC RETENTION TIME (HRT)	The time required to displace the volume within a system or sub-system. It is a measure of the time available for chemical reactions or biological activity to take place in a continuously moving process.
INPUTS / OUTPUTS	Inputs / Outputs refer to the direction of the electronic signal in reference to the PLC. They can be either digital or analog signals.
RECOVERY CLEAN	Cleaning with chemicals to recover membrane permeability.
MICROORGANISMS	Microscopic organisms, either plant or animal, invisible or barely visible to the naked eye. Examples: algae, bacteria, fungi, protozoa, and viruses.
MEMBRANE	A porous synthetic material which acts as a barrier or filter with distinct rejection properties, such that constituents that are rejected tend to be rejected to a very high degree, while most other constituents readily pass through the membrane. Membranes are commonly classified based on the rejection properties into four groupings – MF (microfiltration), UF (ultrafiltration), NF (nanofiltration), RO (reverse osmosis).
MEMBRANE CONFIGURATION	In membrane separation technology, configuration of a membrane product describes its construction or membrane spatial arrangement. Basic membrane configurations include hollow fiber, spiral, tubular, and flat-sheet.
MEMBRANE PROJECTION	An estimation of the membranes performance using a software simulation. Projections are used on RO systems to confirm the performance meets the membrane manufacturer’s guidelines and to assess the solubility limits of the various sparingly soluble salts.
MICROFILTRATION (MF)	A process using a membrane class to reject relatively large particles – 0.1 to 3 µm in diameter and above, with

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	relatively low applied pressures.
MODULE (membrane)	Smallest practical unit containing one or more membranes and supporting structures.
NORMALIZATION	Converting data to a standard reference condition. Allows for comparative analysis excluding known application-specific variances.
OXIDATION	A type of chemical reaction where an oxidant takes on electrons altering the oxidation state of the reagents. In terms of water treatment it is most commonly applied to the use of an oxidant (eg. oxygen supplied through aeration, permanganate, hypochlorite, etc.) to convert some dissolved metals from their highly soluble reduced state to their less soluble oxidized state (eg. Iron, manganese, etc.).
PERMEABLE	Refers to a materials capability to allow substances to flow through them. For example, UF membranes are permeable to water, but they are not permeable to suspended solids.
PERMEABILITY	The ratio of the flux and transmembrane pressure at that flux (L/m2 / h/ kPa or gfd/psi).
PERMEATE	Water or fluid which has passed through the membrane.
PERMIT	A legal document issued by the governing regulatory agency. Requirements vary by jurisdiction. Permits may be required to pull water from the raw water source, to treat the water to the required standard, to treat wastewater and to discharge the treated wastewater.
PLATE-AND-FRAME	Membrane configuration made up of multiple flat sheet membranes combined together in larger building blocks.
PLUG FLOW	Flow in which no back-mixing or dispersion occurs along the length of the pipe or reactor.
PORE	An opening in a membrane or filter matrix.
POROUS	Ability of certain substances to pass fluids due to an open physical structure.
POROUS PLUGGING	Type of membrane fouling – due to pore blockage.
PRETREATMENT	Processes required for the effectiveness of downstream processes.
RECOVERY	The percentage of the feed water that is converted to treated water for a given treatment process.
REJECT	The concentrate from a membrane system, particularly NF or RO) once it exits the system.

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RESISTANCE	Inverse of permeability. The higher the resistance the greater the force required to drive flow at a given velocity.
RETENTATE	See concentrate.
SCALING	Buildup of precipitated salts on a surface – such as pipes, tanks, boiler tubes, membrane surface (in RO, UF). An example of a common scale is calcium carbonate.
SILT DENSITY INDEX (SDI)	A test used to measure the level of suspended solids in feed water (especially for RO). It is a measure of the tendency of water to foul a membrane, based on a timed flow through a membrane filter (0.45 µm), at a constant pressure, also known as “fouling index”.
SHEAR FORCE	Unaligned forces applied to a surface in opposing directions. Term used to describe the forces applied by local flow velocities tangentially on membrane surfaces by aeration and/or liquid flow velocities.
SOLUBILITY LIMIT	Concentration threshold for a given pair of ions, where if the value is exceeded they can start precipitating out of solution. Limit is dependent on concentration of the individual ions, temperature, pH and ionic strength of the solution. Antiscalants can be used to extend the solubility limits for some combination of ions.
SPARINGLY SOLUBLE SALTS	Group of salts that have the potential of precipitating out of solution as the concentration of dissolved solids builds up. An example of a sparingly soluble salt is calcium carbonate, which the primary constituent in hard water scale.
STAGE	Term used to describe the arrangement of some RO systems, where the concentrate of one or more vessels are combined to feed another one or more vessels. The stages are used to maintain the minimum cross-flow velocity inside the RO modules for systems with high recoveries.
SUPERNATANT	Liquid clarified by sedimentation.
SURFACE POROSITY	Percentage of the surface area occupied by the pores.
SUSPENDED SOLIDS	Particulate matter that is present in solution and that would be rejected if filtered through a 0.45µm filter paper. Matter is suspended due to a combination of having a density similar to the solution and/or the motion of the solution.
TOTAL CHLORINE	The concentration of free chlorine and chloramines.
TOTAL SOLIDS	Total dissolved and undissolved solids in water or wastewater.

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TRANSMEMBRANE PRESSURE	Pressure difference from the feed side of the membrane to the permeate side.
TURBIDITY	A measure of the cloudiness of a solution. It is a surrogate measurement for suspended solids and is indicative of the cleanliness of the water. Typically measured by measuring the degree to which the solution scatters light, where the standard units are ntu (Nephelometric turbidity units).
ULTRAFILTRATION (UF)	Membrane separation process based on size exclusion. UF operates in the molecular weight cut-off (MWCO) range from 1,000 MWCO to 200,000 MWCO, or 0.002 µm to 0.1 µm. Emulsified oils, suspended solids, bacteria, and large molecules are rejected by UF membranes. Water and small molecules – dyes, surfactants, dissolved salts, and solvents pass through into the filtrate.
WASTEWATER	Spent or used water from a community or industry that contains dissolved and/or suspended matter.

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APPENDIX H

CONTROL NARRATIVE

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2006348 - Agnico Eagle WTP
System Control Narrative - Test Protocol

Revision	YYYY-MM-DD	Description	By
A01	2020-04-20	For Approval	J.Eaton
A02	2020-04-22	Updated by Electrical Design	D.Butchart
A03	2020-04-30	Removed PLC	J.Eaton
C01	2020-06-10	As Built	J.Eaton

System Inputs

Module	Tag	Description	Input Type	HMI Display Units	Device Range and Units	Device Span/PLC Scale	Datalog (Y)	Trending (Y)	Notes	Input Verification
4100	LSHH-4101	Level Switch High High	Discrete N.C.						Wired to a Junction Box for Connection to Existing System	
4100	LSHH-4102	Level Switch High High	Discrete N.C.						Wired to a Junction Box for Connection to Existing System	
8000	TSH-8001	Temperature Switch High	Direct	deg F	5-40 deg C				Note: This switch is considered N.O. when the building temperature is below the manual setpoint.	
8000	TSLL-8001	Temperature Switch Low Low	Discrete N.O.	deg F	5-40 deg C				Wired to a Junction Box for Connection to Existing System	
8000	LSHH-8001	Level Switch High High	Discrete N.C.						Wired to a Junction Box for Connection to Existing System	

System Outputs and Modes of Operation

Module	Tag / Mode	Description	Control Logic	Output Type	Hour Meter	Amp Meter	HOA Control	Output Verification	Logic Verification
8000	F-8001	Building Fan	The building fan will turn on when the building temperature exceeds the manual setpoint of TSH-8001. The building fan will turn off when the building temperature falls below the manual setpoint of TSH-8001.	Direct					
8000	H-8001	Building Heater	The building heater will turn on when the building temperature falls below the manual setpoint of its integral thermostat. The building heater) will turn off when the building temperature exceeds the manual setpoint of its integral thermostat.	Direct					
8000	H-8002	Building Heater	The building heater will turn on when the building temperature falls below the manual setpoint of its integral thermostat. The building heater) will turn off when the building temperature exceeds the manual setpoint of its integral thermostat.	Direct					
8000	HT-8001	Heat Trace GFI	Always ON	Direct					
8000	GFI	Convenienct GFI	Always ON	Direct					

Appendix E: Operation and Maintenance Manual of current equipment

AGNICO EAGLE

Vendor Document Status

1 ☐ Proceed to next submission and status.

2 ☐ Proceed with exceptions as noted to next submission and status.

3 ☐ Do not proceed.
Revise as noted and resubmit next submission and status.

4 ☐ Complete, no further submission required.

By: Date:

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Agnico Eagle No. 6515-C-250-010-154-MNL-0001 R: Sub001

DOCUMENT FOR INFORMATION

J04

Agnico Eagles Mines Limited
Meliadine Containerized Water Treatment Plant

Operation & Maintenance Manual

P65873–J04–0001,00

h2O innovation®

TABLE OF CONTENTS

Section 1 - Contacting H_2O Innovation 5
Section 2 - System Overview 6
2.1 - Introduction 6
2.2 – Critical Parameters of Raw Water 6
2.3 - Process Description 7
2.3.1 – Cartridge Filter Treatments 7
2.3.2 – Chemical Treatments 8
2.3.3 – Ultra-Violet Treatments 8
Section 3 - Pre-Operational Procedures 9
3.1 - Installation Instructions 9
3.1.1 - Introduction 9
3.1.2 - Shipping, Receiving and Storage 9
3.1.3 - Equipment Installation 10
3.1.4 - Valve Installation 10
3.1.5 - Nozzles and Piping 11
3.1.6 - Electrical Installation 13
3.2 - Commissioning 14
3.3 - Calibration and Instrument Care 14
Section 4 - Safety 16
4.1 - Our First Priority – Safety 16
4.2 - Preamble and General Precautions 17
4.3 - Safety Standards 18
4.4 - Personal Protective Equipment (PPE) 18
4.5 - Key Safety Warnings 18
4.6 - Safety Guidelines 22
Section 5 - Operating Procedures 25
5.1 - Modes of Operation 25
5.1.1 - Production Mode 25
5.1.2 - Service Mode 25
5.2 - Operating the System 25

5.2.1 – Before Starting the System 25
5.2.2 – Starting the System 26
5.2.3 – Stoping or Restarting the System 26
5.2.4 - Operating Guidelines 26
5.3 - Manual Controls 27
5.4 - Process Set Points 28
Section 6 - System Maintenance Procedures 29
6.1 – Introduction and General Maintenance 29
6.2 – Instrument Calibration 29
6.3 – Lubrication of Electrical Motors 29
6.4 – Leaking of Mechanical Seals 30
6.5 – Replacement of the Cartridge Filters 30
6.6 - Working with Rotating Equipment 31
6.7 - Trouble-Shooting 31
Section 7 – Controls Documentation 34
7.1 – Process Control Narrative 34
7.2 - Operation Table 48
7.3 - Alarm List 51
7.4 - I/O LIST 54
Section 8 – Material Safety Datasheets 56
8.1 – Sodium Hypochlorite 56
Section 9 - Spare Parts List 63
Section 10 - Drawings and Diagrams 65
10.1 - Piping and Instrumentation Diagrams (P&ID) 65
10.2 – Process Flow Diagram (PFD) 72
10.3 - General Arrangement Drawings 75
10.4 - Equipment List 83
10.5 - Valve List 85
10.6 - Instrument List 87
10.7 - Control Panel Layouts 89
10.8 - Electrical Schematics 105
10.9 - Single Line Diagram 124

Section 11 - Vendors O&M Data and Manuals 128
11.1 - Index of Tabs 128
11.2 - A1 – ABB Turdidimeter 129
11.3 - A2 – Amtrol Pressurized Tank 174
11.4 - B1 – Bray Butterfly Valve 191
11.5 - C1 – Champion Check Valve 231
11.6 - C2-1 – Chemline Electric Actuator 238
11.7 - C2-2 – Chemline Globe Valve 258
11.8 - C2-3 – Chemline Needle Valve 263
11.9 - C2-4 – Chemline Pressure Relief Valve 266
11.10 - C2-5 – Chemline Pressure Gauge Isolator 270
11.11 - C2-6 – Chemline Ball Valve 272
11.12 - E1-1 – Endress & Hauser Measuring Station 276
11.13 - E1-2 – Endress & Hauser Pressure Transmitter 289
11.14 - E1-3 – Endress & Hauser Flowmeter 302
11.15 - G1-1 – Georg Fischer Strainer 331
11.16 - G1-2 – Georg Fischer Ball Valve 334
11.17 - G2 – Grundfos Pump 337
11.18 - I1 – Intempco Temperature Transmitter 370
11.19 - P1 – Primary Fluid Calibration Column 373
11.20 - P2 – Prominent Dosing Pump 376
11.21 - S1 – Sharpe Ball Valve 609
11.22 - S2 – Shelco Cartridge Filter 611
11.23 - T2 – Trojan UV Treatment Units 613
11.24 - V1 – Viqua Solenoid Valve 644
11.25 - W1 – Wika Pressure Gauge 651
Section 12 - Appendice 656
12.1 – Daily Data Recording Sheet 656
12.2 - Equipment Maintenance Log 657

SECTION 1 - CONTACTING H_2O INNOVATION

If you need telephone or on-site service support, chemicals, membranes, filters, or spare parts for your system, please contact your H_2O Innovation SP&S Regional Manager. If they are unavailable or to place standard orders the following contact information can be used.

Service in the United-States
(763) 566-8961
service.us@h2oinnovation.com

Service in Canada
(418) 688-0170 Extension 321
service.ca@h2oinnovation.com

Should you require **EMERGENCY** support for anything other than a chemical spill, you can contact our 24-hour hotline at (855) H20-SRVC. The number is not routed to a call center, but rather it will ring the cell phone of the service person on-call. While we cannot commit to an immediate answer, our goal is to respond to emergency calls within 2 hours. For emergencies regarding chemical spills, refer to the MSDS for the specific chemical.



Please note that the following standard rates may apply (all rates are valid for 2016 calendar year ï please contact H_2O Innovation for a current rate sheet if required):

Table 1: Service Rates

Role	Hourly Rate
On-site: Field service technician [1-4]	$125
On-site: Engineer or Programmer [1-4]	$125
Off-site: Field service technician [5]	$125
Off-site: Engineer or Programmer [5]	$125

Notes:
1. Hours in excess of a 10-hour work day will be invoiced at 1.5 x the applicable labor rate.
2. Automobile mileage expenses will be invoiced at $0.56 / mile.
3. Hotel, airfares, flight change fees and related travel expenses will be invoiced at 1.15 times cost.
4. Meals will be invoiced at a per diem rate of $58.50.
5. Including on site visit preparation, travel time, support by telephone or email and report writing time.

SECTION 2 - SYSTEM OVERVIEW

2.1 - INTRODUCTION

This operation and maintenance manual, submitted by H_2O Innovation, is intended for a 216 m^3/day feed flow water treatment plant designed for the Agnico Eagle Mines Limited Meliadine Project.

This manual is intended to cover various equipment, instruments and valves that make up the water treatment system and the specifications and design conditions. Equipment that is not part of H_2O Innovationôs supply is not covered in this manual. Moreover, it is beyond the scope of this manual to describe the operating processes and control systems that are not provided by H_2O Innovation.

This manual contains drawings of the system, process and instrumentation diagrams, wiring diagrams, maintenance procedures and any other documents necessary for operation. In addition, subsequent parts of this manual contain the necessary technical documents, obtained from manufacturers, to operate specific components and ensure good maintenance procedures.

2.2 - CRITICAL PARAMETERS OF RAW WATER

The design of this system was based on the parameters provided to H_2O Innovation.

The system can be damaged if a water of different composition than what was submitted is used. This is especially true for the cartridge filters and ultra-violet reactors. A change in the composition of the water may require additional equipment, more frequent washes or other different operating procedures. It should also be noted that system performance may vary depending on design parameters and with the increasing age of the equipment. If significant variations in raw water quality results in a need for additional processing equipment, these will be the customerôs responsibility. At all times, the feed water entering the water treatment system must never exceed the critical values presented in the table below.

Table 3: Critical Parameters of Raw Water

Parameters	Values
Maximum Operating Temperature	40ÁC (104ÁF)
Minimum Operating Temperature	4ÁC (39ÁF)
Maximum Ambient Air Temperature	40ÁC (104ÁF)
Minimum Ambient Air Temperature	0ÁC (32ÁF)
Maximum Applied Pressure	100 PSI
Maximum Iron Concentration	0,3 PPM
Maximum Hardness	120 PPM
Maximum pressure drop in cartridge filters	20 PSI

Short-term variations of the temperature, the pressure, the hardness, iron, or of suspended solids may cause decreased efficiency and damage to the equipment.

When properly operated and maintained, the process equipment adequately treats the raw water and easily meets the operation specifications of the unit. If the feed water no longer is within the parameters due to a change in the quality of the raw water or to equipment failure in the unit, you must not operate the equipment until the situation is rectified. The situation is restored when the raw water is once again within the operating parameters or if the situation has been assessed by H2O Innovation and that a discharge is given to continue operations. Continue operations with raw water that exceeds critical parameters can cause irreversible damage.

2.3 - PROCESS DESCRIPTION

This section explains the major principles of operation of the water treatment system using cartridge filtration and ultra-violet disinfection. A basic understanding of the relationship between the different components of the system is a prerequisite to operate and efficiently maintenance the system. The study of the drawings shown in Section 10 ï Drawings and Diagrams combined with the reading of this manual provides the necessary understanding as previously mentioned.

Refer to manufacturerôs literature and manuals that are provided in Section 11 ï Vendors O&M Data and Manuals for a detailed description of the operation for a specific component.

The system is based on the design described in Table 2.

Table 2 : System Configuration

Description	Value	Unit
Maximum Daily Flow (Design Flow)	216 000	L/d
Peak Hourly Flow (Distribution Flow)	620	L/min
Total Number of Trains Installed	2 x 100%	
Fresh Water Storage	20 000	L
Treated Water Storage	20 000	L

2.3.1 - CARTRIDGE FILTER TREATMENTS

Physical treatments are accomplished by withdrawing the suspended particles in raw water. This is achieved with cartridge filters which contain 4 pleated element cartridges that are able to trap debris, oils and other unwanted particles as water flows through it. The first cartridge filter will achieve 5 microns filtration and the second will achieve 1 micron filtration.

2.3.2 - CHEMICAL TREATMENTS

Chemical treatments are accomplished by the injection of sodium hypochlorite (NaOCl), which is often used for water purification. Hypochlorite can be used to prevent algae growth and is effective against bacteria and viruses. Sodium hypochlorite also produces residual disinfectant.

2.3.3 - ULTRA-VIOLET (UV) TREATMENTS

The water is then disinfected by two ultraviolet reactors installed in parallel. This treatment serves as sterilization which deactivates organic contaminants, such as pathogens, bacteria, parasites or viruses.

SECTION 3 - PRE-OPERATIONAL PROCEDURES

3.1 - INSTALLATION INSTRUCTIONS

3.1.1 - INTRODUCTION

It is expected that the contractor installing this system is familiar with normal construction means and methods for water treatment equipment of this nature and that detailed instructions for installation are not required. Since the installation of the system is outside of H_2O Innovationôs scope, the following is provided as general guideline only. Typical construction site safety practices must be followed as a priority. It is critical to review the safety section of this manual before any work begins: Section 4-Safety

For each item that is loose shipped with the system, follow the installation instructions included in Section 11 ï Vendors O&M Data and Manuals of this manual.

The following sections provide some general guidelines when it comes to installing the system. Refer to the project drawings (Section 10 - Drawings and Diagrams) for details on how the system is designed and configured. The drawings that the installation contractor will need are included with this manual and are typically piping and instrumentation diagrams (P&IDs), general arrangements (GAs), assembly drawings, and electrical drawings, etc. Drawings provided by the Ownerôs engineer or other outside firms should also be referred to and discrepancies noted to all affected parties for resolution. Ensure that drawings are red-lined and updated as changes are made in the field. These red-lined drawings must be forwarded to H_2O Innovation before the field service representative comes to site.



Before performing any installation work please read the section in this manual on safety: Section 4-Safety

3.1.2 - SHIPPING, RECEIVING AND STORAGE

Equipment will be typically packaged and shipped from one of H_2O Innovationôs factories. Drop shipments are also possible for loose ship items. Please discuss timing of shipments with the H_2O project manager so that receipt can be coordinated with other site activities. All shipments must be inspected on arrival for signs of damage or discrepancies with the packing slips. Any noted damage must be photographed immediately and a report sent to H_2O Innovation. Typically, ownership of the equipment transfers to the installation contractor on receipt of the equipment at site. Damage that occurs after ownership has transferred will not be the responsibility of H_2O Innovation.

Equipment should be stored on site by the installation contractor in a dark, dry location and secured to prevent theft. Temperature should be controlled to between 5ÁC and 30ÁC. Ensure control panel doors are kept closed unless the panel is being worked on. This will help to keep the interior clean. Keep strong electromagnetic radiation sources away from the sensitive electrical equipment that comes in control panels and instrumentation during storage and installation.

If rotating equipment is going to be left on site for extended periods, please inform the H_2O Innovation project manager so that advice on how often to rotate shafts can be provided. Also, electrical connection to specific equipment heaters may be needed to prevent condensation, particularly in motors.

3.1.3 - EQUIPMENT INSTALLATION

Place all major components, such as pumps, blowers, skids and tanks as shown on drawings provided in this manual (Section 10.3 General Arrangement Drawings). Ensure any valves or other components that were removed for shipping are placed in the correct location and fastened.

Major equipment items are often grouted in place. Please refer to specific installation instructions for each item to see if grouting is required (Section 11 ï Vendors O&M Data and Manuals). After grouting has been completed and set, align all rotating equipment as described in the installation instructions.

Perform initial startup procedures (vibration checks, bumping, etc.) for all rotating equipment as per manufacturer instructions and contractual requirements.

3.1.4 - VALVE INSTALLATION

Butterfly valves should be installed in the partially open position and stroked during the installation process. Please see manufacturerôs specific instructions in Section 11 ï Vendors O&M Data and Manuals. Mating pipe flanges need to be aligned tangentially and also with an axial gap that agrees with the valve lay length so that no loads are applied to the valve in any direction when it is in place.

Butterfly valves that are installed in lines that could see sediment, solids or two phase flow should be installed such that the valve shaft is horizontal. This allows passage of solids and air.

Ball valves should not be used to support piping loads. Threaded metallic valves should be installed using double pipe wrenches and appropriate sealant on the joints. Orientation is not a concern for ball valves in general. Ensure packing is torqued to the requirements in the vendor information.

3.1.5 - NOZZLES AND PIPING

Interconnecting piping that is not included in H_2O Innovation scope, needs to be supplied by the installation contractor. All piping should be installed according to the drawings provided by both H_2O Innovation and the Owner's Engineer. **The contractor shall make sure that the insulation of all openings for interconnecting piping between the containers is adequate for the Arctic conditions once the work is completed.**

Mating piping must not impart a load in any direction to nozzles or other connections on a skid or tank. This means that piping must be fully supported such that if the equipment or skid flange is removed, the piping will remain in its place. Pipe support designs are typically completed and sealed by a structural engineer for the jurisdiction in which the plant is being installed. The engineer should also take dynamic loads due to moving fluids and operating pressure into account in the design of the piping system. Note that PVC piping requires support more often than metallic piping and there are known standards for how often this piping needs to be supported.

Skid and tank drain connections for block and bleed lines, instrument sample drains or general process drains must be designed with an air gap (unless specified otherwise) and sized to accommodate the full expected design flow plus a generous safety margin. Generally speaking, a sloped floor drain should be located in the vicinity of each skid to provide a destination for instrumentation drains and piping maintenance drains. Instrumentation drains should be plumbed into the drain so that slip hazards are not created by water flowing across the floor.

It is expected that the installation contractor will flush all piping before commissioning (this includes factory installed piping). H_2O Innovation recommends that potable water be used for pipe and tank flushing. Frequent visual inspections during construction can be helpful to remove construction trash and dust that often ends up in piping systems.

Piping is often lined for corrosion protection. This is true of carbon steel pipe and also stainless steel pipe. Stainless steel has a thin chromium oxide layer that provides the inherent corrosion protection. Welding, heating or mishandling any of these piping and fittings can damage the coatings and thus compromise the corrosion protection. Metallic piping that is perpetually wet on the outside due to building ventilation issues (or other HVAC issues) is particularly prone to corrosion. Building ventilation needs to be sized to control condensation inside buildings.

Stainless steel components (not just piping) should not be handled by mild steel equipment (like mild steel forklift tines or chains) as the stainless steel surface can be marred or scratched resulting in the loss of corrosion resistance. Carbon steel can be imbedded in the stainless surface and lead to corrosion. Keep carbon steel from contacting stainless steel during the installation process and only use tools that are dedicated for use on stainless steel when installing and working with stainless steel.

Also, if stainless steel is stored outdoors, it should be covered and protected from the blowing dust and sand that is common on construction sites. The surface of the stainless steel can be abraded and damaged when stored outdoors. Also, when grinding or welding near stainless

steel, protect the material with guards or ensure that the stainless is thoroughly cleaned, pickled and passivated afterwards (it is possible to use pickle/paste compound, but this method is not suitable for large surfaces or is not a substitute for pickling according to ASTM A380 in an acid bath).

Stainless steel can also be subject to attack by chlorides and sources are common in water treatment plants (salt water, sodium hypochlorite). Ensure that all steel surfaces are kept away from chloride sources that they are not designed to protect against.

Polyvinyl chloride (PVC) piping is brittle and care should be used when handling components made of PVC. Temperature extremes should also be avoided with PVC as well as mechanical stresses. PVC is not ultraviolet (UV) resistant and should not be stored where sunlight can contact the surface (this includes both direct and indirect sunlight). Chlorinated polyvinyl chloride (CPVC) piping does have higher UV, chemical and temperature resistance but the same general storage guidelines should be followed. PVC piping is not designed to convey compressed gasses (like air). Air must be completely bled from all PVC or CPVC lines before equipment is put into operation.

High density polyethylene (HDPE) is often used as an alternative to PVC. The key factor when installing HDPE piping is that it expands and contracts significantly with temperature shifts. Temperature can be changed in an HDPE pipeline by internal factors (e.g. during a high temperature CIP) or by external factors (e.g. a stagnant line exposed to sunlight). The support system and joints need to be designed to accommodate this expansion and contraction of HDPE.

Joints in chemical lines should not be located over electrical equipment or over areas where operators could reasonably be anticipated to be on a regular basis. Ideally, chemical system joints have flange guards installed such that leakage can be detected visually. Another approach for chemical systems is to use double-walled piping with leakage detection systems.

Follow torquing recommendations provided by equipment vendors for all bolted connections; ideally by hand and not with power tools. Connections should be torqued in a star pattern to apply even force to the flanges or joints. Please ensure that the required flat washers and lock washers are included with these connections and that the bolt heads and nuts lie flat on the washers.

Note that stainless steel bolting will require an appropriate anti-seize compound applied to the threads before the connection is made. Fastening hardware specifications are listed on H_2O Innovation drawing notes and must be followed. These hardware specifications are applicable to shop manufactured equipment and field assembled components. For connections that are submerged, use NSF approved anti-seize in drinking water applications (e.g. White Knight food grade anti-seize compound).

3.1.6 - ELECTRICAL INSTALLATION

Refer to the project electrical drawings in this manual (10.8 ï Electrical Schematics) and the plant electrical drawings provided by the Ownerôs engineer. Electrical connections and interconnections to junction boxes and panels provided by H_2O Innovation must meet regulatory and local standards. Electrical work must be completed by licensed and insured electricians in the jurisdiction where the facility is being constructed. Interconnecting electrical cables need to be sized for the maximum anticipated electrical load and well supported in trays or conduit. Use separate cable trays for 24 VDC, 120 VAC and 480 VAC wire runs. Ensure that all panels, skids and cable trays (and electrical equipment in general) are properly and adequately grounded.

Generally speaking, systems will have a control panel and a power panel. Both panels need to be mounted and anchored in accordance with the project drawings. Like mechanical equipment, electrical equipment needs to be anchored according to local structural requirements if it is loose ship. Pre-mounted panels are taken into account when analyzing the support frames.

Field mounted instrumentation is normally wired to either a local junction box or back to the main control panel. This will be detailed in the electrical drawings for the plant. Ensure that the wire numbers depicted in the electrical drawings are clearly shown and permanently labeled on the field cables. Ensure that the electrical drawings are red-lined and updated as changes are made in the field. These red-lined drawings must be forwarded to H_2O Innovation before the field service representative comes to site.

Once equipment has been installed and wired the on-site electrician typically:

1. Bumps three phase motors to ensure that they have been wired for the correct rotational direction and changes the wiring if not correct.
2. Performs a continuity test for all field wiring.
3. Powers up the panels.
4. Ensures that all analog and digital signals to and from the Programmable Logic Controller (PLC) are transmitting properly.
5. Calibrates all instruments (see section 3.3 - Calibration and Instrument Care).
6. Red lines electrical drawings with any changes that occurred in the field.
7. Shuts off power feeding the plant to ensure that the UPS is working properly.
8. Ensures that all of the remote IO is communicating with main PLC. Since a ring topology configuration is typically used, any Ethernet cable or fiber optic cable can be disconnected and the system should remain connected and communicating.

3.2 - COMMISSIONING



Before performing any commissioning work please read the section in this manual on safety: Section 4- Safety.

Commissioning services may be included in the contract and provided by H_2O Innovation. Refer to specific documentation related to commissioning for detailed information. Typically, the customer or contractor is responsible for ensuring a supply of electricity, raw water and a receiving destination for the treated water for pipe and module flushing and performance testing of the equipment. Also, the customer is responsible for the provision of necessary analytical tests for treated water quality during performance testing.

A commissioning visit for start-up is included in the contract. The services of a qualified electrician, pipefitter and millwright will be required on site when H_2O Innovation staff is on site. The costs for these journeyman services are normally excluded from the commissioning contract value.

3.3 - CALIBRATION AND INSTRUMENT CARE



Before performing any calibration work on this system please read the section in this manual on safety: Section 4- Safety.

This water treatment containerized unit uses instrumentation to deliver relevant information for the proper maintenance and operation. It is therefore important that each instrument is maintained in good operating condition. In addition, it is important that the calibration of each instrument is carried out regularly.

Pressure is an important factor in performance monitoring as well as for procedures of operation and maintenance. This system uses mechanical pressure gauges and transducers for monitoring of pressure. Continuous observation of these data will enable a successful operation. H_2O Innovation requires an archive continually updated for purposes of assessment and restart if this is needed. Pressure switches are used to protect the system and equipment when the water pressure reaches non-desired values.

Analytical sensors are present to provide data on water parameters that allow proper monitoring of the system. Temperature transmitters are used to control the membrane washing temperature and the temperature of the raw water during processing.

Refer to the Section 10.6 ï List of Instruments for a complete list of all the instruments and their functionalities.

Table 4 provides some general guidance on calibration and care for instruments in this facility and where to find the vendor information related to each type of instrument.

Table 4: Calibration Summary Table

Instrument	Frequency	Materials	Tab
ABB Turbidimeter	Quarterly	None	A1
Chemline Pressure Gauge	Semi-Annual	Glycerine	C2-5
Endress & Hauser Promag Flowmeter	Semi-Annual	None	E1-3
Endress & Hauser PMC131 Pressure Transmitter	Semi-Annual	None	E1-2
Wika Pressure Gauge	Semi-Annual	Glycerine	W1

SECTION 4 - SAFETY

4.1 - OUR FIRST PRIORITY ï SAFETY

For your own protection and that of your co-workers, please pay particular attention to this section. These safety precautions are intended to protect operators and equipment from risk of physical harm and damage that may arise from the operation and maintenance of this water treatment system. The following table summarizes the symbols used in this manual to highlight areas of risk. These warnings are not intended to be exhaustive and the operator and maintenance staff are expected to execute due diligence in carrying out their work on this system. When in doubt please ask for assistance or advice.

Symbol	Description
	Alerts operators to items that if not followed will result in severe injury or death.
	Alerts operators to items that if not followed can result in severe injury or death.
	Alerts operators to items that if not followed may result in a minor or major injury.
	Alerts operators to items that if not followed may result in damage to equipment or property.

4.2 - PREAMBLE AND GENERAL PRECAUTIONS

Please ensure to read and understand the entire operational and maintenance manual thoroughly. Ensure all assembly, operation, maintenance or inspection instructions described in this manual are followed before using any devices included with this plant. A device can be a valve, instrument, equipment item or any other physical or software component required in the operation of this water plant. Misuse of devices or failure to follow the instructions described in this manual may result in death, serious personal injury and/or damage to property. Failure to read the entire manual before using any device included in the scope of this project constitutes a misuse.

The plant operator is responsible to inspect each device before using it. Only use the device if it passes inspection. Always use the device as described by the original manufacturer of the device. Do not use any malfunctioning device. Keep by-standers away from device during use.

It is up to the operator to use common sense when operating any device. A moment of inattention while operating a device can cause personal injury or death to the operator or to any by-standers and/or damage to property. Keep hands, clothes, loose jewelry from being caught in moving parts. Do not exceed stated weight limits for any device used for lifting.

Do not modify any device in any way other than that described in vendor instruction manuals unless prior written approval of H_2O Innovation Inc. is obtained. Unauthorized modifications to a device may void the warranty and might make the device unsafe to use.

In no event shall H_2O Innovation Inc. be liable for any indirect, incidental or consequential damages resulting from the use of devices in this plant. This disclaimer applies before, during and after use of the device, which include, without limitation, assembly, inspection, use and/or storage. No warranties (express, implied, or statutory) are made in connection with this operational and maintenance manual.

BY REFERRING TO, OR OTHERWISE EMPLOYING, THIS OPERATIONAL AND MAINTENANCE MANUAL, THE OPERATOR, USER OR OWNER OF THE PLANT AGREES TO DEFEND, PROTECT, INDEMNIFY, AND HOLD H_2O INNOVATION INC., ITS AFFILIATES, SUBSIDIARIES, SUCCESSORS, ASSIGNS, DIRECTORS, OFFICERS, AGENTS, AND EMPLOYEES HARMLESS FROM AND AGAINST ALL CLAIMS, LOSSES, EXPENSES, DAMAGES AND LIABILITIES, DIRECT, INCIDENTAL, OR CONSEQUENTIAL, ARISING FROM ACCEPTANCE OR USE OF THIS MANUAL, INCLUDING LOSS OF PROFITS AND REASONABLE ATTORNEY'S FEES, WHICH MAY ARISE OUT OF THE ACCEPTANCE OR USE OR ALLEGED USE OF THIS MANUAL, IT BEING THE INTENT OF THIS PROVISION AND OF THE OPERATOR, USER OR OWNER TO ABSOLVE AND PROTECT H_2O INNOVATION INC., ITS AFFILIATES, SUBSIDIARIES, SUCCESSORS, ASSIGNS, DIRECTORS, OFFICERS, AGENTS, AND EMPLOYEES FROM ANY AND ALL LOSS RELATING IN ANY WAY TO THIS OPERATIONAL AND MAINTENANCE MANUAL INCLUDING THOSE RESULTING FROM ITS OWN NEGLIGENCE.

4.3 - SAFETY STANDARDS

Local safety regulations and standards take precedence over the recommendations discussed here only when they are stricter or more onerous than this manual. The operators and plant owners are expected to follow their local standards and augment those with the information provided in this manual. Also, standards evolve over time and the onus is on the plant operations staff to maintain current certifications and be familiar with the most recent requirements, particularly those related to safety.

4.4 - PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE is required to operate this system safely. The following items should be readily available and properly fitted for operators of this system:

1. Hardhat
2. Safety boots
3. Safety glasses with side shields
4. Face shields
5. Rubber aprons
6. Ear plugs
7. Fall protection equipment (lanyard, harness)
8. Housekeeping equipment (brooms, mops, spill kits, rags)

4.5 - KEY SAFETY WARNINGS

Some of the warnings presented in the following table may not apply to the equipment supplied. Please contact H_2O Innovation for any information on key safety warnings.



Do not mix sodium hypochlorite solution with any acidic solution. This mixture will generate toxic chlorine gas which is lethal. Common acidic solutions include citric acid, sulfuric acid, hydrochloric acid, sodium bisulfite (but are not limited to these).



Membrane modules and piping is under pressure (or vacuum). Ensure that equipment and piping networks are fully de-pressurized to atmospheric pressure before servicing. Energy release, particularly for compressible fluids, can cause serious personal injury or death.



Working on or servicing electrical equipment or mechanical equipment powered by electricity can cause severe injury or death if the electrical source is not completely disconnected and locked out by the service person. Following a documented lock-out, tag-out program is highly recommended for working on equipment in this system.



Air (or other gasses) trapped in PVC piping or conveyed by PVC piping can cause severe injury or death. PVC material shatters if the piping is subject to abnormal stresses when compressed air is present inside. Pieces of piping become projectiles in this case. Ensure air is completely bled with non-compressible fluids from all systems that use PVC piping.



The cleaning of membranes involves the use of strong chemicals. When handling chemicals wear appropriate PPE (face shields, full length rubber gloves, rubber apron, safety glasses with side shields) as recommended in the MSDS for each respective chemical. The MSDS will also provide treatment recommendation in the case of exposure to the chemicals. Failure to follow MSDS recommendations can result in serious injury or death.



The cleaning chemical sodium hypochlorite generates chlorine gas over time that presents a health and safety concern and is highly corrosive to humans and equipment surfaces. Appropriate ventilation is required in areas where sodium hypochlorite solutions are exposed to the operatorôs air space or equipment that can be damaged by corrosion.



Membranes are typically shipped in a preservative solution. Ensure appropriate PPE (face shields, full length rubber gloves, rubber apron, safety glasses with side shields) as recommended by the membrane manufacturer are worn. The MSDS for the preservative solution will also provide treatment recommendation in the case of exposure to the chemicals. Failure to follow MSDS recommendations can result in serious injury or death.



Membrane modules are heavy and should not be manipulated by hand. Use properly designed lifting equipment for installing and removing modules into membrane racks. A falling module can result in serious injury or death.



Do not lift skids from equipment or piping mounted on the skid. Doing so may result in injury or death for workers involved in the operation or damage to the components mounted on the skid.



Exposure to moderate noise levels can lead to long term hearing damage. Exposure to high noise levels, even for short durations, can cause immediate hearing damage. When the possibility of exposure to such noise levels is present {particularly around air blowers, compressors, air release devices} use appropriate hearing protection.



This plant includes rotating equipment. Blowers, compressors, pumps and valves all have components that turn with high energy. Before operating equipment with rotating components or pinch points, ensure that all shields, guards, and emergency kill switches are in place and operational. Rotating parts can catch clothing, fingers, or tools and cause serious injury, death or equipment damage.



Ultraviolet light is often used for disinfection in water treatment systems. Do not look directly at light sources or expose skin to the light as it can burn both eyes and skin.



Maintaining strict cross-connection controls are required to protect public health and maintain water quality. This system may be outfitted with automated cross-connection prevention systems, however, the proper operation of these needs to be routinely verified by operations staff. Failure of cross-connection prevention systems can result in release of chemical or untreated water into the public water system.



When alternating between cleaning chemicals (particularly between an acid and sodium hypochlorite), ensure that the lines and tanks are fully rinsed before using the next chemical. The use of higher quality product water for rinsing is recommended (rather than feed water). Failure to rinse systems adequately can result in adverse chemical reactions. Refer to other warnings in this section.



Operating equipment can get hot. Also, heated chemical solutions are used for cleaning membranes and equipment or piping may not be protected with insulation. To avoid burns, please use caution when touching operating equipment and piping in the plant. Permanent operator protection insulation or guarding is typically required for components that can be warmer than 45ÁC.



When cleaning membranes, strictly follow the procedures described in the membrane manual and document cleans appropriately on log sheets. Otherwise damage may occur to the modules which can negatively affect the membrane performance and the membrane warranty.



Membrane modules can be stored in water and not used for short periods of time. If they are to be left for longer than 4 days, follow procedures listed in the membrane module manufacturerôs manual. Failure to follow recommendations from the manufacture can result in membrane damage.



During membrane integrity tests (MIT) on ultra-filtration membrane systems, the compressed air used must be clean, dry, and free of oil. Do not exceed the maximum recommended testing pressures.



During construction, maintenance, or any other work performed directly above open tanks that feed membrane systems (particularly upstream of the membranes and downstream of the strainers), ensure that foreign debris (for example; pipe turnings, paint chips) do not fall into the tank.



Operating the system using manual controls introduces a risk of equipment damage. It is highly recommended that the system is monitored carefully and with an operator present if manual controls or partial manual controls are used.

4.6 - SAFETY GUIDELINES

There are a number of general guidelines that can greatly improve the safety of operators and visitors to a water treatment plant:

1. **Personal Protective Equipment (PPE)**: Wear the appropriate PPE for the job or task being conducted which applies to bystanders as well. Generally speaking, when in the plant environment, safety boots and safety glasses are highly recommended as a minimum.
2. **Housekeeping**: Maintaining a clean plant is key for minimizing the risk of accidents. Ensure that all tools and loose items are placed in the correct location and that spills are quickly cleaned up.
3. **Routine maintenance**: Maintaining equipment in good running order and conducting preventative maintenance regularly can help prevent situations where safety risks are elevated.
4. **Personal hygiene**: With any water treatment system pathogens can be concentrated in the waste stream. Regular personal hygiene (like washing hands) is important to prevent illness and spread of contamination. If operators are exposed to feed water, concentrate or other water not suitable for human consumption, eyes should be immediately rinsed

at an eye wash station and exposed skin should be cleaned thoroughly with soap and warm water, particularly before eating, drinking or smoking.

5. **Vaccinations**: Due to pathogenic risk at water treatment facilities, it is recommended that operators and maintenance staff be vaccinated against tetanus and Hepatitis A and Hepatitis B. Seek medical advice from a licensed physician before exposure to water at the plant and also if you may have been exposed to potential sources of biological hazards. This is particularly important in wastewater systems.
6. **Fall protection**: Although pressurized membrane systems do not require significant tankage, the risk of falling into a tank or off an elevated platform can be present. A fall of any height can hurt operators and maintenance staff. Follow the local work environment regulations with respect to falls and fall prevention. Safety harnesses, lanyards and engineered anchor points may be required. Note that fall arrest and fall restraint are distinct and in general fall restraint is preferred due to the lower risk of injury.
7. **Equipment specific safety recommendations**: Refer to the provided equipment safety manuals included in Section 11 ï Vendors O&M Data and Manuals. These instructions manuals must be followed for safe operation and maintenance of the system as a whole.
8. **Chemical showers and eyewash stations**: Safety showers and eyewash systems are typically installed within proximity of chemical systems. Operators need to be trained in their effective use and monitoring systems installed such that assistance can be provided in the case that somebody uses one of these systems.
9. **Chemical spills**: Spill clean-up kits and neutralization chemicals should be readily available and operators trained in how to use these systems.
10. **High pressure equipment**: Some pumps, compressors and blowers are capable of generating very high pressures which creates the risk of rupture or major damage if safety devices are bypassed or not maintained. Pressure relief valves should be checked regularly, and tubing or piping used to convey pressurized fluids, such as actuated valve air lines, should be regularly inspected for cracks and damage.
11. **Material Safety Data Sheets (MSDS)**: MSDSô need to be present and available for quick reference for each chemical in use in the plant and operators should read these before doing any work involving these chemicals. The supplier of the chemical is responsible for providing the end user with MSDS sheets. For information, MSDS for some of the used chemicals are included in Section 8 ï Material Safety Data Sheets. Each chemical in use in the plant must have an MSDS present. All chemical containers must be labeled accurately with the chemical name such that the chemical can be readily cross-referenced with the MSDS.
12. **Lighting**: Ensuring that work areas (internal and external) are well lit is important for minimizing risks to operators and also for ease of operations and maintenance.
13. **Confined spaces**: Many workplaces contain areas that are confined spaces. While they are not necessarily designed for people, they are large enough for workers to enter and perform certain jobs. A confined space also has limited or restricted means for entry or exit and is not designed for continuous occupancy. Confined spaces include, but are not limited to, tanks, vessels, silos, storage bins, hoppers, vaults, pits, manholes, tunnels, equipment housings, ductwork, pipelines, etc. OSHA uses the term "permit-required

confined space" to describe a confined space that has one or more of the following characteristics: contains or has the potential to contain a hazardous atmosphere; contains a material that has the potential to engulf an entrant; has walls that converge inward or floors that slope downward and taper into a smaller area which could trap or asphyxiate an entrant; or contains any other recognized safety or health hazard, such as unguarded machinery, exposed live wires, or heat stress. Ensure workers are trained to recognize confined spaces and that only trained personnel are permitted to enter confined spaces when the appropriate safeguards are in place. A means of worker extraction and atmosphere control are normally used when workers are exposed to confined spaces.

14. **Lock-out, tag-out (LOTO):** There are OSHA guidelines that address the practices and procedures necessary to disable machinery or equipment, thereby preventing the release of hazardous energy while employees are performing service and maintenance activities. Their standards outline measures for controlling hazardous energies ð electrical, mechanical, hydraulic, pneumatic, chemical, thermal, and other energy sources. Employees servicing or maintaining machines or equipment may be exposed to serious physical harm or death if hazardous energy is not properly controlled. A documented LOTO system is highly recommended for all operating water treatment facilities.
15. **Safety culture**: An environment where safety discussions happen before all maintenance operations, where operators are free to raise safety concerns without retribution and one where safety reports are openly shared is highly recommended for this water treatment plant. Safety should be built into all routine work and standard operating procedures at the plant and all maintenance work should be prefaced with a discussion on safety for the work at hand. This builds a culture where safety is a top priority and helps ensure all workers go home healthy at the end of their day.

SECTION 5 - OPERATING PROCEDURES

A description of how to operate the plant can be found in Section 7.1 ï Process Control Narrative. What follows is a general description of the principal modes of operation, manual controls, process set points and starting procedures.

5.1 - MODES OF OPERATION

5.1.1 - PRODUCTION MODE

Once the flow set points have been reached and are stabilized the system is in production mode. In the service mode, the feed pumps, cartridge filters, UV Reactors and sodium hypochlorite components are all working in alternance according to the process narrative. It will remain in this mode until the operator stops production or a shutdown alarm forces the system into flush mode. From the HMI, this mode can be set to HAND, OFF or AUTO. When in automatic mode, the system will start or stop by itself according to the raw water tank level.

5.1.2 - SERVICE MODE

In the service mode, the distribution pumps are used to keep a constant pressure in the distribution network. From the HMI, this mode can be set to HAND, OFF or AUTO. When in automatic mode, the system will start or stop by itself according to the pressure on the discharge of the distribution network.

5.2 - OPERATING THE SYSTEM



Before operating the system, please read the section in this manual on safety: Section 4- Safety,

5.2.1 - BEFORE STARTING THE SYSTEM

Before starting the system, it must be prepared for operation. Use the following checklist as a guide to ensure that the unit is ready to operate.

Here are the parameters to be monitored prior to the start of the treatment unit:

- Å All necessary circuit breakers must be closed.
- Å Check that chemicals are at an acceptable level.
- Å Isolate the non-functional parts for repair and maintenance.
- Å Check if the conditions of the previous alarms have been viewed, corrected and reset.

- Put all positioners in automatic mode to ensure proper operation.
- Before starting, especially after long periods of stop, make sure to inspect the equipment and check that everything is ready to operate according to the manufacturerôs manuals.

5.2.2 - STARTING THE SYSTEM

A normal starting sequence can be initiated at any time when the unit is ready to operate. The PLC starts and operates the treatment system automatically after the initial start-up sequence. It is important to position the manual valves so that the process can function properly, as described in section 7.1 - Process Control Narrative.

Here is the standard automatic start sequence for a water treatment plant:

1. Open the power of the human-machine interface (HMI) and ensure that the display shows the treatment main screen (or overview screen). If the power is on, but the screen is blank, touch the screen to activate it.
2. If necessary, enter the username and password, then press the OK button. The main screen should then appear.
3. On this screen, put the train in automatic mode to make it available for production. General rule, the entire system is placed in automatic mode and the PLC will ensure that all equipment used alternatively. This provides a balanced use of the available equipment. The PLC will also ensure that equipment is started in a normal sequence, so that no damage will be done to the equipment.

The exact sequence is described in Section 7.1 - Process Control Narrative.

5.2.3 - STOPING OR RESTARTING THE SYSTEM

The same principle applies to the shutdown sequence. The PLC will ensure that the equipment stops logically not to damage the equipment. Stopping the systenm can be requested at any time during production. Stops can also be caused by alarms. Please refer to Section 7.3 - Alarm List for more details.

To restart the system after a shutdown, you can use the following standard procedure:

1. At the HMI, navigate to the display of alarms and errors.
2. Stop the audible alarms if necessary.
3. Based on the information provided on the screen, determine what conditions may have caused the shutdown of the treatment system.
4. If the cause of the alarm is a problem that requires a physical intervention in the plant, refer to section 6.7- Trouble-Shooting for more information on recurring causes of stops.
5. Reset the alarm (or reset all the alarms) on the screen. The plant will return to its automatic mode and resume production.

5.2.4 - OPERATING GUIDELINES

Here are the major guidelines for daily operations of this water treatment system:

- The critical parameters of the feedwater (Section 2) should be inspected at appropriate intervals as indicated by the operation experience and adjusted if necessary.
- It is important to keep records of the system daily and accurately. The information in these sheets is essential to solving problems related to operation and performance. An example of a daily record sheet is available in the appendices.
- Maintain and schedule preventive maintenance regularly. This includes visual inspection, repairing leaks, cleaning and touch-up paint.
- H2O Innovation highly recommends purging the raw water lines and any equipment after prolonged shutdown. This will minimize the performance degradation of the equipment,

Caution:

It is important to frequently check the cartridge filters during operation. When there is a differential pressure of more than 20 PSI, it is important to change the cartridges. Confirm this value with the correct pressure gauges indicating the pressure before and after the filters.

5.3 - MANUAL CONTROLS



Before using manual controls, please read the section in this manual on safety: Section 4- Safety.

Some measure of manual control of equipment is possible; however these controls should only be used in exceptional circumstances or for troubleshooting assistance. It is expected that this plant operates in AUTO mode most of the time.

1. **Valves**: Valves can be placed in an override condition and opened or closed manually from the HMI. Normally, automated valves are left in the AUTO condition.
2. **Pumps with VFDs**: Pumps with Variable Frequency Drives (VFDs) can be operated manually at specific frequencies. This allows the operator to adjust the flowrate of the pump manually. Normally, the frequency that a pump operates at is controlled by the PLC in AUTO mode.
3. **Pumps without VFDs**: Pumps without VFDs can be placed in ON or OFF mode. Normally, pumps without VFDs are left in AUTO mode and turned ON and OFF by the PLC.
4. **Chemical Pumps:** Typically chemical pumps are operated only in AUTO mode. Refer to Section 4-Safety to understand some of the risks involved in chemical handling. Extreme care should be used when operating chemical pumps in manual mode. Chemical pumps typically are controlled in an ON/OFF fashion (although some plants do have VFDs on the pumps for flow control).
5. **Control Panels**: Control panels can be manually disabled and de-energized with the disconnect switch on the control panels themselves.

6. **Emergency Stop Button**: System operation can be stopped by pressing the emergency stop button. This is a red button located on the main control panel. In some systems, buttons are also located on remote panels but the functionality is the same. These buttons will place the system in a neutral state (all equipment placed in the OFF state) and system operation cannot resume until the button that has been depressed is physically pulled out to its ON location. When the system restarts, it restarts according to the normal start up sequence as defined in the PLC program.

5.4 - PROCESS SET POINTS

The design values for system set points will be determined during commissioning. These values can be changed from the set points screen for a particular system component.

Record all set point changes made during the operation of the system. In the event of a complete loss of power, the system will restart with set points taken from the electronically erasable programmable read only memory (EPROM) and any recent changes will be lost.

SECTION 6 - SYSTEM MAINTENANCE PROCEDURES



Before performing any maintenance, trouble-shooting or cleans on this system please read the section in this manual on safety: Section 4- Safety.

6.1 - INTRODUCTION AND GENERAL MAINTENANCE

This section describes the maintenance and repairs that should be scheduled for this water treatment system. Maintenance procedures for the components that are purchased from manufacturers are explained in the operating and maintenance manuals detailed in Section 11 of this present manual.

To ensure optimal performance of the system, it is important to maintain a maintenance and operation history that is accurate and current. Please refer to Appendix 12 for an example of daily data-recording sheets and typical equipment maintenance logs. Maintain an assiduous and regular documentation of the system performances and maintenance of the equipment is very useful to keep equipment history and make claims under the warranty that is in effect.

It is important to perform preventive maintenance procedures periodically and regularly. Once a month, it is important to check the entire system for signs of wear, deterioration and damage. These symptoms include excessive vibration, excessive or unusual noise, corrosion, pipes or loose connections and leaks.

During the inspection period, it is important to remove dust, sand, oil, moisture or other contaminants from the external surfaces of the engine. Also, remove dust, dirt or other debris from the air inlets.

6.2 - INSTRUMENT CALIBRATION

It is important to calibrate instrumentation and sensors at least twice a year. It is also important to confirm the status of the level and pressure switches at least once every six months. To do so, refer to their operation and maintenance manuals for specific calibration procedures and to the table in section 3.3 ï Calibration and Instrument Care.

6.3 - LUBRIFICATION OF ELECTRIC MOTORS

Grease the bearings on the electrical motors of the pumps every six months (if necessary). The procedure is as follows:

1. Stop the electrical motors.
2. Use a grease gun containing high quality grease that has a wide temperature range.
3. Remove the upper and lower caps of the grease ports of the shaft bearings. If a lubricant fitting is not permanently installed, install a grease gun fitting in the upper port.
4. Pump new grease into the bearing by upper port until the new clean grease appears at the drain port (lower port).
5. Roll the engine briefly until grease stops flowing through the port of the drain. Replace the cap of lower port (drain) and the cap of the upper port.

Caution: Do not over-lubricate the engine, as excessive lubrication can damage the bearing seals.

6.4 - LEAKING OF MECHANICAL SEALS

It is important to check for leaks from the mechanical seals after the first twenty-four (24) hours of operation. Thereafter, check the seals weekly. A leak is considered acceptable when it is not more than a drop every three or four minutes. If the leak rate increases, the gasket should be replaced.

6.5 - REPLACEMENT OF THE CARTRIDGE FILTERS

It is recommended to replace the filter when the differential pressure cartridge filter is over 20 PSI (read the relevant gauges). Operating the cartridge filters when the differential pressure is higher than 20 PSI can cause shearing of particles which can be transported downstream and increase the potential soiling of the water.

- To replace a cartridge filter, make sure the filter is isolate from the flow path so that water cannot enter the housing.

- Open the drain valve and the ventilation valve to allow the housing to drain and relieve pressure.

- Remove and replace the cartridges. Be careful not to leave debris or dirt enter the clean side of the housing. If this happens, flush the clean side to the drain for several minutes before installing the new cartridges.

- If a large amount of material remains on the dirty side of the box, the best way to clean is to use a wet / dry vacuum.

- Before replacing the top of the housing, make sure that the seal is lubricated and properly positioned in its slot. Inspect the gasket and replace it if necessary. Reassemble the housing.

- Fill the filter with water before restarting the system. At this point, it must be ensured that the drain valve is closed.

- Then, open the vent valves to allow air to escape. Partially open the inlet valve. Once a good flow of water goes out of the ventilation valve, close the valve and slowly open the inlet and outlet valves until they are fully open. This activates the cartridge filter for operation,

When the system is not operational, the cartridge filter housings and the filters should remain empty of water and dry. Stagnant water and wet filters are a perfect environment for the development of bio-activity. These biological organisms can be routed to the treated water when the system is back in service.

6.6 - WORKING WITH ROTATING EQUIPMENT

When working with or around pumps, blowers and other rotating equipment items, in addition to the instructions listed in Section 11 ï Vendors O&M Data and Manuals, take the following precautions:

- Before performing maintenance, isolate and drain all piping connected to a pump.
- Before performing maintenance on any rotating or powered equipment item, ensure the item is brought to a zero energy state and complete all lock-out/tag-out procedures required by government regulations, plant-specific procedures, and those recommendations in Section 4 ï Safety
- After completing maintenance, replace any guards or other safety components removed during the procedure. Personnel working on pumps used to transfer chemicals must be familiar with the safe-handling procedures associated with the chemicals involved.
- When working with diaphragm pumps or other chemical transfer pumps, be aware that some media may remain within the pumpôs diaphragm chamber even after the pump has been drained and ensure proper PPE is worn during this work.
- In general, motors should be inspected at regular intervals; approximately every 500 hours of operation or every 3 months, whichever occurs first. Keep the motor clean and the ventilation openings clear. Electrical connectors should be tight. Megger readings on motor insulation should be taken and recorded to monitor for issues.

6.7 - TROUBLE-SHOOTING



Before performing any maintenance, trouble-shooting or cleans on this system please read the section in this manual on safety: Section 4- Safety.

This trouble-shooting guide is intended to provide basic information only. Experienced operators and maintenance staff are required at any facility that has significant process equipment such

as this one. Only qualified and trained personnel should engage in trouble-shooting or maintenance on the equipment covered by this manual. The information provided in Section 11-Vendors O&M Data and Manuals must also be used for diagnosing and trouble-shooting issues with sub-vendor components.

These procedures assume that the instrumentation that is used when indicating a fault is calibrated and working properly. It is always recommended to check the accuracy and proper functioning of instrumentation in question. For analytical alarms, the operating team should check the values with laboratory instruments to confirm that the value is accurate before investigating other possible sources of the problem.

The following table describes some common problems and potential resolutions.

Table 7: Trouble-Shooting Tips

Problem	Possible Cause	Potential Resolution
High/Low Feed Pressure	Control loop	Check control system to make sure it is in ñAUTOò
	Feed pump VFD	Check for VFD malfunction.
	Feed pump discharge valve	Return discharge valve to normal position.
Low Suction Pressure on Feed Pump	Raw water tank level or feed valve	Ensure raw water tank is full and the feed valve is fully open.
	Pressure control loop	Ensure pressure control loop is in ñAUTOò
	Pump VFD	Check for VFD malfunction.
Feed Pump Failure	Circuit breaker	Close circuit breaker if open.
	Pump starter	Replace or repair starter as needed.
	Motor overloads	Ensure pump is operating properly. Repair or replace components as needed.
	Pump VFD	Check for VFD malfunction.

Problem	Possible Cause	Potential Resolution
High Pressure	Flow path	Look for any obstructions to the permeate flow path, clear as needed.
Low Flow	Flow line	Check for obstructions or closed valves in the permeate flow line.
	Control valve	Control valve may not be working properly, make necessary adjustments or repairs.
	Plant discharge piping	There may be a block in the plant discharge piping. Clear any obstructions and open any necessary valves.
	Feed pressure	Feed pressure may be low. Increase to specified levels.
	Control loop	Check control system to make sure it is in ñAUTOò
System will not start, no alarms.	Distribution water tank	It is normal for the system not to start if the product water tank is full.

SECTION 7 - CONTROLS DOCUMENTATION

7.1 - PROCESS CONTROL NARRATIVE

I13

PROCESS AND CONTROL NARRATIVE

Meliadine WTP

P65873-I13-0001,02

Simon Barbeau
18/08/2016

TABLE OF CONTENTS

SECTION 1 - DOCUMENT INTRODUCTION 2

1.1 - OBJECTIVES OF THIS DOCUMENT 2
1.2 - REFERENCE DOCUMENTS 2
1.2.1 - Drawings 2
1.3 - ABBREVIATIONS 2

SECTION 2 - SUMMARY 3

SECTION 3 - TREATMENT SYSTEM 4

3.1 - CONFIGURATION 4
3.1.1 - Main components configuration 4
3.2 - PRODUCTION MODE 4
3.2.1 - Functional Description 4
3.2.2 - Triggers 4
3.2.3 - Process Control 5
3.3 - PRODUCTION MODE OPERATING PARAMETERS 8
3.3.1 - Operating Parameters 8
3.3.2 - Dosing parameters 8

SECTION 4 - DISTRIBUTION SYSTEM 9

4.1 - CONFIGURATION 9
4.1.1 - Main components configuration 9
4.2 - SERVICE MODE 9
4.2.1 - Functional Description 9
4.2.2 - Triggers 9
4.2.3 - Process Control 10
4.3 - DISTRIBUTION PUMP OPERATING PARAMETERS 11
4.3.1 - Operating Parameters 11

SECTION 1 - DOCUMENT INTRODUCTION

1.1 - OBJECTIVES OF THIS DOCUMENT

The process control narrative describes the drinking water treatment system and its functionalities. It defines the specific requirements, which are necessary for proper and efficient operation of the system. In particular, it explains how the system runs throughout the different sequences of operation. This document should be consulted in tandem with the P&IDs and HMI operator interface. It should be noted that only the scope of work provided by H_2O Innovation is considered in this document.

1.2 - REFERENCE DOCUMENTS

1.2.1 - DRAWINGS

DRAWING NUMBER	DRAWING NAME	NUMBER OF PAGES
P65893-C01-0001	Meliadine WTP containerized unit Process & Instrumentation Diagram	6

1.3 - ABBREVIATIONS

ABBRÉVIATIONS	DÉFINITION
AUTO	Automatic
HAND	Munual
HMI	Human machine interface
MM	Multimedia
NaOCl	Sodium Hypochlorite
PLC	Programmable Logic Controller
UV	Ultraviolet
VFD	Variable Frequency Drive

SECTION 2 - SUMMARY

The system supplied by H2O Innovation is a containerized water treatment plant for production of potable water with a capacity of 216,000 liters per day. As requested, in document *6515-GGD-023 RO Potable Water General Guideline Design*, the water treatment plant proposed includes the required treatment steps:

- Fresh water storage
- 5 Micron Cartridge filters
- 1 Micron Cartridge filters
- UV Reactors
- Chlorine Injection
- Treated water storage
- Distribution system

SECTION 3 - TREATMENT SYSTEM

3.1 - CONFIGURATION

3.1.1 - MAIN COMPONENTS CONFIGURATION

ÉQUIPMENT	TAGS	CONFIGURATION
Filters Feed pump	P-10200	N+1 (2 x 100%)
Raw water Tank	T-10000	N (1 x 100%)
Cartridges Filters (5 microns)	F-40000	N+1 (2 x 100%)
Cartridges Filters (1 microns)	F-40100	N+1 (2 x 100%)
UV Reactors	UV-91000	N+1 (4 x 50%)
NaOCl Dosing System	P-89100	N+1 (2 x 100%)

3.2 - PRODUCTION MODE

3.2.1 - FUNCTIONAL DESCRIPTION

The feed pump is used to transport raw water from the raw water storage tank to the cartridge filters. Water is then sent through two series of cartridges filters. The first set is 5 microns cartridge filters and the second set is a 1 micron cartridge filter.

The water then goes through the first disinfection step - through the UV reactors. Each UV reactors has a flow restrictor on the outlet.

Finally, sodium hypochlorite is dosed in the treated water line. The treated water is then sent to the drinking water storage tank inside the distribution container.

3.2.2 - TRIGGERS

The water treatment plant can be activated in different ways. From the HMI, it can be set to HAND, OFF or AUTO.

3.2.2.1 - HAND

From the HMI, the operator can manually start the treatment system by setting it to Hand. For the HAND operation, the system will run until the operator switch the system to OFF or AUTO.

3.2.2.2 - OFF

From the HMI, the system can be set to OFF. When the system is offline, it is not available to start from the automated logic control. The offline mode is usually triggered by an operator on the HMI when equipment is defective or requires maintenance.

3.2.2.3 - AUTO

From the HMI, the operator can also switch the system to AUTO. When the system is in AUTO operation, the system is available for start and stop request coming from the automated logic control. The triggers for the pump when it is set to AUTO are:

3.2.2.3.1 - LEVEL OF THE STORAGE TANK

When the level in the filtrate storage tank (LT-99259) reaches the start level set point, the system begins **Production Mode**. It remains in production until the level in the tank reaches the stop level set point. The default values for those set points are defined in the operating parameters table.

3.2.2.3.2 - ALTERNATING FEED PUMPS

When a starting request is sent to the feed pumps (P-10200), only one pump can start at a time. A totalizer of operating hours is monitored on each pump. Between pumps that are available, the one with the lowest number of operating hours starts. This allows for an even amount of operation time for each pump so that there is not one pump getting more wear and tear than another pump.

3.2.2.3.3 - ALTERNATING DOSING PUMPS

When a starting request is sent to the dosing pump (P-89100), only one dosing pump can start at a time. A totalizer of operating hours is monitored on each pump. Between pumps that are available, the one with the lowest number of operating hours starts. This allows for an even amount of operation time for each pump so that there is not one pump getting more wear and tear than another pump.

3.2.3 - PROCESS CONTROL

3.2.3.1 - START SEQUENCE

When the system has a request to start, the system performs the following steps:

- Open automated valve FV-10299
- Wait 5 seconds and start the feed pump P10200
- Start the dosing pump P-89100 based on the production flow

3.2.3.2 - STOP SEQUENCE

When the system has a request to stop, the system performs the following steps:

- Stop the dosing pump P-89100
- Stop the feed pump P10200

- Wait 5 seconds and close automated valve FV-10299

3.2.3.3 - PROCESS CONTROLS

3.2.3.3.1 - LEVEL IN THE FEED WATER TANK

During **Production Mode**, the level transmitter (LT-10059) located on the raw water tank (T-1000) is used to control the ON/OFF automated valve (FV-10001). On the HMI, the operator can define set points to open and close the valve. When the level reaches the low opening set point, the valve opens. When the level reaches the high closing set point, the valve closes. The default values for this parameter are defined in the operating parameters table.

3.2.3.3.2 - FLOW PACED SODIUM HYPOCHLORITE INJECTION

During **Production Mode**, the sodium hypochlorite injection will vary based on the production flow (FIT-10274). For the sodium Hypochlorite injection, the operator may define the dosing rate on the HMI, the specific gravity, the weight %, the dilution %, the pump capacity and the pump stroke %. The PLC will calculate the required frequency to obtain the dosing rate set point depending on the dosing pump curve.

$$Q_C = \frac{Q_P * 1000 * \frac{C_V}{1000000}}{SG * C_S * C_D}$$

And

$$S = \frac{Q_c}{Cap * Stroke}$$

Where :

Q_C is the required flow of chemical product (sodium hypochlorite) (lph)

Q_P is the production flow (m^3/h)

C_V is the dosing rate setpoint (mg/L)

SG is the specific gravity

C_S is the weight concentration %

C_D is the dilution concentration %

Cap *is the maximum capacity of the dosing pump (lph)*

S *is the frequency of the pump (%)*

$Stroke$ is the stroke of the dosing pump (%)

3.2.3.3.3 - PRODUCTION FLOW

During **Production Mode**, the production flow will be monitored by the flowmeter (FIT-10274) and will be adjusted manually with the manual control valve (HCV-10276).

3.2.3.3.4 - PUMPS HAND/OFF/AUTO

Each pump/equipment can be set in Hand/Off/Auto mode from the HMI.

3.2.3.3.5 - AUTOMATED VALVE

Each automated valve can be set in Open/Close/Auto mode from the HMI.

3.2.3.3.6 - UV REACTORS

UV reactors (UV-91000) are completely autonomous units. They do not need to start and/or stop. The solenoid valve (SV-91053) on the outlet of each unit is connected to the controller of the UV reactor and will close automatically when the attached reactor gets a fault. From the UV reactor the PLC will get one fault signal and one intensity reading from each UV unit. Those inputs are displayed on the HMI.

3.2.3.4 - ANALOG READINGS

For each analog input in the PLC, we should have an indicator of the current value on the HMI. In the table below, the display unit is defined for each type of equipment:

TYPE	DISPLAY UNIT
Pressure	kPa
Flow	m^3/h
Level (tank)	M
Valve Opening	%
Turbidity	NTU
UV Intensity	%
Cl_2	Ppm
pH	--

3.2.3.5 - ALARMS

Please refer to the alarm list. Each set point for the alarms can be modified from the HMI.

3.3 - PRODUCTION MODE OPERATING PARAMETERS

3.3.1 - OPERATING PARAMETERS

PARAMETERS	TAGS	MIN	MAX	DEFAULT	UNITS
Treated water tank Start Level	LT-99259	0.0	2.0	1.2	m
Treated water tank Stop Level	LT-99259	0.0	2.0	1.5	m
Raw water tank Low opening Setpoint	LT-10059	0.0	2.2	1.3	m
Raw water tank High closing Setpoint	LT-10059	0.0	2.2	1.6	m

3.3.2 - DOSING PARAMETERS

PARAMETERS	TAGS	MIN	MAX	DEFAULT	UNITS
Dosing rate		0	5	1	mg/L
Specific gravity		0	2	1.157	--
Weight concentration %		0	100	12.5	%
Dilution concentration %		0	100	100	%
Maximum Pump Capacity		0	10	0.6	lph
Pump Stroke		0	100	50	%

SECTION 4 - DISTRIBUTION SYSTEM

4.1 - CONFIGURATION

4.1.1 - MAIN COMPONENTS CONFIGURATION

ÉQUIPMENT	TAGS	CONFIGURATION
Distribution pump	P-10200	N+1 (2 x 100%)
Treated water Tank	T-10000	N (5 x 20%)
Hydropneumatic Tank	T-99300	N (1 x 100%)

4.2 - SERVICE MODE

4.2.1 - FUNCTIONAL DESCRIPTION

The distribution pump is used to keep a constant pressure in the distribution network.

4.2.2 - TRIGGERS

From the HMI, the distribution pump can be set to HAND, OFF or AUTO.

4.2.2.1 - HAND

From the HMI, the operator can manually start the pump by setting it to Hand. For the HAND operation, the pump will run until the operator switch the system to OFF or AUTO. This feature is useful when we need to test the equipment.

4.2.2.2 - OFF

From the HMI, the pump can be set to OFF. When a pump is offline, it is not available to start from the automated logic control. The offline mode is usually triggered by an operator on the HMI when equipment is defected.

4.2.2.3 - AUTO

From the HMI, the operator can also switch the pump to AUTO. When the pump is in AUTO operation, the system is available for start and stop request coming from the automated logic control. The triggers for the pump when it is set to AUTO are:

4.2.2.3.1 - PRESSURE

When the pressure on the discharge of the distribution pumps get below the distribution pressure setpoint, the distribution pump starts.

4.2.2.3.2 - ALTERNATING PUMPS

When a starting request is sent to the pumps, only one pump can start at a time. A totalizer of operating hours is monitored on each pump. Between pumps that are available, the one with the lowest number of operating hours starts. This ensures none pumps are getting more wear and tear than another.

4.2.3 - PROCESS CONTROL

When the membrane filtration system is running, the feed pump (P-10200) is activated.

4.2.3.1 - DISTRIBUTION CONTROL

4.2.3.1.1 - CONSTANT PRESSURE

The pressure transmitter (PT-99259) located on the discharge of the distribution pumps is used to control the distribution pressure, using a PID loop controlled by the PLC. The PLC uses pressure values and adjusts the system to keep a constant pressure according to the pressure set point defined on the HMI. The default values are defined in the operating parameters table.

4.2.3.1.2 - CONTROL WITH VARIABLE FREQUENCY DRIVE

The PLC controls the distribution pump (P-99200) speed through the variable frequency drive connected to it. The PID loop calculation will accelerate the pump to increase the flow or the pressure and slow down to decrease it.

4.2.3.1.3 - PUMPS HAND/OFF/AUTO

Each pump/equipment can be set in Hand/Off/Auto mode from the HMI.

4.2.3.2 - ANALOG READINGS

For each analog input in the PLC, we should have an indicator of the current value on the HMI. In the table below, the display unit is defined for each type of equipment:

TYPE	DISPLAY UNIT
Pressure	kPa
Flow	m^3/h
Level (tank)	M
VFD Speed	Hz

4.2.3.3 - ALARMS

Please refer to the alarm list. Each set point for the alarms can be modified from the HMI.

4.3 - DISTRIBUTION PUMP OPERATING PARAMETERS

4.3.1 - OPERATING PARAMETERS

PARAMETERS	TAGS	MIN	MAX	DEFAULT	UNITS
Distribution Pressure	PT-99259	100	600	480	kPa

7.2 - OPERATION TABLE

X - OFF / Close O - ON / Open	P-10200 Raw water pump	P-89100 NaOCl Dosing pump		FV-10001 Feed Control Valve	FV-10299 Shutoff Valve
OFF	X	X		X	X
Production Mode	O	O[1]		O/X[2]	O

[1] NaOcl dosing pump will dose based on the production flow.

[2] Open and close according the level in the raw water tank (T-10059) - refer to PCN

X - OFF / Close O - ON / Open	P-99200 Dsitribution pump
OFF	X
Service Mode	O[1]

[1] Nthe speed of the pump will vary depending on the discharge pressure (P-99259)

7.3 - ALARM LIST

Cause and Effect List

CUSTOMER: Meliadine
PROJECT NUMBER: P-65873
DOCUMENT NUMBER: I10

Created by: SIB
Revised by: SIB
Date: 2016-08-18

Revision: 02

P&ID TAG	PLC TAG	TYPE	SUB-TYPE	DESCRIPTION (HMI MESSAGE)	Deadband	Low Limit	High Limit	SETPOINT	UNITS	DELAY (s)	Severity	ACTIVE CONDITION	TRIGGER	ACTION	RESET	Reset Required	P&ID #	NOTES	Rev
NA		Alarm	Digital	Main Control Panel Emercengy Stop	-	-	-	-	-		4	Always	When the emergency stop button is engaged.	Shutdown all the system. Display Alarm on HMI.	When the emergency stop button is released	No	NA		01
NA		Alarm	Digital	Panel 120V Detect	-	-	-	-	-		4	Always					NA		01
LI-10000		Alarm	Analog	Raw Water Tank Level Transmitter Out of Range Alarm	-	-	-	-	-	5	4	Always	When the analog signal is out of the 4-20 mA range.	Shutdown raw water pumps. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	Yes	P-65893-C01-0100		01
LI-10000		Alarm	Analog	Raw Water Tank Level High High Alarm	0,1	0	2	TBD	m	20	4	Always	When the high high alarm setpoint is reached.	Close the Feed Control Valve (FCV-10001) Display Alarm on HMI.	When the high high setpoint is no longer active.	No	P-65893-C01-0100		02
LI-10000		Alarm	Analog	Raw Water Tank Level High Alarm	0,1	0	2	1,8	m	20	3	Always	When the high alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the high setpoint is no longer active.	No	P-65893-C01-0100		02
LI-10000		Alarm	Analog	Raw Water Tank Level Low Alarm	0,1	0	2	1,1	m	20	3	Always	When the low alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the low setpoint is no longer active.	No	P-65893-C01-0100		02
LI-10000		Alarm	Analog	Raw Water Tank Level Low Low Alarm	0,1	0	2	1	m	20	4	Always	When the low low alarm setpoint is reached.	Shutdown raw water pumps. Display Alarm on HMI.	When the low low setpoint is no longer active.	No	P-65893-C01-0100		02
LE-10068		Alarm	Digital	Raw Water Leak Detector High High Alarm	-	-	-	-	-	5	4	Always	When the leak detector digital signal is activated	Shutdown the systems and close the raw water valve FV-10001	When the leak detector digital signal is no longer active	Yes	P-65893-C01-0100		01
PI-10259		Alarm	Analog	Raw Water Feed Pressure Transmitter Out of Range Alarm	-	-	-	-	-	5	4	Always	When the analog signal is out of the 4-20 mA range.	Shutdown raw water pumps. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	Yes	P-65893-C01-0100		01
PI-10259		Alarm	Analog	Raw Water Feed Pressure High High Alarm	1	0	400	400	kPa	5	4	When at least one raw water pump is running.	When the high high alarm setpoint is reached.	Shutdown raw water pumps. Display Alarm on HMI.	When the high high setpoint is no longer active.	Yes	P-65893-C01-0100		01
PI-10259		Alarm	Analog	Raw Water Feed Pressure High Alarm	1	0	400	400	kPa	5	3	When at least one raw water pump is running.	When the high alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the high setpoint is no longer active.	No	P-65893-C01-0100		01
P-10200A		Alarm	Digital	Raw Water Feed Pump A Motor Fault Alarm	-	-	-	-	-	3	4	When raw water pump A is running.	When the motor fault is triggered on the pump.	Shutdown raw water pump A, start pump B if available. Display Alarm on HMI.	When the fault is no longer active.	Yes	P-65893-C01-0100		02
P-10200A		Alarm	Digital	Raw Water Feed Pump A Motor Fail to Start Alarm	-	-	-	-	-	15	4	Always	When the PLC do not receive the run confirmation after a request to start	Shutdown raw water pump A, start pump B if available. Display Alarm on HMI.	When the fault is no longer active.	Yes	P-65893-C01-0100		01
P-10200A		Alarm	Digital	Raw Water Feed Pump A Motor Fail to Stop Alarm	-	-	-	-	-	15	4	Always	When the run confirmation is not release after a request to stop	All the valves and equipment remains in actual positions /status. Display Alarm on HMI.	When the fault is no longer active.	Yes	P-65893-C01-0100		01
P-10200B		Alarm	Digital	Raw Water Feed Pump B Motor Fault Alarm	-	-	-	-	-	3	4	When raw water pump B is running.	When the motor fault is triggered on the pump.	Shutdown raw water pump B, start pump A if available. Display Alarm on HMI.	When the fault is no longer active.	Yes	P-65893-C01-0100		02
P-10200B		Alarm	Digital	Raw Water Feed Pump B Motor Fail to Start Alarm	-	-	-	-	-	15	4	Always	When the PLC do not receive the run confirmation after a request to start	Shutdown raw water pump B, start pump A if available. Display Alarm on HMI.	When the fault is no longer active.	Yes	P-65893-C01-0100		01
P-10200B		Alarm	Digital	Raw Water Feed Pump B Motor Fail to Stop Alarm	-	-	-	-	-	15	4	Always	When the run confirmation is not release after a request to stop	All the valves and equipment remains in actual positions /status. Display Alarm on HMI.	When the fault is no longer active.	Yes	P-65893-C01-0100		01
P-10200 A/B		Alarm	Digital	Both Raw Water Pump Fault Alarm	-	-	-	-	-	-	4	Always	When Raw Water pump A and Raw water Pump B are in fault	Shutdown all the system. Display Alarm on HMI.	When the fault on one of the Raw Water pump	Yes	P-65893-C01-0100		02
FI-10274		Alarm	Analog	Raw Water Feed Flow Transmitter Out of Range Alarm	-	-	-	-	-	5	4	Always	When the analog signal is out of the 4-20 mA range.	Shutdown raw water pumps. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	Yes	P-65893-C01-0100		01
FI-10274		Alarm	Analog	Raw Water Feed Flow High High Alarm	0,1	0	20	11,3	m3/h	30	4	When at least one raw water pump is running.	When the high high alarm setpoint is reached.	Shutdown raw water pumps. Display Alarm on HMI.	When the high high setpoint is no longer active.	Yes	P-65893-C01-0100		01
FI-10274		Alarm	Analog	Raw Water Feed Flow High Alarm	0,1	0	20	10,2	m3/h	30	3	When at least one raw water pump is running.	When the high alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the high setpoint is no longer active.	No	P-65893-C01-0100		01
FI-10274		Alarm	Analog	Raw Water Feed Flow Low Alarm	0,1	0	20	2,5	m3/h	30	3	When at least one raw water pump is running.	When the low alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the low setpoint is no longer active.	No	P-65893-C01-0100		01
FI-10274		Alarm	Analog	Raw Water Feed Flow Low Low Alarm	0,1	0	20	0	m3/h	30	4	When at least one raw water pump is running.	When the low low alarm setpoint is reached.	Shutdown raw water pumps. Display Alarm on HMI.	When the low low setpoint is no longer active.	Yes	P-65893-C01-0100		01
PDI-40039		Alarm	Analog	Primary Cartridge Filter Differential Pressure High Alarm	1	0	150	70	kPa	300	3	When at least one raw water pump is running.	When the high alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the high setpoint is no longer active.	No	P-65893-C01-0400		01
PDI-40139		Alarm	Analog	Secondary Cartridge Filter Differential Pressure High Alarm	1	0	150	70	kPa	300	3	When at least one raw water pump is running.	When the high alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the high setpoint is no longer active.	No	P-65893-C01-0400		01
PI-40045		Alarm	Analog	Primary Filter Inlet Pressure Transmitter Out of Range Alarm	-	-	-	-	-	5	4	Always	When the analog signal is out of the 4-20 mA range.	Shutdown raw water pumps. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	Yes	P-65893-C01-0400		01
PI-40059		Alarm	Analog	Primary Filter Outlet Pressure Transmitter Out of Range Alarm	-	-	-	-	-	5	4	Always	When the analog signal is out of the 4-20 mA range.	Shutdown raw water pumps. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	Yes	P-65893-C01-0400		01
PI-40159		Alarm	Analog	Secondary Filter Outlet Pressure Transmitter Out of Range Alarm	-	-	-	-	-	5	4	Always	When the analog signal is out of the 4-20 mA range.	Shutdown raw water pumps. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	Yes	P-65893-C01-0400		01
AI-40206		Alarm	Analog	Filtered Water Turbidity Transmitter Out of Range Alarm	-	-	-	-	-	5	4	Always	When the analog signal is out of the 4-20 mA range.	Shutdown raw water pumps. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	Yes	P-65893-C01-0400		02
AI-40206		Alarm	Analog	Filtered Water Turbidity High High Alarm	0,01	0	0,3	0,15	NTU	120	4	When at least one raw water pump is running.	When the high high alarm setpoint is reached.	Shutdown raw water pumps. Display Alarm on HMI.	When the high high setpoint is no longer active.	Yes	P-65893-C01-0400		02
AI-40206		Alarm	Analog	Filtered Water Turbidity High Alarm	0,01	0	0,3	0,1	NTU	60	3	When at least one raw water pump is running.	When the high alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the high setpoint is no longer active.	No	P-65893-C01-0400		02
P-89100A		Alarm	Digital	NaOCl Dosin Pump A Fault Alarm	-	-	-	-	-	3	4	Always	When the fault is triggered on the dosing pump	Shutdown dosing pump A, start pump B if available. Display Alarm on HMI.	When the fault is no longer active.	Yes	P-65893-C01-0800		02
P-89100B		Alarm	Digital	NaOCl Dosin Pump B Fault Alarm	-	-	-	-	-	3	4	Always	When the fault is triggered on the dosing pump	Shutdown dosing pump B, start pump A if available. Display Alarm on HMI.	When the fault is no longer active.	Yes	P-65893-C01-0800		02
P-89100 A/B		Alarm	Digital	Both NaOCl Dosing Pump Fault Alarm	-	-	-	-	-	-	4	Always	When dosing pump A and dosing pump B are in fault	Shutdown all the system. Display Alarm on HMI.	When the fault on one of the Dosing pumps is	Yes	P-65893-C01-0100		02
UV-91000A		Alarm	Digital	UV Reactor A Fault Alarm	-	-	-	-	-	3	4	Always	When the fault is triggered on the UV reactor	System keeps operating. (Selenoid on the outlet of the uv reactor will automatically close, not control by the PLC) Display Alarm on HMI.	When the fault is no longer active.	No	P-65893-C01-0910		01
UV-91000B		Alarm	Digital	UV Reactor B Fault Alarm	-	-	-	-	-	3	4	Always	When the fault is triggered on the UV reactor	System keeps operating. (Selenoid on the outlet of the uv reactor will automatically close, not control by the PLC) Display Alarm on HMI.	When the fault is no longer active.	No	P-65893-C01-0910		01
UV-91000C		Alarm	Digital	UV Reactor C Fault Alarm	-	-	-	-	-	3	4	Always	When the fault is triggered on the UV reactor	System keeps operating. (Selenoid on the outlet of the uv reactor will automatically close, not control by the PLC) Display Alarm on HMI.	When the fault is no longer active.	No	P-65893-C01-0910		01
UV-91000D		Alarm	Digital	UV Reactor D Fault Alarm	-	-	-	-	-	3	4	Always	When the fault is triggered on the UV reactor	System keeps operating. (Selenoid on the outlet of the uv reactor will automatically close, not control by the PLC) Display Alarm on HMI.	When the fault is no longer active.	No	P-65893-C01-0910		01
UV-91000A/B/C/D				All UV Reactors in fault Alarm	-	-	-	-	-	-	4	Always	When UV Reactor A and UV reactor B and UV reactor C and UV reactor D are in fault	Shutdown all the system. Display Alarm on HMI.	When the fault on one of the UV reactor is no t	Yes	P-65893-C01-0100		02
UV-91000A		Alarm	Analog	UV Reactor A Intensity Transmitter Out of Range Alarm	-	-	-	-	-	3	3	Always	When the analog signal is out of the 4-20 mA range.	Warning only. System keeps operating. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	No	P-65893-C01-0910		02
UV-91000B		Alarm	Analog	UV Reactor B Intensity Transmitter Out of Range Alarm	-	-	-	-	-	3	3	Always	When the analog signal is out of the 4-20 mA range.	Warning only. System keeps operating. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	No	P-65893-C01-0910		02
UV-91000C		Alarm	Analog	UV Reactor C Intensity Transmitter Out of Range Alarm	-	-	-	-	-	3	3	Always	When the analog signal is out of the 4-20 mA range.	Warning only. System keeps operating. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	No	P-65893-C01-0910		02

P&ID TAG	PLC TAG	TYPE	SUB-TYPE	DESCRIPTION (HMI MESSAGE)	Deadband	Low Limit	High Limit	SETPOINT	UNITS	DELAY (s)	Severity	ACTIVE CONDITION	TRIGGER	ACTION	RESET	Reset Required	P&ID #	NOTES	Rev
UV-91000D		Alarm	Analog	UV Reactor D Intensity Transmitter Out of Range Alarm	-	-	-	-	-	3	3	Always	When the analog signal is out of the 4-20 mA range.	Warning only. System keeps operating. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	No	P-65893-C01-0910		02
AI-91093		Alarm	Analog	Treated Water Chlorine Analyzer Out of Range Alarm	-	-	-	-	-	3	3	Always	When the analog signal is out of the 4-20 mA range.	Warning only. System keeps operating. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	No	P-65893-C01-0910		02
AI-91093		Alarm	Analog	Treated Water Chlorine High High Alarm	0,1	0	5	5	ppm	60	4	When at least one raw water pump is running.	When the high high alarm setpoint is reached.	Shutdown raw water pumps. Display Alarm on HMI.	When the high high setpoint is no longer active.	No	P-65893-C01-0910		02
AI-91093		Alarm	Analog	Treated Water Chlorine High Alarm	0,1	0	5	4	ppm	60	3	When at least one raw water pump is running.	When the high alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the high setpoint is no longer active.	No	P-65893-C01-0910		02
AI-91093		Alarm	Analog	Treated Water Chlorine Low Alarm	0,1	0	5	0,3	ppm	60	3	When at least one raw water pump is running.	When the low alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the low setpoint is no longer active.	No	P-65893-C01-0910		02
AI-91093		Alarm	Analog	Treated Water Chlorine Low Low Alarm	0,1	0	5	0,1	ppm	60	4	When at least one raw water pump is running.	When the low low alarm setpoint is reached.	Shutdown raw water pumps. Display Alarm on HMI.	When the low low setpoint is no longer active.	Yes	P-65893-C01-0910		02
AI-91090		Alarm	Analog	Treated Water pH Transmitter Out of Range Alarm	-	-	-	-	-	3	3	Always	When the analog signal is out of the 4-20 mA range.	Warning only. System keeps operating. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	Yes	P-65893-C01-0910		01
AI-91090		Alarm	Analog	Treated Water pH High High Alarm	0,1	0	14	8,7	-	60	4	When at least one raw water pump is running.	When the high high alarm setpoint is reached.	Shutdown raw water pumps. Display Alarm on HMI.	When the high high setpoint is no longer active.	Yes	P-65893-C01-0910		02
AI-91090		Alarm	Analog	Treated Water pH High Alarm	0,1	0	14	8,5	-	60	3	When at least one raw water pump is running.	When the high alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the high setpoint is no longer active.	No	P-65893-C01-0910		01
AI-91090		Alarm	Analog	Treated Water pH Low Alarm	0,1	0	14	6,5	-	60	3	When at least one raw water pump is running.	When the low alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the low setpoint is no longer active.	No	P-65893-C01-0910		01
AI-91090		Alarm	Analog	Treated Water pH Low Low Alarm	0,1	0	14	6,3	-	60	4	When at least one raw water pump is running.	When the low low alarm setpoint is reached.	Shutdown raw water pumps. Display Alarm on HMI.	When the low low setpoint is no longer active.	Yes	P-65893-C01-0910		02
LE-99068		Alarm	Digital	Treated Water Leak Detector High High Alarm	-	-	-	-	-	5	4	Always	When the leak detector digital signal is activated	Shutdown distribution pumps. Shutdown the raw water pumps. Display Alarm on HMI.	When the leak detector digital signal is no longer active	Yes	P-65893-C01-0100		01
LI-99259		Alarm	Analog	Treated Water Tank Level Transmitter Out of Range Alarm	-	-	-	-	-	5	4	Always	When the analog signal is out of the 4-20 mA range.	Shutdown raw water pumps. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	Yes	P-65893-C01-0990		01
LI-99259		Alarm	Analog	Treated Water Tank Level High High Alarm	0,1	0	2	1,8	m	30	4	Always	When the high high alarm setpoint is reached.	Shutdown raw water pumps. Display Alarm on HMI.	When the high high setpoint is no longer active.	No	P-65893-C01-0990		01
LI-99259		Alarm	Analog	Treated Water Tank Level High Alarm	0,1	0	2	1,7	m	30	3	Always	When the high alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the high setpoint is no longer active.	No	P-65893-C01-0990		01
LI-99259		Alarm	Analog	Treated Water Tank Level Low Alarm	0,1	0	2	1,1	m	30	3	Always	When the low alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the low setpoint is no longer active.	No	P-65893-C01-0990		01
LI-99259		Alarm	Analog	Treated Water Tank Level Low Low Alarm	0,1	0	2	1	m	30	4	Always	When the low low alarm setpoint is reached.	Shutdown distribution pumps. Display Alarm on HMI.	When the low low setpoint is no longer active.	No	P-65893-C01-0990		01
P-99200A		Alarm	Digital	Distribution Pump A VFD Fault Alarm	-	-	-	-	-	3	4	Always	When the VFD fault is triggered on the pump.	Shutdown distribution pump A, starts pump B if it is available. Display Alarm on HMI.	When the fault is no longer active.	Yes	P-65893-C01-0990		02
P-99200A		Alarm	Digital	Distribution Pump A Motor Fail to Start Alarm	-	-	-	-	-	15	4	Always	When the PLC do not receive the run confirmation after a request to start	Shutdown distribution pump A, starts pump B if it is available. Display Alarm on HMI.	When the fault is no longer active.	Yes	P-65893-C01-0100		02
P-99200A		Alarm	Digital	Distribution Pump A Motor Fail to Stop Alarm	-	-	-	-	-	15	4	Always	When the run confirmation is not release after a request to stop	All the valves and equipment remains in actual positions /status. Display Alarm on HMI.	When the fault is no longer active.	Yes	P-65893-C01-0100		02
P-99200B		Alarm	Digital	Distribution Pump B VFD Fault Alarm	-	-	-	-	-	3	4	Always	When the VFD fault is triggered on the pump.	Shutdown distribution pump B, starts pump A if it is available. Display Alarm on HMI.	When the fault is no longer active.	Yes	P-65893-C01-0990		02
P-99200B		Alarm	Digital	Distribution Pump B Motor Fail to Start Alarm	-	-	-	-	-	15	4	Always	When the PLC do not receive the run confirmation after a request to start	Shutdown distribution pump B, starts pump A if it is available. Display Alarm on HMI.	When the fault is no longer active.	Yes	P-65893-C01-0100		02
P-99200B		Alarm	Digital	Distribution Pump B Motor Fail to Stop Alarm	-	-	-	-	-	15	4	Always	When the run confirmation is not release after a request to stop	All the valves and equipment remains in actual positions /status. Display Alarm on HMI.	When the fault is no longer active.	Yes	P-65893-C01-0100		02
P-99200 A/B		Alarm	Digital	Both Distribution Pump Fault Alarm	-	-	-	-	-	-	4	Always	When Distribution pump A and Distribution Pump B are in fault	Shutdown all the system. Display Alarm on HMI.	When the fault on one of the distribution pum	Yes	P-65893-C01-0100		02
PI-99259		Alarm	Analog	Distribution Pressure Transmitter Out of Range Alarm	-	-	-	-	-	5	4	Always	When the analog signal is out of the 4-20 mA range.	Shutdown distribution pumps. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	Yes	P-65893-C01-0990		01
PI-99259		Alarm	Analog	Distribution Pressure High High Alarm	1	0	600	600	kPa	5	4	Always	When the high high alarm setpoint is reached.	Shutdown distribution pumps. Display Alarm on HMI.	When the high high setpoint is no longer active.	Yes	P-65893-C01-0990		01
PI-99259		Alarm	Analog	Distribution Pressure High Alarm	1	0	600	520	kPa	10	2	Always	When the high alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the high setpoint is no longer active.	No	P-65893-C01-0990		02
PI-99259		Alarm	Analog	Distribution Pressure Low Alarm	1	0	600	350	kPa	10	2	Always	When the high alarm setpoint is reached.	Warning only. System keeps operating. Display Alarm on HMI.	When the high setpoint is no longer active.	No	P-65893-C01-0990		02
FI-99274		Alarm	Analog	Distribution Flow Transmitter Out of Range Alarm	-	-	-	-	-	5	3	Always	When the analog signal is out of the 4-20 mA range.	Shutdown distribution pumps. Display Alarm on HMI.	When the signal is between 4 - 20 mA.	Yes	P-65893-C01-0990		01
FI-99274		Alarm	Analog	Distribution Flow Low Low Alarm	0,1	0	45	0	m3/h	300	4	When at least one distribution pump is running.	When the low low alarm setpoint is reached.	Shutdown distribution pumps. Display Alarm on HMI.	When the low low setpoint is no longer active.	No	P-65893-C01-0990		02

7.4 - I/O LIST

CUSTOMER: Meliadine WTP
PROJECT NUMBER: P65873
DOCUMENT NUMBER: P65873-I11-0001

Created by: Vincent Roberge
Revised by: Philippe Leroux
Date: 03-08-2016

Revision: 2

NAME	INSTRUMENT / DESCRIPTION	I/O ADDRESS	SIGNAL	PANNEL / JB	LOCATION	MODULE	P&ID #	Rev
MAIN CONTROL PANEL								
IX_MCP_AU	Main Control Panel Emergency Stop		24 VDC	MCP-101	1	BMXDDI3202K	NA	1
IX_MCP_RESET	Alarm Reset		24 VDC	MCP-101	1	BMXDDI3202K	NA	1
IX_MCP_120V	Panel 120V Detect		24 VDC	MCP-101	1	BMXDDI3202K	NA	1
Spare			24 VDC	MCP-101	1	BMXDDI3202K	NA	1
IX_LE_10068	Raw Water Container Leak Detector		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0100	1
Spare			24 VDC	MCP-101	1	BMXDDI3202K	NA	1
IX_LE_99068	Treated Water Container Leak Detector		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0990	2
Spare			24 VDC	MCP-101	1	BMXDDI3202K	NA	1
IX_YA_89100A	Sodium Hypochlorite Pump P-89100A Fault Feedback		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0800	1
IX_YA_89100B	Sodium Hypochlorite Pump P-89100B Fault Feedback		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0800	1
IX_YA_91000A	UV-91000A Fault Feedback		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0910	1
IX_YA_91000B	UV-91000B Fault Feedback		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0910	1
IX_YA_91000C	UV-91000C Fault Feedback		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0910	1
IX_YA_91000D	UV-91000D Fault Feedback		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0910	1
Spare			24 VDC	MCP-101	1	BMXDDI3202K	NA	1
Spare			24 VDC	MCP-101	1	BMXDDI3202K	NA	1
IX_YA_10200A	Raw Water Pump P-10200A Fault Feedback		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0100	1
IX_YA_10200B	Raw Water Pump P-10200B Fault Feedback		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0100	1
IX_YI_10200A	Raw Water Pump P-10200A Running Feedback		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0100	1
IX_YI_10200B	Raw Water Pump P-10200B Running Feedback		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0100	1
IX_YA_99200A	Distribution Pump P-99200A Fault Feedback		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0990	2
IX_YI_99200A	Distribution Pump P-99200A Running Feedback		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0990	2
IX_YA_99200B	Distribution Pump P-99200B Fault Feedback		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0990	2
IX_YI_99200B	Distribution Pump P-99200B Running Feedback		24 VDC	MCP-101	1	BMXDDI3202K	P65873-C01-0990	2
Spare			24 VDC	MCP-101	1	BMXDDI3202K	NA	1
Spare			24 VDC	MCP-101	1	BMXDDI3202K	NA	1
Spare			24 VDC	MCP-101	1	BMXDDI3202K	NA	1
Spare			24 VDC	MCP-101	1	BMXDDI3202K	NA	1
Spare			24 VDC	MCP-101	1	BMXDDI3202K	NA	1
Spare			24 VDC	MCP-101	1	BMXDDI3202K	NA	1
Spare			24 VDC	MCP-101	1	BMXDDI3202K	NA	1
Spare			24 VDC	MCP-101	1	BMXDDI3202K	NA	1
OX_FYO_10001	Raw Water Tank T-10000 Feed Valve FV-10001 Open Command		24 VDC	MCP-101	2	BMXDDO3202K	P65873-C01-0100	2
OX_FYC_10001	Raw Water Tank T-10000 Feed Valve FV-10001 Close Command		24 VDC	MCP-101	2	BMXDDO3202K	P65873-C01-0100	2
OX_FYO_10299	Raw Water to Cartridge Filters Valve FV-10299 Open Command		24 VDC	MCP-101	2	BMXDDO3202K	P65873-C01-0100	2
OX_FYC_10299	Raw Water to Cartridge Filters Valve FV-10299 Close Command		24 VDC	MCP-101	2	BMXDDO3202K	P65873-C01-0100	2
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
OX_YC_89100A	Sodium Hypochlorite Pump P-89100A Start Command		24 VDC	MCP-101	2	BMXDDO3202K	P65873-C01-0800	1
OX_YC_89100B	Sodium Hypochlorite Pump P-89100B Start Command		24 VDC	MCP-101	2	BMXDDO3202K	P65873-C01-0800	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
OX_YC_10200A	Raw Water Pump P-10200A Start Command		24 VDC	MCP-101	2	BMXDDO3202K	P65873-C01-0100	1
OX_YC_10200B	Raw Water Pump P-10200B Start Command		24 VDC	MCP-101	2	BMXDDO3202K	P65873-C01-0100	1
OX_YC_99200A	Distribution Pump P-99200A Start Command		24 VDC	MCP-101	2	BMXDDO3202K	P65873-C01-0990	1
OX_YC_99200B	Distribution Pump P-99200B Start Command		24 VDC	MCP-101	2	BMXDDO3202K	P65873-C01-0990	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
Spare			24 VDC	MCP-101	2	BMXDDO3202K	NA	1
IX_LT_10060	Raw Water Tank T-10060 Level Transmitter		4-20 ma	MCP-101	3	BMXAMI0810	P65873-C01-0100	1
IX_LT_99259	Treated Water Tank T-99000 Level Transmitter		4-20 ma	MCP-101	3	BMXAMI0810	P65873-C01-0990	1
Spare			4-20 ma	MCP-101	3	BMXAMI0810	P65873-C01-0100	1
IX_PT_10259	Raw water Pumps Discharge Pressure Transmitter		4-20 ma	MCP-101	3	BMXAMI0810	P65873-C01-0100	1
IX_PT_40045	5 Microns Cartridge Filters Inlet Pressure Transmitter		4-20 ma	MCP-101	3	BMXAMI0810	P65873-C01-0400	1
IX_PT_40059	5 Microns Cartridge Filters Outlet Pressure Transmitter		4-20 ma	MCP-101	3	BMXAMI0810	P65873-C01-0400	1
IX_PT_40159	1 Micron Cartridge Filters Outlet Pressure Transmitter		4-20 ma	MCP-101	3	BMXAMI0810	P65873-C01-0400	1
IX_PT_99259	Distribution Pumps Discharge Pressure Transmitter		4-20 ma	MCP-101	3	BMXAMI0810	P65873-C01-0990	1
Spare			4-20 ma	MCP-101	4	BMXAMI0810	NA	1
Spare			4-20 ma	MCP-101	4	BMXAMI0810	NA	1
Spare			4-20 ma	MCP-101	4	BMXAMI0810	NA	1
Spare			4-20 ma	MCP-101	4	BMXAMI0810	NA	1
Spare			4-20 ma	MCP-101	4	BMXAMI0810	NA	1
Spare			4-20 ma	MCP-101	4	BMXAMI0810	NA	1
Spare			4-20 ma	MCP-101	4	BMXAMI0810	NA	1
IX_FIT_10274	Raw Water to Cartridge Filters Flow Transmitter		4-20 ma	MCP-101	5	BMXAMI0810	P65873-C01-0100	1
IX_FIT_99274	Treated Water to Distribution Flow Transmitter		4-20 ma	MCP-101	5	BMXAMI0810	P65873-C01-0990	1
IX_AIT_91000A	UV-91000A Light Intensity		4-20 ma	MCP-101	5	BMXAMI0810	P65873-C01-0910	1
IX_AIT_91000B	UV-91000B Light Intensity		4-20 ma	MCP-101	5	BMXAMI0810	P65873-C01-0910	1
IX_AIT_91000C	UV-91000C Light Intensity		4-20 ma	MCP-101	5	BMXAMI0810	P65873-C01-0910	1
IX_AIT_91000D	UV-91000D Light Intensity		4-20 ma	MCP-101	5	BMXAMI0810	P65873-C01-0910	1
Spare			4-20 ma	MCP-101	5	BMXAMI0810	NA	2
Spare			4-20 ma	MCP-101	5	BMXAMI0810	NA	2
IX_AIT_40206	Filtered Water Turbidity Transmitter		4-20 ma	MCP-101	6	BMXAMI0810	P65873-C01-0400	1
IX_AIT_91093	Treated Water Chlorine Transmitter		4-20 ma	MCP-101	6	BMXAMI0810	P65873-C01-0910	2
IX_AIT_91090	Treated Water pH Transmitter		4-20 ma	MCP-101	6	BMXAMI0810	P65873-C01-0910	2
IX_AIT_91094	Treated Water Temperature Transmitter		4-20 ma	MCP-101	6	BMXAMI0810	NA	2
IX_SI_99200A	Distribution Pump P-99200A Speed Feedback		4-20 ma	MCP-101	6	BMXAMI0810	P65873-C01-0990	2
IX_SI_99200B	Distribution Pump P-99200B Speed Feedback		4-20 ma	MCP-101	6	BMXAMI0810	P65873-C01-0990	2
Spare			4-20 ma	MCP-101	6	BMXAMI0810	NA	1
Spare			4-20 ma	MCP-101	6	BMXAMI0810	NA	1
OX_SC_89100A	Sodium Hypochlorite Pump P-89100A Speed Command		4-20 ma	MCP-101	7	BMXAMO0410	P65873-C01-0800	1
OX_SC_89100B	Sodium Hypochlorite Pump P-89100B Speed Command		4-20 ma	MCP-101	7	BMXAMO0410	P65873-C01-0800	1
OX_SC_99200A	Distribution Pump P-99200A Speed Command		4-20 ma	MCP-101	7	BMXAMO0410	P65873-C01-0990	1
OX_SC_99200B	Distribution Pump P-99200B Speed Command		4-20 ma	MCP-101	7	BMXAMO0410	P65873-C01-0990	1
Spare			4-20 ma	MCP-101	8	BMXAMO0410	NA	1
Spare			4-20 ma	MCP-101	8	BMXAMO0410	NA	1
Spare			4-20 ma	MCP-101	8	BMXAMO0410	NA	1
Spare			4-20 ma	MCP-101	8	BMXAMO0410	NA	1

SECTION 8 - MATERIAL SAFETY DATA SHEETS

8.1 - SODIUM HYPOCHLORITE

Material Safety Data Sheet

LA5839
Sodium Hypochlorite 12% Water Treatment

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Id: LA5839
Product Name: Sodium Hypochlorite 12% Water Treatment
Synonyms: Sodium oxychloride; Soda bleach liquor; Javel water; Clorox; Javex.
Chemical Family: Hydrochlorous acid, sodium salt.
Application: Chemical intermediate. Laboratory reagent. Water treatment. Pulp and paper. Bleaching agent. Disinfectant.

Distributed By:
Univar Canada Ltd.
9800 Van Horne Way
Richmond, BC
V6X 1W5

Prepared By: The Environment, Health and Safety Department of Univar Canada Ltd.
Preparation date of MSDS: 03/Apr/2014
Telephone number of preparer: 1-866-686-4827

24-Hour Emergency Telephone Number (CANUTEC): (613) 996-6666

2. HAZARDS IDENTIFICATION

Potential Acute Health Effects:
Eye Contact: Corrosive to eye tissue and may cause severe damage and blindness.
Skin Contact: Corrosive. May cause severe skin irritation. Prolonged contact may lead to burns and blisters and may aggravate dermatitis. May cause whitening or bleaching of the skin.
Inhalation: Corrosive to the respiratory passage. Causes irritation of the mouth, nose and throat. Repeated and/or prolonged exposures may cause productive cough, running nose, bronchopneumonia, pulmonary edema (fluid build-up in lungs) and reduction of pulmonary function. If mixed with acids or warmed to temperatures greater than 40 °Celsius, Sodium hypochlorite solutions release chlorine gas. This gas can cause severe irritation of the nose and throat. Exposures to high levels of chlorine gas may result in severe lung damage.
Ingestion: Corrosive. Causes burns to the mouth, throat and stomach. Causes vomiting, nausea, and diarrhea. Coma, shock and death may occur.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredients	Percentage (W/W)	LD50s and LC50s Route & Species:
Water 7732-18-5	60-100	Oral LD50 (Rat) >90 mL/kg
Sodium Hypochlorite, Solution 7681-52-9	10-30	Oral LD50 Rat = 8200 mg/kg Dermal LD50 Rabbit > 10000 mg/kg

Note: Drug Identification Number (DIN) - 02265729

4. FIRST AID MEASURES

Eye Contact: Wash eyes with water for a minimum of 30 minutes or until no evidence of the chemical remains. Hold eyelids open during flushing. Seek immediate medical attention.
Skin Contact: In case of contact, immediately flush skin with plenty of water for at least 30 minutes. Get medical attention.
Inhalation: Remove person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, get immediate medical attention.
Ingestion: Rinse mouth with water. Do not induce vomiting. Do not give anything by mouth to an unconscious person. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs. Seek immediate medical attention.
Notes to Physician: Due to the severely irritating or corrosive nature of the material, swallowing may lead to ulceration and inflammation of the upper alimentary tract with hemorrhage and fluid loss. Also, perforation of the esophagus or stomach may occur, leading to mediastinitis or peritonitis and the resultant complications.

5. FIRE FIGHTING MEASURES

Flash Point: None.
Flash Point Method: Not applicable.
Autoignition Temperature: Not available.
Flammable Limits in Air (%): Not Available.
Extinguishing Media: Use extinguishing media appropriate for surrounding fire.
Special Exposure Hazards: Keep containers cool to prevent rupture and release of material. Closed containers may explode in fire. Spilled material may cause floors and contact surfaces to become slippery.
Hazardous Decomposition/Combustion Materials (under fire conditions): Chlorine. Oxygen. Oxides of sodium.
Special Protective Equipment: Fire fighters should wear full protective clothing, including self-contained breathing equipment.
NFPA RATINGS FOR THIS PRODUCT ARE: Not Available.
HMIS RATINGS FOR THIS PRODUCT ARE: HEALTH 3, FLAMMABILITY 0, REACTIVITY 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures: Wear appropriate protective equipment.
Environmental Precautionary Measures: Prevent entry into sewers or streams, dike if needed. Consult local authorities.
Procedure for Clean Up: Ventilate area. Small spills: soak up with absorbent material and scoop into containers. Large spills : prevent contamination of waterways. Dike and pump into suitable containers. Clean up residual with absorbent material, place in appropriate container and flush with water. Spilled material may cause floors and contact surfaces to become slippery.

7. HANDLING AND STORAGE

Handling: For industrial use only. Handle and open containers with care. Avoid contact with eyes, skin and clothing. Do not ingest. Avoid inhalation of chemical. Empty containers may contain hazardous product residues. Keep the containers closed when not in use. Protect against physical damage. Use appropriate personnel protective equipment. When diluting, add this product to water in small amounts to avoid spattering. Never add water to this material.
Storage: Store in a cool, dry, well ventilated area, away from heat and ignition sources. Store below 29 °C. Do not freeze. Keep away from direct sunlight. Store away from organic chemicals, strong bases, metal powders, carbides, sulfides, and any readily oxidizable material. Storage area should be equipped with corrosion-resistant floors, sumps and should have controlled drainage to a recovery tank. Store in a sealed polyethylene lined container.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls:

Local exhaust ventilation as necessary to maintain exposures to within applicable limits. Make up air should always be supplied to balance air exhausted (either generally or locally). Ventilation required when spraying or applying in a confined area. Ventilation should be explosion proof. Eliminate ignition sources.

Respiratory Protection: Wear a NIOAH approved full facepiece respirator for acid gases or a self-contained breathing apparatus for air concentration levels up to 5 ppm. NIOSH approved supplied air respirator when airborne concentrations exceed exposure limits.

Gloves:

Impervious gloves. Neoprene gloves. Nitrile gloves. Rubber gloves.

Skin Protection: Neoprene coated apron or chemical resistant clothing. Impervious boots.

Eyes: Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes.

Other Personal Protection Data: Ensure that eyewash stations and safety showers are proximal to the work-station location.

Ingredients	Exposure Limit - ACGIH	Exposure Limit - OSHA	Immediately Dangerous to Life or Health - IDLH
Water	Not available.	Not available.	Not Available.
Sodium Hypochlorite, Solution	0.5 ppm As For Chlorine.	Not available.	Not Available.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid
Color: Clear Green to yellow.
Odor: Chlorine.
pH 11.5 - 13
Specific Gravity: 1.175
Boiling Point: Decomposition at 40°C / 104°F
Freezing/Melting Point: -25°C / -12°F
Vapor Pressure: 17.5 mmHg
Vapor Density: Not Available.
% Volatile by Volume: Not Available.
Evaporation Rate: Not Available.
Solubility: Soluble in water.
VOCs: Not Available.
Viscosity: Not Available.
Molecular Weight: Not Available.
Other: Not Available.

10. STABILITY AND REACTIVITY

Chemical Stability: Unstable above 40°C / 104 °F.
Hazardous Polymerization: Will not occur.
Conditions to Avoid: High temperatures. Exposure to light.
Materials to Avoid: Acids. Ammonia. Strong oxidizers. Reducing agents. Metals.
Hazardous Decomposition Products: When heated to decomposition, it emits acrid smoke and irritating fumes. Chlorine. Oxides of sodium. Oxygen.

Additional Information:

Hypochlorites may react with primary amines to form nitrogen trichloride which explodes spontaneously in air. Hypochlorite bleach reacts with urea to form nitrogen trichloride which explodes spontaneously in air. Some metals accelerate the decomposition of Sodium Hypochlorite. Nickel. Copper. Tin. Iron and its alloys. Manganese.

11. TOXICOLOGICAL INFORMATION

Principle Routes of Exposure

Ingestion: Corrosive. Causes burns to the mouth, throat and stomach. Causes vomiting, nausea, and diarrhea. Coma, shock and death may occur.

11. TOXICOLOGICAL INFORMATION

Skin Contact: Corrosive. May cause severe skin irritation. Prolonged contact may lead to burns and blisters and may aggravate dermatitis. May cause whitening or bleaching of the skin.
Inhalation: Corrosive to the respiratory passage. Causes irritation of the mouth, nose and throat. Repeated and/or prolonged exposures may cause productive cough, running nose, bronchopneumonia, pulmonary edema (fluid build-up in lungs) and reduction of pulmonary function. If mixed with acids or warmed to temperatures greater than 40 °Celsius, Sodium hypochlorite solutions release chlorine gas. This gas can cause severe irritation of the nose and throat. Exposures to high levels of chlorine gas may result in severe lung damage.
Eye Contact: Corrosive to eye tissue and may cause severe damage and blindness.

Additional Information: Aspiration may cause lung damage. Corrosive effects on the skin and eyes may be delayed, and damage may occur without the sensation or onset of pain.
Acute Test of Product:
Acute Oral LD50: Not Available.
Acute Dermal LD50: Not Available.
Acute Inhalation LC50: Not Available.

Carcinogenicity:

Ingredients	IARC - Carcinogens	ACGIH - Carcinogens
Water	Not listed.	Not listed.
Sodium Hypochlorite, Solution	Group 3	Not listed.

Carcinogenicity Comment: No additional information available.

Reproductive Toxicity/ Teratogenicity/ Embryotoxicity/ Mutagenicity: Not Available.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information:

Ingredients	Ecotoxicity - Fish Species Data	Acute Crustaceans Toxicity:	Ecotoxicity - Freshwater Algae Data
Water	Not Available.	Not Available.	Not Available.
Sodium Hypochlorite, Solution	0.03 - 0.19 mg/L LC50 (Oncorhynchus mykiss) 96 h semi-static 0.05 - 0.771 mg/L LC50 (Oncorhynchus mykiss) 96 h flow-through 0.06 - 0.11 mg/L LC50 (Pimephales promelas) 96 h flow-through 0.18 - 0.22 mg/L LC50 (Oncorhynchus mykiss) 96 h static 0.28 - 1 mg/L LC50 (Lepomis macrochirus) 96 h flow-through 0.4 - 0.8 mg/L LC50 (Lepomis macrochirus) 96 h static 4.5 - 7.6 mg/L LC50 (Pimephales promelas) 96 h static	Not Available.	0.095 mg/L EC50 Skeletonema costatum 24 h

Other Information:
Harmful to aquatic life at low concentrations. Toxicity is primarily associated with pH.

13. DISPOSAL CONSIDERATIONS

Disposal of Waste Method: Disposal of all wastes must be done in accordance with municipal, provincial and federal regulations.
Contaminated Packaging: Empty containers should be recycled or disposed of through an approved waste management facility.

14. TRANSPORT INFORMATION

DOT (U.S.):
DOT Shipping Name: HYPOCHLORITE SOLUTION
DOT Hazardous Class 8
DOT UN Number: UN1791
DOT Packing Group: III
DOT Reportable Quantity (lbs): Not Available.
Note: No additional remark.
Marine Pollutant: No.

TDG (Canada):
TDG Shipping Name: HYPOCHLORITE SOLUTION
Hazard Class: 8
UN Number: UN1791
Packing Group: III
Note: No additional remark.
Marine Pollutant: No.

15. REGULATORY INFORMATION

U.S. TSCA Inventory Status: All components of this product are either on the Toxic Substances Control Act (TSCA) Inventory List or exempt.

Canadian DSL Inventory Status: All components of this product are either on the Domestic Substances List (DSL), the Non-Domestic Substances List (NDSL) or exempt.

Note: Not available.

U.S. Regulatory Rules

Ingredients	CERCLA/SARA - Section 302:	SARA (311, 312) Hazard Class:	CERCLA/SARA - Section 313:
Water	Not Listed.	Not Listed.	Not Listed.
Sodium Hypochlorite, Solution	Not Listed.	Listed	Not Listed.

California Proposition 65: Not Listed.
MA Right to Know List: Listed.
New Jersey Right-to-Know List: Listed.
Pennsylvania Right to Know List: Listed.

WHMIS Hazardous Class:
E CORROSIVE MATERIAL



16. OTHER INFORMATION

Additional Information: This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

Disclaimer: NOTICE TO READER:
Univar, expressly disclaims all express or implied warranties of merchantability and fitness for a particular purpose, with respect to the product or information provided herein, and shall under no circumstances be liable for incidental or consequential damages.

Do not use ingredient information and/or ingredient percentages in this MSDS as a product specification. For product specification information refer to a Product Specification Sheet and/or a Certificate of Analysis. These can be obtained from your local Univar Sales Office.

All information appearing herein is based upon data obtained from the manufacturer and/or recognized technical sources. While the information is believed to be accurate, Univar makes no representations as to its accuracy or sufficiency. Conditions of use are beyond Univar's control and therefore users are responsible to verify this data under their own operating conditions to determine whether the product is suitable for their particular purposes and they assume all risks of their use, handling, and disposal of the product, or from the publication or use of, or reliance upon, information contained herein. This information relates only to the product designated herein, and does not relate to its use in combination with any other material or in any other process.

*****END OF MSDS*****

SECTION 9 - SPARE PARTS LIST

PROJECT: Meliadine Drinking

PROJECT NUMBER: P65873

PROJECT MANAGER: Alexis Morissette

DOCUMENT NUMBER: P65873-J02-0001

REVISION: 0

REVISION DATE: 2016-07-27

SPARE PARTS LIST

Critical Spare	Recommended Spare (2 year)	Maintenance Spare	Manufacturer	Model	Spare Description	On site Tags	Note	*On site total*	Spare quanity	Critical Spare	Recommended Spare (2 year)	Maintenance Spare
			Bray	310300-11010169-010200-21100007	3" Butterfly Valve	HV-99299 HV-99252A/B HV-99250A/B HV-10078		*6*	1	x		
			Champion	3-CVR15-SSPX-R	3" Check Valve	CV-99251 A/B		*2*	1	x		
			Chemline	21A005EC	1/2" PVC Ball Valve	HV-10228A/B HV-40028A/B HV-40128A/B HV-40078A/B HV-40178A/B HV-99228A/B HV-99277		*13*	5	x		
			Chemline	21A012EC	1-1/4" PVC Ball Valve	HV-99301		*1*	1	x		
			Chemline	LCMTE	1/4" PVC Sample Valve	HV-40080A/B HV-40180A/B HV-91077		*5*	1	x		
			Chemline	SB12A005VU	Pressure relief valve	PSV-89172A/B PCV-89172		*3*	1	x		
			Chemline	21A010EC	1" PVC Ball Valve	HV-91052A/B/C/D		*4*	2	x		
			Chemline	21A020EC	2" PVC Ball Valve	HV-10250A/B HV-10252A/B HV-40050A/B HV-40052A/B HV-40150A/B HV-40152A/B HV-91099		*13*	3	x		
			Georg Fischer	161.546.342	1/2" PVC Ball Valve for Dosing Skid	HV-89101 HV-89112 HV-89129 HV-89150A/B HV-89115 HV-89153 HV-89152A/B HV-89199		*10*	5	x		
			Grundfos Canada	96126851 & 85Z99123	Fresh water pump and motor	P-10200A/B		*2*	1	x		
			Grundfos Canada	85Z99129	Distribution pump's motor	P99200		*2*	1	x		
			Grundfos Canada	96416384	Distribution pump	P-99200		*2*	1	x		
			Prominent	GMXa0708PVT7U000UD1130BEN	Dosing Pump	P-89100A/B		*2*	1	x		
			Prominent	7142038	Dosing Pump Level Switch	LSL-89067A/B		*2*	1	x		
			Prominent	1001301	Dosing Pump Control Cable	N/A		*2*	1	x		
			Shelco	MEE1-30	1 micron Cartridges	F-40100A/B		*20*	20	x		
			Shelco	MEE5-30	5 micron Cartridges	F-40000A/B		*20*	20	x		
			Viqua	602856	UV Lamps	UV-91000A/B/C/D		*4*	6	x		
			Viqua	602976	UV Quartz Sleeve	UV-91000A/B/C/D		*4*	3	x		
			Viqua	650709-009	UV lights controller	UV-91000A/B/C/D		*4*	6	x		
			Viqua	650580	UV Sensor	UV-91000A/B/C/D		*4*	3	x		
			Champion	2-CVR15-SSPX-R	2" Check Valve	CV-10251 A/B		*2*	1	x		
			Bray	310400-11010169-010400-21100007	4" Butterfly Valve	HV-99078		*1*	1	x		
			Chemline	21A020VF/QA1T020	Automated On/Off valve	FV-10299	Stock Ham-Nord	*2*	1	x		
			Endress Hauser	PMC131-C22E1A1S	0-1000 kPa Pressure Transmitter	PT-10259 PT-40045 PT-40059 PT-40159	Can fit all PT on site since largest pressure range	*4*	1		x	
			Endress Hauser	CPS71-1BU2ESA	pH Sensor for Chlorine Panel	AE-91090		*1*	1		x	
			Endress Hauser	71076921	Spare Kit for CCS141, Chlorine Panel's Free Chlorine Sensor	AE-91093	Contains 2 replacement cartridges, 50 mL filling electrolyte and polishing sheets	*0*	1		x	
					Lot of PVC fittings (one of each type)		Jean Lizée will make one			x		

SECTION 10 - DRAWINGS AND DIAGRAMS

10.1 - PIPING AND INSTRUMENTATION DIAGRAMS (P&ID)

VALVE SYMBOLS

N.OPEN N.CLOSED

- BALL
- V-BALL
- BUTTERFLY
- DIAPHRAGM
- GATE
- GLOBE
- NEEDLE
- PLUG
- SAMPLE/DRAIN
- CHECK
- BACKFLOW PREVENTER
- INJECTION QUILL
- 3-WAY, 4-WAY
- PRESSURE REGULATING
- BACK PRESSURE REGULATING
- FLOW CONTROL
- 2-WAY SOLENOID
- 3-WAY SOLENOID
- 4-WAY SOLENOID
- AIR RELEASE
- VACUUM BREAKER
- PRESSURE RELEASE
- SLUICE GATE/WEIR

VALVE ACTUATOR SYMBOLS

- PNEUMATIC (FAIL LAST POSITION)
- F.C. PNEUMATIC FAIL CLOSE
- F.O. PNEUMATIC FAIL OPEN
- ELECTRIC
- DIAPHRAGM
- POSITIONER (ANY ACTUATOR TYPE)
- HAND OVERRIDE (ANY ACTUATOR TYPE)
- TRAVEL STOPS (ANY ACTUATOR TYPE)

FLOWMETER SYMBOLS

- ROTAMETER
- ROTAMETER W/ INTEGRAL NEEDLE VALVE
- THERMAL

INTEGRAL REMOTE

- MAGNETIC
- PADDLE
- VORTEX
- DP/ORIFICE

INSTRUMENTATION SYMBOLS

LOCALLY MOUNTED	IN CONTROL PANEL	DESCRIPTION
X nnnnn	X nnnnn	DISCRETE INSTRUMENT
	X nnnnn	PRIMARY PLC OR DCS SHARED CONTROL
	X nnnnn	SECONDARY PLC OR DCS SHARED CONTROL
	X nnnnn	COMPUTER FUNCTION

INSTRUMENT FUNCTIONS

- K SIGNAL PROCESSING FUNCTION
- A/M AUTO/MANUAL
- Σ ADDITION/SUMMATION
- Δ DIFFERENTIAL
- INTERLOCK LOGIC FUNCTION
- AVERAGING

INSTRUMENT CONNECTIONS

THREADED SOCKETWELD WELDED

PIPING CONNECTIONS & SYMBOLS

- FLANGE
- QUICK DISCONNECT HOSE/TUBE
- THREADED CONNECTION
- EXPANSION/FLEXIBLE/ ISOLATION JOINT
- UNION
- GROOVED COUPLING
- BLIND FLANGE
- DOUBLE CONTAINMENT
- CAPPED END
- REDUCER
- X" INSULATION THICKNESS
- INSULATION
- ECCENTRIC REDUCER
- X" INSULATION THICKNESS
- HEAT TRACING E=ELECTRIC S=STEAM G=GLYCOL
- DRAIN OUTLET

PIPING ABBREVIATIONS

316 SS	316 STAINLESS STEEL
304 SS	304 STAINLESS STEEL
316L SS	LOW CARBON 316 STAINLESS STEEL
304L SS	LOW CARBON 304 STAINLESS STEEL
CPVC	CHLORINATED POLYVINYL CHLORIDE
CS	CARBON STEEL
DI	DUCTILE IRON
HDPE	HIGH-DENSITY POLYETHYLENE
PE	POLYETHYLENE
PVC	POLYVINYL CHLORIDE
RLCS	RUBBER LINED CARBON STEEL
SCH.	SCHEDULE
SDR	STANDARD DIMENSION RATIO

LINE SYMBOLOGY

- MAIN PROCESS LINE
- SECONDARY PROCESS LINE
- PROCESS LINE, BY OTHERS
- COMM LINK (EX. PLC TO HMI)
- COMM LINK (EX. PLC TO DCS)
- ELECTRIC WIRING
- PNEUMATIC LINE
- LINE JUMPER
- PIPE DISCONTINUATION
- FLOW DIRECTION ARROWS
- 4" 316 SS SCH.10 — LINES SIZE/ MATERIAL IDENTIFIER
- SKID BOUNDARY — NOT BY H_2O Innovation / SKID BY H_2O Innovation
- REVISION
- LINES TO/FROM OTHER SHEETS — DESCRIPTION C01-0001 SHT 1 DESTINATION

PUMP SYMBOLS

- CENTRIFUGAL
- CHEMICAL METERING
- DIAPHRAGM
- POSITIVE DISPLACEMENT
- VACUUM
- SUBMERSIBLE OR FLOATING
- VERTICAL TURBINE
- PERISTALTIC/HOSE

MISCELLANEOUS EQUIPMENT SYMBOLS

- CARTRIDGE FILTER HOUSING
- AUTOMATIC STRAINER
- SILENCER
- MOTORIZED MIXER
- STATIC MIXER
- RESIN TRAP
- MOTOR
- EDUCTOR OR VENTURI
- Y STRAINER
- CONICAL OR TEMPORARY STRAINER
- PULSATION DAMPENER
- DIAPHRAGM
- FLOW ORIFICE
- RUPTURE DISK (PRESSURE)
- RUPTURE DISK (VACUUM)
- SPECTACLE BLIND (NORMALLY OPEN, NORMALLY CLOSED)
- COARSE BUBBLE DIFFUSER
- FINE BUBBLE DIFFUSER
- FILTER
- TURBOCHARGER
- MANWAY
- TANK
- IMMERSED HEATER
- IN-LINE HEATER
- ULTRASONIC LEVEL TRANSMITTER
- FLOAT-STYLE LEVEL SWITCH
- CHEMICAL CONTAINMENT
- CALIBRATION COLUMN
- MEMBRANE
- UV STERILIZER
- AIR COMPRESSOR
- POSITIVE DISPLACEMENT BLOWER
- REGENERATIVE BLOWER
- CENTRIFUGAL BLOWER
- REFRIGERATED AIR DRYER
- FLOW CHAMBER
- BIO-WHEEL

FLOW INSTRUMENTS

FAH	FLOW ALARM HIGH
FAL	FLOW ALARM LOW
FCV	FLOW CONTROL VALVE
FE	FLOW ELEMENT
FI	FLOW INDICATOR
FIC	FLOW INDICATING CONTROLLER
FIT	FLOW INDICATING TRANSMITTER
FR	FLOW RECORDING
FSH	FLOW SWITCH HIGH
FSL	FLOW SWITCH LOW
FV	FLOW CONTROL OR ON/OFF VALVE
FQ	FLOW TOTALIZER
FY	FLOW SIGNAL CONVERT, I/P, OR SOLN

PRESSURE INSTRUMENTS

PAH	PRESSURE ALARM HIGH
PAL	PRESSURE ALARM LOW
PC	PRESSURE CONTROLLER
PCV	SELF REG PRESS CONTROL VALVE
PDH	DIFFERENTIAL PRESSURE HIGH
PDI	DIFFERENTIAL PRESSURE INDICATOR
PDIT	DIFF PRESS INDICATING TRANSMITTER
PDSH	DIFFERENTIAL PRESS SWITCH HIGH
PG	PRESSURE GAUGE
PI	PRESSURE INDICATOR
PIC	PRESSURE INDICATING CONTROLLER
PIT	PRESSURE INDICATING TRANSMITTER
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
PSV	SELF REG PRESS SAFETY VALVE
PT	PRESSURE TRANSMITTER
PY	PRESS SIGNAL CONVERT, I/P, OR SOLN
PSLH	PRESSURE SWITCH LOW HIGH

LEVEL INSTRUMENTS

LAH	LEVEL ALARM HIGH
LAL	LEVEL ALARM LOW
LCV	SELF REG LEVEL CONTROL VALVE
LE	LEVEL ELEMENT
LG	LEVEL GAUGE
LI	LEVEL INDICATOR
LIC	LEVEL INDICATING CONTROLLER
LIT	LEVEL INDICATING TRANSMITTER
LSH	LEVEL SWITCH HIGH
LSL	LEVEL SWITCH LOW
LT	LEVEL TRANSMITTER
LV	LEVEL CONTROL OR ON/OFF VALVE
LY	LEVEL SIGNAL CONVERT, I/P, OR SOLN

TEMPERATURE INSTRUMENTS

TAH	TEMPERATURE ALARM HIGH
TAL	TEMPERATURE ALARM LOW
TC	TEMPERATURE CONTROLLER
TE	TEMPERATURE ELEMENT
TG	TEMPERATURE GAUGE
TI	TEMPERATURE INDICATOR
TIC	TEMP INDICATING CONTROLLER
TIT	TEMP INDICATING TRANSMITTER
TSH	TEMPERATURE SWITCH HIGH
TSL	TEMPERATURE SWITCH LOW
TT	TEMPERATURE TRANSMITTER
TV	TEMP CONTROL OR ON/OFF VALVE
TY	TEMP SIGNAL CONVERT, I/P, OR SOLN

ELECTRICAL ABBREVIATIONS

JB	JUNCTION BOX
MCP	MAIN CONTROL PANEL
RIO	REMOTE I/O PANEL
PP	POWER PANEL
VFD	VARIABLE FREQUENCY DRIVE
HOA	HAND-OFF-AUTO

ANALYTICAL INSTRUMENTS

AAH	ANALYTICAL ALARM HIGH
AAL	ANALYTICAL ALARM LOW
AE	ANALYTICAL ELEMENT
AI	ANALYTICAL INDICATOR
AIC	ANAL INDICATING CONTROLLER
AIT	ANAL INDICATING TRANSMITTER
ASH	ANALYTICAL SWITCH HIGH
ASL	ANALYTICAL SWITCH LOW
AT	ANALYTICAL TRANSMITTER
AY	ANALYTICAL SIGNAL CONVERT, I/P, OR SOL

MISCELLANEOUS INSTRUMENTS

HS	HAND SWITCH
HI	HAND SWITCH POSITION INDICATOR
II	CURRENT INDICATOR
QQI	TOTALIZER INDICATOR
SC	SPEED CONTROLLER
SI	SPEED INDICATOR
YA	MOTOR ALARM
YC	MOTOR CONTROL
YI	MOTOR ON/OFF INDICATOR
ZI	POSITION INDICATOR
ZIC	SWITCH CLOSE INDICATOR
ZIO	SWITCH OPEN INDICATOR
ZSC	POSITION SWITCH CLOSED
ZSO	POSITION SWITCH OPEN
ZT	POSITION TRANSMITTER
ZY	POSITIONER

VALVES & EQUIPMENT

AC	AIR COMPRESSOR
ARV	AIR RELEASE VALVE
AS	AIR SUPPLY
B	BLOWER
BT	BULK TOTE
CBD	COARSE BUBBLE DIFFUSER
CV	CHECK VALVE
ED	EDUCTOR
F	FILTER
FBD	FINE BUBBLE DIFFUSER
FL	FAIL LAST (DEFAULT IF NOT SHOWN)
FC	FAIL CLOSED
FO	FAIL OPEN
FQG	CALIBRATION COLUMN
H	HEATER
HCV	HAND CONTROL VALVE
HTR	HEATER
HV	HAND VALVE
M	MOTOR
MX	MIXER
P	PUMP
RT	RESIN TRAP
ST	SPILL TANK
STR	STRAINER
T	TANK
UV	ULTRAVIOLET
HV	HAND VALVE
MV	MULTI FUNCTION VALVE

OTHER ABBREVIATIONS

CAP	CAPACITANCE
CIP	CLEAN-IN-PLACE
COND	CONDUCTIVITY
DO_2	DISSOLVED OXYGEN
ESP	EMERGENCY STOP
IA	INSTRUMENT AIR
I/P	CURRENT TO PNEUMATIC CONVERTER
ORP	OXIDATION REDUCTION POTENTIAL
pH	HYDROGEN ION
RES	RESISTIVITY
RTD	RESISTANCE TEMP DETECTOR
SOL	SOLENOID
SP	SET POINT
uS	MICROSIEMENS

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00	13/06/2016	INITIAL RELEASE	M.P.	S.B.	R.D.	A.M.

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INTERPRETATION: ANSI Y14.5
TOLERANCES
FRACTIONS: ±1/64"
DECIMALS 0.X: ±0.030
0.XX: ±0.015
ANGLES: ±0.5°
HOLE SIZES: ±1/64"
HOLE CENTERS: ±1/64"
DO NOT SCALE PRINTS

MELIADINE

WTP CONTAINERIZED UNIT

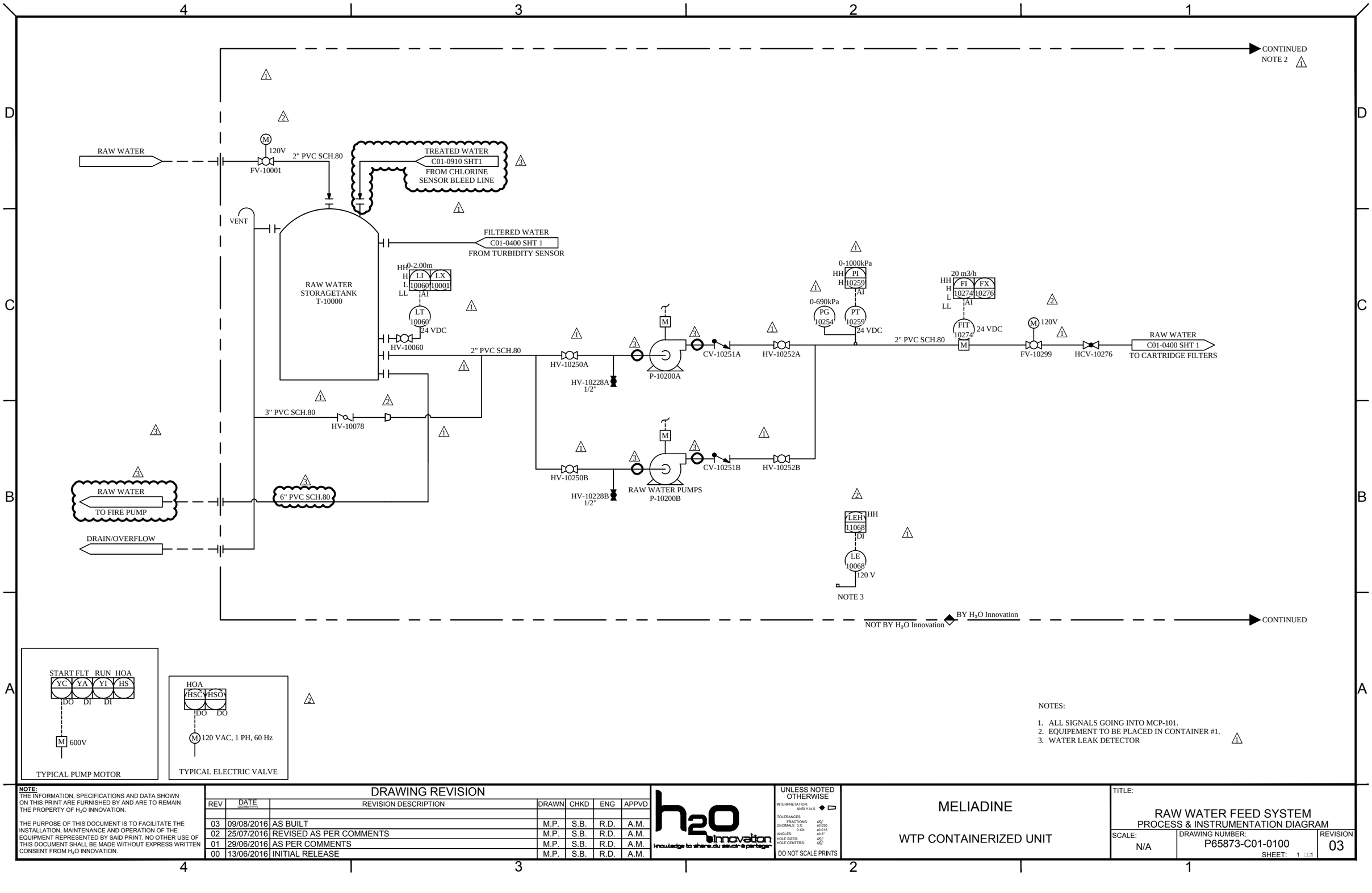
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SCALE: N/A

DRAWING NUMBER: P65873-C01-0001

SHEET: 1 □1

REVISION 03



NOTES:

1. ALL SIGNALS GOING INTO MCP-101.
2. EQUIPEMENT TO BE PLACED IN CONTAINER #1.
3. WATER LEAK DETECTOR

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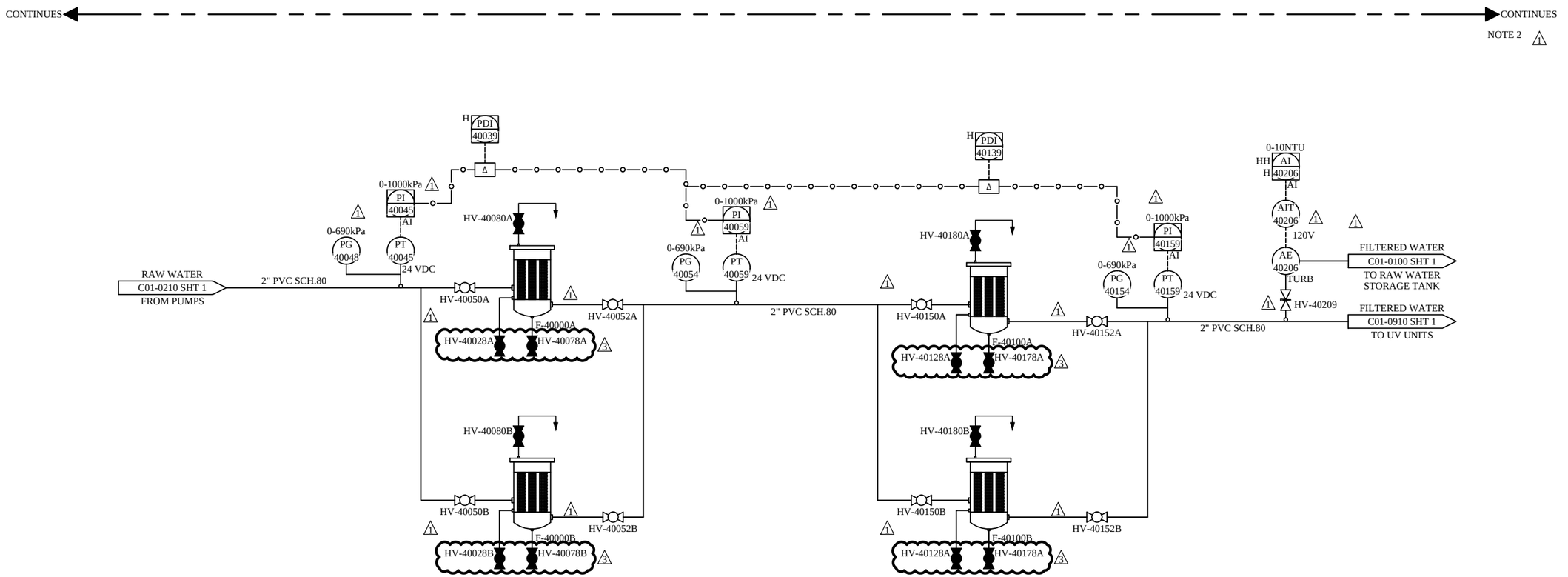
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WTP CONTAINERIZED UNIT

TITLE:
RAW WATER FEED SYSTEM
PROCESS & INSTRUMENTATION DIAGRAM

SCALE:	DRAWING NUMBER:	REVISION
N/A	P65873-C01-0100	03

SHEET: 1 □1



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NOTES:

1. ALL SIGNALS GOING INTO MCP-101.
2. EQUIPEMENT TO BE PLACED IN CONTAINER #1.

NOTE:
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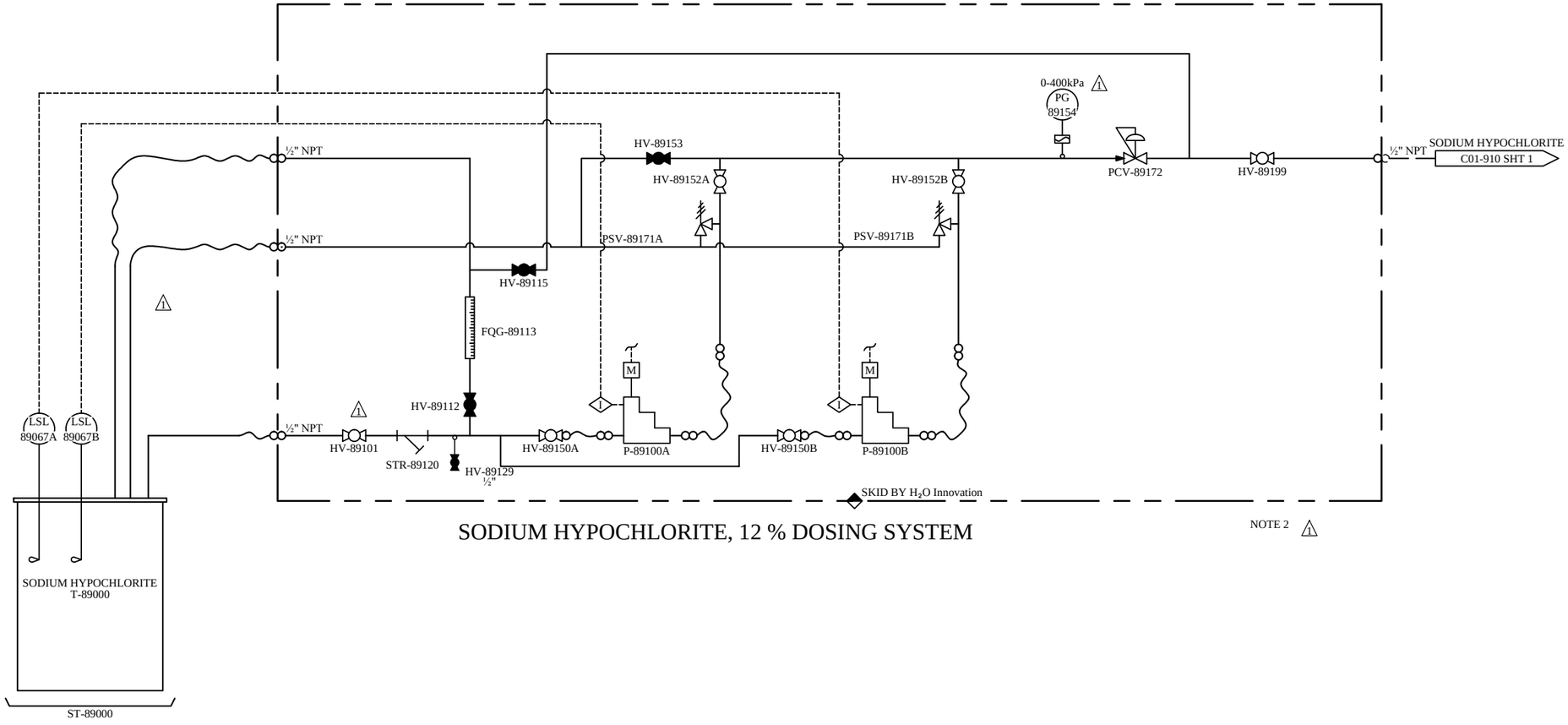
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FRACTIONS: ±1/64"
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0.XX: ±0.015
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HOLE CENTERS: ±1/32"
DO NOT SCALE PRINTS

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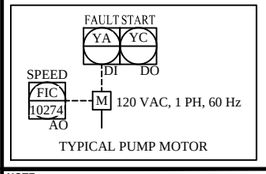
TITLE:
CARTRIDGE FILTERS
PROCESS & INSTRUMENTATION DIAGRAM

SCALE:	DRAWING NUMBER:	REVISION
N/A	P65873-C01-0400	03
	SHEET: 1 □1	



SODIUM HYPOCHLORITE, 12 % DOSING SYSTEM

NOTE 2 ⚠1



TYPICAL PUMP MOTOR

NOTES:

1. ALL SIGNALS GOING INTO MCP-101.
2. EQUIPEMENT TO BE PLACED IN CONTAINER #1. ⚠1

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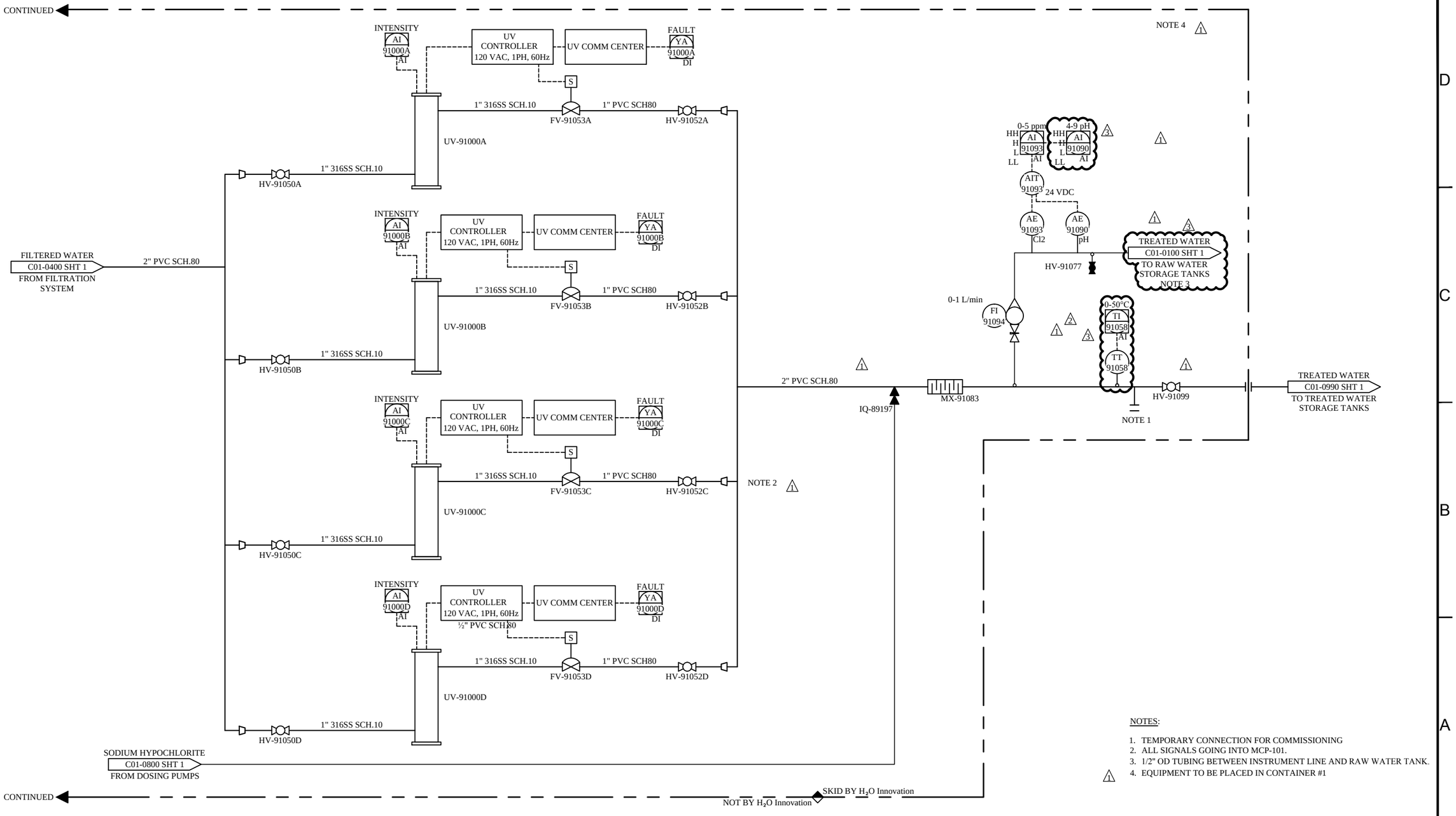
UNLESS NOTED OTHERWISE
INTERPRETATION: ANSI Y14.5
TOLERANCES
FRACTIONS: ±1/64"
DECIMALS 0.X: ±0.030
0.XX: ±0.015
ANGLES: ±0.5°
HOLE SIZES: ±1/64"
HOLE CENTERS: ±1/64"
DO NOT SCALE PRINTS

MELIADINE

WTP CONTAINERIZED UNIT

TITLE:
DOSING SKIDS - DUPLEX SOLENOID
PROCESS & INSTRUMENTATION DIAGRAM

SCALE: N/A
DRAWING NUMBER: P65873-C01-0800
SHEET: 1 □1
REVISION 03



NOTES:

1. TEMPORARY CONNECTION FOR COMMISSIONING
2. ALL SIGNALS GOING INTO MCP-101.
3. 1/2" OD TUBING BETWEEN INSTRUMENT LINE AND RAW WATER TANK.
4. EQUIPMENT TO BE PLACED IN CONTAINER #1

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INTERPRETATION: ANSI Y14.5
TOLERANCES:
FRACTIONS: ±1/64"
DECIMALS 0.X: ±0.030
0.XX: ±0.015
ANGLES: ±0.5°
HOLE SIZES: +1/64" -0"
HOLE CENTERS: ±1/32"
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WTP CONTAINERIZED UNIT

TITLE:
UV TREATMENT UNITS
PROCESS & INSTRUMENTATION DIAGRAM

SCALE: N/A

DRAWING NUMBER: P65873-C01-0910

SHEET: 1 □1

REVISION 03

TREATED WATER
C01-0910 SHT 1
FROM UV UNITS

2" PVC SCH.80

VENT

TREATED WATER
STORAGETANK
T-99000

NOTE 1

HH
H
L
LL
0-2.00m
LI
99259
AI

LT
99259
24 VDC

HV-99259

4" PVC SCH.80

HV-99078

3" PVC SCH.80

HV-99250A

HV-99228A
1/2"

M

P-99200A

CV-99251A

HV-99252A

HYDROPNEUMATIC
TANK
T-99300

HV-99301
1-1/4"

3" PVC SCH.80

0-600kPa
HH
H
L
PI
99259
PX
99200
AI

0-690kPa
PG
99254

PT
99259
24 VDC

0-45 m3/Hr
LL
FI
99274
AI

FIT
99274
24 VDC

M

NOTE 3

NOTE 4

TREATED WATER
TO EMERGENCY SHOWER

HV-99299

TREATED WATER
TO DISTRIBUTION

HV-99277
1/2"

LEH
99068
HH
DI

LE
99068
120 V

NOTE 5

3" PVC SCH.80

HV-99250B

HV-99228B
1/2"

M

TREATED WATER
DISTRIBUTION PUMPS
P-99200B

CV-99251B

HV-99252B

DRAIN/OVERFLOW

BY H_2O Innovation

BY OTHERS

SIGNAL
FROM PROCESS
VARIABLE

PID	SPD	START	FLT	RUN	HOA
PIC	SI	YC	YA	YI	HS
AO	AI	DO	DI	DI	

SC

M 600 VAC, 3 PH, 60 Hz

TYPICAL PUMP MOTOR (WITH VFD)

NOTES:

1. 5 TANKS IN SERIES LINKED TOGETHER
2. ALL SIGNALS GOING INTO MCP-101.
3. EQUIPMENT TO BE PLACED IN CONTAINER #2.
4. EQUIPMENT TO BE PLACED IN CONTAINER #1.
5. WATER LEAK DETECTOR

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INTERPRETATION: ANSI Y14.5
TOLERANCES
FRACTIONS: ±1/64"
DECIMALS .0.X: ±0.030
.0.XX: ±0.015
ANGLES: ±0.5°
HOLE SIZES: +1/64" -0"
HOLE CENTERS: ±1/64"
DO NOT SCALE PRINTS

MELIADINE

WTP CONTAINERIZED UNIT

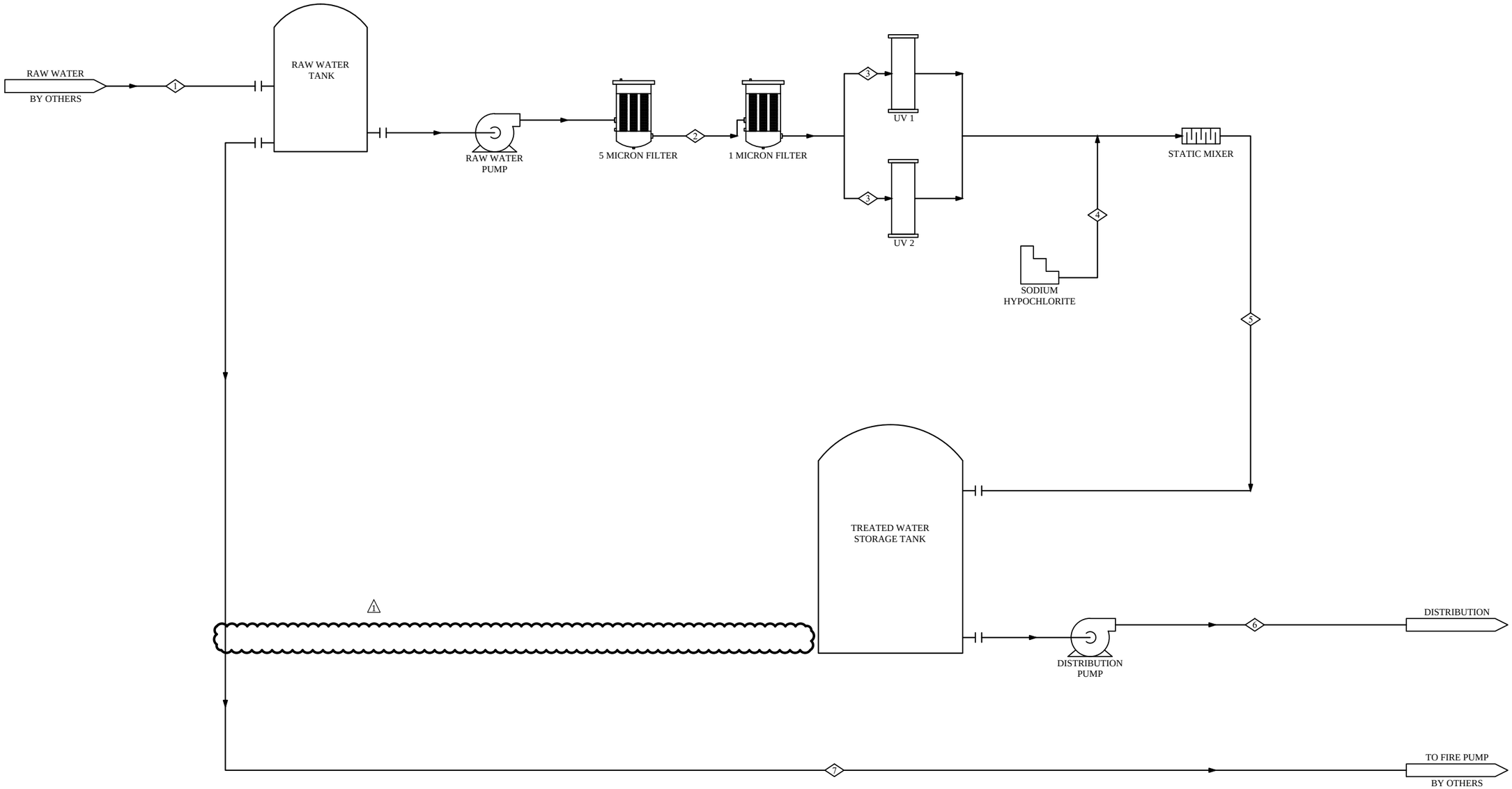
TITLE:
TREATED WATER DISTRIBUTION SYSTEM
PROCESS & INSTRUMENTATION DIAGRAM

SCALE: N/A

DRAWING NUMBER: P65873-C01-0990
SHEET: 1 □1

REVISION 03

10.2 - PROCESS FLOW DIAGRAM (PFD)



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INTERPRETATION: ANSI Y14.5
TOLERANCES
FRACTIONS: ±1/64"
DECIMALS .0.X: ±0.030
.0.XX: ±0.015
ANGLES: ±0.5°
HOLE SIZES: ±1/64"
HOLE CENTERS: ±1/64"
DO NOT SCALE PRINTS

MELIADINE STP

WTP CONTAINERIZED UNIT

TITLE:
PROCESS FLOW DIAGRAM

SCALE:	DRAWING NUMBER:	REVISION
N/A	P65873-C11-0001	1
	SHEET: 1 □2	

Line Number	Description	Design Flow	Max Flow		
1	Raw Feed	9,1 m3/d	9,1 m3/d		
2	Filter Feed	4,55 m3/d	9,1 m3/d		
3	UV Feed	2,28 m3/d	4,55 m3/d		
4	Sodium Hypochlorite 12,5% *	0,04 m3/d	0,05 m3/d		
5	Feed Treated Water Tank	9,1 m3/d	9,1 m3/d		
6	Distribution	9,1 m3/d	37,2 m3/d		
7	Feed Fire Pump	Fire pump (By Other)	Fire pump (By Other)		

* Those flow are calculated with a 4:1 dilution solution made from sodium hypochlorite 12, 5%

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INTERPRETATION: ANSI Y14.5
TOLERANCES
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0.XX: ±0.015
ANGLES: ±0.5°
HOLE SIZES: ±1/32"
HOLE CENTERS: ±1/32"
DO NOT SCALE PRINTS

MELIADINE STP

WTP CONTAINERIZED UNIT

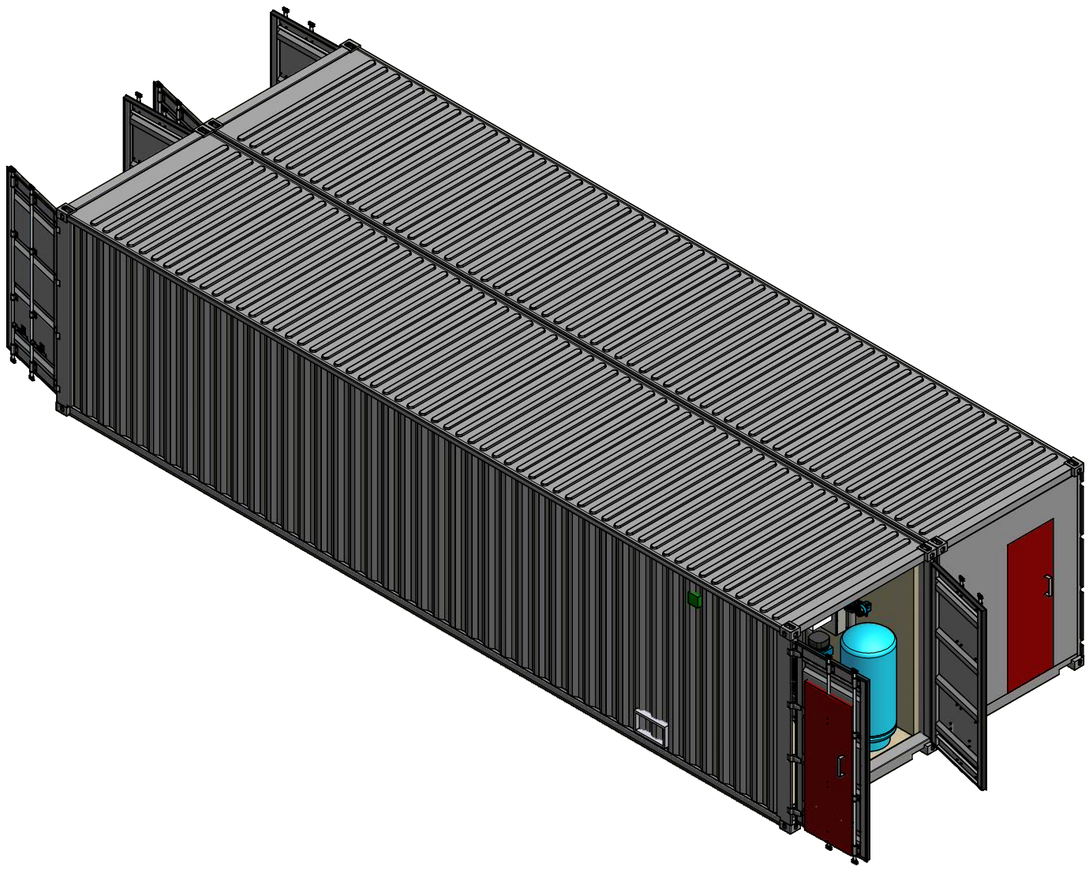
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PROCESS FLOW DIAGRAM

SCALE: N/A

DRAWING NUMBER: P65873-C11-0001
SHEET: 2 □2

REVISION: 1

10.3 - GENERAL ARRANGEMENT DRAWINGS



ISO VIEW

NOTES:

1. REFERENCE P&ID #P65873-C01-0001.

2. BOLTS AND NUTS ARE STAINLESS STEEL TYPE 316. WASHERS AND
LOCK WASHERS ARE STAINLESS STEEL TYPE 316 PER ASTM F436 AND F844.
MECHANICAL PROPERTIES PER CONDITION CW OF ASTM F593.
DIMENSION PER ASME B18.2.1.
THREADS PER ANSI B1.1 CLASS 2A.

3. STRUCTURAL STEEL WELDING AS PER CODE OF STANDARD PRACTICE, CSA W47.1 AND CSA W59.

4. NO VERTICAL DOWN WELDS ARE ALLOWED UNLESS CERTIFIED PER CSA W59 AND
APPROVED BY H_2O INNOVATION.

5. STITCH WELDS ARE NOT ALLOWED UNLESS APPROVED BY H_2O INNOVATION.

6. HOLLOW STRUCTURAL STEEL SECTIONS PER ASTM A500, GRADE B.

7. STRUCTURAL CHANNEL, ANGLES, AND PLATE PER ASTM A36.

8. SAND BLAST FRAME TO SSPC-SP10 FINISH, ACCEPTABLE FOR POWDER COAT OR PAINTING.

9. APPLY ONE (1) COAT, WITH MINIMUM DRY FILM THICKNESS (DFT) PER COAT OF 4 TO 7 MILS,
OF POLYAMIDE EPOXY PRIMER. PITT-GUARD 95-245 SERIES FROM PPF OR APPROVED EQUAL.

10. APPLY TWO (2) COATS, WITH MINIMUM DRY FILM THICKNESS (DFT) PER COAT OF 2 TO 3 MILS,
OF ACRYLIC ALIPHATIC URETHANE PAINT. PITTHANE ULTRA 95-812 SERIES (TINTED TO
MATCH RAL5010) FROM PPG OR APPROVED EQUAL.
TO ACHIEVE FINAL 8 TO 13 MILS TOTAL DRY FILM THICKNESS.

11. ALL STAINLESS STEEL TO BE WELDED TO ASME B31.1,
100 PERCENT PENETRATION AND BACK GASSED WITH ARGON.

12. FINISHED FABRICATION OF STAINLESS STEEL SPOOLS MUST BE
HYDROSTATICALLY TESTED TO 1.5 TIMES OPERATING PRESSURE.
OPERATING PRESSURE SHALL BE XXX.

13. ALL PVC PIPE TO BE SCHEDULE 80, GRAY, U.N.O.
PIPE MATERIAL TO CONFORM TO ASTM D1784.
PHYSICAL DIMENSIONS, SCHEDULES, AND TOLERANCES TO CONFORM TO ASTM D1785.

14. ALL PVC FITTINGS TO BE SCHEDULE 80, GRAY.
SOCKET FITTINGS TO CONFORM TO ASTM D2467.

15. PVC FLANGES 3" AND LARGER TO BE VAN STONE STYLE WITH GLASS FILLED PVC RING, U.N.O.
PVC FLANGES 2-½" AND SMALLER TO BE VAN STONE STYLE WITH PVC RING, UNO
PVC FLANGES TO MEET CLASS 150 BOLT HOLE PATTERN PER ANSI B16.5.

16. PVC PRIMER TO CONFORM TO ASTM F656.
PVC SOLVENT CEMENT TO CONFORM TO ASTM D2564.

17. ALL GASKETS TO CONFORM TO ASTM F477.

18. FINISHED FABRICATION OF PVC/CPVC SPOOLS MUST BE HYDROSTATICALLY TESTED TO 50 PSI.

19. UNWITNESSED TEST REPORT MUST BE PROVIDED.

20. MATERIAL TEST REPORTS (MTR) TO BE PROVIDED FOR ALL MATERIAL.

21. APPROXIMATE SHIPPING WEIGHT: 63,847 LBS.

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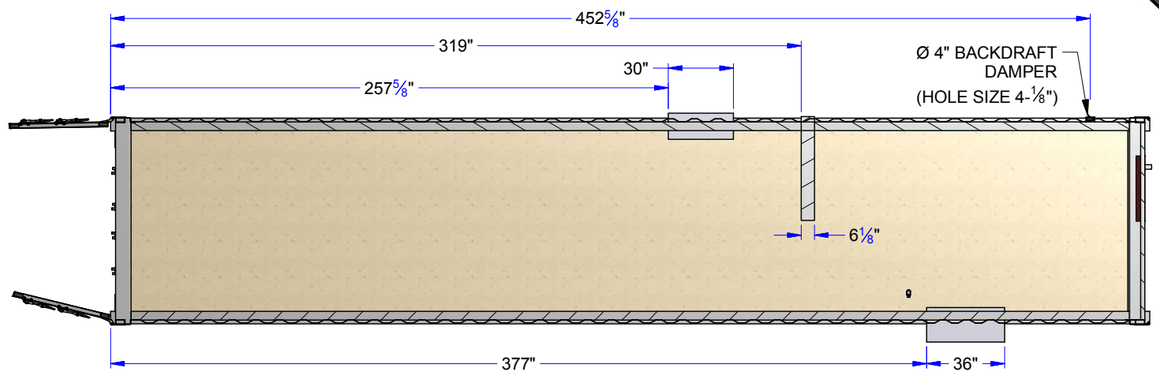
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TOLERANCES:
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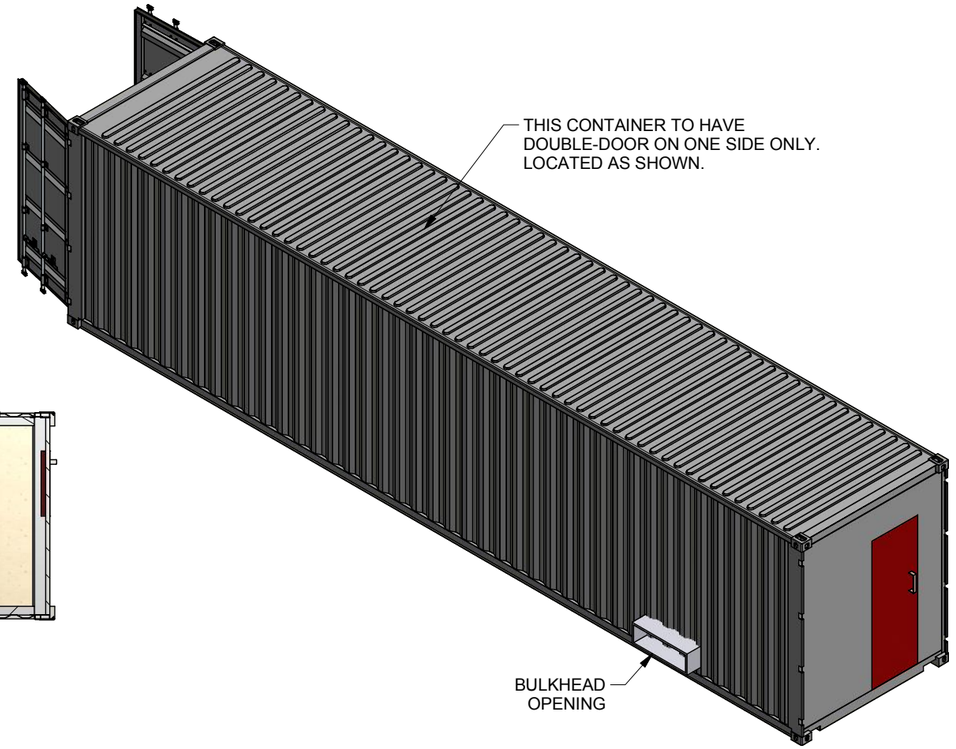
MELIADINE, NU

TITLE:
DRINKING WATER CONTAINER
GENERAL ARRANGEMENT

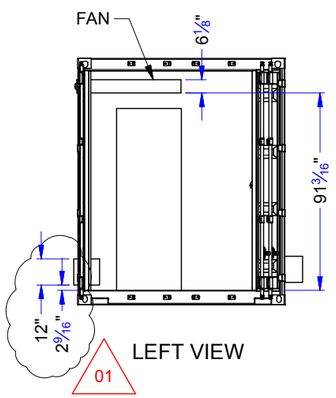
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N/A	P65873-B01-0001 SHEET: 1 OF 4	01



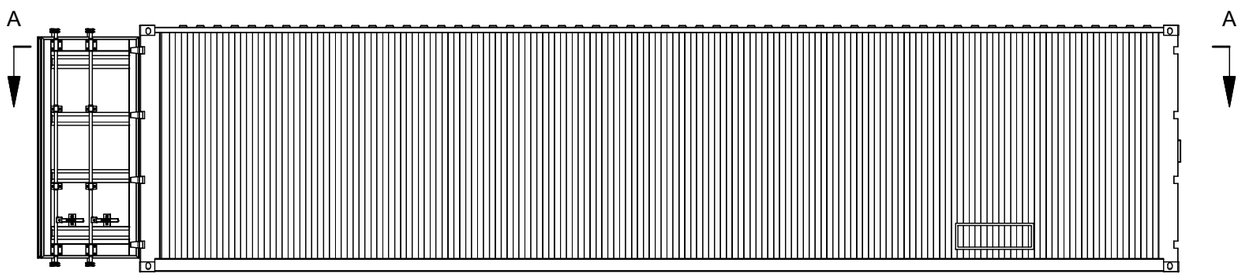
SECTION A-A



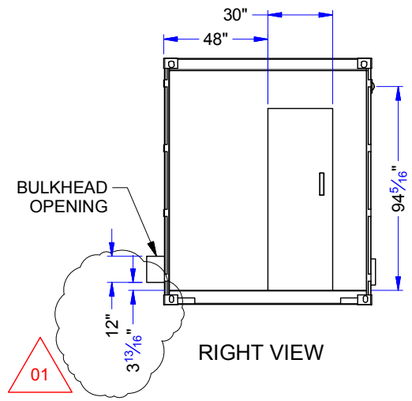
ISO VIEW



LEFT VIEW



FRONT VIEW



RIGHT VIEW

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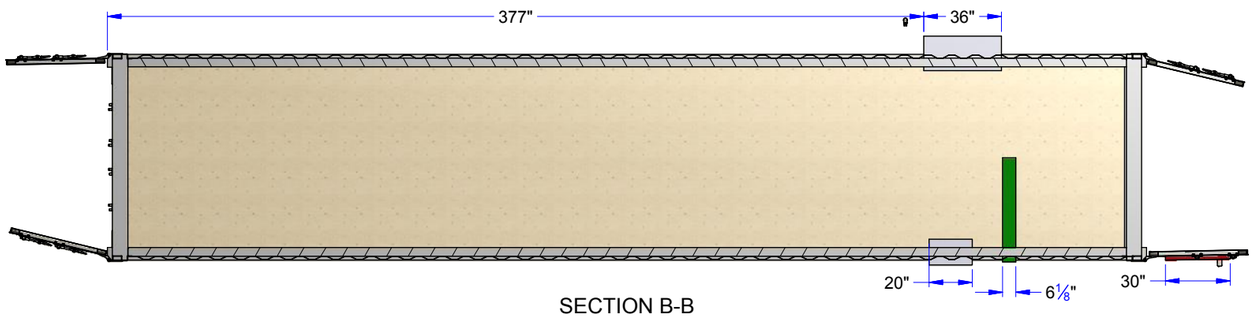
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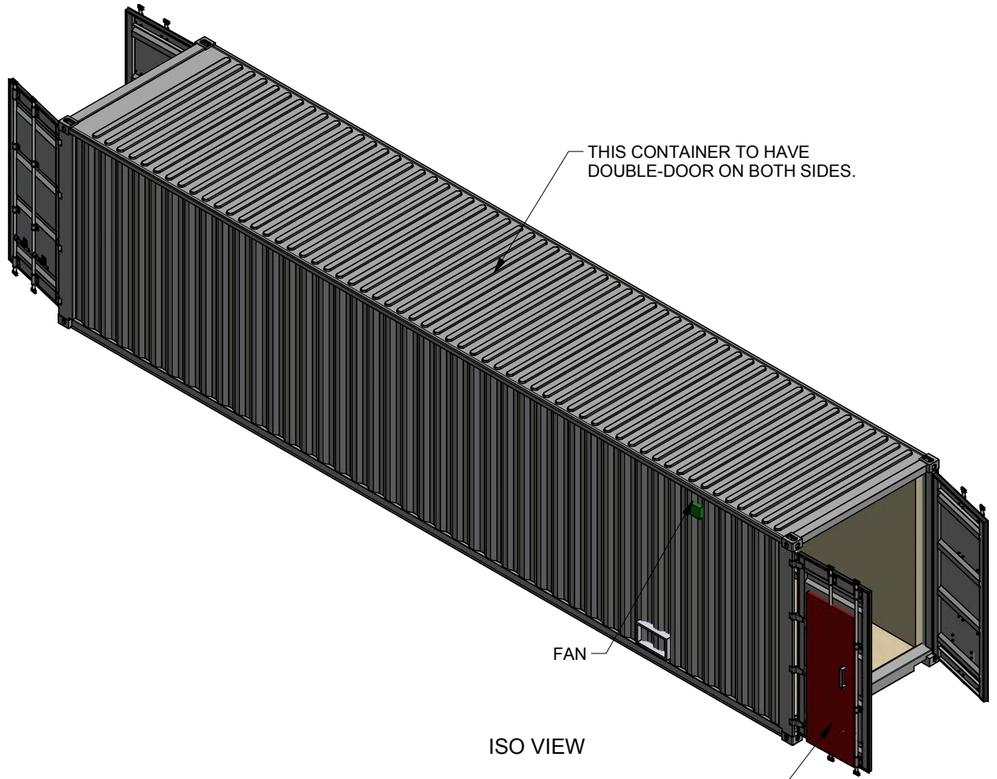
MELIADINE, NU

TITLE:
DRINKING WATER CONTAINER
GENERAL ARRANGEMENT

SCALE:	DRAWING NUMBER:	REVISION
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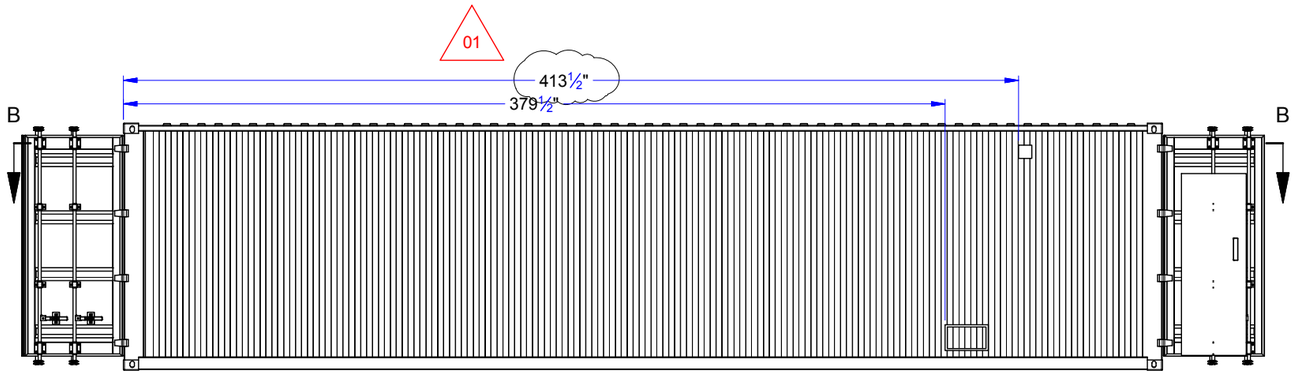


SECTION B-B

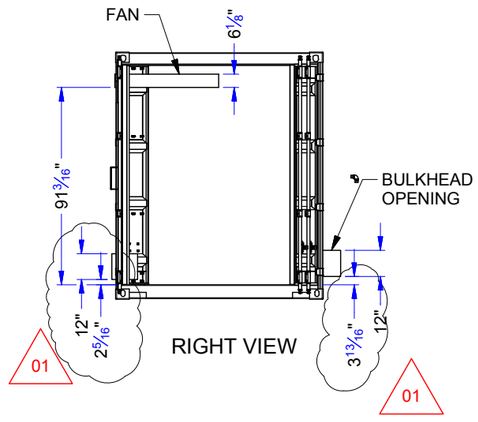


ISO VIEW

NOTE : 30" WIDTH DOOR TO BE MADE IN DOUBLE DOOR (LEFT SIDE WHEN FACING IT FROM OUTSIDE) AS SEEN ON DRAWING.



FRONT VIEW



RIGHT VIEW

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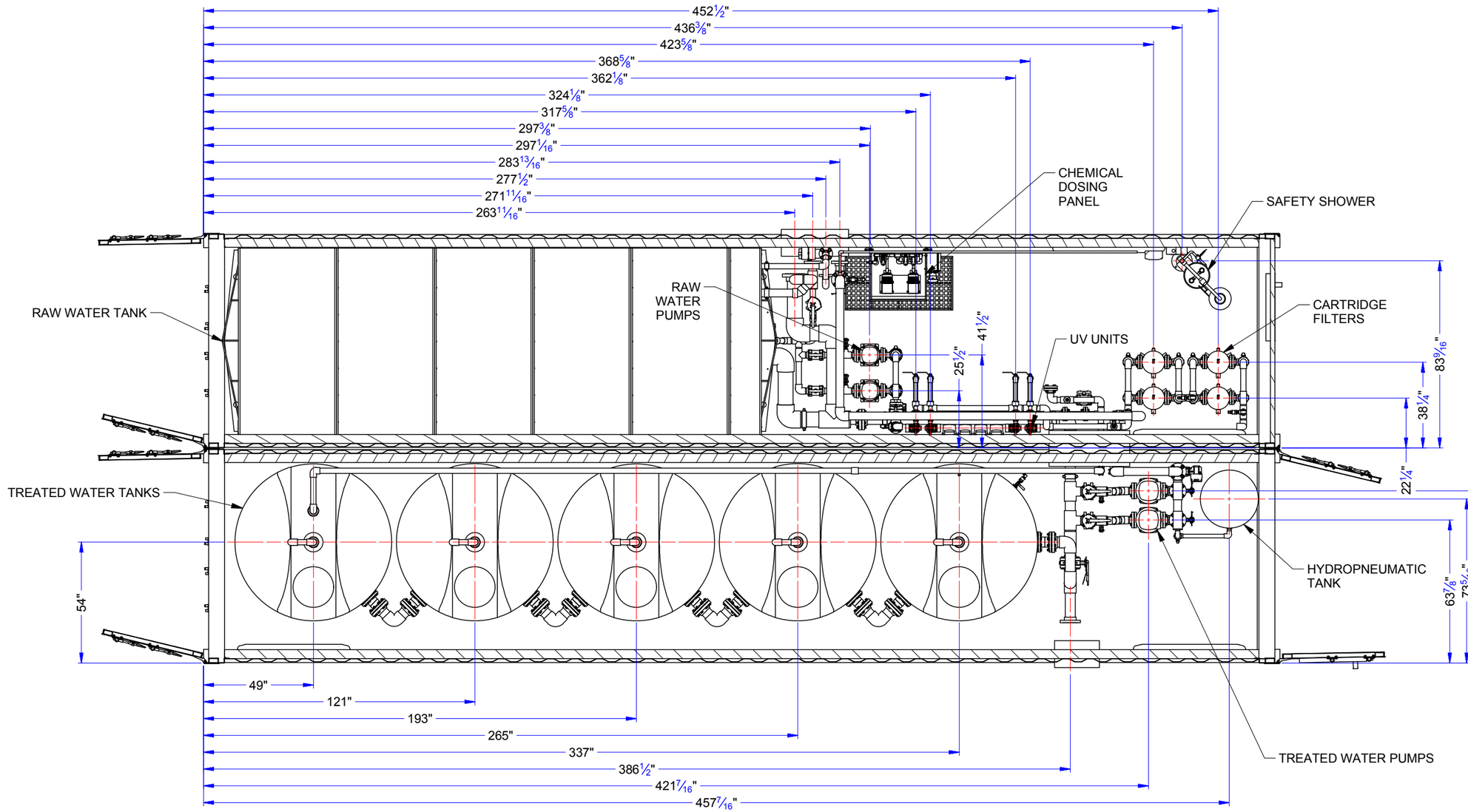
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DECIMALS: 0.X: ±0.030
0.XX: ±0.015
ANGLES: ±0.5°
HOLE SIZES: ±1/64"
HOLE CENTERS: ±1/64"
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MELIADINE, NU

TITLE:
DRINKING WATER CONTAINER
GENERAL ARRANGEMENT

SCALE:	DRAWING NUMBER:	REVISION
N/A	P65873-B01-0001 SHEET: 3 OF 4	01



TOP VIEW

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00	24/06/2016	FOR CONSTRUCTION	DM	-	RD	RD

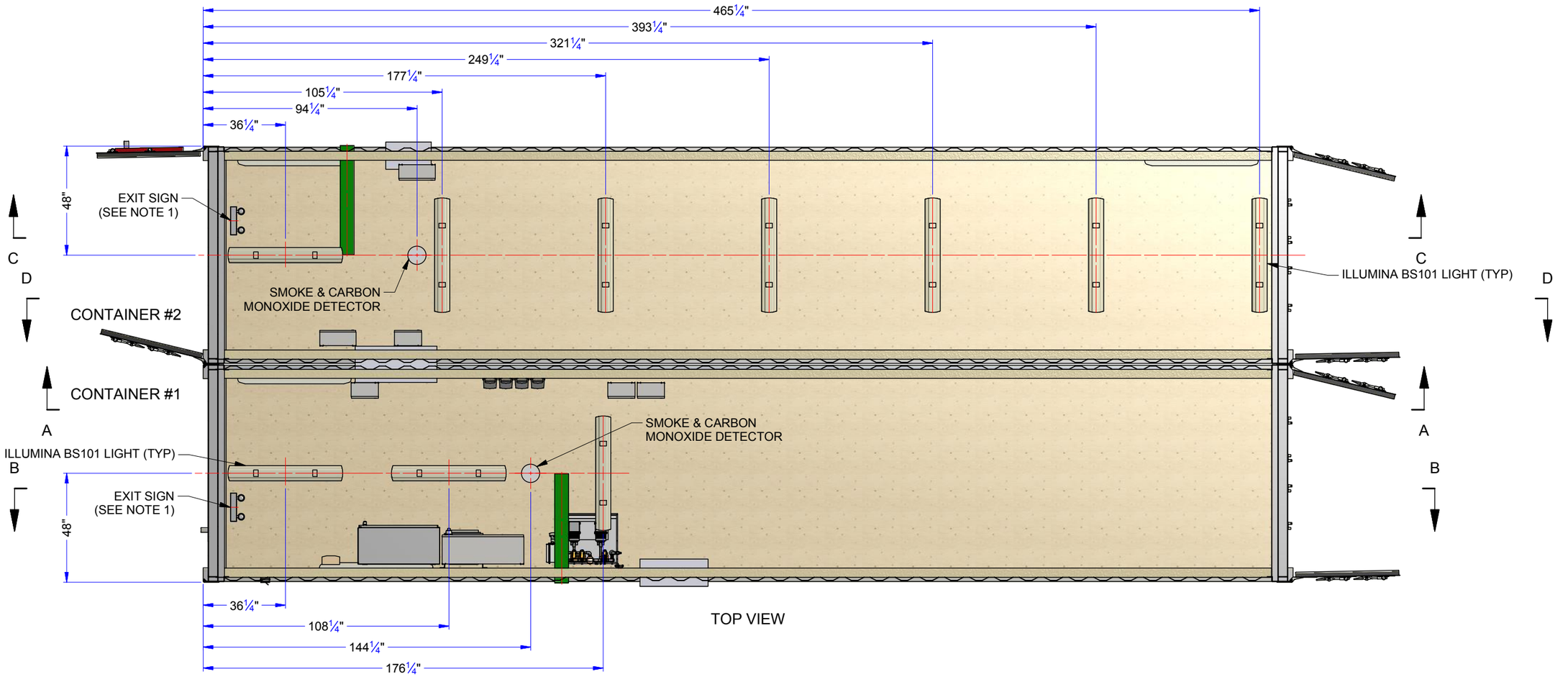
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0.XX: ±0.015
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HOLE CENTERS: ±1/64"
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MELIADINE, NU

TITLE:
DRINKING WATER CONTAINER
GENERAL ARRANGEMENT

SCALE:	DRAWING NUMBER:	REVISION
1:50	P65873-B01-0001 SHEET: 4 OF 4	01



NOTES:

1. INSTALL EXIT SIGN CENTERED ABOVE DOOR.

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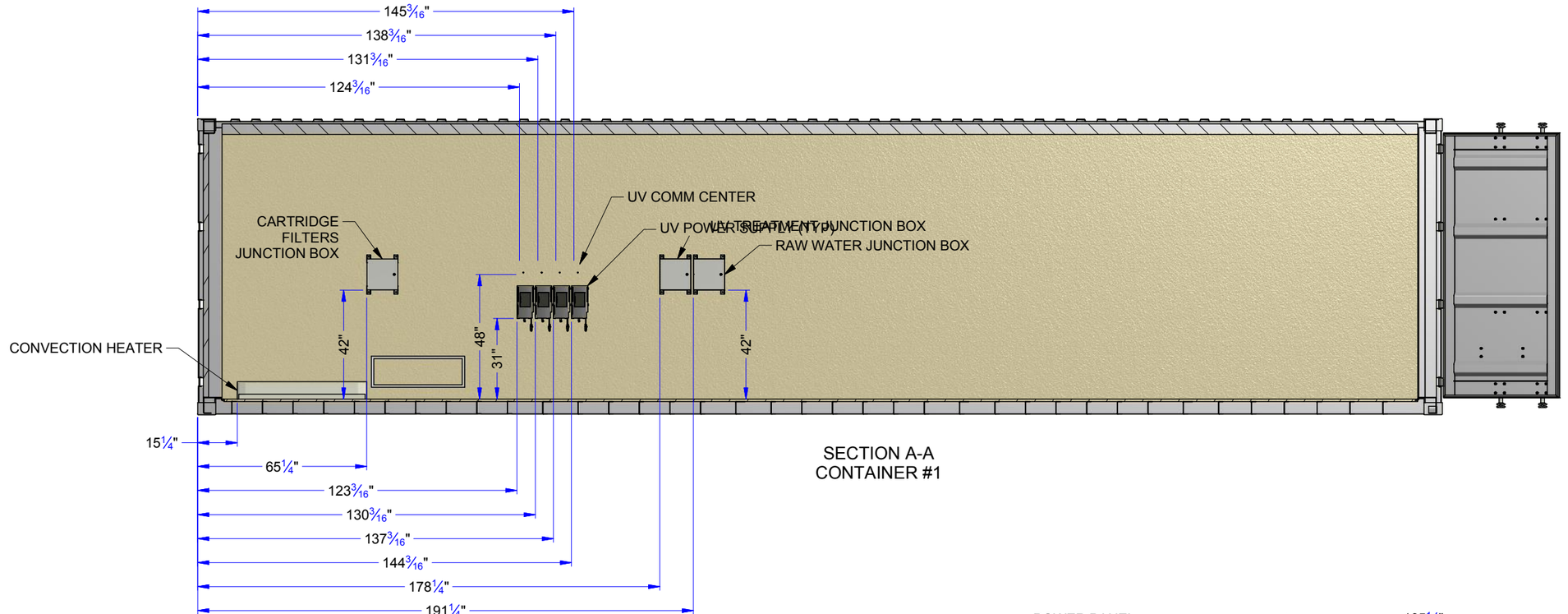
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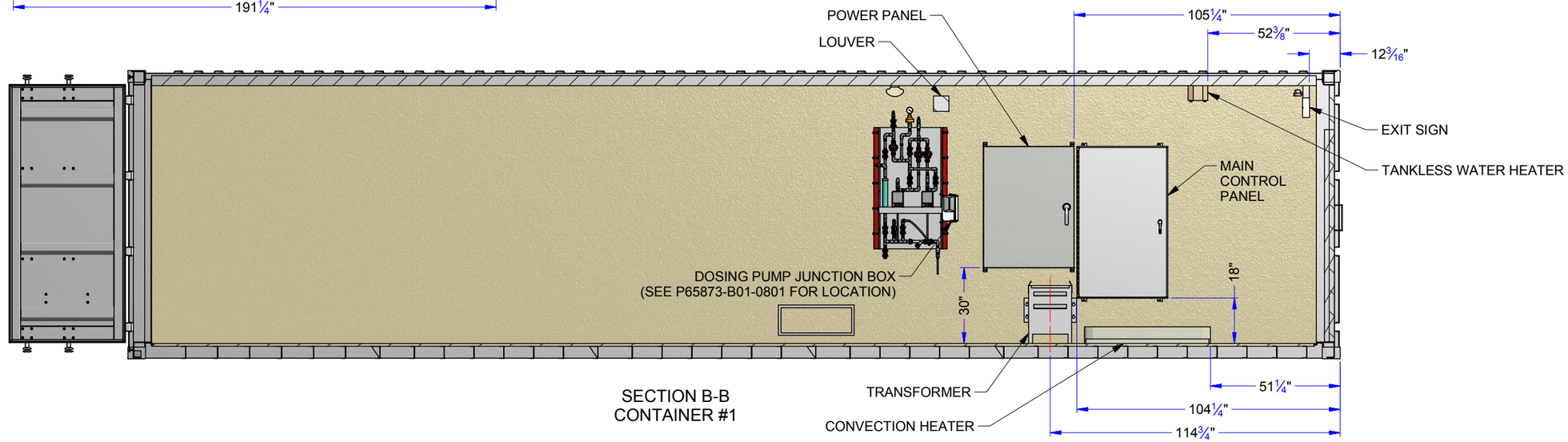
MELIADINE, NU

TITLE:
DRINKING WATER CONTAINERS
ELECTRICAL GENERAL ARRANGEMENT

SCALE:	DRAWING NUMBER:	REVISION
1/4"=1'	P65873-B01-0002 SHEET: 1 OF 3	00



SECTION A-A
CONTAINER #1



SECTION B-B
CONTAINER #1

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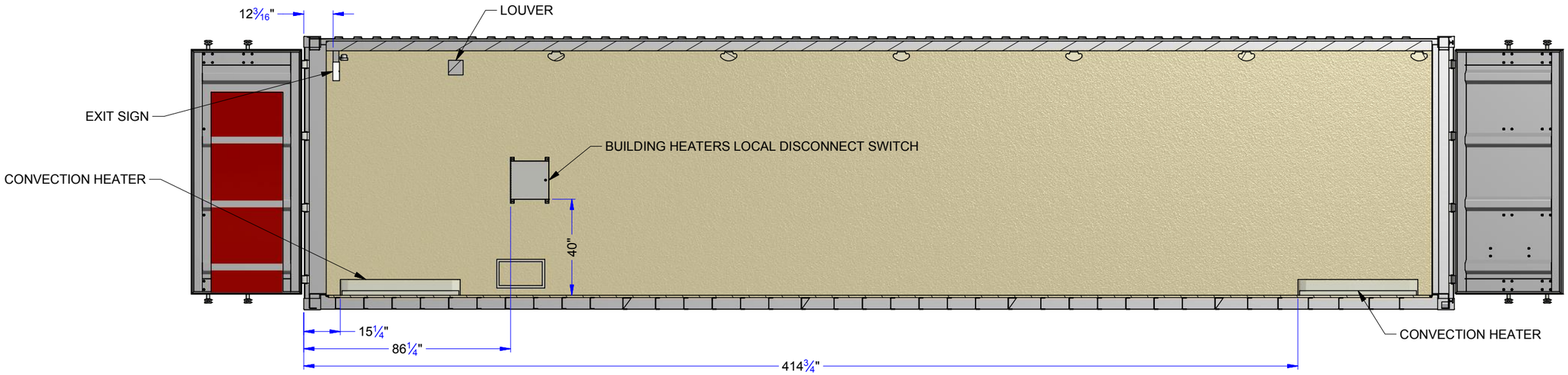
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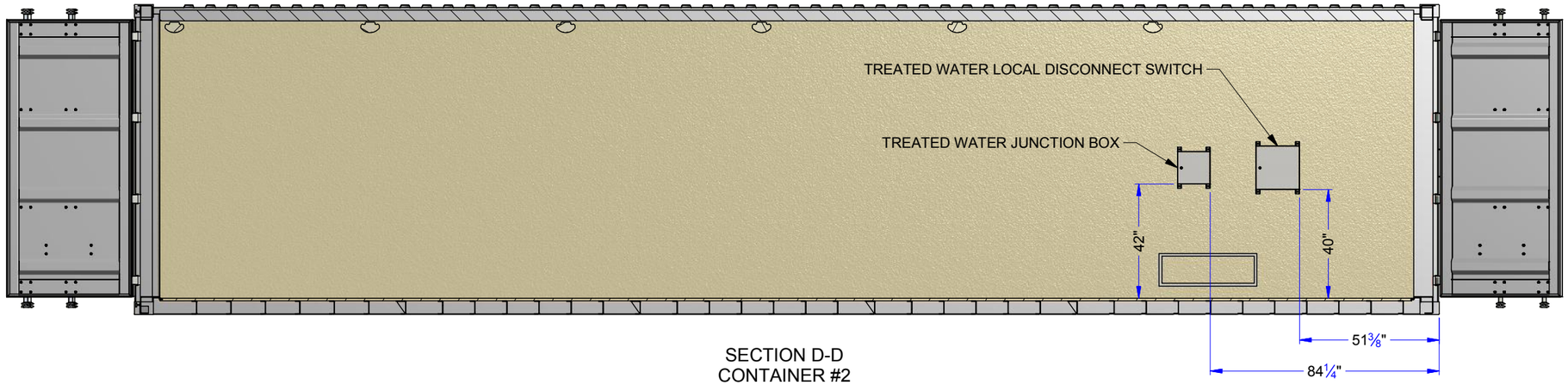
MELIADINE, NU

TITLE:
DRINKING WATER CONTAINERS
ELECTRICAL GENERAL ARRANGEMENT

SCALE:	DRAWING NUMBER:	REVISION
1/4"=1'	P65873-B01-0002 SHEET: 2 OF 3	00



SECTION C-C
CONTAINER #2



SECTION D-D
CONTAINER #2

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MELIADINE, NU

TITLE:
DRINKING WATER CONTAINERS
ELECTRICAL GENERAL ARRANGEMENT

SCALE:	DRAWING NUMBER:	REVISION
1/4"=1'	P65873-B01-0002 SHEET: 3 OF 3	00

10.4 - EQUIPMENT LIST

H2O Equipment List

PROJECT: Meliadine Drinking
PROJECT NUMBER: P65873
PROJECT MANAGER: Alexis Morissette
DOCUMENT NUMBER: P65873-C05-0001
REVISION: 0
REVISION DATE: 2016-07-05 (YYYY-MM-DD)

Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer
Reference	Revision	Tag	Functional Description	Quantity	Model	Manufacturer	Item Description	Process Fluid	Wet Material Characteristics	Mechanical Characteristics	Electrical Characteristics	Inlet Connection Size (in)	Outlet Connection Size (in)	Connection Type	P&ID Sheet
1	0	P-10200A/B	Raw Water Pumps	2	96126851-8SZ99123	Grundfos Canada	GRUNDFOS PUMP, CRN10-4, 316SS, 2" 300 LB FLANGE, 3PH/60HZ/575V, 3HP INVERTER READY NEMA PREMIUM WEG MOTOR, #GRU96126851-8SZ99123	Raw Water	316SS / EPDM	40GPM @ 75psi	575V / 3 Phases / 60Hz	2,00	2,00	Flange ANSI 300	P65873-C01-0100
2	0	F-40000A/B	5 Microns Cartridge Filter Housing	2	4FOS3C-316-2F-TABS-P-B	Shelco	SHELCO CARTRIDGE FILTER HOUSING, 4 CARTRIDGE OF 30", SS316, 2" CLASS 150 FLANGES, CLAMP, MOUNTING TABS, PASSIVATED, BUNA-N GASKET, #4FOS3C-316-2F-TABS-P-B	Raw Water	316LSS, Buna-N	150psi, 84gpm	N/A	2,00	2,00	Flange ANSI 150	P65873-C01-0400
3	0	N/A	5 Microns Cartridge Filters	20	MEE5-30	Shelco	SHELCO MICROSENTRY MEE SERIES CARTRIDGE FILTER, POLYSTER / PP, 5 MICRONS PORE SIZES, 30" LENGHT, 2-5/8" OD, #MEE5-30	Raw Water	Polyester / PP	5 microns Pore Sizes	N/A	N/A	N/A	N/A	P65873-C01-0400
4	0	F-40100A/B	1 Micron Cartridge Filter Housing	2	4FOS3C-316-2F-TABS-P-B	Shelco	SHELCO CARTRIDGE FILTER HOUSING, 4 CARTRIDGE OF 30", SS316, 2" CLASS 150 FLANGES, CLAMP, MOUNTING TABS, PASSIVATED, BUNA-N GASKET, #4FOS3C-316-2F-TABS-P-B	Raw Water	316LSS, Buna-N	150psi, 84gpm	N/A	2,00	2,00	Flange ANSI 150	P65873-C01-0400
5	0	N/A	1 Micron Cartridge Filters	20	MEE1-30	Shelco	SHELCO MICROSENTRY MEE SERIES CARTRIDGE FILTER, POLYSTER / PP, 1 MICRON PORE SIZES, 30" LENGHT, 2-5/8" OD, #MEE1-30	Raw Water	Polyester / PP	1 microns Pore Sizes	N/A	N/A	N/A	N/A	P65873-C01-0400
6	0	T-89000	Sodium Hypochlorite Dosing Skid Storage Tank	1	PTB-200	ACO Containers	ACO TANK AL 200 LITERS 22" X 39" HDPE POLY TOTE BARREL WITH 5 1/2" Lid# PTB-200	NaOCl	HDPE	200L	N/A	Varies	Varies	Varies	P65873-C01-0800
7	0	STR-89120	Sodium Hypochlorite Dosing Skid Inlet Strainer	1	192.306.300	Georg Fischer	GEORGE FISHER, LINE STRAINER TYPE 306, PVC/EPDM, 20 MESH, 1/2" SPIGOT, #192.306.300	NaOCl	PVC	150psi	N/A	0,50	0,50	Spigot	P65873-C01-0800
8	0	P-89100A/B	Sodium Hypochlorite Dosing Skid Metering Pumps	2	GMXa0708PVT7U000UD1130BEN	Prominent	PROMINENT METERING PUMP, 5,5 L/H, PVDF/PTFE LIQUID END DIAPHRAGM, PVT7 DEGAS OPTION , MANUAL + EXTERNAL 1:1 CONTROL, 1/2" X 3/8" TUBE FITTINGS. #GMXA0708PVT7U000UD1130BEN	NaOCl	PVDF/PTFE	5,7L/hr, 101psi WITH PVT7	115V, 60Hz	1/2"OD x 3/8"ID	1/2"OD x 3/8"ID	Tubing	P65873-C01-0800
9	0	LSL-89067A/B	Sodium Hypochlorite Dosing Skid Level Switch	2	7142038	Prominent	PROMINENT FLOAT SWITCH, 15 FT PE CABLE, PVC BODY, FOAMED PE CABLE, CERAMIC WEIGHT, TWO-STAGES, #7142038	NaOCl	PVC / PE	N/A	N/A	N/A	N/A	N/A	P65873-C01-0800
10	0	N/A	Metering Pumps Control Cable	2	1001301	Prominent	CRT CONTROL CABLE: 15 FT (5M), 5 WIRES, 5 POLES #1001301	NaOCl	N/A	N/A	N/A	N/A	N/A	N/A	P65873-C01-0800
11	0	FQG-89113	Sodium Hypochlorite Dosing Skid Calibration Column	1	PV-2-500	Primary Fluid System	CALIBRATION COLUMN, 500 ML, PVC 1/2" NPT, # PV -2 - 500	NaOCl	PVC	500mL	N/A	0,50	0,50	FNPT	P65873-C01-0800
12	0	UV-91000A/B/C/D	UV System	4	UX MAX PRO30 (#650659)	Trojan (Viqua)	TROJAN (VIQUA) UV MAX PRO30, 316LSS, 30GPM MAX, COMBO 1-1/4"MNPT/1"FNPT CONNECTIONS, 120VAC/60HZ, 200W LAMP, #650659	Filtered Water	316LSS	30GPM, 10-100psi	120VAC, 60Hz	Combo 1-1/4" / 1"	Combo 1-1/4" / 1"	MNPT / FNPT	P65873-C01-0910
13	0	N/A	Comm Center	4	270272-R	Trojan (Viqua)	TROJAN DRY CONTACT BOARD (603020) AND COMMUNICATION CENTER FOR PROMAX30 UV REACTOR #270272-R	Filtered Water	N/A	N/A	N/A	N/A	N/A	N/A	P65873-C01-0910
14	0	N/A	Comm Center 4-20mA Cards	4	270268-R	Trojan (Viqua)	TROJAN 4-20MA UV SENSOR INTERFACE PRO G-K PLUS SERIES, PN#: 270268-R.	Filtered Water	N/A	N/A	N/A	N/A	N/A	N/A	P65873-C01-0910
15	0	N/A	UV System Cables	4	260201-R	Trojan (Viqua)	TROJAN DRY CONTACT CABLE, #260201-R	Filtered Water	N/A	N/A	N/A	N/A	N/A	N/A	P65873-C01-0910
16	0	N/A	UV System Solenoid Valves	4	650627	Trojan (Viqua)	SOLENOID VALVE FOR TROJAN PROMAX30 UV. #650627	Filtered Water	PPE / EPDM	150psi	24VDC (Plugged in UV Controller)	1,00	1,00	FNPT	P65873-C01-0910
17	0	MX-91083	Treated Water Sodium Hypochlorite Inline Mixer	1	MP-2-3	Komax	STATIC MIXER MP-2-3, 2" DIAMETER, PVC, 3 ELEMENTS, 9" LONG	Treated Water	PVC	150psi, 3 Mixing Elements	N/A	2,00	2,00	Flange ANSI 150	P65873-C01-0910
18	0	T-99000-A/B/C/D/E	Treated Water Tank	5	CT-1010	ACO Containers	ACO CLOSED TOP TANK, CAPACITY OF 1212 US GALLONS (1010 IMPERIAL GALLONS) / 4590 L, 70" DIAMETER X 77" HEIGHT, HDPE, LIQUID SPECIFIC GRAVITY LESS THAN 1.5 #CT-1010-HDPE-1.5SG	Treated Water	HDPE	1212Gallons Capacity, Designed for liquid below 1,5SG	N/A	Varies	Varies	Flange ANSI 150	P65873-C01-0990
19	0	P-99200	Treated Water Distribution Pumps	2	96416384-8SZ99129	Grundfos Canada	GRUNDFOS PUMP, CRN32-2, 316SS, 2-1/2" 150 LB FLANGE, 3PH/60HZ/575V, 7-1/2 HP INVERTER READY NEMA PREMIUM WEG MOTOR, #96416384 -8SZ99129	Treated Water	316SS / EPDM	164GPM @ 55psi	575V / 3 Phases / 60Hz	2,50	2,50	Flange ANSI 150	P65873-C01-0990
20	0	T-99300	Treated Water Hydraupneumatic Tank	1	WX-350	Amtrol	PRESSURE TANK WELL-X-TROL, STAND MODEL, 119 GALLONS, 1-1/4" FNPT CONNEXION, NOT CODIFIED, ?! #WX-350	Treated Water	PP / SS	150psi, 32,3gpm @40-60psi	N/A	N/A	1-1/4"	FNPT	P65873-C01-0990

10.5 - VALVE LIST

H2O Valve List

PROJECT: Meliadine Drinking

PROJECT NUMBER: P65873

PROJECT MANAGER: Alexis Morissette

DOCUMENT NUMBER: P65873-C20-0001

REVISION: 0

REVISION DATE: 2016-07-20

(YYYY-MM-DD)

Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer
Reference	Revision	Tag	Functional Description	Quantity	Model	Manufacturer	Item Description	Wet Material Characteristics	Mechanical Characteristics	Electrical Characteristics	Inlet Connection Size (in)	Outlet Connection Size (in)	Connection Type	Actuation Type	Limit Switches	Positionner
1		FV-10001	Raw Water Inlet On/Off Valve	1	21A020VF/QA1T020	Chemline	VALVE A BILLE UNION CHEMLINE PVC 80 GRIS 2" FLANGE ANSI 150 TYPE 21 EPDM AVEC ACTUATEUR ELECTRIQUE QA 120VAC "ON/OFF" #21A020EF/QB1T020	SS316, EPDM	230 psi	120 volts	2,00	2,00	Flange class 150	Electrical Actuator	No	No
2		HV-10060	Raw Water Tank Level Transmitter Isolation Valve	1	1/2-50M76	Sharpe	SHARPE BALL VALVE, 1/2", SERIES 50M76. PART# 1/2-50M76.	SS 316, PTFE	1000 psi	N/A	0,50	0,50	NPT	Lever Handle	No	No
3	0	HV-10250A/B	Raw Water Pump Inlet Isolation Valve	2	21A020EC	Chemline	UNION BALL VALVE CHEMLINE PVC 2" COMBO TYPE 21 EPDM #21A020EC	SS316, EPDM	230 psi	N/A	3,00	3,00	Wafer	Lever Handle	No	No
4	0	HV-10228A/B	Raw Water Pump Drain Valve	2	21A005EC	Chemline	UNION BALL VALVE CHEMLINE PVC 2" COMBO TYPE 21 EPDM #21A005EC	PVC, EPDM	230 psi	N/A	2,00	2,00	Combo Socket Thread	Lever Handle	No	No
5	0	CV-10251A/B	Raw Water Pump Outler Check Valve	2	2-CVR1S-SSPX-R	Champion	CHAMPION 2" CHECK-VALVE, RETAINERLESS WAFER, ASME 150 CLASS, 316SS BODY&DISCS, INTEGRAL METAL SEAT, INCONEL X-750 SPRING, SERRATED RAISED FACE, #2CVR1S-SSPX-R	SS316/ Inconel X-750	ASME Class 150	N/A	2,00	2,00	Wafer	None	No	No
6	0	HV-10252A/B	Raw Water Pump Outlet Isolation Valve	2	21A020EC	Chemline	UNION BALL VALVE CHEMLINE PVC 2" COMBO TYPE 21 EPDM #21A020EC	SS316, EPDM	230 psi	N/A	3,00	3,00	Wafer	Lever Handle	No	No
7	0	FV-10299	Raw Water Discharge Line Flow Valve	1	21A020VF/QA1T020	Chemline	VALVE A BILLE UNION CHEMLINE PVC 80 GRIS 2" FLANGE ANSI 150 TYPE 21 EPDM AVEC ACTUATEUR ELECTRIQUE QA 120VAC "ON/OFF" #21A020EF/QB1T020	SS316, EPDM	230 psi	120 volts	2,00	2,00	Flange class 150	Electrical Actuator	No	No
8	0	HCV-10276	Raw Water Discharge Line Manual Flow Control Valve	1	GVA020ET	Chemline	GLOBE VALVE CHEMLINE PVC 80 2". # GVA020ET	PVC, EPDM	150 psi	N/A	2,00	2,00	FNPT	Lever Handle	No	No
9	0	HV-10078	Raw Water Storage Tank Drain Valve	1	310300-11010169-010200-21100007	Bray	BRAY BUTTERFLY VALVE SERIES 31, LUG STYLE, 3", CAST IRON/NDI/316SS/EPDM, CLASS 150 WITH LEVER HANDLE WITH 10 POSITIONS #310300-11010169-010200-21100007	SS316, EPDM	175 psi, class 150	N/A	3,00	3,00	Lug	Lever Handle	No	No
10	0	HV-40050A/B	5 Microns Cartridge Filter Inlet Isolation Valve	2	21A020EC	Chemline	UNION BALL VALVE CHEMLINE PVC 2" COMBO TYPE 21 EPDM #21A020EC	SS316, EPDM	230 psi	N/A	3,00	3,00	Wafer	Lever Handle	No	No
11	0	HV-40028A/B	5 Microns Cartridge Filter Dirty Drain Valve	2	21A005EC	Chemline	BALL VALVE CHEMLINE 21 SERIES, PVC, EPDM SEAL, 1/2" COMBO THREADED/SOCKET. #21A005EC	PVC, EPDM	230 psi	N/A	0,50	0,50	Combo Socket Thread	Lever Handle	No	No
12	0	HV-40078A/B	5 Microns Cartridge Filter Clean Drain Valve	2	21A005EC	Chemline	BALL VALVE CHEMLINE 21 SERIES, PVC, EPDM SEAL, 1/2" COMBO THREADED/SOCKET. #21A005EC	PVC, EPDM	230 psi	N/A	0,50	0,50	Combo Socket Thread	Lever Handle	No	No
13	0	HV-40080A/B	5 Microns Cartridge Filter Vent Valve	2	LCMTE	Chemline	SAMPLE VALVE STRAITH CHEMLINEPVC GREY 1/4 MNPT #LCMTE	PVC, EPDM	230 psi	N/A	0,25	0,25	M-NPT	Lever Handle	No	No
14	0	HV-40052A/B	5 Microns Cartridge Filter Outlet Isolation Valve	2	21A020EC	Chemline	UNION BALL VALVE CHEMLINE PVC 2" COMBO TYPE 21 EPDM #21A020EC	SS316, EPDM	230 psi	N/A	3,00	3,00	Wafer	Lever Handle	No	No
15	0	HV-40150A/B	1 Micron Cartridge Filter Inlet Isolation Valve	2	21A020EC	Chemline	UNION BALL VALVE CHEMLINE PVC 2" COMBO TYPE 21 EPDM #21A020EC	SS316, EPDM	230 psi	N/A	3,00	3,00	Wafer	Lever Handle	No	No
16	0	HV-40128A/B	1 Micron Cartridge Filter Dirty Drain Valve	2	21A005EC	Chemline	BALL VALVE CHEMLINE 21 SERIES, PVC, EPDM SEAL, 1/2" COMBO THREADED/SOCKET. #21A005EC	PVC, EPDM	230 psi	N/A	0,50	0,50	Combo Socket Thread	Lever Handle	No	No
17	0	HV-40178A/B	1 Micron Cartridge Filter Clean Drain Valve	2	21A005EC	Chemline	BALL VALVE CHEMLINE 21 SERIES, PVC, EPDM SEAL, 1/2" COMBO THREADED/SOCKET. #21A005EC	PVC, EPDM	230 psi	N/A	0,50	0,50	Combo Socket Thread	Lever Handle	No	No
18	0	HV-40180A/B	1 Micron Cartridge Filter Vent Valve	2	LCMTE	Chemline	SAMPLE VALVE STRAITH CHEMLINEPVC GREY 1/4 MNPT #LCMTE	PVC, EPDM	230 psi	N/A	0,25	0,25	M-NPT	Lever Handle	No	No
19	0	HV-40152A/B	1 Micron Cartridge Filter Outlet Isolation Valve	2	21A020EC	Chemline	UNION BALL VALVE CHEMLINE PVC 2" COMBO TYPE 21 EPDM #21A020EC	SS316, EPDM	230 psi	N/A	3,00	3,00	Wafer	Lever Handle	No	No
20		HV-40209	Turbidimeter Isolation Valve	1	NGA005	Chemline	CHEMLINE NEEDLE VALVE NG SERIES, PVC BODY, PTFE SEAL, 1/2" NPT, #NGA005	PVC, EPDM	NA	NA	0,50	0,50	F-NPT	Lever Handle	No	No
21	0	HV-89101	Sodium Hypochlorite Dosing Skid Inlet Isolation Valve	1	161.546.342	GF	GF 1/2", VANNE À BILE TYPE 546, CONNEXION COMBO, PVC/EPDM. #161,546,342	PVC, EPDM	230 psi	N/A	0,50	0,50	Combo Socket Thread	Lever Handle	No	No
22	0	HV-89129	Sodium Hypochlorite Dosing Skid Drain Valve	1	161.546.342	GF	GF 1/2", VANNE À BILE TYPE 546, CONNEXION COMBO, PVC/EPDM. #161,546,342	PVC, EPDM	230 psi	N/A	0,50	0,50	Combo Socket Thread	Lever Handle	No	No
23	0	HV-89150A/B	Sodium Hypochlorite Dosing Skid Pump Inlet Isolation Valve	2	161.546.342	GF	GF 1/2", VANNE À BILE TYPE 546, CONNEXION COMBO, PVC/EPDM. #161,546,342	PVC, EPDM	230 psi	N/A	0,50	0,50	Combo Socket Thread	Lever Handle	No	No
24	0	HV-89152A/B	Sodium Hypochlorite Dosing Skid Pump Outlet Isolation Valve	2	161.546.342	GF	GF 1/2", VANNE À BILE TYPE 546, CONNEXION COMBO, PVC/EPDM. #161,546,342	PVC, EPDM	230 psi	N/A	0,50	0,50	Combo Socket Thread	Lever Handle	No	No
25	0	PCV-89172	Sodium Hypochlorite Dosing Skid Backpressure Valve	1	SB12A005VU	Chemline	CHEMLINE 1/2", SB12 SERIES, BACKPRESSURE/ PRESSURE RELIEF VALVE. 5-150 PSI, PVC BODY/VITON SEALS/TRUE UNION SOCKET ENDS; # SB12A005VU	PVC, VITON	150 psi	N/A	0,50	0,50	Socket	None	No	No
26	0	HV-89199	Sodium Hypochlorite Dosing Skid Outlet Isolation Valve	1	161.546.342	GF	GF 1/2", VANNE À BILE TYPE 546, CONNEXION COMBO, PVC/EPDM. #161,546,342	PVC, EPDM	230 psi	N/A	0,50	0,50	Combo Socket Thread	Lever Handle	No	No
27	0	HV-89115	Sodium Hypochlorite Dosing Skid Calibration Column Inlet Valve	1	161.546.342	GF	GF 1/2", VANNE À BILE TYPE 546, CONNEXION COMBO, PVC/EPDM. #161,546,342	PVC, EPDM	230 psi	N/A	0,50	0,50	Combo Socket Thread	Lever Handle	No	No
28	0	HV-89112	Sodium Hypochlorite Dosing Skid Calibration Column Outlet Valve	1	161.546.342	GF	GF 1/2", VANNE À BILE TYPE 546, CONNEXION COMBO, PVC/EPDM. #161,546,342	PVC, EPDM	230 psi	N/A	0,50	0,50	Combo Socket Thread	Lever Handle	No	No
29	0	PSV-89171A/B	Sodium Hypochlorite Dosing Skid Pressure Relief Valve	2	SB12A005VU	Chemline	CHEMLINE 1/2", SB12 SERIES, BACKPRESSURE/ PRESSURE RELIEF VALVE. 5-150 PSI, PVC BODY/VITON SEALS/TRUE UNION SOCKET ENDS; # SB12A005VU	PVC, VITON	150 psi	N/A	0,50	0,50	Socket	None	No	No
30	0	HV-89153	Sodium Hypochlorite Dosing Skid Tank Return Isolation Valve	1	161.546.342	GF	GF 1/2", VANNE À BILE TYPE 546, CONNEXION COMBO, PVC/EPDM. #161,546,342	PVC, EPDM	230 psi	N/A	0,50	0,50	Combo Socket Thread	Lever Handle	No	No
31	0	HV-91050A/B/C/D	UV System Inlet Isolation Valve	4	1-50M76	Sharpe	SHARPE BALL VALVE, 1", SERIES 50M76. PART# 1-50M76.	SS 316, PTFE	1000 psi	N/A	1,00	1,00	NPT	Lever Handle	No	No
32	0	FV-91053A/B/C/D	UV System Outlet Solenoid Valve	4	Included with UV	Viqua	NA	PPE	NA	N/A	1,00	1,00	NPT	Solenoid	No	No
33	0	HV-91052A/B/C/D	UV System Outlet Isolation Valve	4	21A010EC	Chemline	BALL VALVE CHEMLINE 21 SERIES, PVC, EPDM SEAT, 1" COMBO THREADED/SOCKET, #21A010EC	SS316, EPDM	230 psi	N/A	1,00	1,00	Combo Socket Thread	Lever Handle	No	No
34	0	IQ-91097	Sodium Hypochlorite Injection Quill	1	Included with dosing pump	Prominent	NA	PVDF / PTFE	N/A	N/A	0,50	0,50	Combo Socket Thread	N/A	No	No
35		HV-91077	Chlorine Panel Sample Valve	1	Included with Chlorine Panel	Endress Hauser	NA	N/A	NA	N/A	N/A	N/A	N/A	Lever Handle	No	No
36	0	HV-91099	Treated Water Line to Storage Insolation Valve	1	21A020EC	Chemline	UNION BALL VALVE CHEMLINE PVC 2" COMBO TYPE 21 EPDM #21A020EC	SS316, EPDM	230 psi	N/A	3,00	3,00	Wafer	Lever Handle	No	No
37		HV-99259	Treated Water Storage Tank Level Transmitter Isolation Valve	1	1/2-50M76	Sharpe	SHARPE BALL VALVE, 1/2", SERIES 50M76. PART# 1/2-50M76.	SS 316, PTFE	1000 psi	N/A	0,50	0,50	NPT	Lever Handle	No	No
38	0	HV-99250A/B	Distribution Pump Inlet Isolation Valve	2	310300-11010169-010200-21100007	Bray	BRAY BUTTERFLY VALVE SERIES 31, LUG STYLE, 3", CAST IRON/NDI/316SS/EPDM, CLASS 150 WITH LEVER HANDLE WITH 10 POSITIONS #310300-11010169-010200-21100007	SS316, EPDM	175 psi, class 150	N/A	3,00	3,00	Lug	Lever Handle	No	No
39	0	HV-99228A/B	Distribution Pump Drain Valve	2	21A005EC	Chemline	BALL VALVE CHEMLINE 21 SERIES, PVC, EPDM SEAT, 1/2" COMBO THREADED/SOCKET, #21A005EC	PVC, EPDM	230 psi	N/A	0,50	0,50	Combo Socket Thread	Lever Handle	No	No
40	0	CV-99251A/B	Distribution Pump Check Valve	2	3CVR1S-SSPX-R	Champion	CHAMPION 3" CHECK-VALVE, RETAINERLESS WAFER, ASME 150 CLASS, 316SS BODY&DISCS, INTEGRAL METAL SEAT, INCONEL X-750 SPRING, SERRATED RAISED FACE. #3CVR1S-SSPX-R	SS316, Inconel X-750	ASME Class 150	N/A	3,00	3,00	Wafer	None	No	No
41	0	HV-99252A/B	Distribution Pump Outlet Isolation Valve	2	310300-11010169-010200-21100007	Bray	BRAY BUTTERFLY VALVE SERIES 31, LUG STYLE, 3", CAST IRON/NDI/316SS/EPDM, CLASS 150 WITH LEVER HANDLE WITH 10 POSITIONS #310300-11010169-010200-21100007	SS316, EPDM	175 psi, class 150	N/A	3,00	3,00	Lug	Lever Handle	No	No
42	0	HV-99301	Distribution Line Hydropneumatic Tank Isolation Valve	1	21A012EC	Chemline	BALL VALVE CHEMLINE PVC EPDM SEAT, 1-1/4", #21A012EC	PVC, EPDM	230 psi	N/A	1,25	1,25	Combo Socket Thread	Lever Handle	No	No
43	0	HV-99277	Distribution Line Sample Valve	1	21A005EC	Chemline	BALL VALVE CHEMLINE 21 SERIES, PVC, EPDM SEAT, 1/2" COMBO THREADED/SOCKET. #21A005EC	PVC, EPDM	230 psi	N/A	0,50	0,50	Combo Socket Thread	Lever Handle	No	No
44	0	HV-99299	Distribution System Shutoff Valve	1	310300-11010169-010200-21100007	Bray	BRAY BUTTERFLY VALVE SERIES 31, LUG STYLE, 3", CAST IRON/NDI/316SS/EPDM, CLASS 150 WITH LEVER HANDLE WITH 10 POSITIONS #310300-11010169-010200-21100007	SS316, EPDM	175 psi, class 150	N/A	3,00	3,00	Lug	Lever Handle	No	No
45	0	HV-99078	Treated Water Storage Tank Drain Valve	1	310400-11010169-010400-21100007	Bray	BRAY BUTTERFLY VALVE SERIES 31, LUG STYLE, 4", CAST IRON/NDI/316SS/EPDM, CLASS 150 WITH LEVER HANDLE 310400-11010169-010400-21100007	SS316, EPDM	250 psi	N/A	4,00	4,00	Wafer	Lever Handle	No	No

10.6 - INSTRUMENT LIST

H2O Instrument List

PROJECT: Meliadine Drinking
PROJECT NUMBER: P65873
PROJECT MANAGER: Alexis Morissette
DOCUMENT NUMBER: P65873-C14-0001
REVISION: 0
REVISION DATE: 2016-07-06 (YYYY-MM-DD)

Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer	Engineer
Reference	Revision	Tag	Functional Description	Quantity	Model	Manufacturer	Item Description	Wet Material Characteristics	Mechanical Characteristics	Electrical Characteristics	Inlet Connection Size (in)	Outlet Connection Size (in)	Connection Type	Scale Range	Scale Unit	P&ID Sheet
P65873-C01-0100																
1	0	LT-10060	Raw Water Storage Tank Pressure Transmitter	1	PMC131-C22E1D14	Endress & Hauser	ENDRESS & HAUSER PRESSURE TRANSMITTER, CERAMIC, EPDM SEALS, MEAS. RANGE: 0...400mBAR/40KPA GAUGE; SENSOR OVERLOAD LIMIT: 8BAR/800KPA, CSA APPROVED, # PMC131-C22E1D14	SS304	0-40 kPa	11-30 VDC	0,50	NA	M-NPT	See P&ID	kPa	P65873-C01-0100
2	0	PG-10254	Raw Water Pumps Pressure Gauge	1	9200015	Wika	GAUGE WIKA, 100 PSI, 2.5" DIAL, 1/4" NPT SS, BOTTOM CONNECTION, GLYCERINE, #9200015	SS316	100 psi (690kPa)	N/A	0,25	N/A	M-NPT	See P&ID	psi,kPa	P65873-C01-0100
3	0	PT-10259	Raw Water Pumps Pressure Transmitter	1	PMC131-C22E1A1S	Endress & Hauser	ENDRESS & HAUSER PRESSURE TRANSMITTER, CERAMIC, EPDM SEALS, MEAS. RANGE: 0...10BAR/1MPA GAUGE; SENSOR OVERLOAD LIMIT: 40BAR/4MPA, CSA APPROVED, PN: PMC131-C22E1A1S	SS304	0-1000 kPa	11-30 VDC	0,50	N/A	M-NPT	See P&ID	kPa	P65873-C01-0100
4	0	FIT-10274	Raw Water Pumps Flowmeter	1	10D50-4LGA1RA0B5AA	Endress & Hauser	ENDRESS & HAUSER PROMAG 10D FLOWMETER, 2" FLANGE CLASS 150, 24 VDC, WITH 2-LINE PUSH BUTTONS DISPLAY, 4-20 MA HART #10D50-4LGA1RA0B5AA	SS316, Polyamide	N/A	11-40 VDC	2,00	2,00	Flange ANSI 150	See P&ID	m³/h	P65873-C01-0100
P65873-C01-0400																
5	0	PG-40048	Feed Water Filters Pressure Gauge	1	9200015	Wika	GAUGE WIKA, 100 PSI, 2.5" DIAL, 1/4" NPT SS, BOTTOM CONNECTION, GLYCERINE, #9200015	SS316	100 psi (690kPa)	N/A	0,25	N/A	M-NPT	See P&ID	psi,kPa	P65873-C01-0400
6	0	PT-40045	Feed Water Pressure Transmitter	1	PMC131-C22E1A1S	Endress & Hauser	ENDRESS & HAUSER PRESSURE TRANSMITTER, CERAMIC, EPDM SEALS, MEAS. RANGE: 0...10BAR/1MPA GAUGE; SENSOR OVERLOAD LIMIT: 40BAR/4MPA, CSA APPROVED, PN: PMC131-C22E1A1S	SS304	0-1000 kPa	11-30 VDC	0,50	N/A	NPT	See P&ID	kPa	P65873-C01-0400
7	0	PG-40054	Micro Cartridge Filters Pressure Gauge	1	9200015	Wika	GAUGE WIKA, 100 PSI, 2.5" DIAL, 1/4" NPT SS, BOTTOM CONNECTION, GLYCERINE, #9200015	SS316	100 psi (690kPa)	N/A	0,25	N/A	M-NPT	See P&ID	psi,kPa	P65873-C01-0400
8	0	PT-40059	Micro Cartridge Filters Pressure Transmitter	1	PMC131-C22E1A1S	Endress & Hauser	ENDRESS & HAUSER PRESSURE TRANSMITTER, CERAMIC, EPDM SEALS, MEAS. RANGE: 0...10BAR/1MPA GAUGE; SENSOR OVERLOAD LIMIT: 40BAR/4MPA, CSA APPROVED, PN: PMC131-C22E1A1S	SS304	0-1000 kPa	11-30 VDC	0,50	N/A	NPT	See P&ID	kPa	P65873-C01-0400
9	0	PG-40154	Filtered Water Pressure Gauge	1	9200015	Wika	GAUGE WIKA, 100 PSI, 2.5" DIAL, 1/4" NPT SS, BOTTOM CONNECTION, GLYCERINE, #9200015	SS316	100 psi (690kPa)	N/A	0,25	N/A	M-NPT	See P&ID	psi,kPa	P65873-C01-0400
10	0	PT-40159	Filtered Water Pressure Transmitter	1	PMC131-C22E1A1S	Endress & Hauser	ENDRESS & HAUSER PRESSURE TRANSMITTER, CERAMIC, EPDM SEALS, MEAS. RANGE: 0...10BAR/1MPA GAUGE; SENSOR OVERLOAD LIMIT: 40BAR/4MPA, CSA APPROVED, PN: PMC131-C22E1A1S	SS304	0-1000 kPa	11-30 VDC	0,50	N/A	NPT	See P&ID	kPa	P65873-C01-0400
11	0	AE/AIT-40206	Filtered Water Turbidity Meter with Transmitter	1	4690/11111031	ABB	ABB TURBIDIMETER ,LOW CONCENTRATION, WITH DISPLAY, 0-40 NTU, LCD LIGHT, 115 VAC, 10 METERS CABLE. #: 4690-11111031	Glass	10 psi max	115 VAC	0,25	0,50	Varies	See P&ID	NTU	P65873-C01-0400
P65873-C01-0800																
12	0	LSL-89067A/B	Sodium Hypochlorite Tank Level Switch Low	2			Supplied with Pump	N/A	N/A	N/A	N/A	N/A	N/A		N/A	P65873-C01-0800
13	0	PG-89154	Sodium Hypochlorite Pump Pressure Gauge	1	SGA005002PG-P025-60SS	Chemline	CHEMLINE SG SERIES GAUGE ISOLATOR AND PRESSURE GAUGE MOUNTED, PVC BOTTOM, TEFLON DIAPHRAGM, 1/2" CONNECTIONS, GLYCERINE FILLED, WITH PRESSURE GAUGE 0-60 PSI P025-60-SS , #SGA005002PG-P02560SS	SS316/PVC	60 psi (400kPa)	N/A	0,25	N/A	F-NPT	See P&ID	psi,kPa	P65873-C01-0800
P65873-C01-0910																
14	0	TT -91058	Treated Water Temperature Transmitter	1	RL5S-P-1-S3-250-S-H10-WA2-025 RT810-P-0/50°C TW03A12L2.5U=1	Intempco Mac-Weld	INTEMPCO TEMPERATURE TRANSMITTER, 316SS, 24VDC, 3/4"NPT PROCESS CONNECTION, 0 TO 50°C, #RL5S-P-1-S3-250-S-H10-WA2-025 / RT810-P-0/50°C / TW03A12L2.5U=1	316SS	0 - 50°C	24VDC	0,75	N/A	NPT	See P&ID	N/A	P65873-C01-0910
15	0	FI-91094/AE-91090/AE-91093/AIT-91093	Treated Water pH & Chlorine Measuring Panel	1	CCE10-2A2EP7605	Endress & Hauser	ENDRESS & HAUSER CL TEMPERATURE & pH TRANSMITTER, 24VDC, 3 OUTPUT4-20MA, # CCE10-2A2EP7605	PVC, EPDM	0-14 pH, 0-5mg/L	24VDC	0,50	N/A	NPT	See P&ID	N/A	P65873-C01-0910
P65873-C01-0990																
16	0	LT-99259	Treated Water Storage Tank Pressure Transmitter	1	PMC131-C22E1D14	Endress & Hauser	ENDRESS & HAUSER PRESSURE TRANSMITTER, CERAMIC, EPDM SEALS, MEAS. RANGE: 0...400mBAR/40KPA GAUGE; SENSOR OVERLOAD LIMIT: 8BAR/800KPA, CSA APPROVED, PN: PMC131-C22E1D14	SS304	0-40 kPa	11-30 VDC	0,50	N/A	M-NPT	See P&ID	kPa	P65873-C01-0910
17	0	PG-99254	Treated Water Distribution Pumps Pressure Gauge	1	9200015	Wika	GAUGE WIKA, 100 PSI, 2.5" DIAL, 1/4" NPT SS, BOTTOM CONNECTION, GLYCERINE, #9200015	SS316	100 psi (690kPa)	N/A	0,25	N/A	M-NPT	See P&ID	psi,kPa	P65873-C01-0990
18	0	PT-99259	Treated Water Distribution Pumps Pressure Transmitter	1	PMC131-C22E1A1R	Endress & Hauser	ENDRESS & HAUSER PRESSURE TRANSMITTER, CERAMIC, EPDM SEALS, MEAS. RANGE: 0...6BAR/600KPA GAUGE; SENSOR OVERLOAD LIMIT: 40BAR/4MPA, CSA APPROVED, PN: PMC131-C22E1A1R	SS304	0-600 kPa	11-30 VDC	0,50	N/A	M-NPT	See P&ID	kPa	P65873-C01-0990
19	0	FIT-99274	Treated Water Distribution Pumps Flow Meter	1	10D80-4LGA1RA0B5AA	Endress & Hauser	ENDRESS & HAUSER PROMAG 10D FLOWMETER, 3" FLANGE CLASS 150, 24 VDC, WITH 2-LINE PUSH BUTTONS DISPLAY, 4-20 MA HART #10D80-4LGA1RA0B5AA	SS316, Polyamide	N/A	11-40 VDC	3,00	3,00	Flange ANSI 150	See P&ID	m³/h	P65873-C01-0990

10.7 - CONTROL PANEL LAYOUTS

MELIADINE WTP

CONTAINERIZED WATER TREATMENT PLANT

E02 ELECTRICAL PANEL DRAWINGS

NOTE:

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DWG TITLE

MELIADINE WTP
CONTAINERIZED WATER TREATMENT PLANT
ELECTRICAL DRAWINGS

TITLE

JOB NO

P65873

DWG NO

P65873-E02-TITLE

SHEET NO	REVISION
1 OF 15	.00

DRAWING #	DESCRIPTION 1	DESCRIPTION 2	DESCRIPTION 3	SHEET #
P65873-E02-TITLE		TITLE		1
P65873-E02-INDEX		INDEX		2
P65873-E02-PP101-PL	PP-101	POWER PANEL	PANEL LAYOUT	3
P65873-E02-PP101-BOM	PP-101	POWER PANEL	BILL OF MATERIAL	4
P65873-E02-PP101-TAG	PP-101	POWER PANEL	LAMICOID TAG	5
P65873-E02-MCP101-PL	MCP-101	MAIN CONTROL PANEL	PANEL LAYOUT	6
P65873-E02-MCP101-BOM	MCP-101	MAIN CONTROL PANEL	BILL OF MATERIAL	7
P65873-E02-MCP101-TAG	MCP-101	MAIN CONTROL PANEL	LAMICOID TAG	8
P65873-E02-LDSHTR-PL	LDS-HTR	LOCAL DISCONNECT SWITCH	PANEL LAYOUT	9
P65873-E02-LDSDP-PL	LDS-DP	LOCAL DISCONNECT SWITCH	PANEL LAYOUT	10
P65873-E02-JBTRTW-PL	JB-TRTW	JUNCTION BOX	PANEL LAYOUT	11
P65873-E02-JBUV-PL	JB-UV	JUNCTION BOX	PANEL LAYOUT	12
P65873-E02-JBRAWW-PL	JB-RAWW	JUNCTION BOX	PANEL LAYOUT	13
P65873-E02-JBCARTFLT-PL	JB-CARTFLT	JUNCTION BOX	PANEL LAYOUT	14
P65873-E02-JBDOSING-PL	JB-DOSING	JUNCTION BOX	PANEL LAYOUT	15

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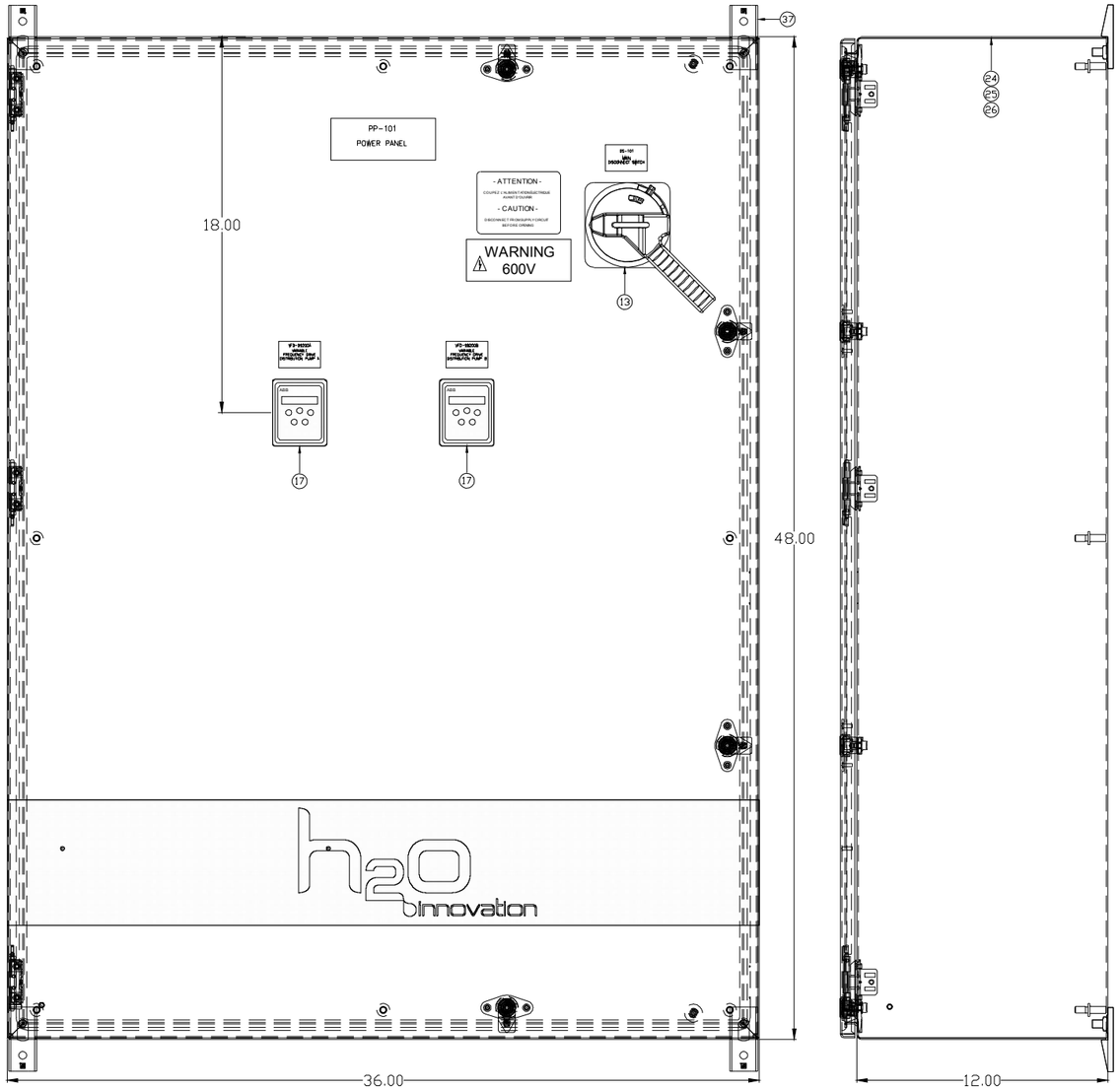
DWG TITLE
MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

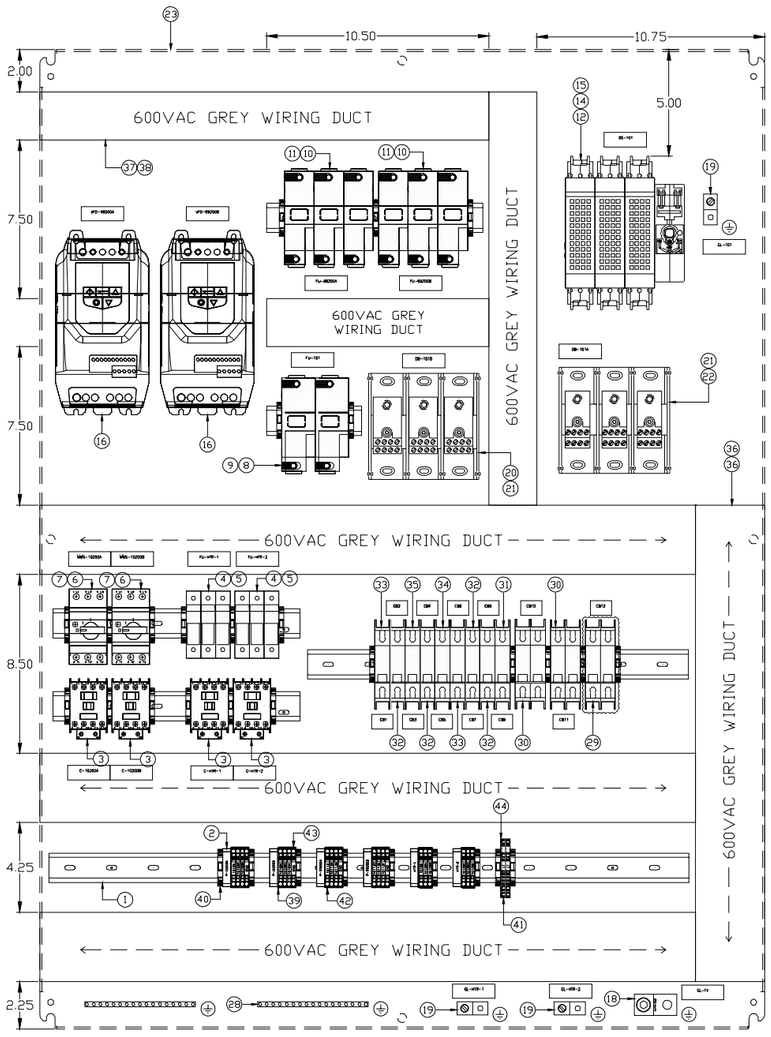
INDEX

JOB NO
P65873

DWG NO
P65873-E02-INDEX

SHEET NO	REVISION
2 OF 15	.00





NOTE 1: THIS PANEL WILL BE INSTALLED ON WALL (CONTAINER #1)

NOTE 2: ALL CONNECTIONS WILL BE THROUGH THE BOTTOM

NOTE 3: THIS PANEL APPROX. WEIGHT 250 LBS

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DWG TITLE
MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

PP-101
POWER PANEL
PANEL LAYOUT

JOB NO
P65873

DWG NO
P65873-E02-PP101-PL

SHEET NO
3 OF 15

REVISION
.00

ITEM	QTY	SUB	CATALOG	MFG	DESCRIPTION
1	6		199-DR1	AB	TRACK 35mmX7.5mmX1219mm
2	6		1492-GM35	AB	GROUP MARKING CARRIER
3	4		100-C09D10	AB	100-C CONTACTOR, 3-POLE, 9A, 1 N.O. CONTACT
4	2	*1	1492-FB3C30	AB	3 POLE FUSE BLOCK, 30AMPS - CLASS CC
5		*6	ATQR7	FERRAZ	FUSE - CLASS CC, 7AMPS
6	2	*1	140M-C2E-B40	AB	IEC MOTOR PROTECTION CIRCUIT BREAKER, STANDARD MAGNETIC TRIP, 140M (C-FRAME)
7		*1	140M-C-AFA11	AB	FRONT-MOUNTED AUXILIARY CONTACT - 1N.O-1N.C.
8	1	*1	1492-FB2J60	AB	2 POLE FUSE BLOCK, 60AMPS - CLASS J
9		*2	AJT60	FERRAZ	FUSE - CLASS J, 60AMPS
10	2	*1	1492-FB3J30	AB	3 POLE FUSE BLOCK, 30AMPS - CLASS J
11		*6	HSJ15	FERRAZ	FUSE HIGH SPEED/CLASS J, 15AMPS
12	1	*1	194R-J100-1753	AB	194R NEXT GENERATION DISCONNECT SWITCH, FUSE TYPE J, OPEN STYLE, 100A, 3 POLE
13		*1	194R-HM4E	AB	PADLOCKABLE HANDLE NEMA 4X RED/YELLOW
14		*1	194R-R7	AB	OPERATING SHAFT 12 INCHES
15		*3	AJT100	FERRAZ	FUSE - CLASS J, 100AMPS
16	2	*1	ACS250-03U-09A0-6	ABB	AJUSTABLE FREQUENCY AC DRIVE, 600VAC, 7.5HP, IP20
17		*1	RCRP-01	ABB	PANEL MOUNT REMOTE KEYPAD FOR ACS250 DRIVES
18	1		ADR25	BLACKBURN	ALUMINUM GROUND LUG, 6AWG-250KCMIL
19	3		ADR21	BLACKBURN	ALUMINUM GROUND LUG, 14-2/0AWG
20	1	*1	MPDB67633	FERRAZ	ALUMINIUM DISTRIBUTION BLOCK, 3POLE, 8 OPENINGS PER POLE, 250AMPS
21		*3	MPDBC6667	FERRAZ	PLASTIC HINGED SAFETY COVER FOR MPDB67 SERIES
22	1	*1	MPDB67583	FERRAZ	ALUMINIUM DISTRIBUTION BLOCK, 3POLE, 8 OPENINGS PER POLE, 135AMPS
21		*3	MPDBC6667	FERRAZ	PLASTIC HINGED SAFETY COVER FOR MPDB67 SERIES
23	1		CP4836	HOFFMAN	BACK PLATE 48X36
24	1	*1	CSD483612SSR	HOFFMAN	CONCEPT WALL-MOUNT ENCLOSURE 48X36X12 STAINLESS STEEL
25		*1	ADP2	HOFFMAN	THERMOPLASTIC DATA POCKET 12X12
26		*1	AGS808	HOFFMAN	GROUND STRAP
27	1		CMFKSS	HOFFMAN	STAINLESS STEEL MOUNTING BRACKET KIT
28	2		N-174-AS	ILSCO	GROUND BAR COOPER
29	1		60149	SCHNEIDER	2 POLE THERMAL MAGNETIC CIRCUIT BREAKER, 30A
30	2		60147	SCHNEIDER	2 POLE THERMAL MAGNETIC CIRCUIT BREAKER, 20A
31	1		60113	SCHNEIDER	1 POLE THERMAL MAGNETIC CIRCUIT BREAKER, 20A
32	4		60101	SCHNEIDER	1 POLE THERMAL MAGNETIC CIRCUIT BREAKER, 1A
33	2		60112	SCHNEIDER	1 POLE THERMAL MAGNETIC CIRCUIT BREAKER, 15A
34	1		60105	SCHNEIDER	1 POLE THERMAL MAGNETIC CIRCUIT BREAKER, 4A
35	1		60111	SCHNEIDER	1 POLE THERMAL MAGNETIC CIRCUIT BREAKER, 13A
36	1	*1	TY3CPG6	THOMAS & BETTS	WIRING DUCT COVER 3" GRAY
36		*1	TY3CPG6	THOMAS & BETTS	WIRING DUCT COVER 3" GRAY
37	1	*1	TY2X3NPG6	THOMAS & BETTS	WIRING DUCT 2X3" GRAY
38		*1	TY2CPG6	THOMAS & BETTS	WIRING DUCT COVER 2" GRAY
39	6		2002-1292	WAGO	FEED-TROUGH END BARRIER FOR 2002-1201 TERMINAL BLOCK
40	31		249-116	WAGO	SCREWLESS END RETAINER
41	2		2002-2201	WAGO	DOUBLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY
42	18		2002-1201	WAGO	SINGLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY
43	4		2002-1207	WAGO	SPRING CLAMP GROUND TERMINAL BLOCK, GREEN/YELLOW
44	1		2002-2292	WAGO	FEED-TROUGH END BARRIER FOR 2002-2201 TERMINAL BLOCK

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DWG TITLE
MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

PP-101
POWER PANEL
BILL OF MATERIAL

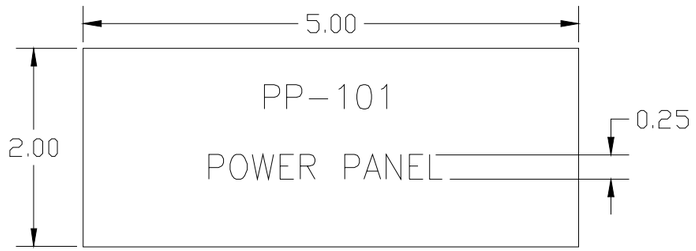
JOB NO
P65873

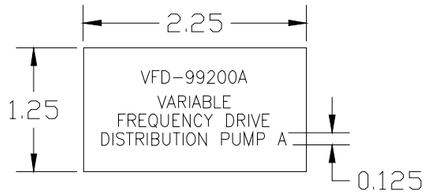
DWG NO
P65873-E02-PP101-BOM

SHEET NO
4 OF 15

REVISION
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ENCLOSURE DOOR IDENTIFICATION





VFD-99200B
VARIABLE
FREQUENCY DRIVE
DISTRIBUTION PUMP B

DS-101
MAIN
DISCONNECT SWITCH

NOTE 1: ADHESIVE BACKED LAMINATED PLASTIC

NOTE 2: BLACK LETTERING ON WHITE BACKGROUND

NOTE 3: THICKNESS 1/16"

INSIDE PANEL IDENTIFICATION

VFD-99200A	C-10200A	CB3	P-10200A
VFD-99200B	C-10200B	CB4	P-10200B
FU-99200A	FU-HTR-1	CB5	P-99200A
FU-99200B	FU-HTR-2	CB6	P-99200B
FU-101	C-HTR-1	CB7	HTR-1
DB-101B	C-HTR-2	CB8	HTR-2
DB-101A	GL-HTR-1	CB9	
DS-101	GL-HTR-2	CB10	
GL-101	GL-TX	CB11	
MMS-10200A	CB1	CB12	
MMS-10200B	CB2		

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DWG TITLE

MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

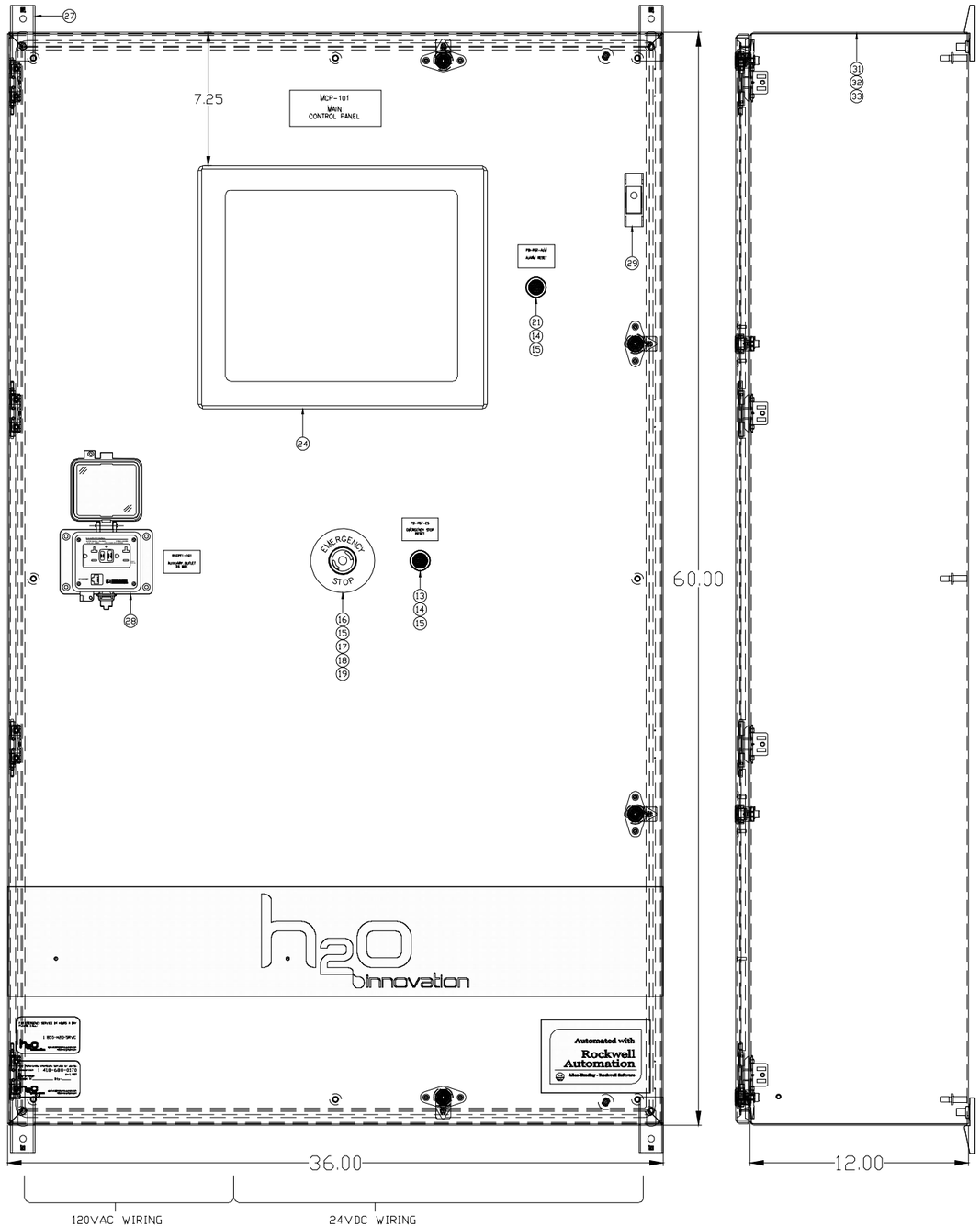
PP-101
POWER PANEL
LAMICOID TAG

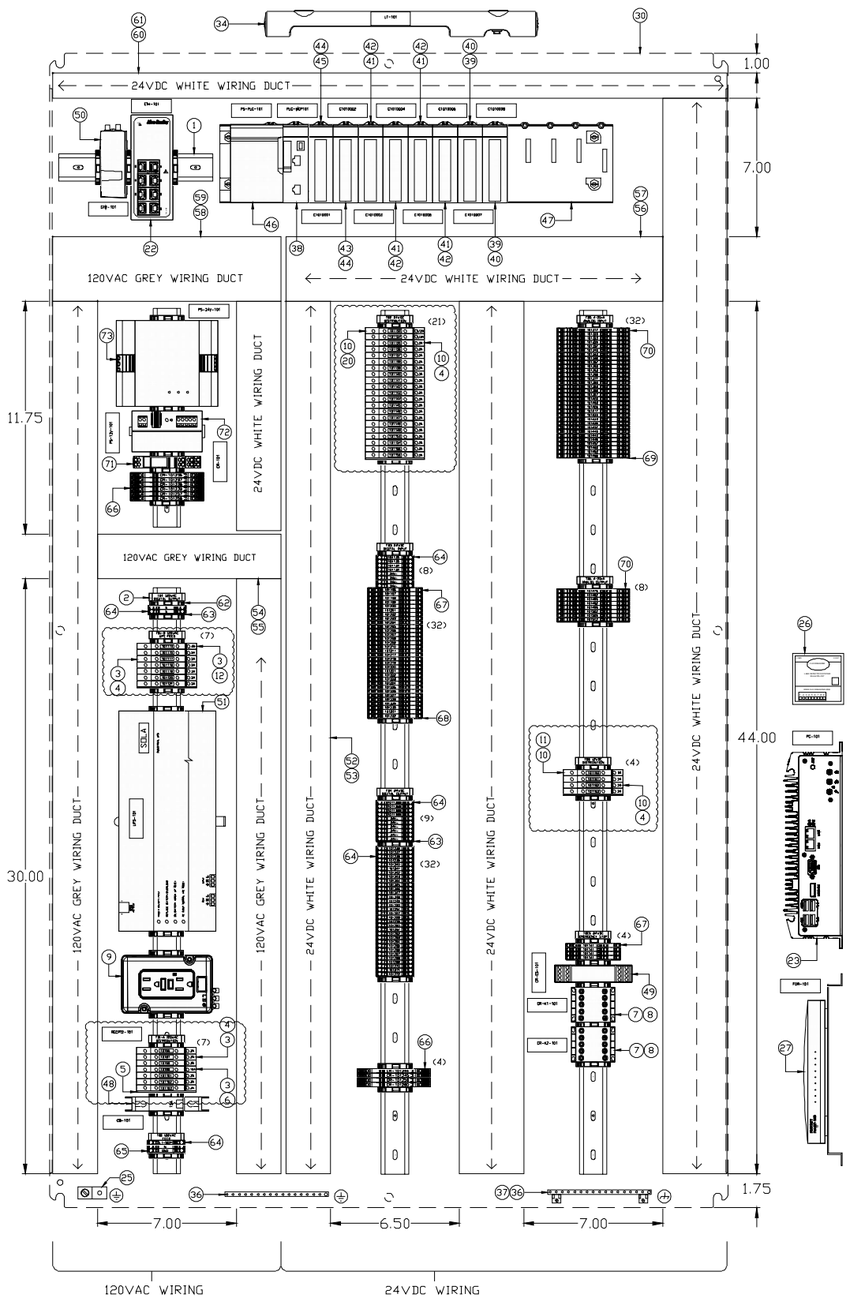
JOB NO: P65873

DWG NO: P65873-E02-PP101-TAG

SHEET NO: 5 OF 15

REVISION: .00





NOTE 1: THIS PANEL WILL BE INSTALLED ON WALL (CONTAINER #1)

NOTE 2: ALL CONNECTIONS WILL BE THROUGH THE BOTTOM

NOTE 3: THIS PANEL APPROX. WEIGHT 250 LBS

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DWG TITLE

MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

MCP-101
MAIN CONTROL PANEL
PANEL LAYOUT

JOB NO
P65873

DWG NO
P65873-E02-MCP101-PL

SHEET NO	REVISION
6 OF 15	.00

ITEM	QTY	SUB	CATALOG	MFG	DESCRIPTION
1	7		199-DR1	AB	TRACK 35mmX7.5mmX1219mm
2	11		1492-GM35	AB	GROUP MARKING CARRIER
3	1	*1	1492-JD3FB120	AB	TERMINAL BLOCK/FUSE HOLDER, 120V, LED INDICATION
6		*2	GGM10	FERRAZ	FUSE - CLASS GGM, 10AMPS
3	12	*1	1492-JD3FB120	AB	TERMINAL BLOCK/FUSE HOLDER, 120V, LED INDICATION
4		*2	GGM2	FERRAZ	FUSE - CLASS GGM, 2AMPS
3	1	*1	1492-JD3FB120	AB	TERMINAL BLOCK/FUSE HOLDER, 120V, LED INDICATION
12		*2	GGM4	FERRAZ	FUSE - CLASS GGM, 4AMPS
5	4		1492-EBJD3FB	AB	END BARRIER
7	2	*1	700-K22Z-ZJ	AB	MCS MINI CONTROL RELAY, IEC, 2 NO 2 NC CONTACTS, 24VDC
8		*1	100-KFA40E	AB	FRONT-MOUNTED AUXILIARY CONTACTS
9	1		1492-REC15	AB	RAIL MOUNTED RECEPTACLE 125V 15A #18-14AWG
10	1	*1	1492-JD3FB24	AB	TERMINAL BLOCK/FUSE HOLDER, 24V, LED INDICATION
11		*2	GGM3	FERRAZ	FUSE - CLASS GGM, 3AMPS
10	2	*1	1492-JD3FB24	AB	TERMINAL BLOCK/FUSE HOLDER, 24V, LED INDICATION
20		*2	GGM1/2	FERRAZ	FUSE - CLASS GGM, 0.5AMPS
10	22	*1	1492-JD3FB24	AB	TERMINAL BLOCK/FUSE HOLDER, 24V, LED INDICATION
4		*2	GGM2	FERRAZ	FUSE - CLASS GGM, 2AMPS
13	1	*1	800FP-F4	AB	NON-ILLUMINATED PUSH BUTTON, MOMENTARY, RED
14		*1	800F-X10	AB	800F CONTACT BLOCK N.O.
15		*1	800F-ALP	AB	800F PLASTIC MOUNTING LATCH
16	1	*1	800FP-LMT44	AB	E-STOP ILLUMINATED PLASTIC PUSH BUTTON - MUSHROOM (TWIST-TO-RELEASE)
15		*1	800F-ALP	AB	800F PLASTIC MOUNTING LATCH
17		*2	800F-X01S	AB	SECURITY CONTACT BLOCK N.C.
18		*1	800F-N3R	AB	RED INTEGRATED LED MODULE, SCREW TERMINATIONS, 24VAC/DC
19		*1	800F-16Y-E112	AB	EMERGENCY STOP LEGEND PLATE, YELLOW, 30MM (ENGLISH DESCRIPTION)
21	1	*1	800FP-F6	AB	NON-ILLUMINATED PUSH BUTTON, MOMENTARY, BLUE
14		*1	800F-X10	AB	800F CONTACT BLOCK N.O.
15		*1	800F-ALP	AB	800F PLASTIC MOUNTING LATCH
22	1		1783-US8T	AB	STRATIX 2000 UNMANAGED ETHERNET SWITCH, 8 RJ45 PORTS, 10-100 MBPS
23	1		ARK-2150L	ADVANTECH	HIGH PERFORMANCE FANLESS EMBEDDED BOX PC
24	1		ADM-1817AP-004	ARISTA	17-INCH INDUSTRIAL OPERATOR INTERFACE, TOUCHSCREEN, 24VDC
25	1		ADR21	BLACKBURN	ALUMINUM GROUND LUG, 14-2/0AWG
26	1		RS-097	FLOODMASTER	LEAK DETECTION ALARM SYSTEM, 120VAC
27	1		FG-30D	FORTINET	FORTIGATE 30D SERIES, INTEGRATED SECURITY SYSTEM, 120V
28	1		P-R2-K2RF0	GRACEPORT	120V OUTLET GFCI DATA PORT INTERFACE WITH CAT5 ETHERNET PORT TYPE4X
29	1		ALFSWD	HOFFMAN	DOOR ACTIVATED SWITCH
30	1		CP6036	HOFFMAN	BACK PLATE 60X36
31	1	*1	CSD603612SSR	HOFFMAN	CONCEPT WALL-MOUNT ENCLOSURE 60X36X12 STAINLESS STEEL
32		*1	ADP2	HOFFMAN	THERMOPLASTIC DATA POCKET 12X12
33		*1	AGS808	HOFFMAN	GROUND STRAP
34	1		LEDDIS35	HOFFMAN	LED LIGHT BAR 14 INCHES, 24VDC, 5 WATTS, 900 LUMENS

ITEM	QTY	SUB	CATALOG	MFG	DESCRIPTION
35	1		CMFKSS	HOFFMAN	STAINLESS STEEL MOUNTING BRACKET KIT
36	1	*1	N-174-AS	ILSCO	GROUND BAR COOPER
37		*1	PKGTAB	SQUARED	GROUND BAR INSULATOR
36	1		N-174-AS	ILSCO	GROUND BAR COOPER
38	1		BMXP342020	MODICON	M340 PROCESSOR MODULE
39	2	*1	BMXAMO0410	MODICON	M340 4 CHANNEL ANALOG OUTPUT MODULE
40		*1	BMXFTW301S	MODICON	FTB 20-WIRE 3METER SHIELDED CABLE
41	4	*1	BMXAMI0810	MODICON	M340 8 CHANNEL ISOLATED ANALOG INPUT MODULE
42		*1	BMXFTW308S	MODICON	FTB 28-WIRE 3METER SHIELDED CABLE
43	1	*1	BMXDDO3202K	MODICON	M340 DISCRETE OUTPUT MODULE, 32 OUTPUTS, 24VDC
44		*1	BMXFCW303	MODICON	FCN 2 X 20-WIRE 3METER CABLE
45	1	*1	BMXDDI3202K	MODICON	M340 DISCRETE INPUT MODULE, 32 INPUTS, 24VDC
44		*1	BMXFCW303	MODICON	FCN 2 X 20-WIRE 3METER CABLE
46	1		BMXCPS3500	MODICON	PLC MODICON M340 POWER SUPPLY MODULE, 100-240 VAC
47	1		BMXXBP1200	MODICON	M340 PLC RACK, 12 SLOTS
48	1		60112	SCHNEIDER	1 POLE THERMAL MAGNETIC CIRCUIT BREAKER, 15A
49	1		XPSAF5130P	SCHNEIDER	SAFETY MONITORING RELAY, DUAL CHANNEL, 24VAC/DC
50	1		RV50	SIERRA	AIRLINK RAVEN RV50 INDUSTRIAL LTE GATEWAY, 12VDC
51	1		SDU850	SOLA	UNINTERRUPTIBLE INDUSTRIAL UPS-850VA
52	1	*1	TY2X3NPW6	THOMAS & BETTS	WIRING DUCT 2X3" WHITE
53		*1	TY2CPW6	THOMAS & BETTS	WIRING DUCT COVER 2" WHITE
54	1	*18	TY2X3NPG6	THOMAS & BETTS	WIRING DUCT 2X3" GRAY
55		*18	TY2CPG6	THOMAS & BETTS	WIRING DUCT COVER 2" GRAY
56	1	*1	TY3X3NPW6	THOMAS & BETTS	WIRING DUCT 3X3" WHITE
57		*1	TY3CPW6	THOMAS & BETTS	WIRING DUCT COVER 3" WHITE
58	1	*18	TY3X3NPG6	THOMAS & BETTS	WIRING DUCT 3X3" GRAY
59		*18	TY3CPG6	THOMAS & BETTS	WIRING DUCT COVER 3" GRAY
60	1	*6	TY1X3NPW6	THOMAS & BETTS	WIRING DUCT 1X3" WHITE
61		*6	TY1CPW6	THOMAS & BETTS	WIRING DUCT COVER 1" WHITE
62	40		249-116	WAGO	SCREWLESS END RETAINER
63	4		2002-1292	WAGO	FEED-THROUGH END BARRIER FOR 2002-1201 TERMINAL BLOCK
64	54		2002-1201	WAGO	SINGLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY
65	1		2002-1207	WAGO	SPRING CLAMP GROUND TERMINAL BLOCK, GREEN/YELLOW
66	10		857-304	WAGO	TERMINAL BLOCK RELAY, SPRING CLAMP, SPDT, 24VDC
67	36		2002-2201	WAGO	DOUBLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY
68	2		2002-2292	WAGO	FEED-THROUGH END BARRIER FOR 2002-2201 TERMINAL BLOCK
69	2		2002-3292	WAGO	FEED-THROUGH END BARRIER FOR 2002-3201 TERMINAL BLOCK
70	40		2002-3201	WAGO	TRIPLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY
71	1		788-507	WAGO	PLUG-IN TYPE RELAY, SPDT, 120VAC
72	1		787-1621	WAGO	POWER SUPPLY 100-240VAC/12VDC, 7A
73	1		787-732	WAGO	POWER SUPPLY 85-264VAC/24VDC, 10A

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DWG TITLE

MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

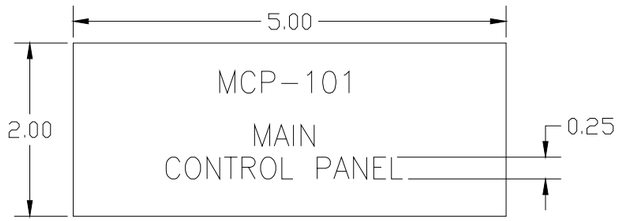
MCP-101
MAIN CONTROL PANEL
BILL OF MATERIAL

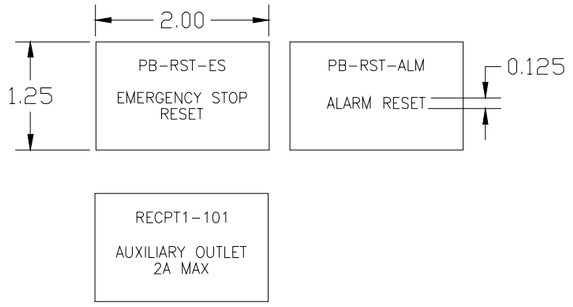
JOB NO
P65873

DWG NO
P65873-E02-MCP101-BOM

SHEET NO	REVISION
7 OF 15	.00

ENCLOSURE DOOR IDENTIFICATION





NOTE 1: ADHESIVE BACKED LAMINATED PLASTIC

NOTE 2: BLACK LETTERING ON WHITE BACKGROUND

NOTE 3: THICKNESS 1/16"

INSIDE PANEL IDENTIFICATION

LT-101	C1010007	TB0 120VAC FEED
		TB1-A 120VAC DISTRIBUTION
ETH-101	UPS-101	TB1-B 120VAC UPS FEED
		TB2 24VDC DISTRIBUTION
GTW-101	PS-12V-101	TB3 24VDC DIGITAL INPUT
		TB4 24VDC DIGITAL OUTPUT
PS-PLC-101	PS-24V-101	TB4 120VAC DIGITAL OUTPUT
		TB5 4-20mA ANALOG INPUT
PLC-MCP101	RECPT2-101	TB6 4-20mA ANALOG OUTPUT
		TB8 12VDC DISTRIBUTION
C1010002	CR-101	TBES 24VDC EMERGENCY STOP
C1010004	CB-101	
C1010006	PC-101	
C1010008	CR-ES-101	
C1010001	FOR-101	
C1010003	CR-K1-101	
C1010005	CR-K2-101	

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DWG TITLE

MELIADINE WTP
CONTAINERIZED WATER TREATMENT PLANT
ELECTRICAL DRAWINGS

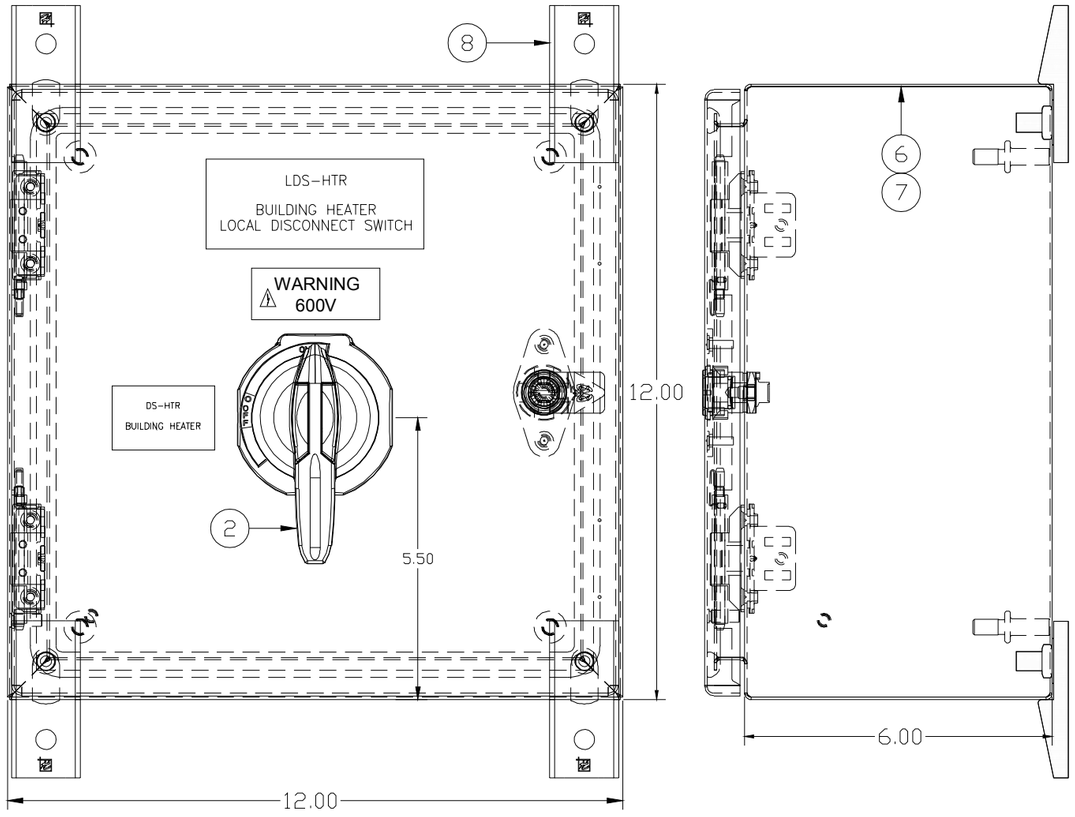
MCP-101
MAIN CONTROL PANEL
LAMICOID TAG

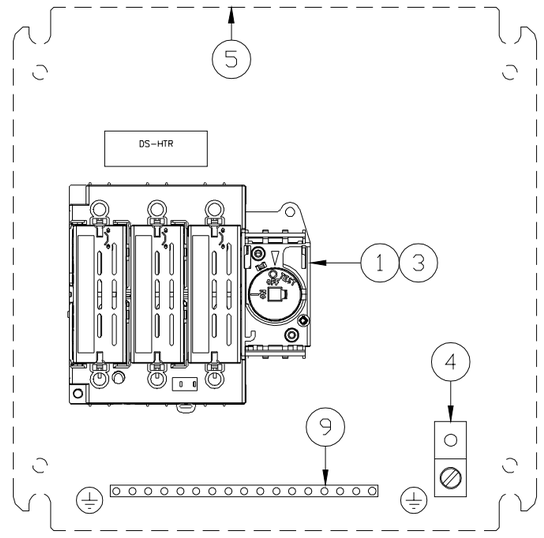
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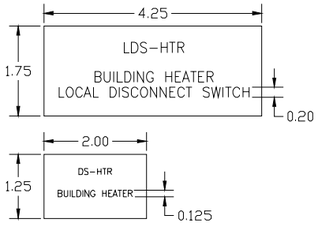
SHEET NO: 8 OF 15

REVISION: .00





ITEM	QTY	SUB	CATALOG	MFG	DESCRIPTION
1	1	*1	194R-N30-1753	AB	NEXT GENERATION DISCONNECT SWITCH, NON-FUSED, 30A, OPEN STYLE
2		*1	194R-PY	AB	PADLOCKABLE HANDLE NEMA 4X RED/YELLOW, UP TO 60A
3		*1	194R-S1	AB	OPERATING SHAFT 12 INCHES
4	1		ADR21	BLACKBURN	ALUMINUM GROUND LUG, 14-2/0AWG
5	1		CP1212	HOFFMAN	BACK PLATE 12X12
6	1	*1	CSD12126SS	HOFFMAN	CONCEPT WALL-MOUNT ENCLOSURE 12X12X6 STAINLESS STEEL
7		*1	AGS808	HOFFMAN	GROUND STRAP
8	1		CMFKSS	HOFFMAN	STAINLESS STEEL MOUNTING BRACKET KIT
9	1		N-174-AS	ILSCO	GROUND BAR COOPER



NOTE 1: THIS JUNCTION BOX WILL BE INSTALLED ON WALL (CONTAINER #2)

NOTE 2: THIS JUNCTION BOX APPROX. WEIGHT 20 LBS

- ADHESIVE BACKED LAMINATED PLASTIC
- BLACK LETTERING ON WHITE BACKGROUND
- THICKNESS 1/16"

NOTE:

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DWG TITLE
MELIADINE WTP
CONTAINERIZED WATER TREATMENT PLANT
ELECTRICAL DRAWINGS

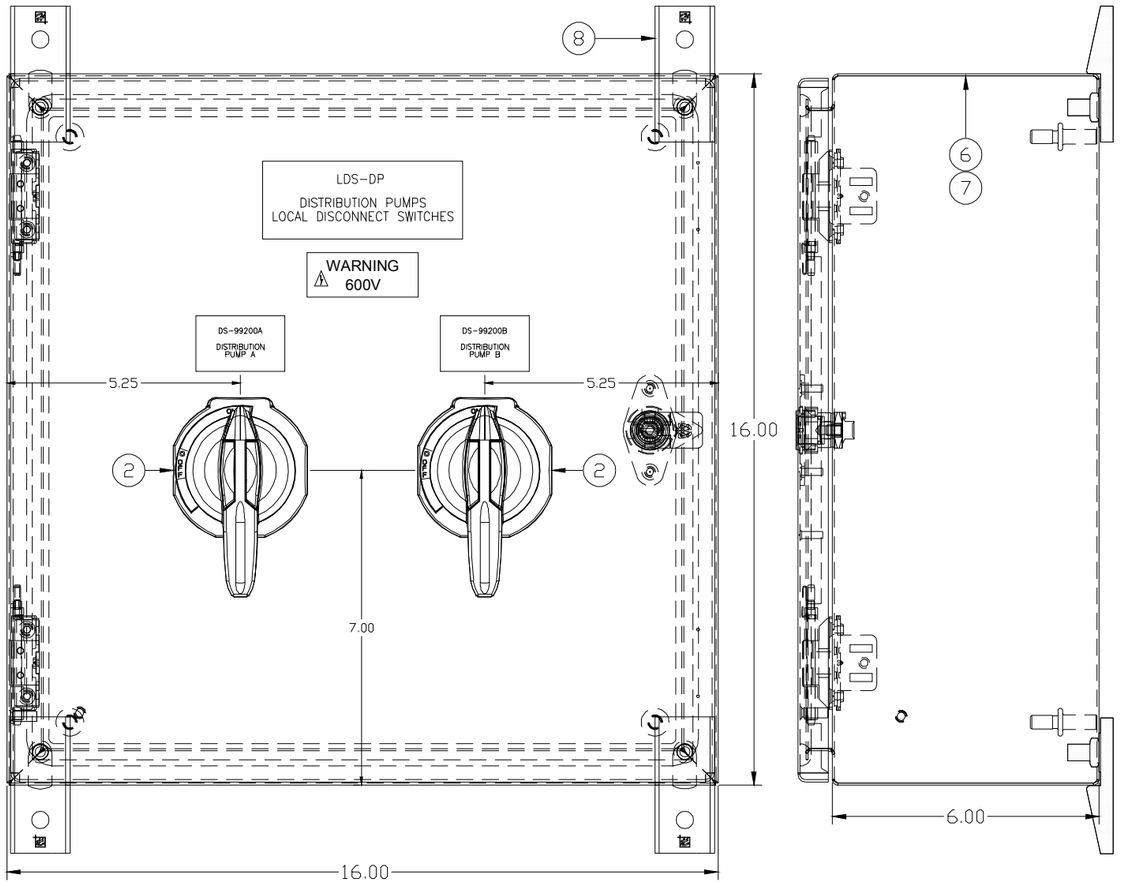
LDS-HTR
LOCAL DISCONNECT SWITCH
PANEL LAYOUT

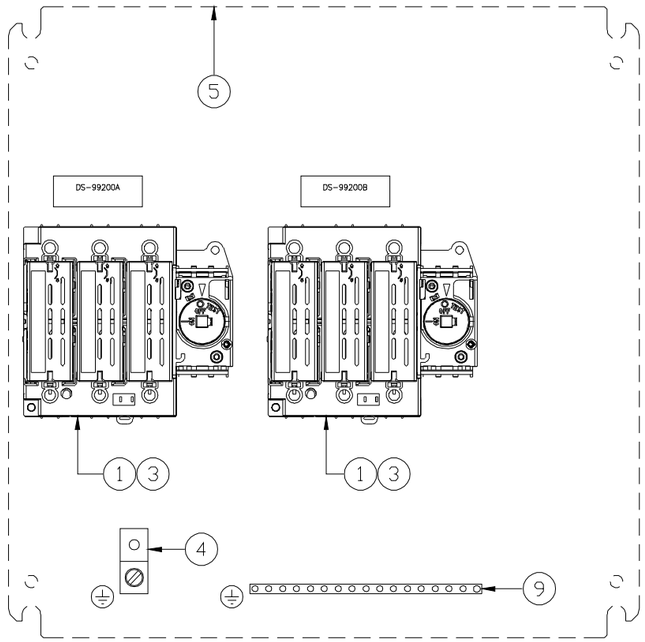
JOB NO
P65873

DWG NO
P65873-E02-LDSHTR-PL

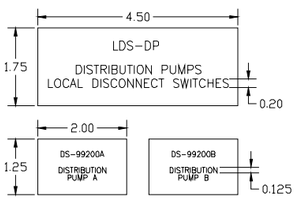
SHEET NO
9 OF 15

REVISION
.00





ITEM	QTY	SUB	CATALOG	MFG	DESCRIPTION
1	2	*1	194R-N30-1753	AB	NEXT GENERATION DISCONNECT SWITCH, NON-FUSED, 30A, OPEN STYLE
2		*1	194R-PY	AB	PADLOCKABLE HANDLE NEMA 4X RED/YELLOW, UP TO 60A
3		*1	194R-S1	AB	OPERATING SHAFT 12 INCHES
4	1		ADR21	BLACKBURN	ALUMINUM GROUND LUG, 14-2/0AWG
5	1		CP1616	HOFFMAN	BACK PLATE 16X16
6	1	*1	CSD16166SS	HOFFMAN	CONCEPT WALL-MOUNT ENCLOSURE 16X16X6 STAINLESS STEEL
7		*1	AGS808	HOFFMAN	GROUND STRAP
8	1		CMFKSS	HOFFMAN	STAINLESS STEEL MOUNTING BRACKET KIT
9	1		N-174-AS	ILSCO	GROUND BAR COOPER



NOTE 1: THIS JUNCTION BOX WILL BE INSTALLED ON WALL (CONTAINER #2)

NOTE 2: THIS JUNCTION BOX APPROX. WEIGHT 30 LBS

- ADHESIVE BACKED LAMINATED PLASTIC
- BLACK LETTERING ON WHITE BACKGROUND
- THICKNESS 1/16"

NOTE:

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.00	10/08/2016	INITIAL VERSION	E.R.		

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DWG TITLE
MELIADINE WTP
CONTAINERIZED WATER TREATMENT PLANT
ELECTRICAL DRAWINGS

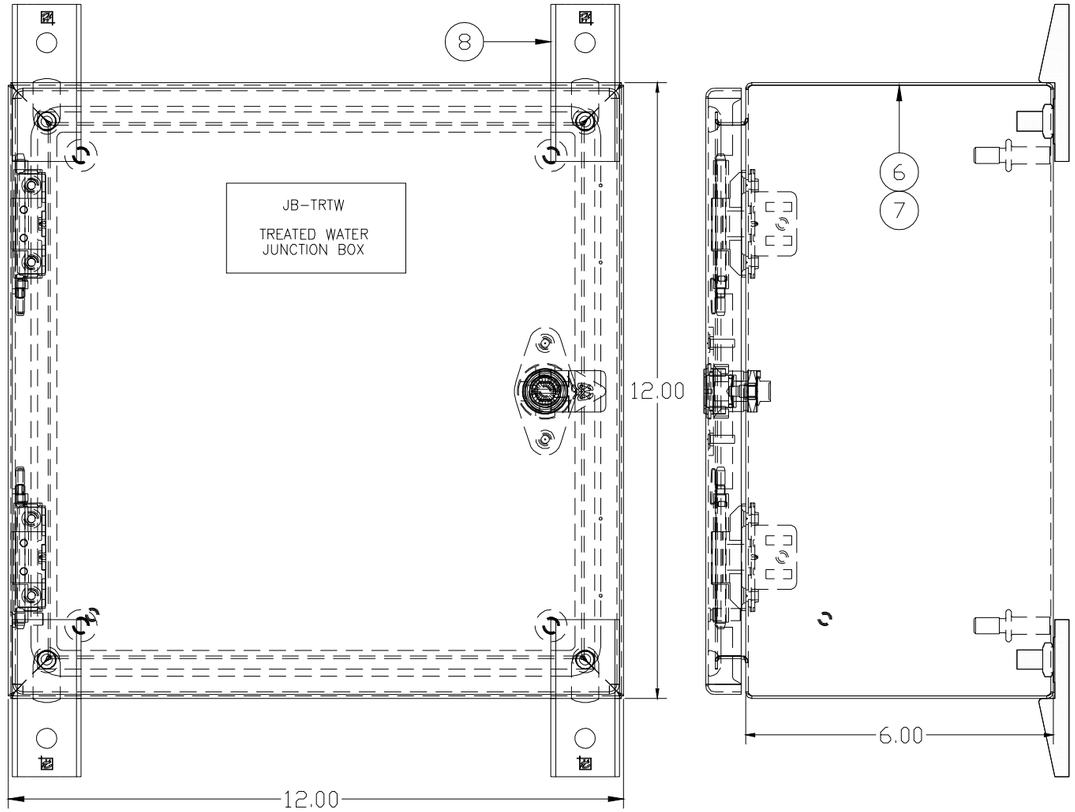
LDS-DP
LOCAL DISCONNECT SWITCH PANEL LAYOUT

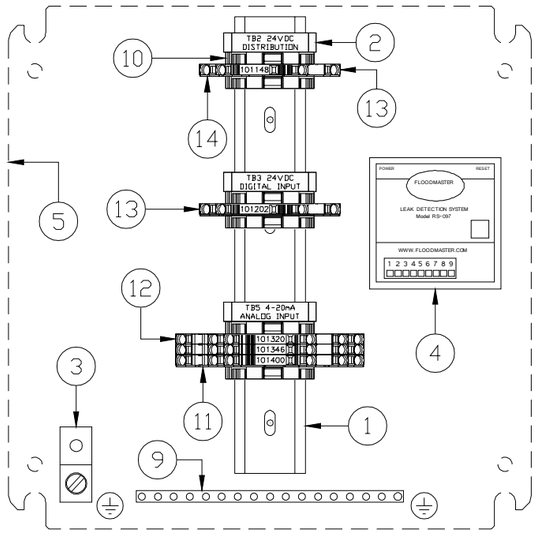
JOB NO
P65873

DWG NO
P65873-E02-LDSDP-PL

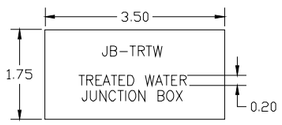
SHEET NO
10 OF 15

REVISION
.00





ITEM	QTY	SUB	CATALOG	MFG	DESCRIPTION
1	1		199-DR1	AB	TRACK 35mmX7.5mmX1219mm
2	3		1492-GM35	AB	GROUP MARKING CARRIER
3	1		ADR21	BLACKBURN	ALUMINUM GROUND LUG, 14-2/0AWG
4	1		RS-097	FLOODMASTER	LEAK DETECTION ALARM SYSTEM, 120VAC
5	1		CP1212	HOFFMAN	BACK PLATE 12X12
6	1	*1	CSD12126SS	HOFFMAN	CONCEPT WALL-MOUNT ENCLOSURE 12X12X6 STAINLESS STEEL
7		*1	AGS808	HOFFMAN	GROUND STRAP
8	1		CMFKSS	HOFFMAN	STAINLESS STEEL MOUNTING BRACKET KIT
9	1		N-174-AS	ILSCO	GROUND BAR COOPER
10	6		249-116	WAGO	SCREWLESS END RETAINER
11	1		2002-3292	WAGO	FEED-TROUGH END BARRIER FOR 2002-3201 TERMINAL BLOCK
12	3		2002-3201	WAGO	TRIPLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY
13	2		2002-2201	WAGO	DOUBLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY
14	2		2002-2292	WAGO	FEED-TROUGH END BARRIER FOR 2002-2201 TERMINAL BLOCK



- ADHESIVE BACKED LAMINATED PLASTIC
- BLACK LETTERING ON WHITE BACKGROUND
- THICKNESS 1/16"

NOTE 1: THIS JUNCTION BOX WILL BE INSTALLED ON WALL (CONTAINER #2)

NOTE 2: THIS JUNCTION BOX APPROX. WEIGHT 15 LBS

NOTE:

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DWG TITLE

MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

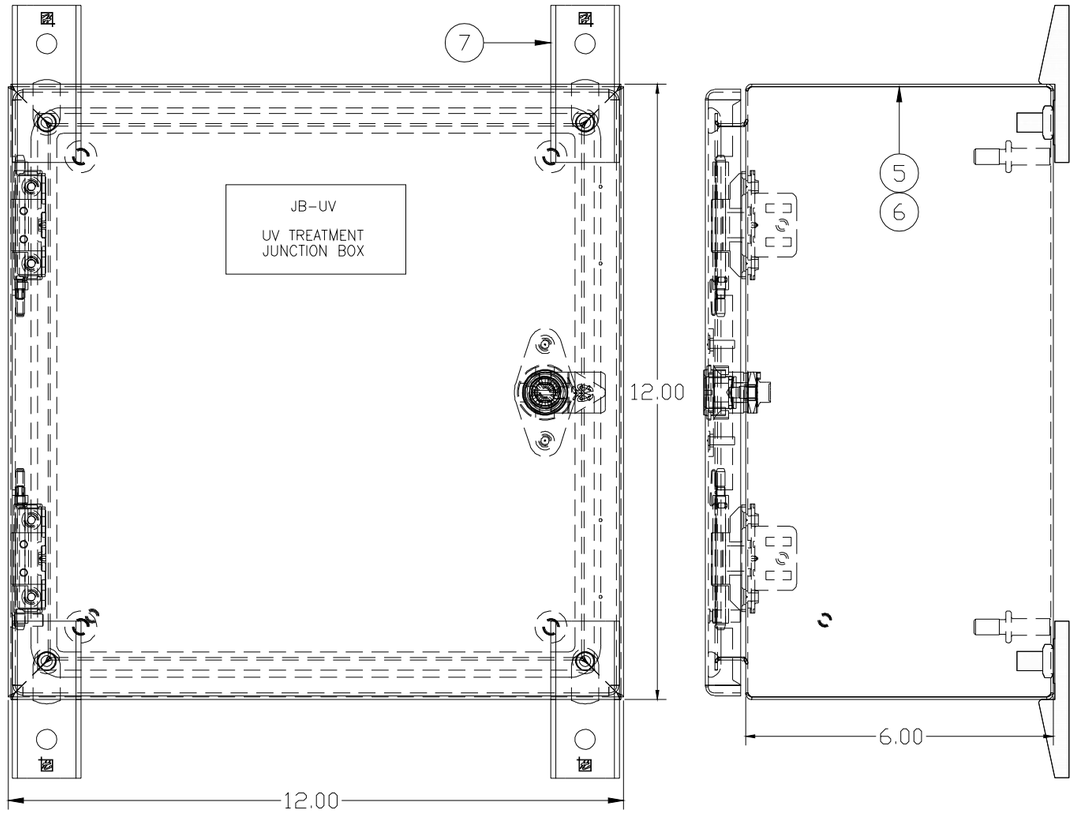
JB-TRTW
JUNCTION BOX
PANEL LAYOUT

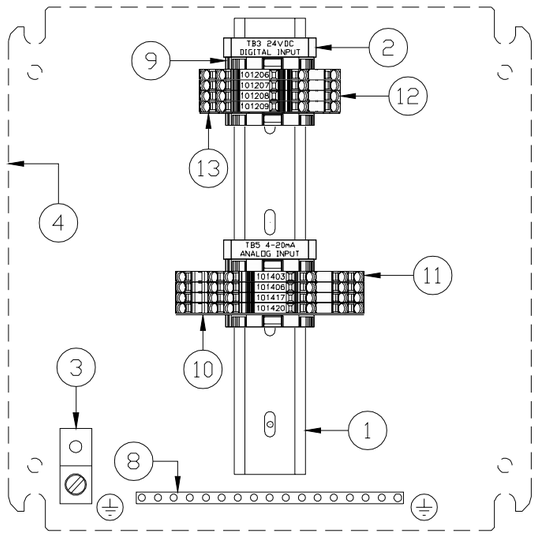
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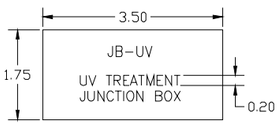
SHEET NO: 11 OF 15

REVISION: .00





ITEM	QTY	SUB	CATALOG	MFG	DESCRIPTION
1	1		199-DR1	AB	TRACK 35mmX7.5mmX1219mm
2	2		1492-GM35	AB	GROUP MARKING CARRIER
3	1		ADR21	BLACKBURN	ALUMINUM GROUND LUG, 14-2/0AWG
4	1		CP1212	HOFFMAN	BACK PLATE 12X12
5	1	*1	CSD12126SS	HOFFMAN	CONCEPT WALL-MOUNT ENCLOSURE 12X12X6 STAINLESS STEEL
6		*1	AGS808	HOFFMAN	GROUND STRAP
7	1		CMFKSS	HOFFMAN	STAINLESS STEEL MOUNTING BRACKET KIT
8	1		N-174-AS	ILSCO	GROUND BAR COOPER
9	1		249-116	WAGO	SCREWLESS END RETAINER
10	1		2002-3292	WAGO	FEED-TROUGH END BARRIER FOR 2002-3201 TERMINAL BLOCK
11	4		2002-3201	WAGO	TRIPLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY
12	4		2002-2201	WAGO	DOUBLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY
13	1		2002-2292	WAGO	FEED-TROUGH END BARRIER FOR 2002-2201 TERMINAL BLOCK



- ADHESIVE BACKED LAMINATED PLASTIC
- BLACK LETTERING ON WHITE BACKGROUND
- THICKNESS 1/16"

NOTE 1: THIS JUNCTION BOX WILL BE INSTALLED ON WALL (CONTAINER #1)

NOTE 2: THIS JUNCTION BOX APPROX. WEIGHT 15 LBS

NOTE:

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DWG TITLE
MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

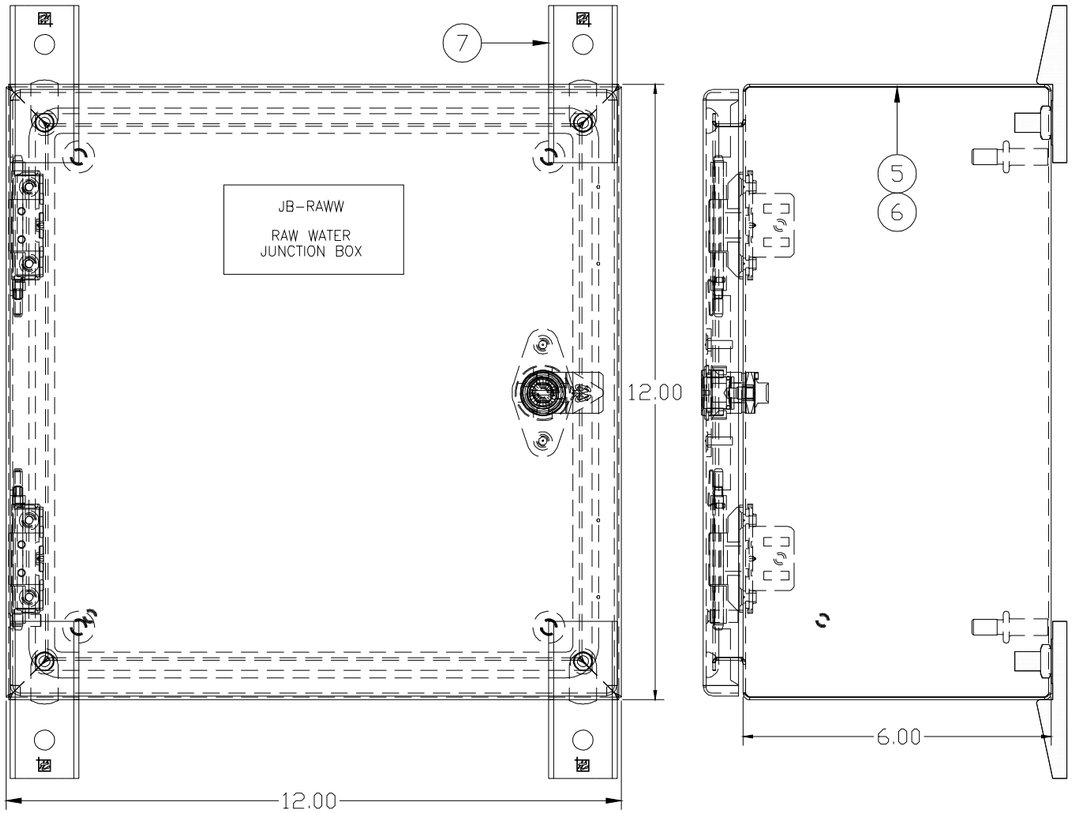
JB-UV
JUNCTION BOX
PANEL LAYOUT

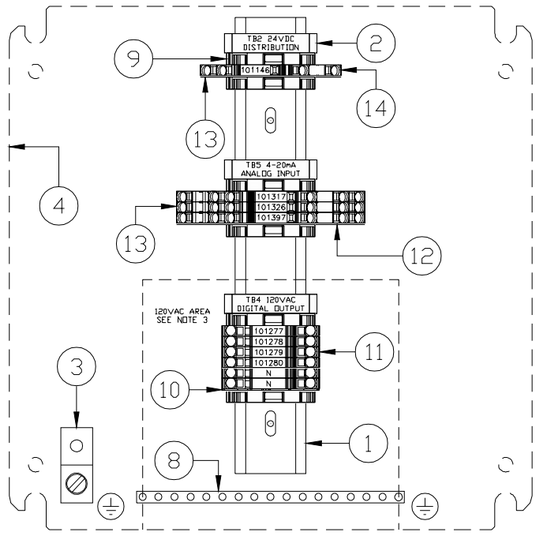
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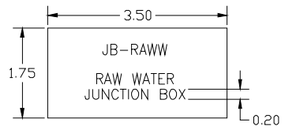
SHEET NO: 12 OF 15

REVISION: .00





ITEM	QTY	SUB	CATALOG	MFG	DESCRIPTION
1	1		199-DR1	AB	TRACK 35mmX7.5mmX1219mm
2	3		1492-GM35	AB	GROUP MARKING CARRIER
3	1		ADR21	BLACKBURN	ALUMINUM GROUND LUG, 14-2/0AWG
4	1		CP1212	HOFFMAN	BACK PLATE 12X12
5	1	*1	CSD12126SS	HOFFMAN	CONCEPT WALL-MOUNT ENCLOSURE 12X12X6 STAINLESS STEEL
6		*1	AGS808	HOFFMAN	GROUND STRAP
7	1		CMFKSS	HOFFMAN	STAINLESS STEEL MOUNTING BRACKET KIT
8	1		N-174-AS	ILSCO	GROUND BAR COOPER
9	1		249-116	WAGO	SCREWLESS END RETAINER
10	1		2002-1292	WAGO	FEED-THROUGH END BARRIER FOR 2002-1201 TERMINAL BLOCK
11	6		2002-1201	WAGO	SINGLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY
12	1		2002-3292	WAGO	FEED-THROUGH END BARRIER FOR 2002-3201 TERMINAL BLOCK
13	3		2002-3201	WAGO	TRIPLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY
14	1		2002-2201	WAGO	DOUBLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY
15	1		2002-2292	WAGO	FEED-THROUGH END BARRIER FOR 2002-2201 TERMINAL BLOCK



- ADHESIVE BACKED LAMINATED PLASTIC
- BLACK LETTERING ON WHITE BACKGROUND
- THICKNESS 1/16"

NOTE 1: THIS JUNCTION BOX WILL BE INSTALLED ON WALL (CONTAINER #2)

NOTE 2: THIS JUNCTION BOX APPROX. WEIGHT 15 LBS

NOTE 3: 120VAC AND 24VDC WIRES SHOULD NOT CROSS EACH OTHER

NOTE:

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DWG TITLE
MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

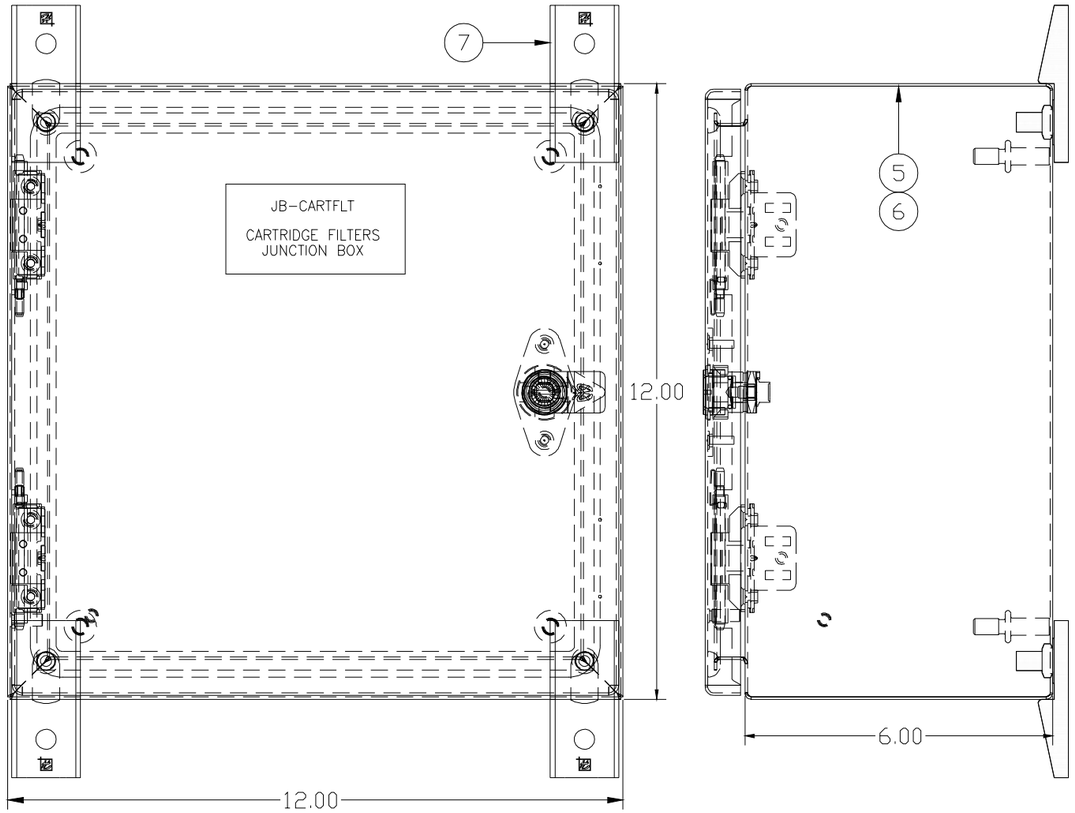
JB-RAWW
JUNCTION BOX
PANEL LAYOUT

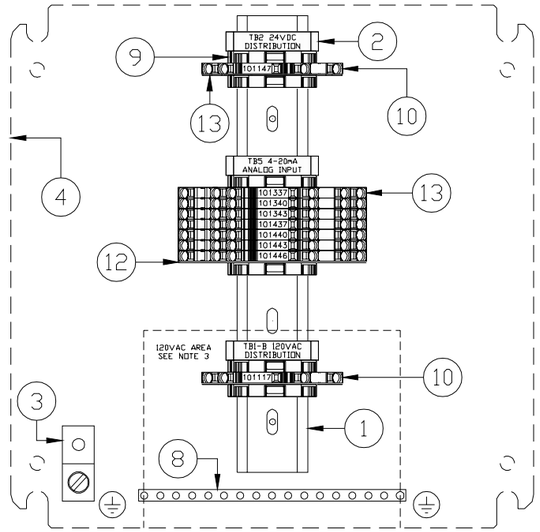
JOB NO: P65873

DWG NO: P65873-E02-JBRAWW-PL

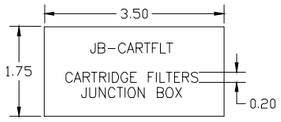
SHEET NO: 13 OF 15

REVISION: .00





ITEM	QTY	SUB	CATALOG	MFG	DESCRIPTION
1	1		199-DR1	AB	TRACK 35mmX7.5mmX1219mm
2	3		1492-GM35	AB	GROUP MARKING CARRIER
3	1		ADR21	BLACKBURN	ALUMINUM GROUND LUG, 14-2/0AWG
4	1		CP1212	HOFFMAN	BACK PLATE 12X12
5	1	*1	CSD12126SS	HOFFMAN	CONCEPT WALL-MOUNT ENCLOSURE 12X12X6 STAINLESS STEEL
6		*1	AGS808	HOFFMAN	GROUND STRAP
7	1		CMFKSS	HOFFMAN	STAINLESS STEEL MOUNTING BRACKET KIT
8	1		N-174-AS	ILSCO	GROUND BAR COOPER
9	1		249-116	WAGO	SCREWLESS END RETAINER
10	2		2002-2201	WAGO	DOUBLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY
11	2		2002-2292	WAGO	FEED-TROUGH END BARRIER FOR 2002-2201 TERMINAL BLOCK
12	1		2002-3292	WAGO	FEED-TROUGH END BARRIER FOR 2002-3201 TERMINAL BLOCK
13	7		2002-3201	WAGO	TRIPLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY



- ADHESIVE BACKED LAMINATED PLASTIC
- BLACK LETTERING ON WHITE BACKGROUND
- THICKNESS 1/16"

NOTE 1: THIS JUNCTION BOX WILL BE INSTALLED ON WALL (CONTAINER #1)

NOTE 2: THIS JUNCTION BOX APPROX. WEIGHT 15 LBS

NOTE 3: 120VAC AND 24VDC WIRES SHOULD NOT CROSS EACH OTHER

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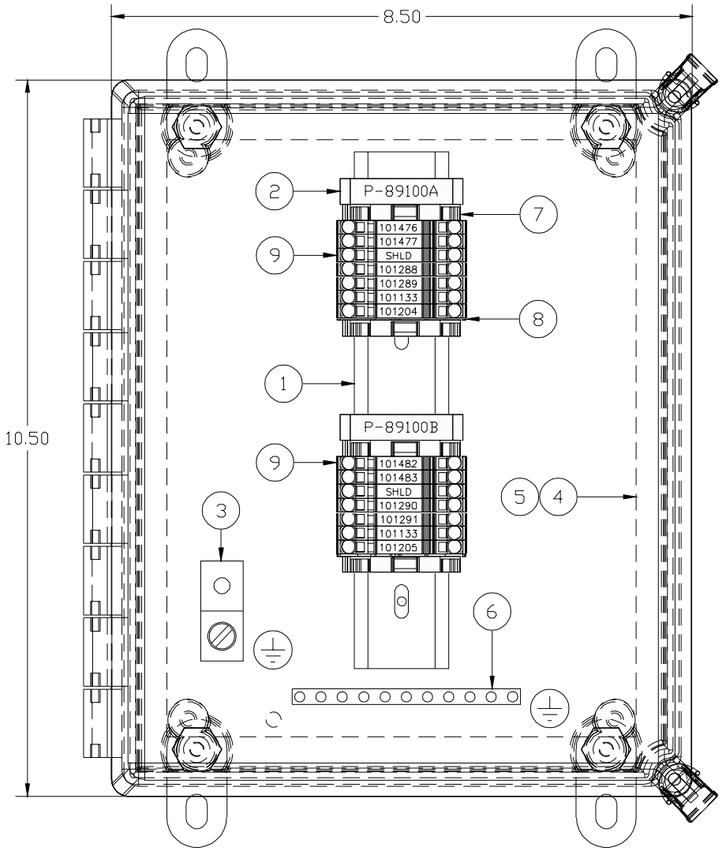
DWG TITLE
MELIADINE WTP
CONTAINERIZED WATER TREATMENT PLANT
ELECTRICAL DRAWINGS

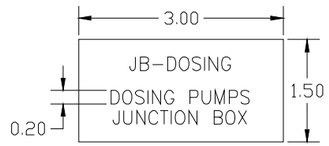
JB-CARTFLT
JUNCTION BOX
PANEL LAYOUT

JOB NO
P65873

DWG NO
P65873-E02-JBCARTFLT-PL

SHEET NO	REVISION
14 OF 15	.00





- ADHESIVE BACKED LAMINATED PLASTIC
- BLACK LETTERING ON WHITE BACKGROUND
- THICKNESS 1/16"

NOTE 1: THIS JUNCTION BOX WILL BE INSTALLED ON THE SODIUM HYPOCHLORITE DOSING SKID (CONTAINER #1)

NOTE 2: THIS JUNCTION BOX APPROX. WEIGHT 10 LBS

ITEM	QTY	SUB	CATALOG	MFG	DESCRIPTION
1	1		199-DR1	AB	TRACK 35mmX7.5mmX1219mm
2	2		1492-GM35	AB	GROUP MARKING CARRIER
3	1		ADR21	BLACKBURN	ALUMINUM GROUND LUG, 14-2/0AWG
4	1	*1	A1086CHQRFG	HOFFMAN	FIBERGLASS CONTINUOUS HINGE TYPE 4X 10X8X6
5		*1	A10P8	HOFFMAN	BACK PLATE 10X8
6	1		N-174-AS	ILSCO	GROUND BAR COOPER
7	4		249-116	WAGO	SCREWLESS END RETAINER
8	2		2002-1292	WAGO	FEED-TROUGH END BARRIER FOR 2002-1201 TERMINAL BLOCK
9	14		2002-1201	WAGO	SINGLE DECK SPRING CLAMP TERMINAL BLOCK, GRAY

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DWG TITLE
MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

JB-DOSING
JUNCTION BOX
PANEL LAYOUT

JOB NO
P65873

DWG NO
P65873-E02-JBDOSING-PL

SHEET NO
15 OF 15

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10.8 - ELECTRICAL SCHEMATICS

MELIADINE WTP

CONTAINERIZED WATER TREATMENT PLANT

C03 ELECTRICAL SCHEMATICS

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DWG TITLE

MELIADINE WTP
CONTAINERIZED WATER TREATMENT PLANT
ELECTRICAL DRAWINGS

TITLE

JOB NO
P65873

DWG NO
P65873-C03-TITLE

SHEET NO
1 OF 18

REVISION
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DRAWING #	DESCRIPTION 1	DESCRIPTION 2	DESCRIPTION 3	SHEET #
P65873-C03-TITLE		TITLE		1
P65873-C03-INDEX		INDEX		2
P65873-C03-LEGEND		LEGEND		3
P65873-C03-PP101-600V-01	PP-101	POWER PANEL	600VAC DISTRIBUTION	4
P65873-C03-PP101-600V-02	PP-101	POWER PANEL	600VAC DISTRIBUTION	5
P65873-C03-PP101-120V-01	PP-101	POWER PANEL	600VAC DISTRIBUTION	6
P65873-C03-MCP101-120V	MCP-101	MAIN CONTROL PANEL	120VAC DISTRIBUTION	7
P65873-C03-MCP101-24V	MCP-101	MAIN CONTROL PANEL	24VDC DISTRIBUTION	8
P65873-C03-MCP101-DI-01	MCP-101	MAIN CONTROL PANEL	DIGITAL INPUT	9
P65873-C03-MCP101-DO-01	MCP-101	MAIN CONTROL PANEL	DIGITAL OUTPUT	10
P65873-C03-MCP101-DO-02	MCP-101	MAIN CONTROL PANEL	DIGITAL OUTPUT	11
P65873-C03-MCP101-AI-01	MCP-101	MAIN CONTROL PANEL	ANALOG INPUT	12
P65873-C03-MCP101-AI-02	MCP-101	MAIN CONTROL PANEL	ANALOG INPUT	13
P65873-C03-MCP101-AI-03	MCP-101	MAIN CONTROL PANEL	ANALOG INPUT	14
P65873-C03-MCP101-AI-04	MCP-101	MAIN CONTROL PANEL	ANALOG INPUT	15
P65873-C03-MCP101-AO-01	MCP-101	MAIN CONTROL PANEL	ANALOG OUTPUT	16
P65873-C03-MCP101-DOSING	JB-DOSING	DOSING PUMPS	JUNCTION BOX	17
P65873-C03-MCP101-ES	MCP-101	MAIN CONTROL PANEL	EMERGENCY STOP	18

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DWG TITLE

MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

INDEX

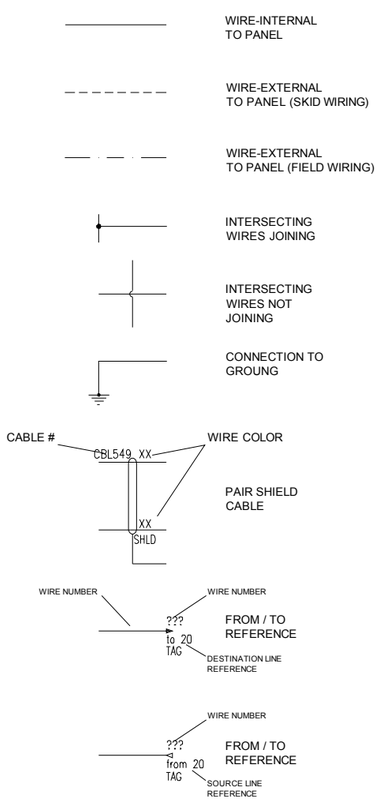
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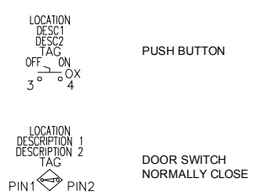
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REVISION: .00

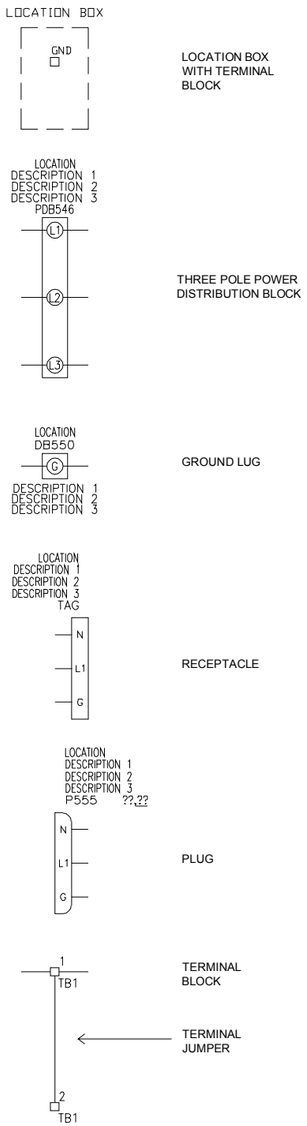
WIRE & CONNECTION



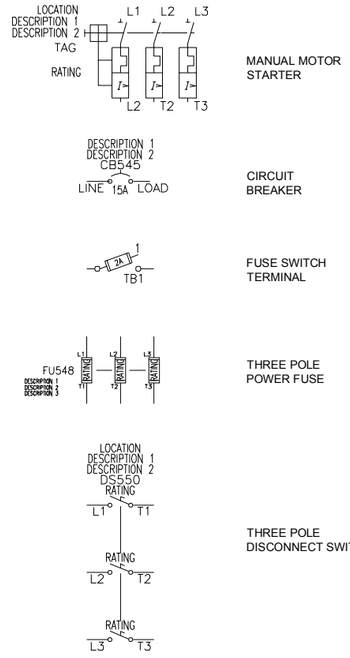
CONTROL SWITCH



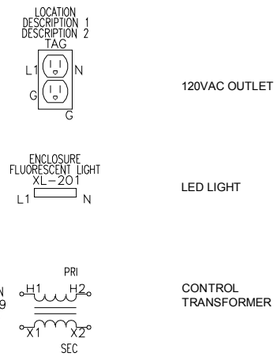
TERMINAL BLOCK



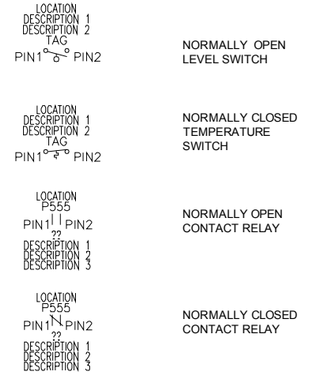
CIRCUIT PROTECTION



MISC ACCESSORY

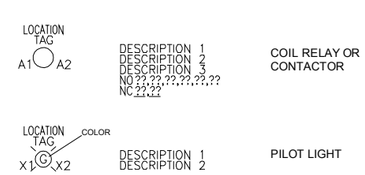


CONTROL CONTACT



WIRE COLOR

24 VDC (+) = BLUE
24 VDC (-) = WHITE/BLUE
120 VAC = BLACK
240VAC = RED
NEUTRAL = WHITE
GROUND = GREEN
ANALOG SIGNAL = +WHITE / -BLACK



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DWG TITLE
MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

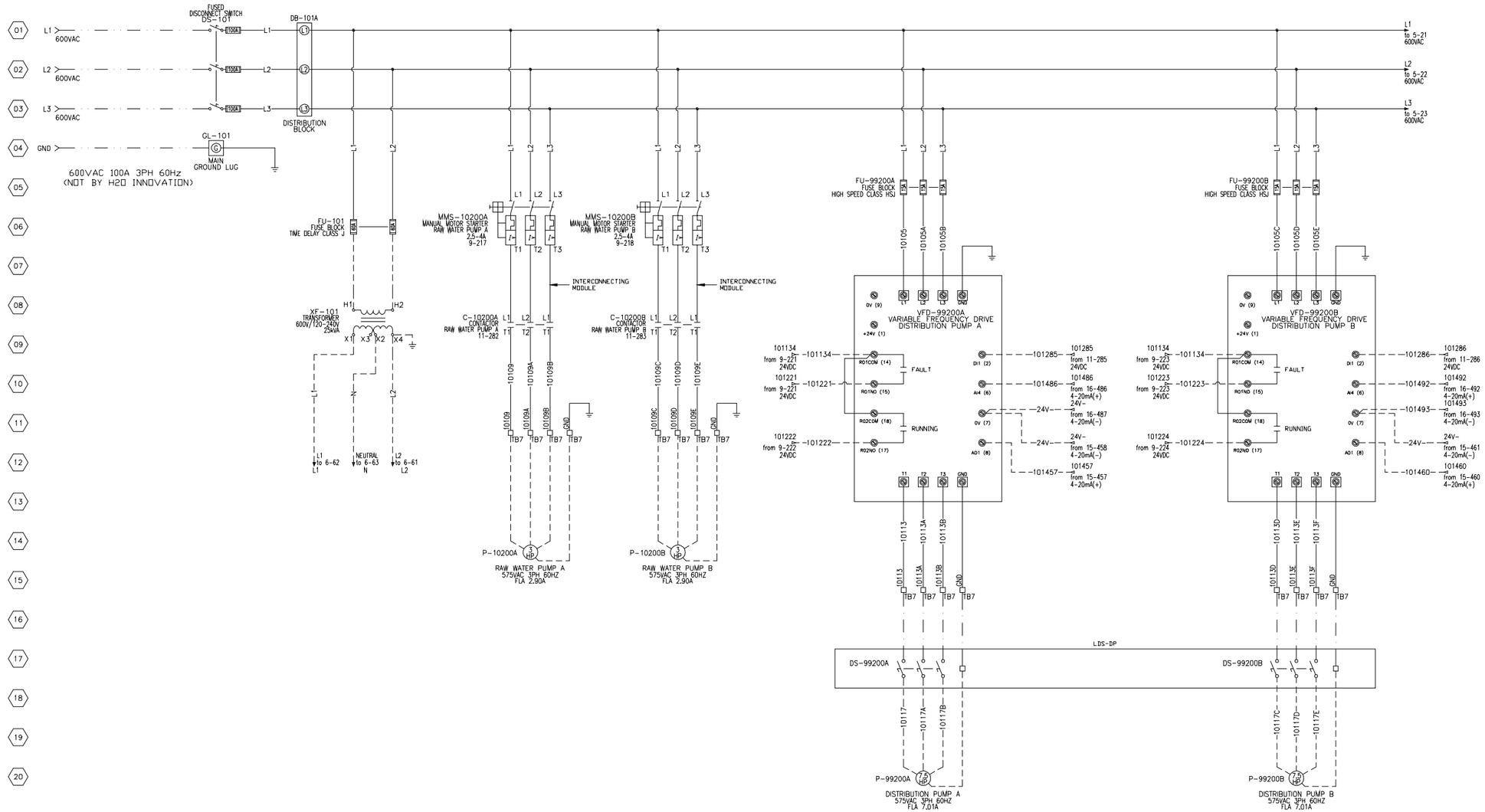
LEGEND

JOB NO
P65873

DWG NO
P65873-C03-LEGEND

SHEET NO
3 OF 18

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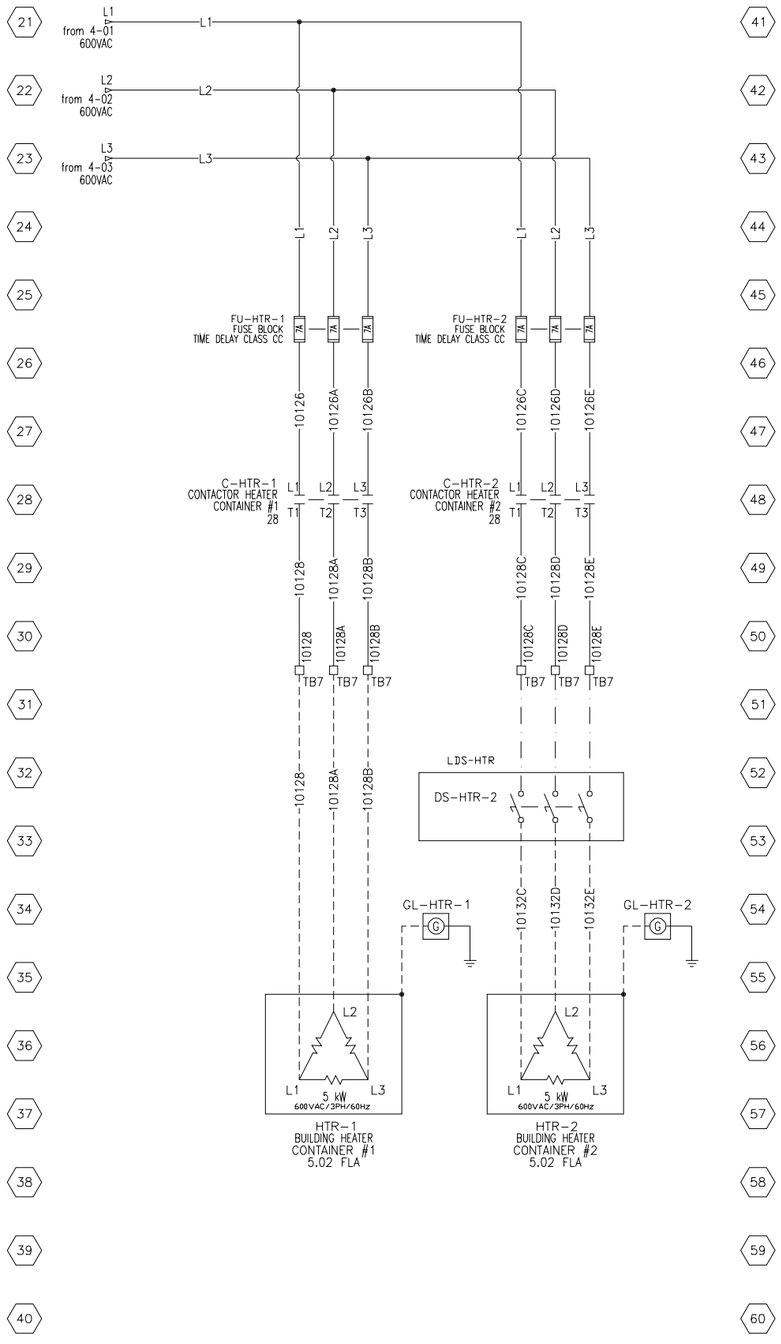
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CONTAINERIZED WATER TREATMENT PLANT
ELECTRICAL DRAWINGS

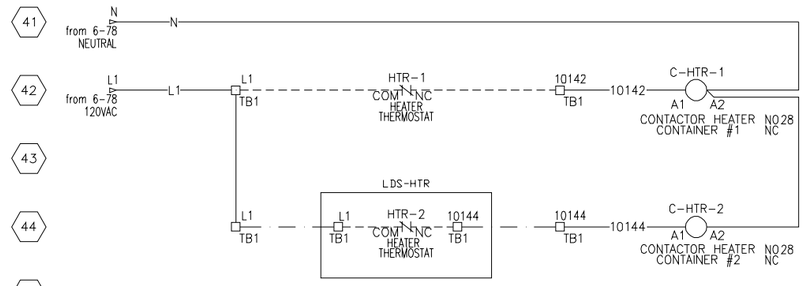
PP-101
POWER PANEL
600VAC DISTRIBUTION

JOB NO
P65873

DWG NO
P65873-C03-PP101-600V-01

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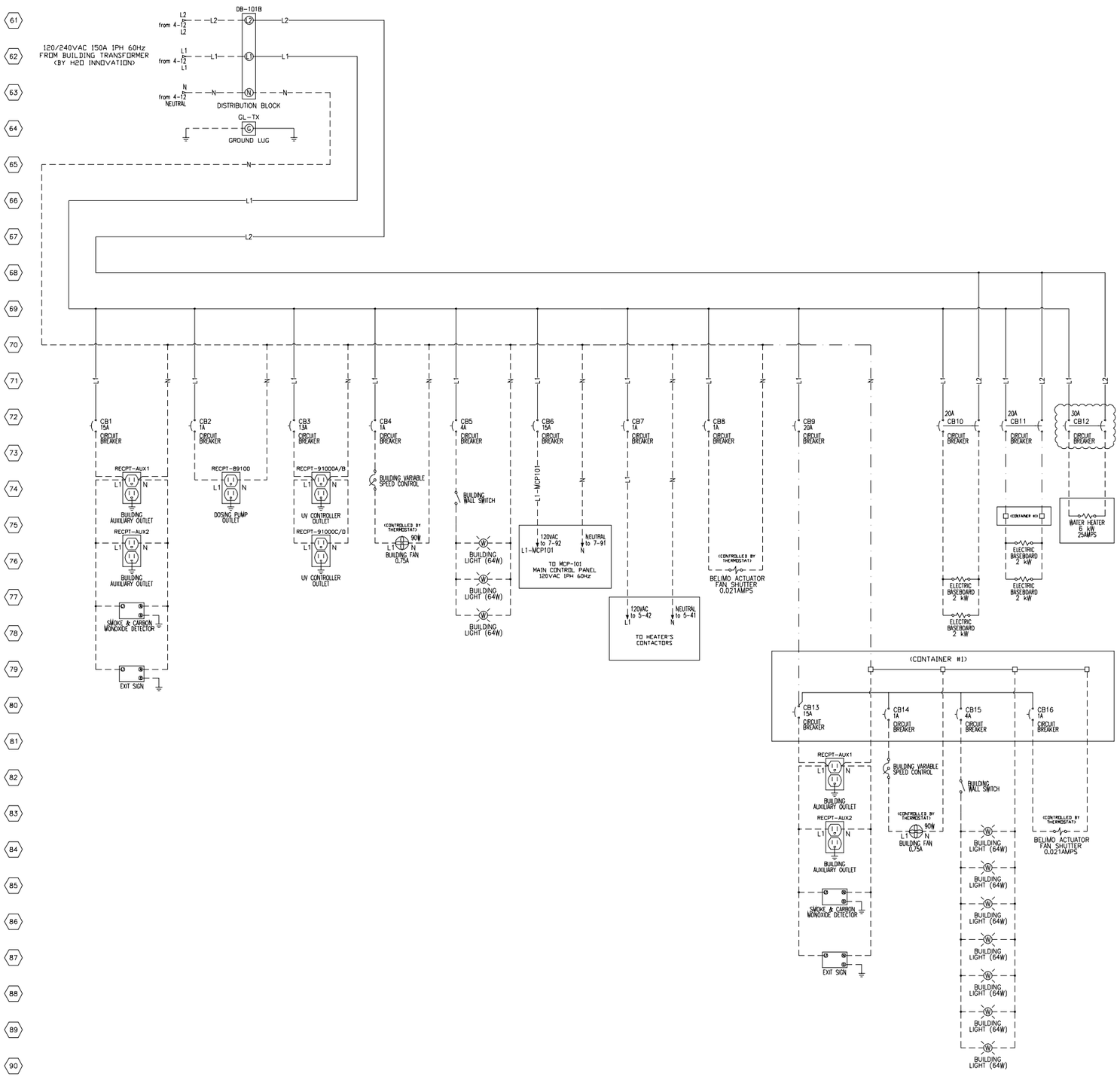
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MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

PP-101
POWER PANEL
600VAC DISTRIBUTION

JOB NO
P65873

DWG NO
P65873-C03-PP101-600V-02

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5 OF 18	.00



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DWG TITLE

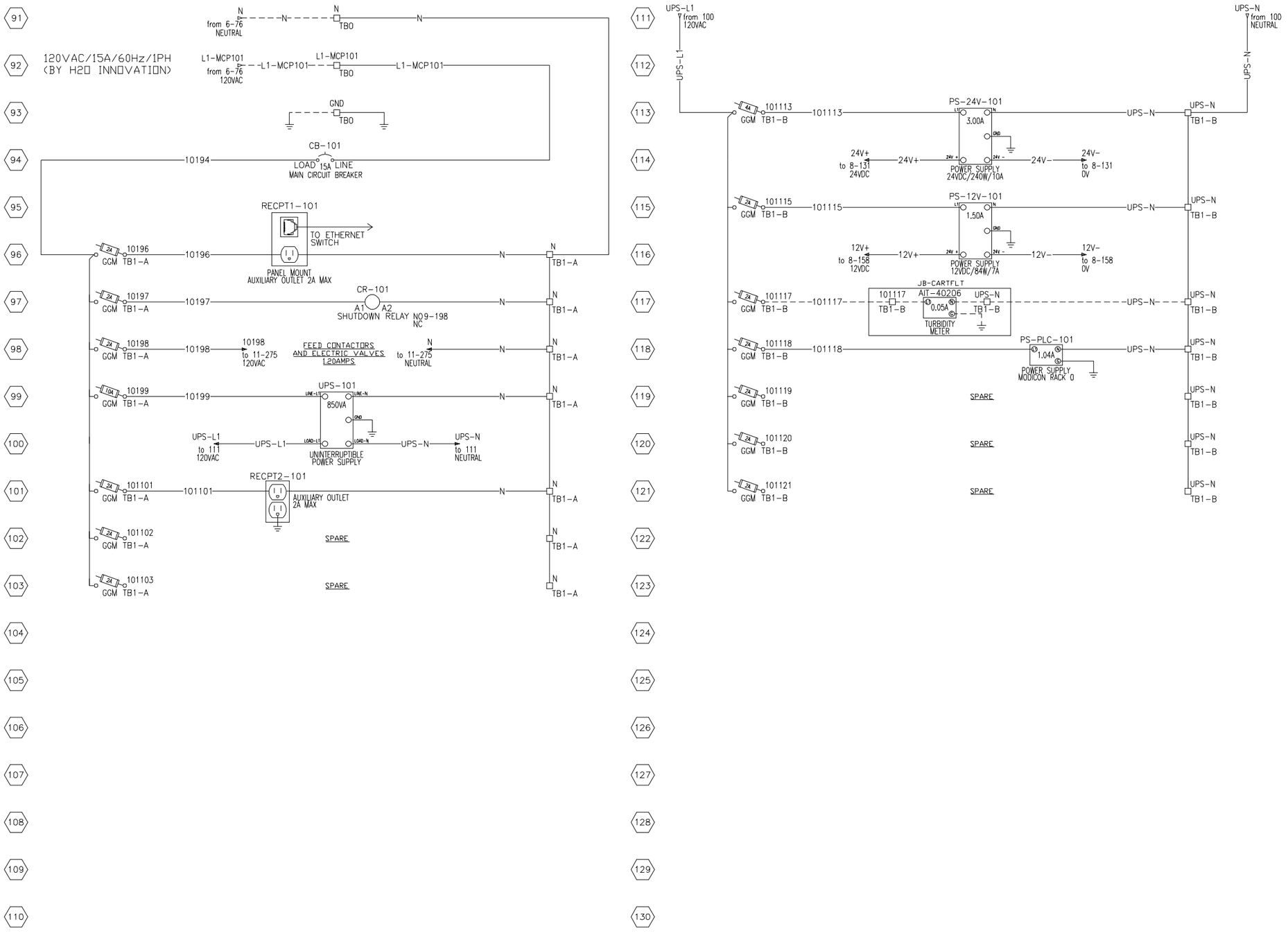
MELIADINE WTP
CONTAINERIZED WATER TREATMENT PLANT
ELECTRICAL DRAWINGS

PP-101
POWER PANEL
600VAC DISTRIBUTION

JOB NO
P65873

DWG NO
P65873-C03-PP101-120V-01

SHEET NO	REVISION
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DWG TITLE
MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

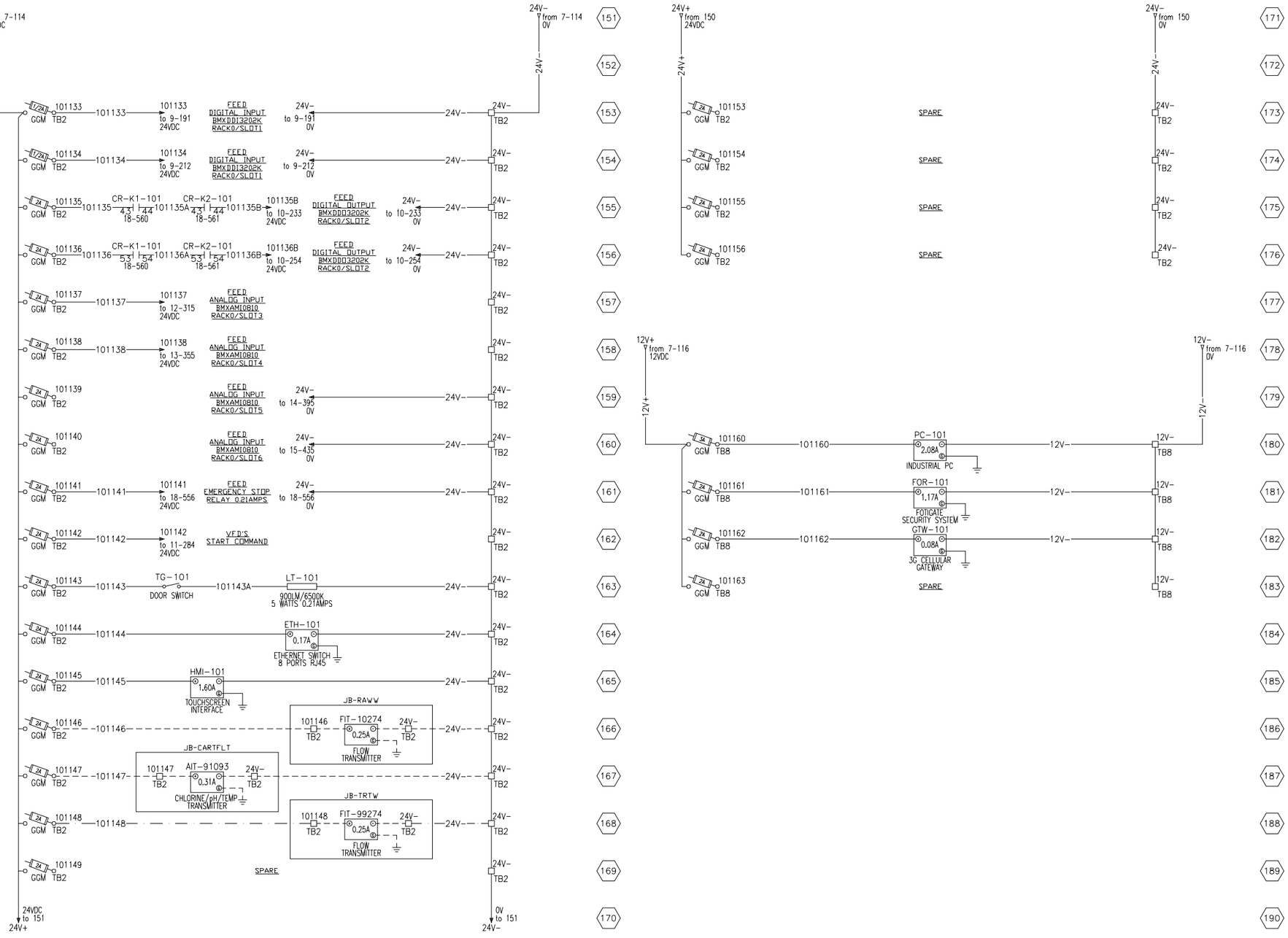
MCP-101
MAIN CONTROL PANEL
120VAC DISTRIBUTION

JOB NO
P65873

DWG NO
P65873-C03-MCP101-120V

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7 OF 18

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DWG TITLE
MELIADINE WTP
CONTAINERIZED WATER TREATMENT PLANT
ELECTRICAL DRAWINGS

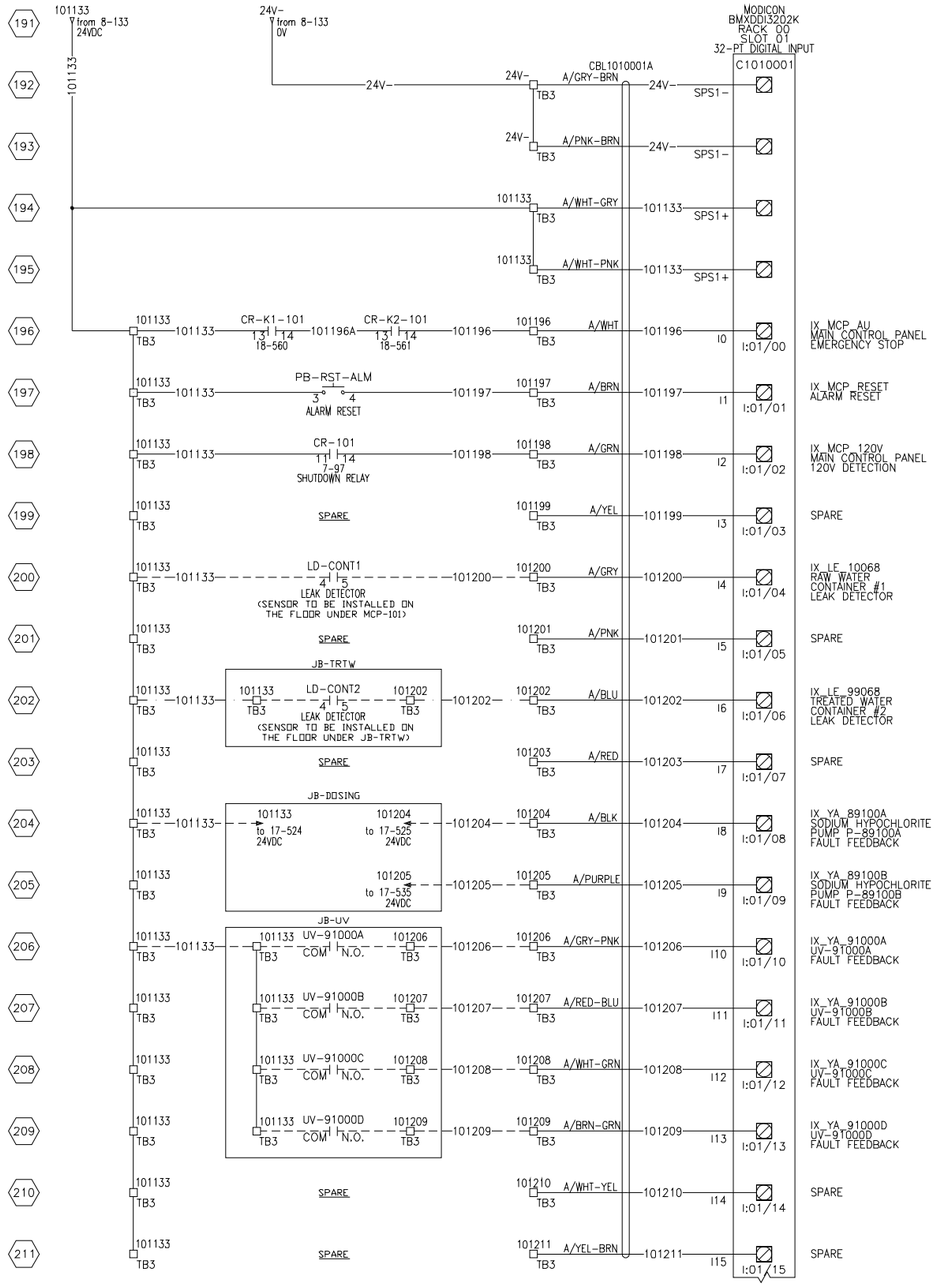
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MAIN CONTROL PANEL
24VDC DISTRIBUTION

JOB NO: P65873

DWG NO: P65873-C03-MCP101-24V

SHEET NO: 8 OF 18

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DWG TITLE

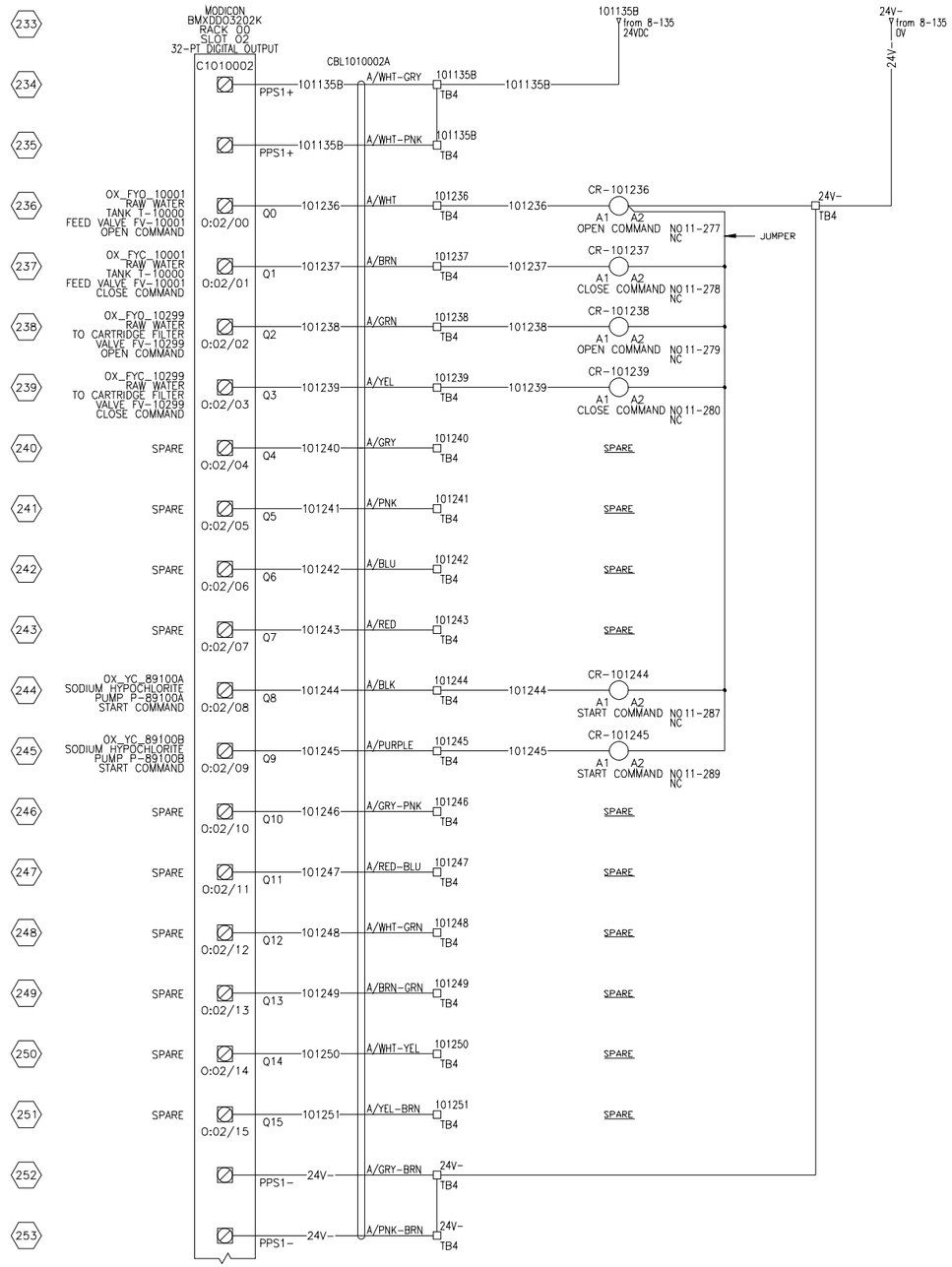
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TREATMENT PLANT
ELECTRICAL DRAWINGS

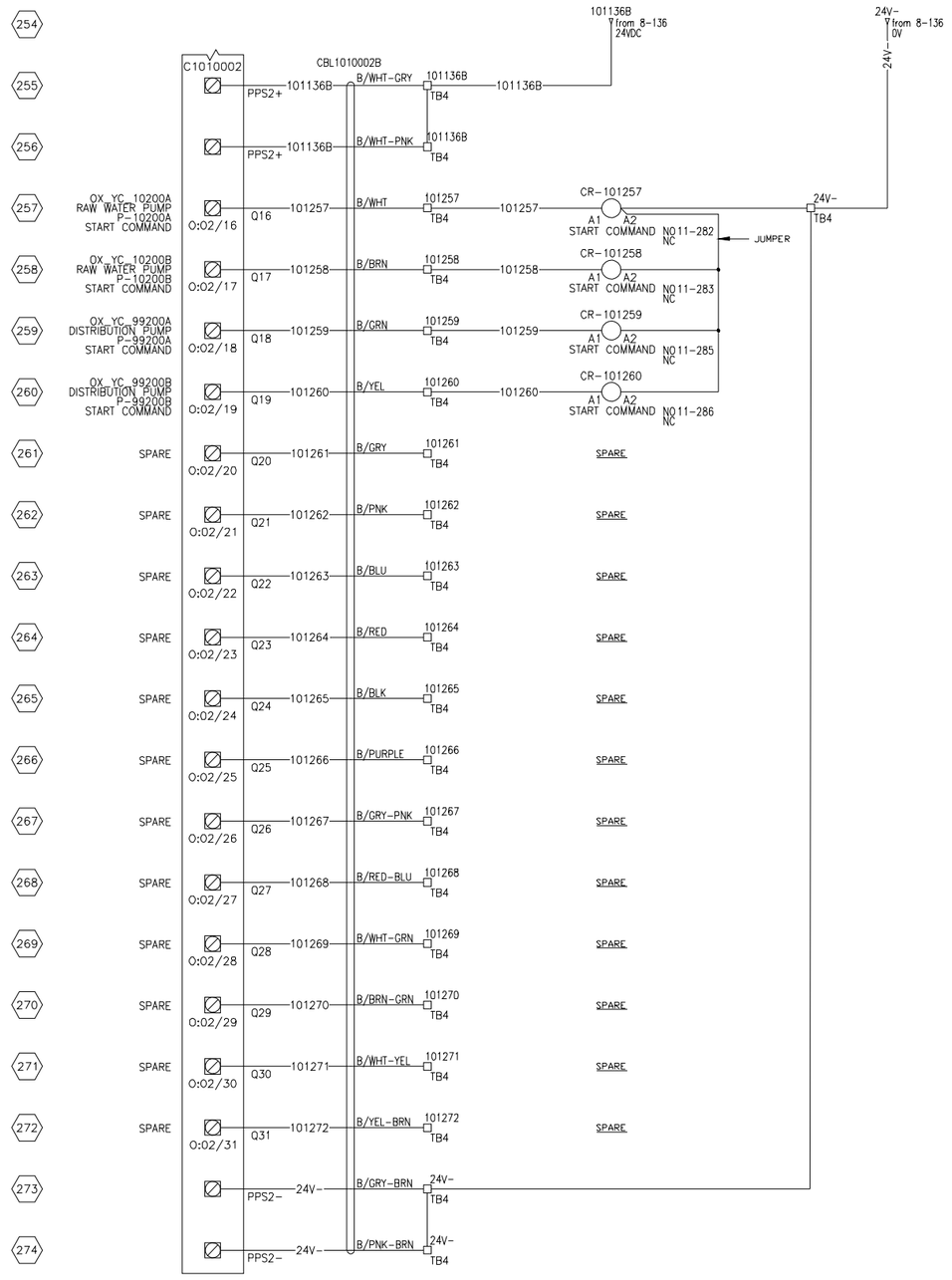
MCP-101
MAIN CONTROL PANEL
DIGITAL INPUT

JOB NO
P65873

DWG NO
P65873-C03-MCP101-DI-01

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9 OF 18	.00





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DWG TITLE
MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

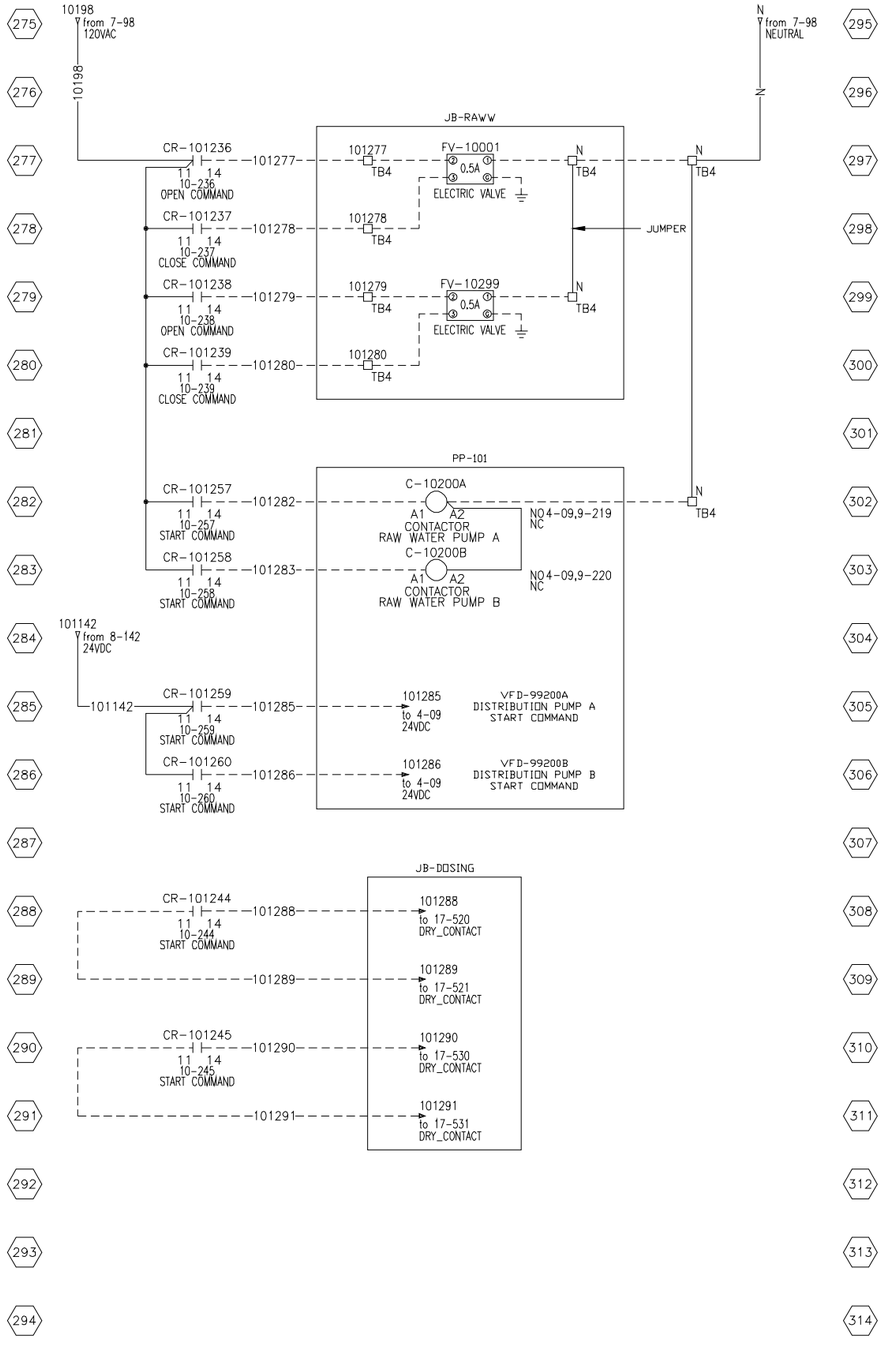
MCP-101
MAIN CONTROL PANEL
DIGITAL OUTPUT

JOB NO: P65873

DWG NO: P65873-C03-MCP101-DO-01

SHEET NO: 10 OF 18

REVISION: .00



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DWG TITLE
MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
ELECTRICAL DRAWINGS

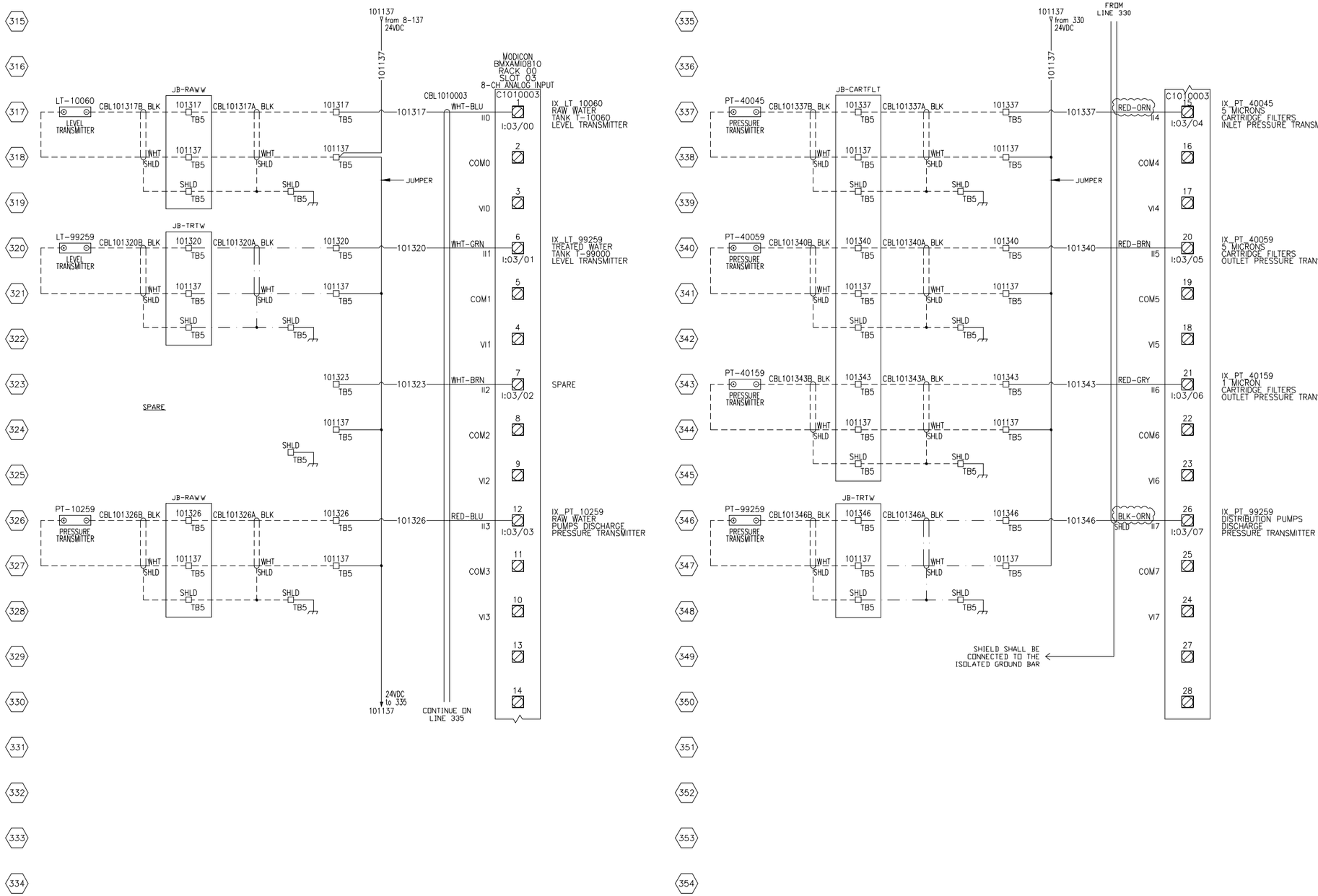
MCP-101
MAIN CONTROL PANEL
DIGITAL OUTPUT

JOB NO
P65873

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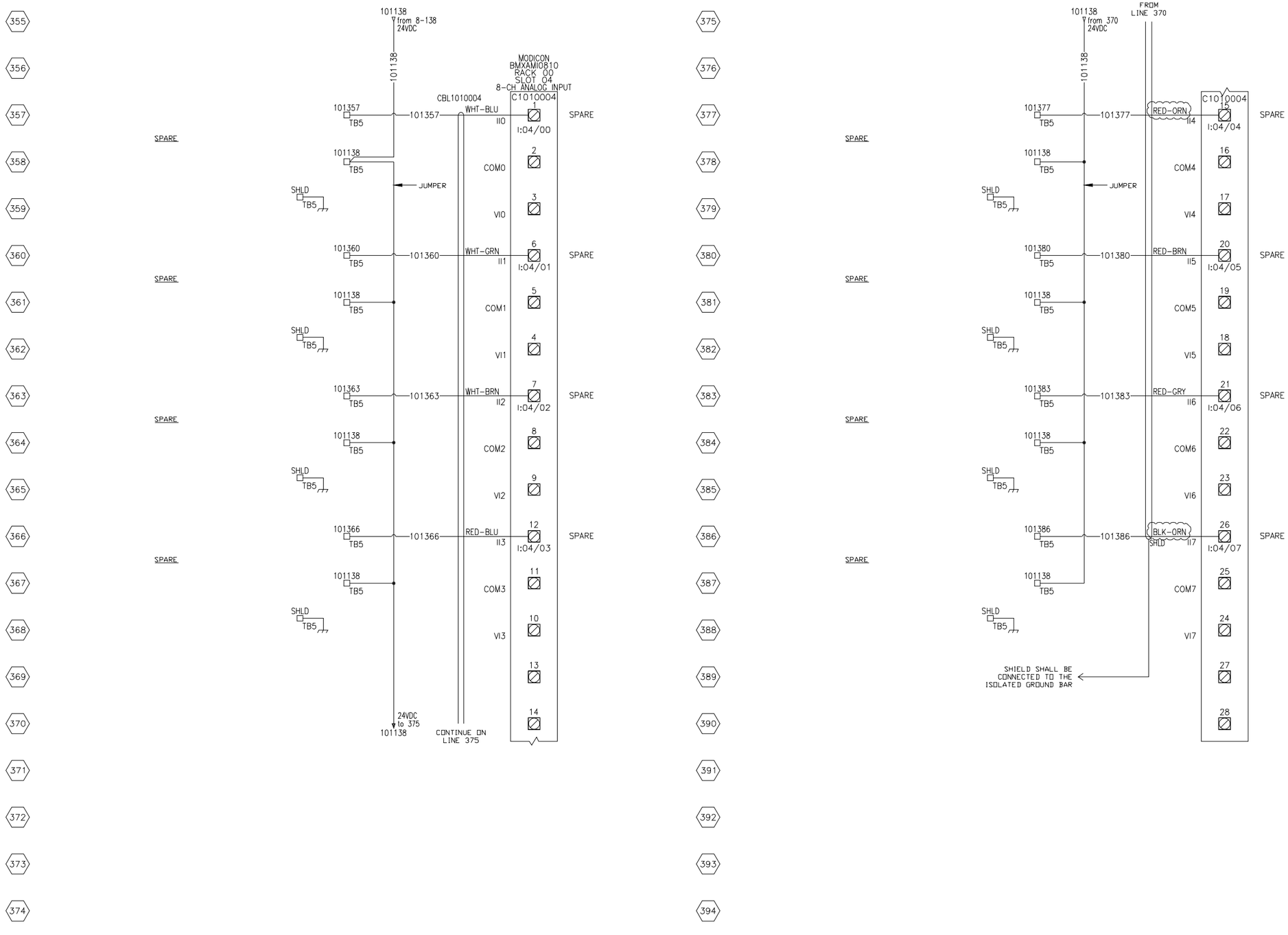
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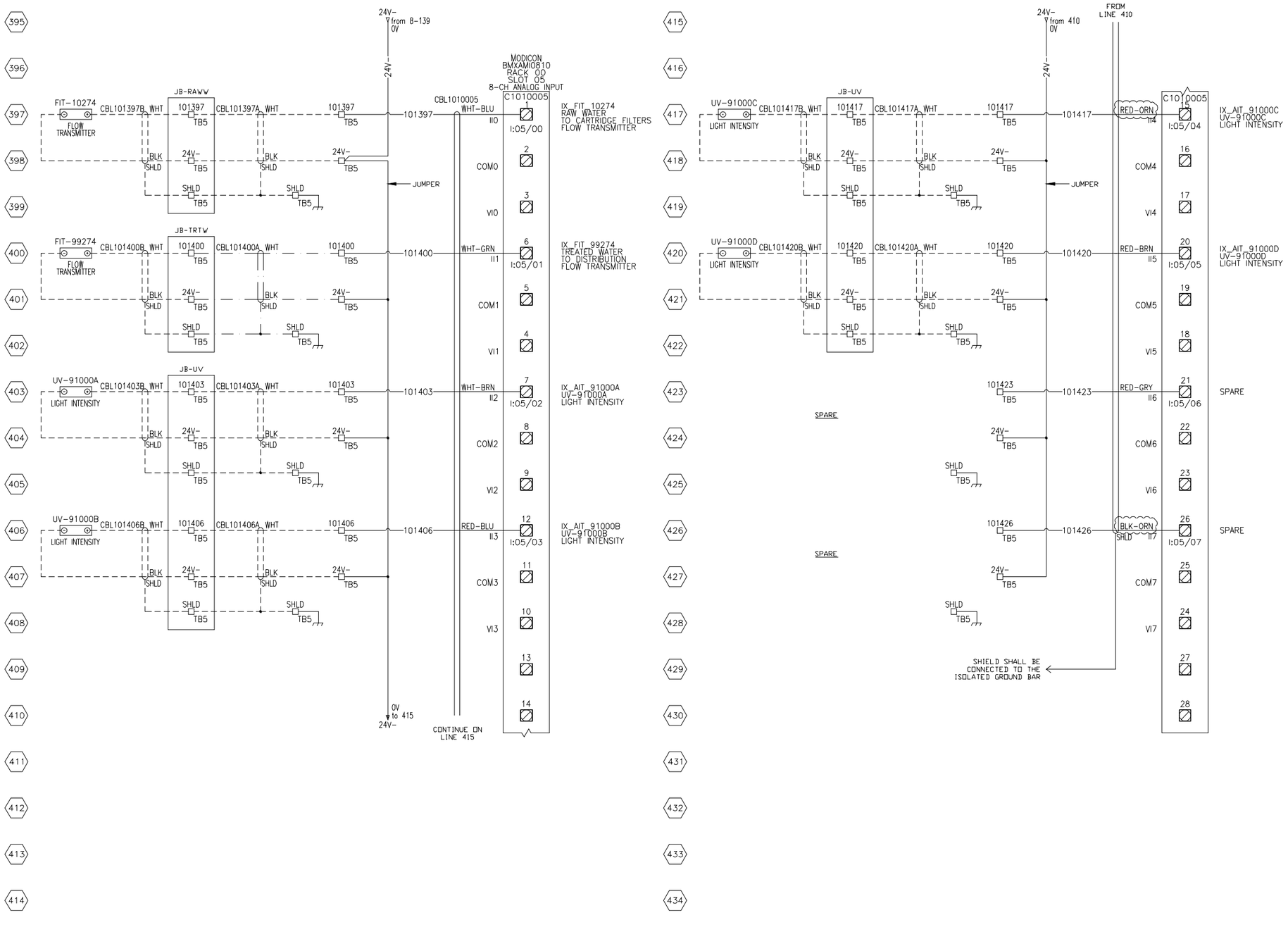
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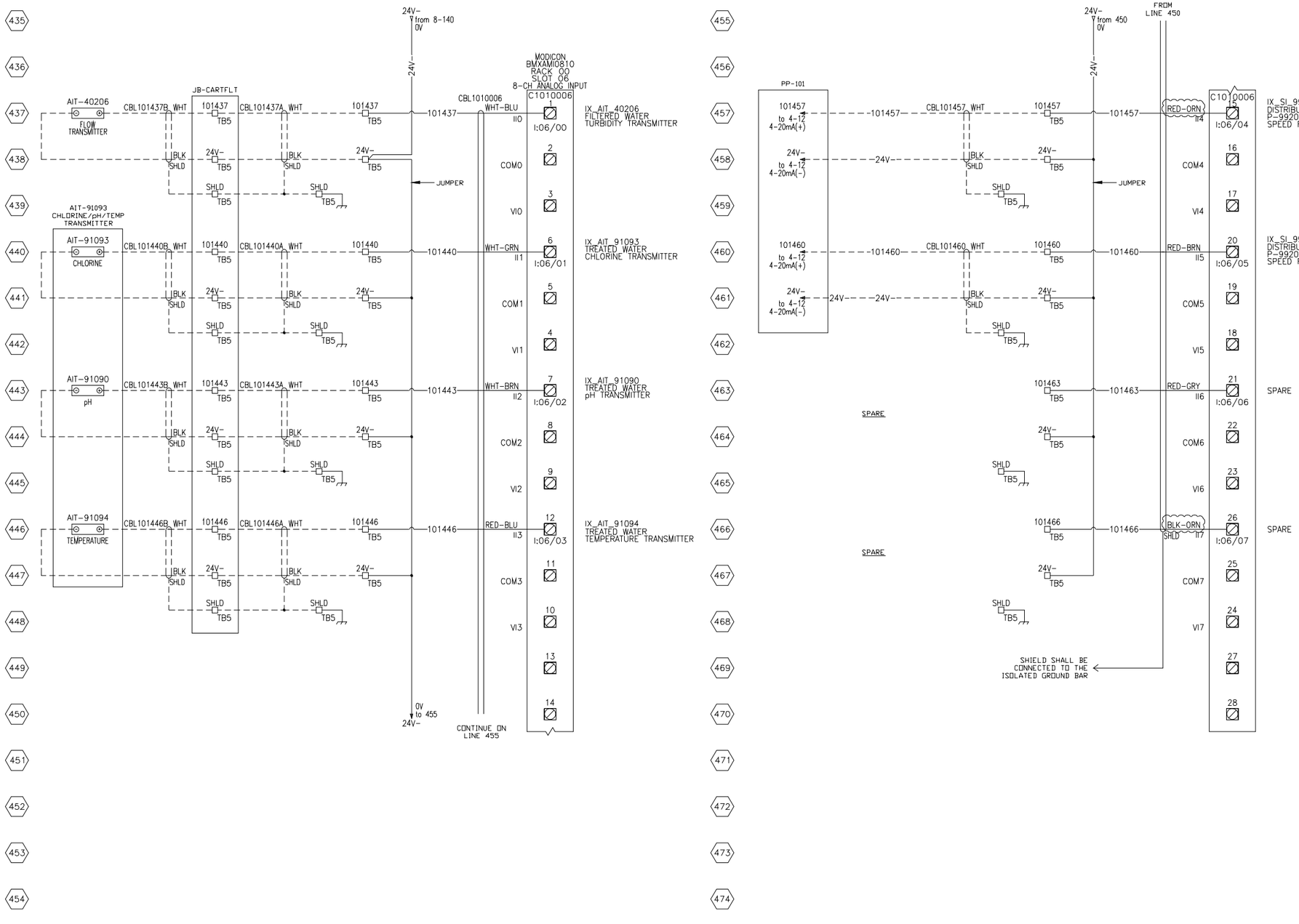
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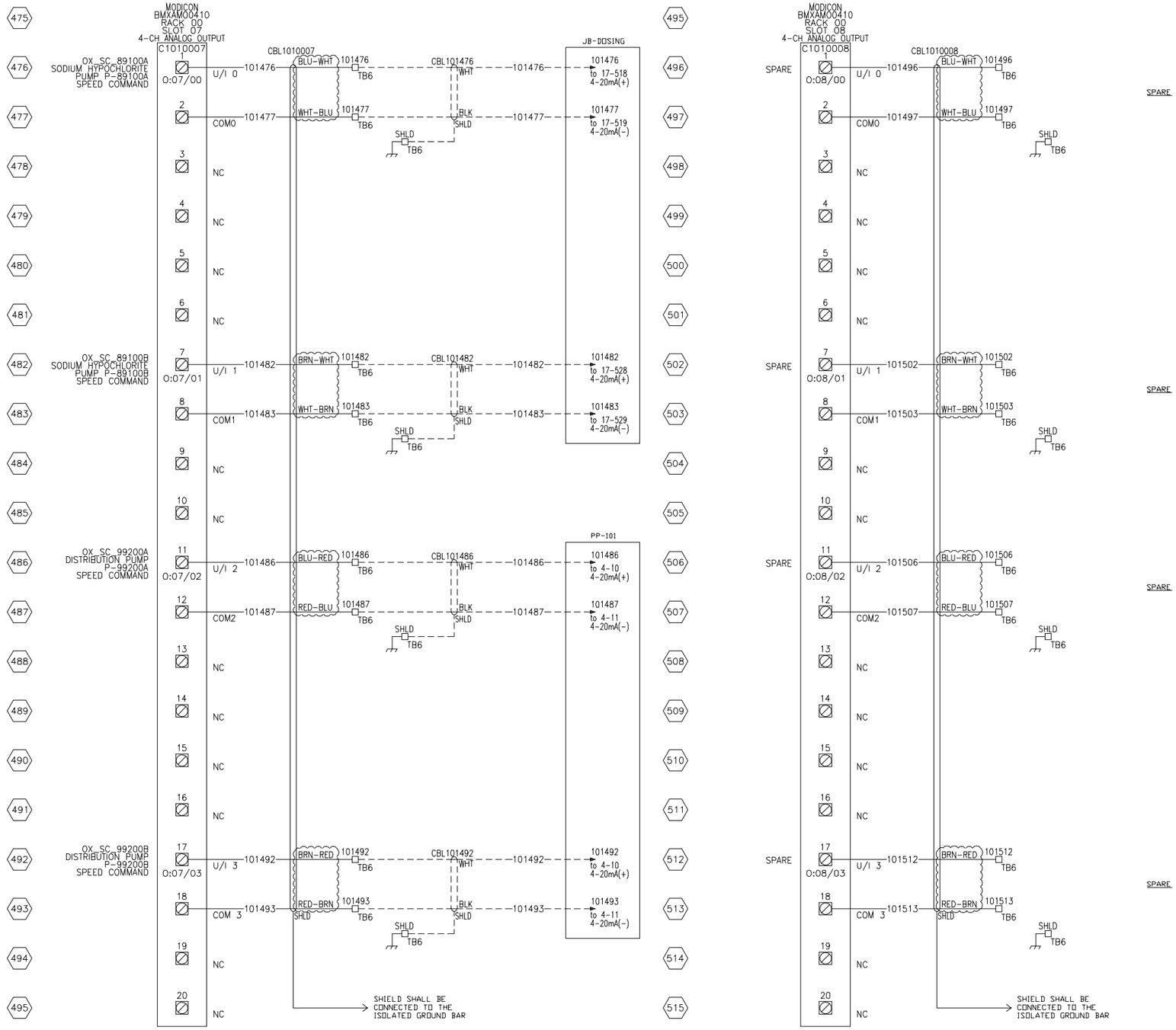
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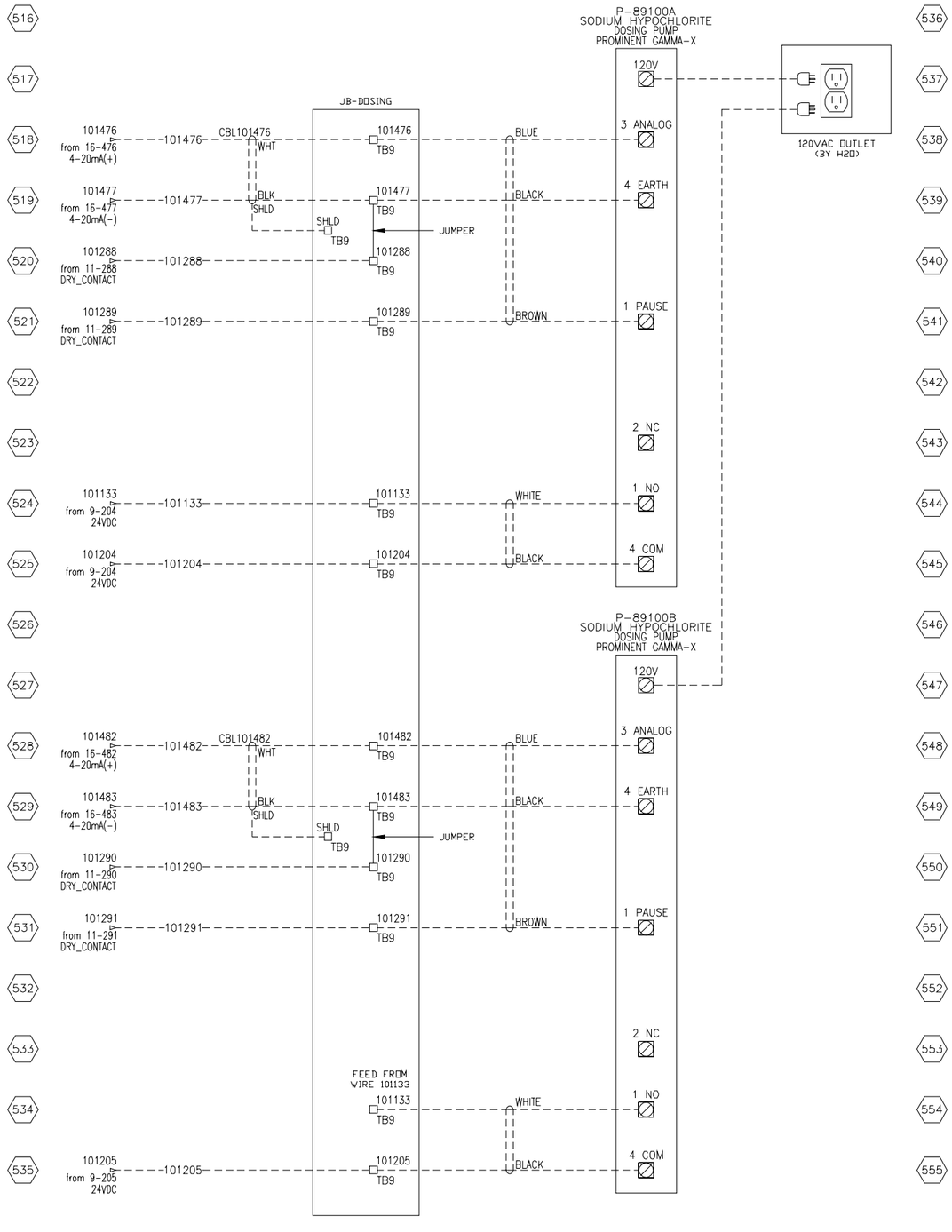
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TREATMENT PLANT
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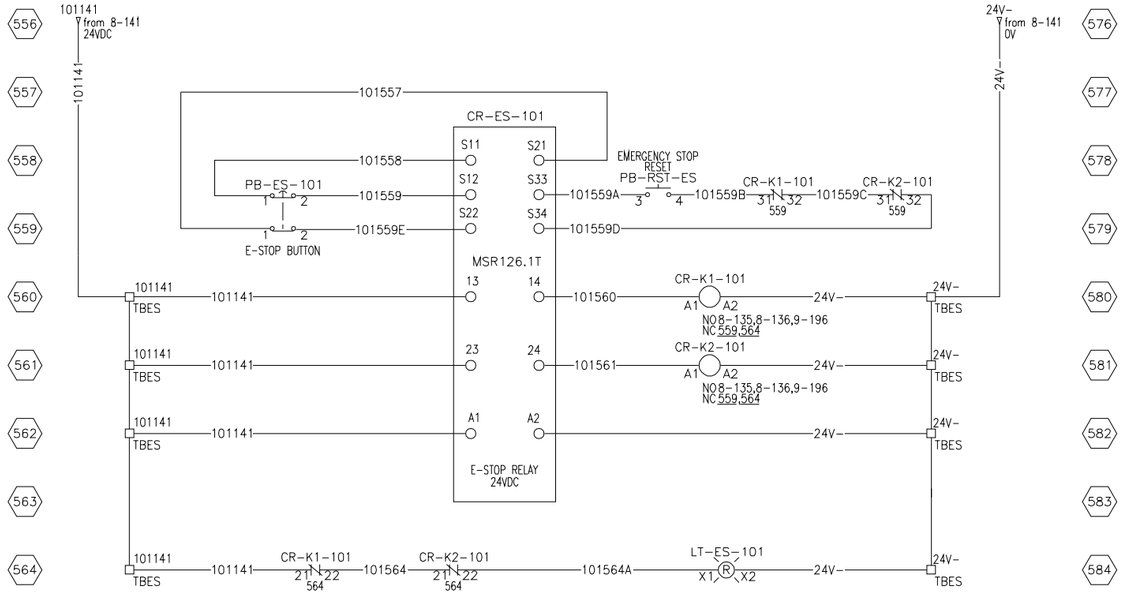
JB-DOSING
DOSING PUMPS
JUNCTION BOX

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17 OF 18

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MAIN CONTROL PANEL
EMERGENCY STOP

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SHEET NO	REVISION
18 OF 18	.00

10.9 - SINGLE LINE DIAGRAM

MELIADINE WTP

CONTAINERIZED WATER TREATMENT PLANT

C02 SINGLE LINE DIAGRAM

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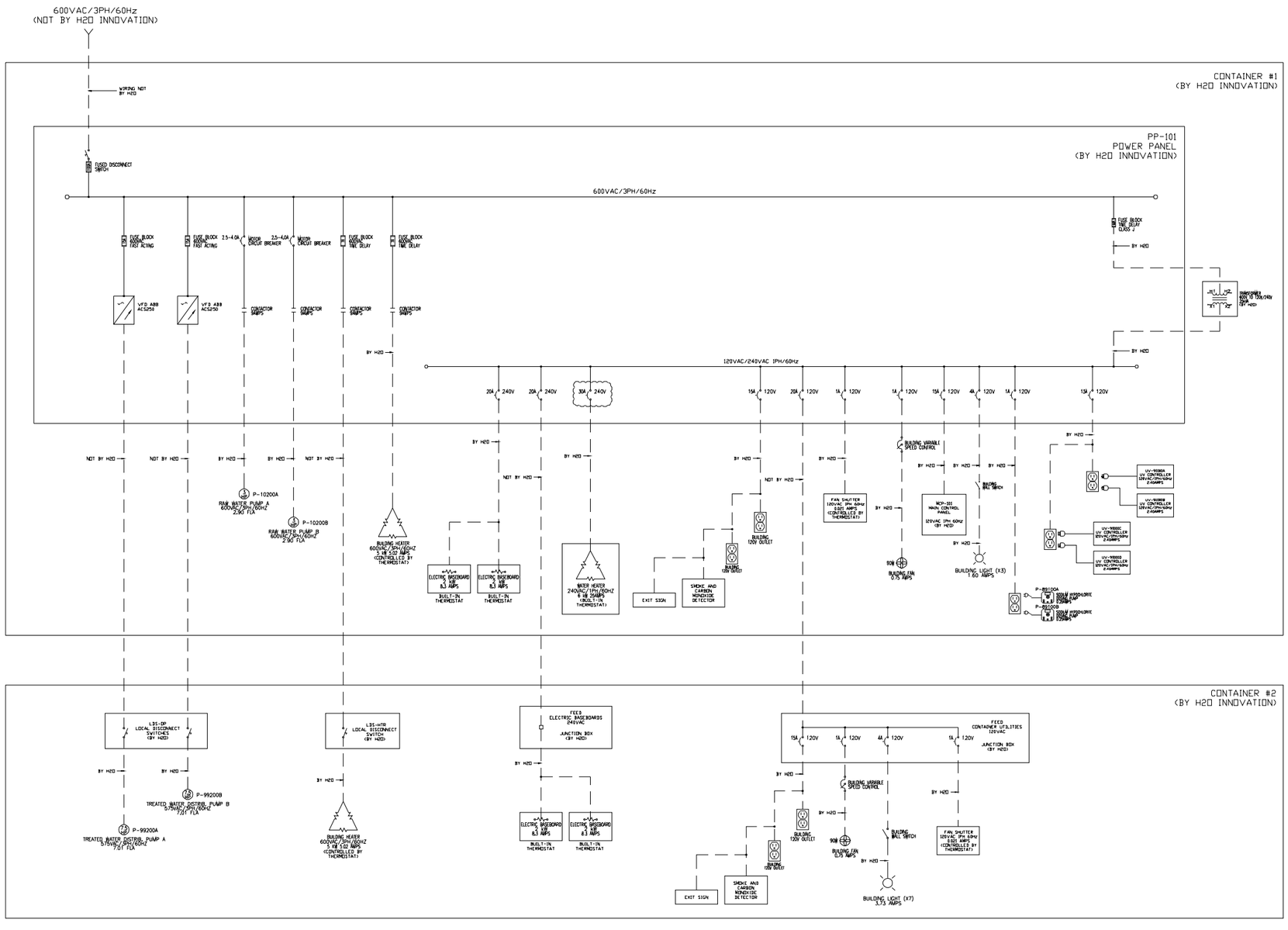
MELIADINE WTP
CONTAINERIZED WATER TREATMENT PLANT
SINGLE LINE DIAGRAM

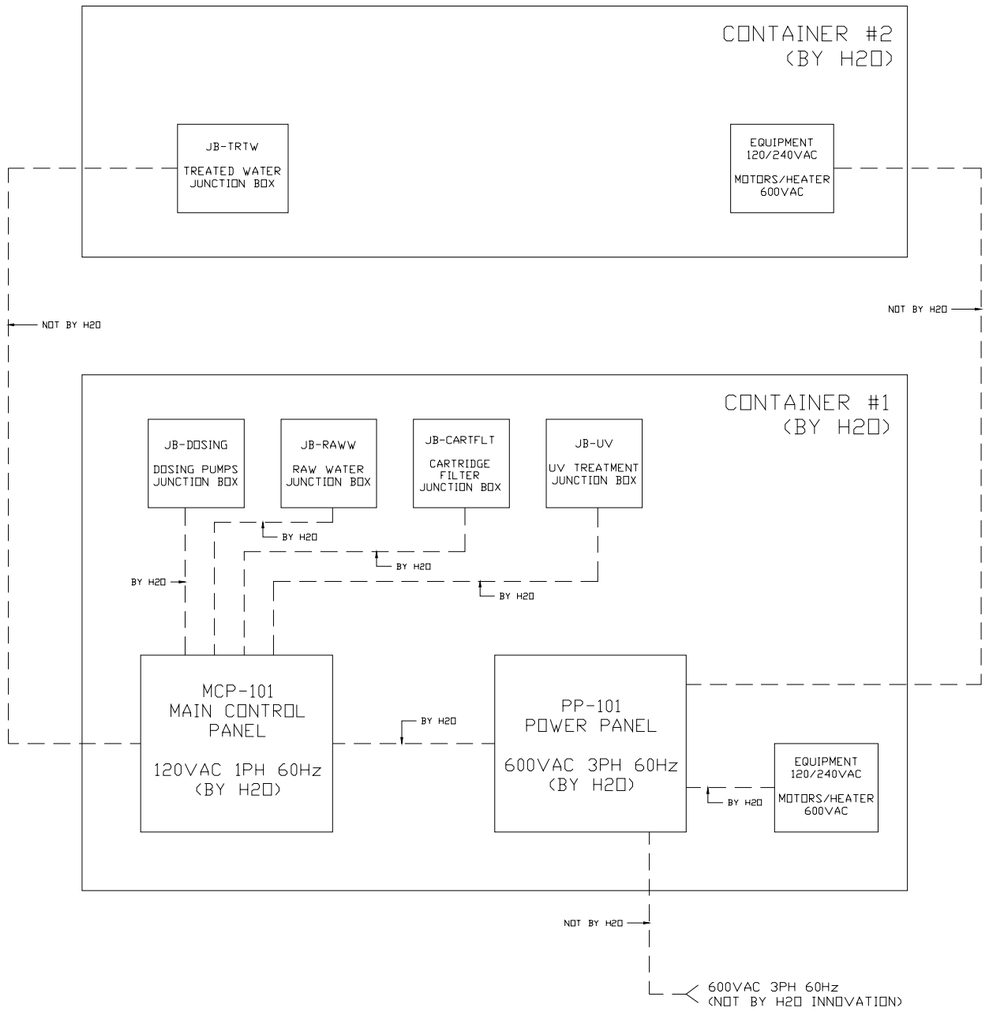
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1 OF 3	.00


600VAC/3PH/60Hz
(NOT BY H2O INNOVATION)
WIRING, NOT BY H2O
CONTAINER #1
(BY H2O INNOVATION)
PP-101
POWER PANEL
(BY H2O INNOVATION)
600VAC/3PH/60Hz
FUSED DISCONNECT SWITCH
FUSE BLOCK 600VAC FAST ACTING
FUSE BLOCK 600VAC FAST ACTING
2.5-4.0A
Motor CIRCUIT BREAKER
2.5-4.0A
Motor CIRCUIT BREAKER
FUSE BLOCK 600VAC TIME DELAY
FUSE BLOCK 600VAC TIME DELAY
FUSE BLOCK TIME DELAY CLASS J
BY H2O
VFD, ABB ACS250
VFD, ABB ACS250
CONTACTOR SWAPS
CONTACTOR SWAPS
CONTACTOR SWAPS
CONTACTOR SWAPS
TRANSFORMER 600V TO 120/240V 15kVA
BY H2O
120VAC/240VAC 1PH/60Hz
20A 240V
20A 240V
30A 240V
15A 120V
20A 120V
1A 120V
1A 120V
15A 120V
4A 120V
1A 120V
15A 120V
BY H2O
NOT BY H2O
NOT BY H2O
BY H2O
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BY H2O



LEGEND

- TRANSFORMER
- FUSE
- SC — CAPACITOR
- LA — LIGHTNING ARRESTOR
- CIRCUIT BREAKER
- CONTACTOR
- SS — SOFT START
- VARIABLE FREQUENCY DRIVE
- T — THERMOSTAT
- DISCONNECT SWITCH
- FUSED DISCONNECT SWITCH
- RECEPTACLE
- ELECTRICAL MOTOR
- NO / NC
- HEATER
- FAN
- DOSING PUMP
- LIGHT

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MELIADINE WTP
CONTAINERIZED WATER
TREATMENT PLANT
SINGLE LINE DIAGRAM

INTERCONNECTION
WIRING

JOB NO: P65873

DWG NO: P65873-C02-01-02

SHEET NO: 3 OF 3

REVISION: .00

SECTION 11 - VENDORS O&M DATA AND MANUALS

11.1 - INDEX OF TABS

Manufacturer	Description	Tab
ABB	Turbidimeter	A1
Amtrol	Pressurized Tank	A2
Bray	Butterfly Valve	B1
Champion	Check Valve	C1
Chemline	Electric Actuator	C2-1
Chemline	Globe Valve	C2-2
Chemline	Needle Valve	C2-3
Chemline	Pressure Relief Valve	C2-4
Chemline	Pressure Gauge Isolator	C2-5
Chemline	Ball Valve	C2-6
Endress & Hauser	Measuring Station	E1-1
Endress & Hauser	Pressure Transmitter	E1-2
Endress & Hauser	Flowmeter	E1-3
Georg Fischer	Strainer	G1-1
Georg Fischer	Ball Valve	G1-2
Grundfos	Pump	G2
Intempco	Temperature Transmitter	I1
Primary Fluid	Calibration Column	P1
Prominent	Dosing Pump	P2
Sharpe	Ball Valve	S1
Shelco	Cartridge Filter	S2
Trojan	UV Treatment Units	T2
Viqua	Solenoid Valve	V1
Wika	Pressure Gauge	W1

11.2 - A1 – ABB TURDIDIMETER

User Guide IM/4690–EN Rev. E

4690 Series
Turbidity systems

Accurate, reliable turbidity measurement



Introduction

An ABB Turbidity system comprises a 4690 / 4695 analyzer and a 7998 turbidity sensor.

The analyzer provides the operator interface and communications to other devices.

The signal from the turbidity sensor is converted by the analyzer and the information is presented on a large, custom-designed, easy-to-read, backlit liquid crystal display (LCD).

The analyzer can be programmed to work with any of the 7998 series sensors and the operating range can also be configured to meet users' requirements.

Available in wall- / pipe-mount or 1/4 DIN panel-mount versions, the analyzer is protected to IP66, ensuring reliable operation in the most demanding situations. The same level of protection is maintained during programming and calibration.

Power and productivity
for a better world™

The Company

We are an established world force in the design and manufacture of measurement products for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

As a part of ABB, a world leader in process automation technology, we offer customers application expertise, service and support worldwide.

We are committed to teamwork, high quality manufacturing, advanced technology and unrivalled service and support.

The quality, accuracy and performance of the Company's products result from over 100 years experience, combined with a continuous program of innovative design and development to incorporate the latest technology.

Contents

1 Safety 2
1.1 Electrical Safety 2
1.2 Symbols 2
1.3 Health & Safety 2
1.4 Product Disposal 2

2 Turbidity Systems 3
2.1 7998 Sensors 3
2.2 Turbidity Measurement Systems 3

3 Installation 5
3.1 Siting Requirements 5
3.1.1 Analyzer 5
3.1.2 Turbidity Sensor 5
3.2 Mounting the Analyzer 6
3.2.1 Wall-mounting 6
3.2.2 Pipe-mounting 6
3.2.3 Panel-mounting 7
3.3 Mounting the Turbidity Sensor 8
3.3.1 Sample Flowrate 9
3.4 Installing the Optional De-bubbler 10
3.4.1 Mounting the De-bubbler 10
3.4.2 Set Up Procedure for De-bubbler 11

4 Electrical Connections 12
4.1 Access to Terminals 12
4.1.1 Wall- / Pipe-mount Analyzer 12
4.1.2 Panel-mount Analyzer 12
4.2 Safety Information 13
4.2.1 Relay Contact Protection and Interference Suppression 13
4.3 Connections 14
4.3.1 Wall- / Pipe-mount Analyzer Connections 14
4.3.2 Panel-mount Analyzer Connections 15
4.4 Selecting the Mains Voltage 16
4.4.1 Wall- / Pipe-mount Analyzer 16
4.4.2 Panel-mount Analyzer 16
4.5 Turbidity Sensor Connections 17

5 Controls and Display 18
5.1 Display 18
5.2 Control Familiarization 18

6 Operation 19
6.1 Analyzer Start-up 19
6.2 Operation – Turbidity Measurement Mode 19
6.2.1 Operating Page 19

7 Calibration 20
7.1 Care and Maintenance of Secondary Standards 20
7.2 Performing a Calibration Verification with a Secondary Standard 21
7.3 Performing a Calibration with a Primary Standard 22

8 Configuration and Electrical Calibration 26
8.1 Access to Configuration Pages 26
8.2 Language Page 26
8.3 Set Up Parameter Page 27
8.4 Set Up Outputs Page 29
8.5 Set Up Serial Interface Page 31
8.6 Electrical Calibration 32
8.6.1 Equipment Required 32
8.6.2 Preparation 32
8.6.3 Electrical Calibration Page 33

9 Maintenance 34
9.1 Sensor Cleaning 34
9.1.1 Sensors Without Wiper Unit 34
9.1.2 Sensors With Wiper Unit 34

10 Fault Finding 35
10.1 Error Messages 35
10.2 Unstable or Erratic Readings 36
10.3 Intermittent Short Term Spikes in Turbidity Readings 36

11 Specification 37

12 Spares and Consumables 39
12.1 Maintenance Kits 39
12.2 Accessories 39
12.3 Upgrade Kits 39
12.4 Strategic Spares 39
12.5 Software 40
12.6 De-bubbler 40

1 Safety

Information in this manual is intended only to assist our customers in the efficient operation of our equipment. Use of this manual for any other purpose is specifically prohibited and its contents are not to be reproduced in full or part without prior approval of the Technical Publications Department.

1.1 Electrical Safety

This equipment complies with the requirements of CEI/IEC 61010-1:2001-2 'Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use' and complies with US NEC 500, NIST and OSHA.

If the equipment is used in a manner NOT specified by the Company, the protection provided by the equipment may be impaired.

1.2 Symbols

One or more of the following symbols may appear on the equipment labelling:

	**Warning** – Refer to the manual for instructions
	**Caution** – Risk of electric shock
	Functional earth (ground) terminal
	Protective earth (ground) terminal

	Direct current supply only
	Alternating current supply only
	Both direct and alternating current supply
	The equipment is protected through double insulation

1.3 Health & Safety

Health and Safety

To ensure that our products are safe and without risk to health, the following points must be noted:

- The relevant sections of these instructions must be read carefully before proceeding.
- Warning labels on containers and packages must be observed.
- Installation, operation, maintenance and servicing must be carried out only by suitably trained personnel and in accordance with the information given.
- Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and / or temperature.

Safety advice concerning the use of the equipment described in this manual or any relevant hazard data sheets (where applicable) may be obtained from the Company address, together with servicing and spares information.

1.4 Product Disposal

Note. The following only applies to European customers.



ABB is committed to ensuring that the risk of any environmental damage or pollution caused by any of its products is minimized as far as possible. The European Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) that came into force on August 13 2005 aims to reduce the waste arising from electrical and electronic equipment; and improve the environmental performance of all those involved in the life cycle of electrical and electronic equipment.

In conformity with European local and national regulations (EU Directive 2002/96/EC stated above), electrical equipment marked with the above symbol may not be disposed of in European public disposal systems after 12 August 2005.

2 Turbidity Systems

2.1 7998 Sensors

Details of the individual sensors are shown in Table 2.1.

Sensor No.	Principle of Sensor	Type of Sensor	Minimum Range	Maximum Range
7998 001 (EPA 180.1)	Incandescent lamp Nephelometric	Flow-through (with wiper unit)	0 to 1 NTU	0 to 40 NTU
7998 002 (EPA 180.1)	Incandescent lamp Nephelometric	Flow-through (with wiper unit)	0 to 40 NTU	0 to 400 NTU
7998 006 (EPA 180.1)	Incandescent lamp Nephelometric	Flow-through (without wiper unit)	0 to 1 NTU	0 to 40 NTU
7998 007 (EPA 180.1)	Incandescent lamp Nephelometric	Flow-through (without wiper unit)	0 to 40 NTU	0 to 400 NTU
7998 011 (ISO 7027)	Infrared LED Nephelometric	Flow-through (with wiper unit)	0 to 1 NTU	0 to 40 NTU
7998 012 (ISO 7027)	Infrared LED Nephelometric	Flow-through (with wiper unit)	0 to 40 NTU	0 to 400 NTU
7998 016 (ISO 7027)	Infrared LED Nephelometric	Flow-through (without wiper unit)	0 to 1 NTU	0 to 40 NTU
7998 017 (ISO 7027)	Infrared LED Nephelometric	Flow-through (without wiper unit)	0 to 40 NTU	0 to 400 NTU

Table 2.1 7998 Sensor Range

2.2 Turbidity Measurement Systems

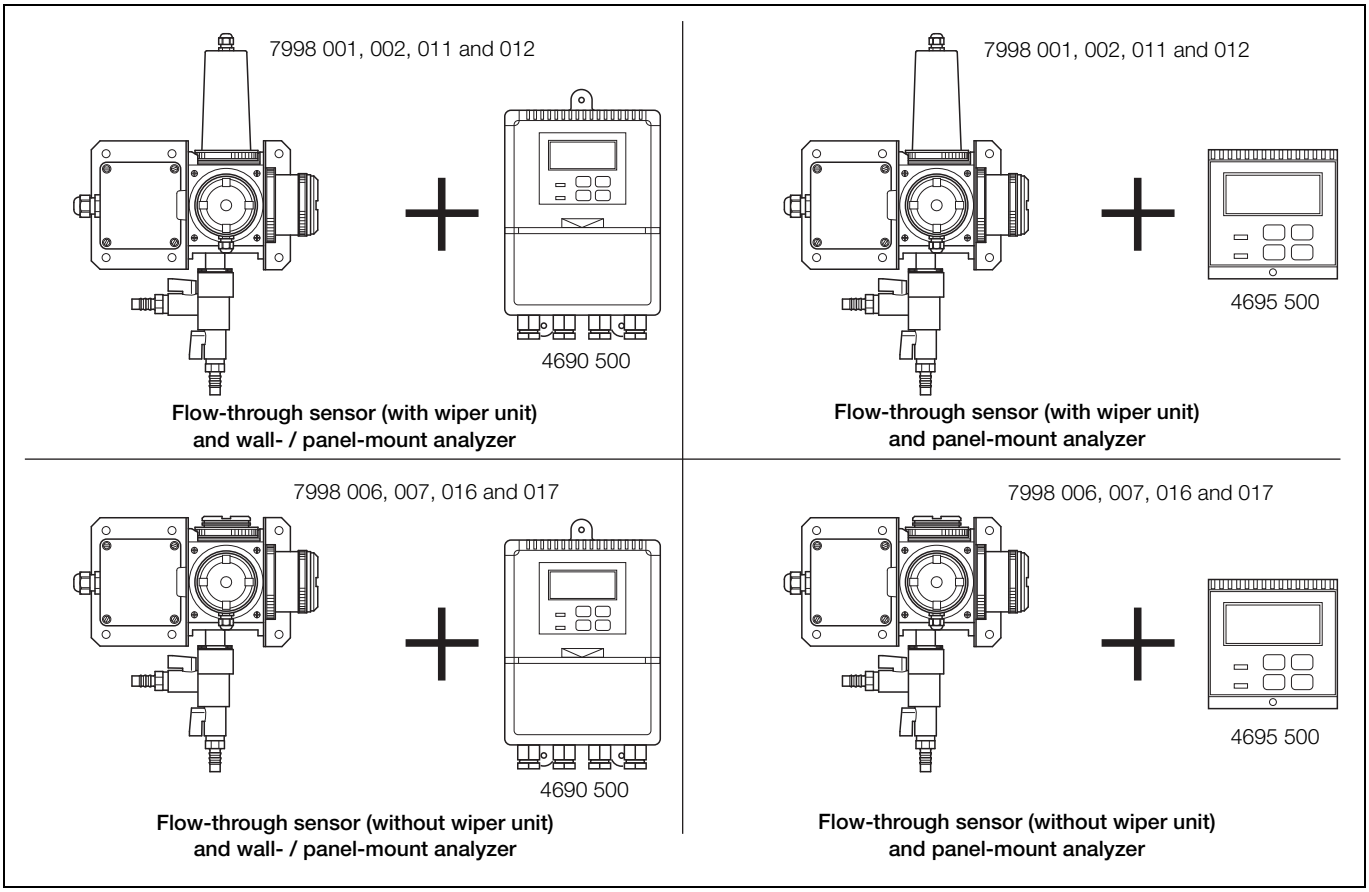


Fig. 2.1 System Arrangements

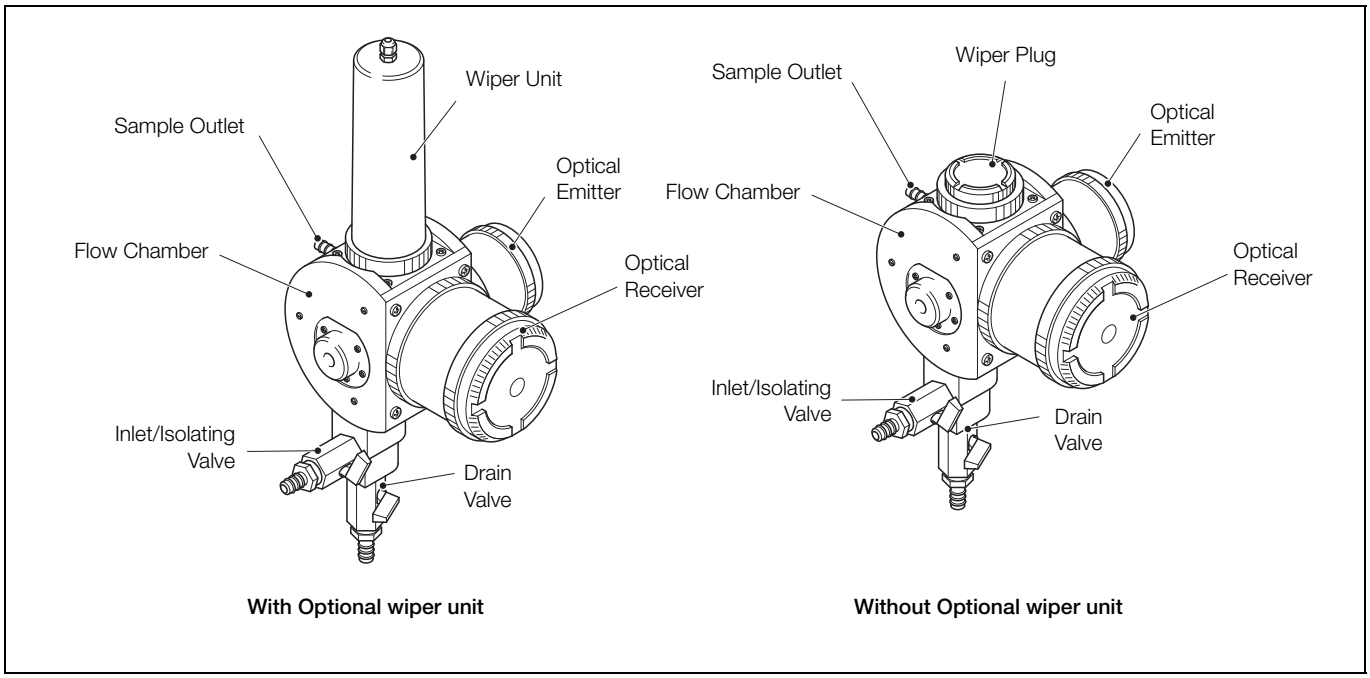


Fig. 2.2 Turbidity Sensors – Main Components

3 Installation

3.1 Siting Requirements

3.1.1 Analyzer

Caution.

- Mount in a location free from excessive vibration.
- Mount away from harmful vapors and dripping fluids.

Note. Mount the analyzer at eye level to enable an unrestricted view of the front panel displays and controls.

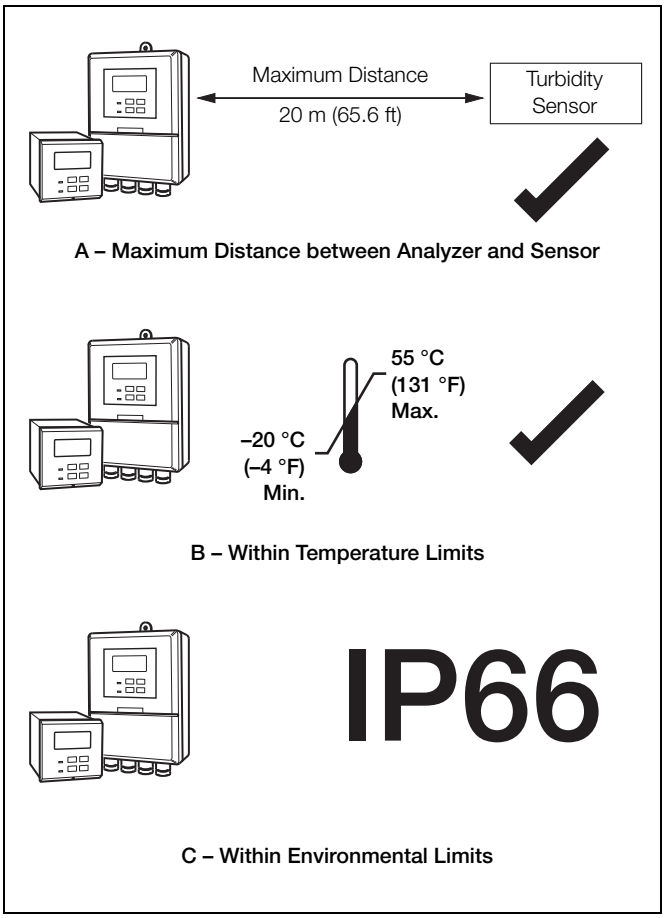


Fig. 3.1 Siting Requirements – Analyzer

3.1.2 Turbidity Sensor

To enable the turbidity sensor to be removed easily for maintenance, ensure an all-round clearance of 200 mm (7.9 in) – see Section 3.3, page 8 for the overall dimensions of the sensor.

Note. Ensure the sensor is located at an appropriate height to ensure ease of access during calibration and cleaning.

Caution. Mount the sensor in a location away from direct sunlight.

3.2 Mounting the Analyzer

3.2.1 Wall-mounting

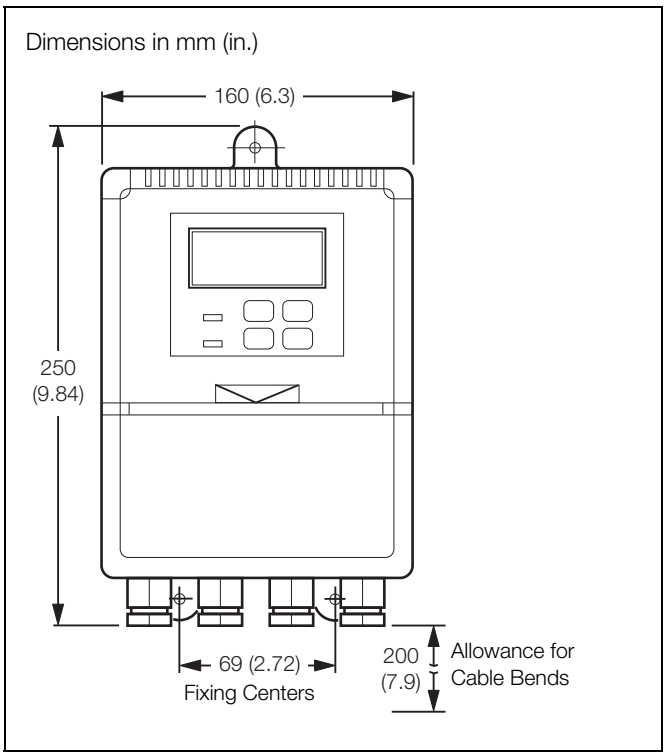


Fig. 3.2 Overall Dimensions

Referring to Fig. 3.3:

1. Mark fixing centers (see Fig. 3.2).
2. Drill suitable holes.
3. Secure analyzer to wall using suitable fixings.

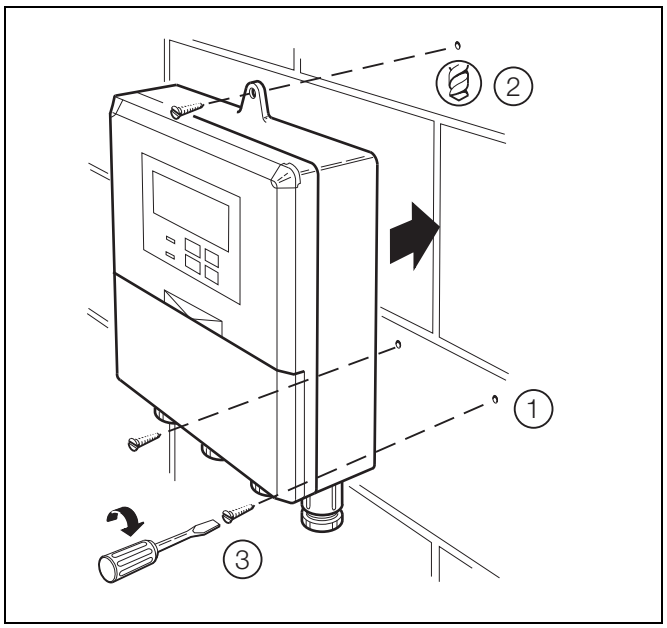


Fig. 3.3 Wall-mounting

3.2.2 Pipe-mounting

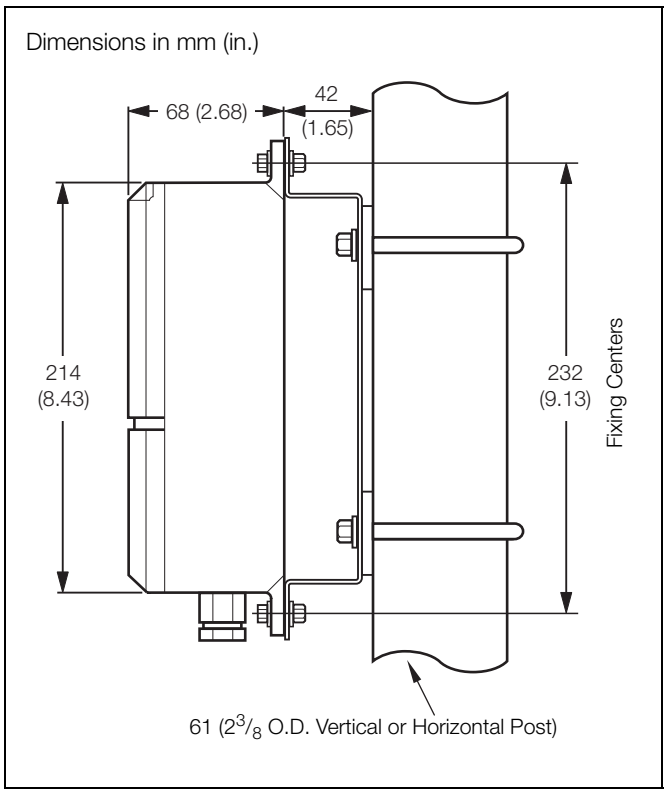


Fig. 3.4 Overall Dimensions

Referring to Fig. 3.5:

1. Position 'U' bolts on pipe.
2. Position plates over 'U' bolts.
3. Secure plates.
4. Secure analyzer to mounting plate.

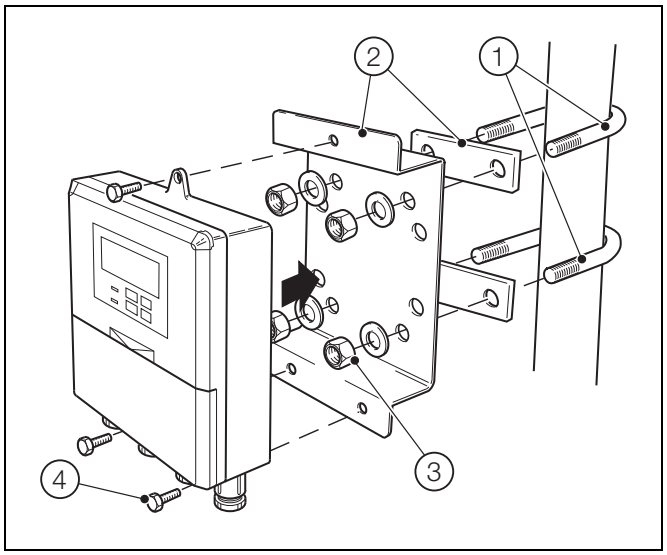


Fig. 3.5 Pipe-mounting

3.2.3 Panel-mounting

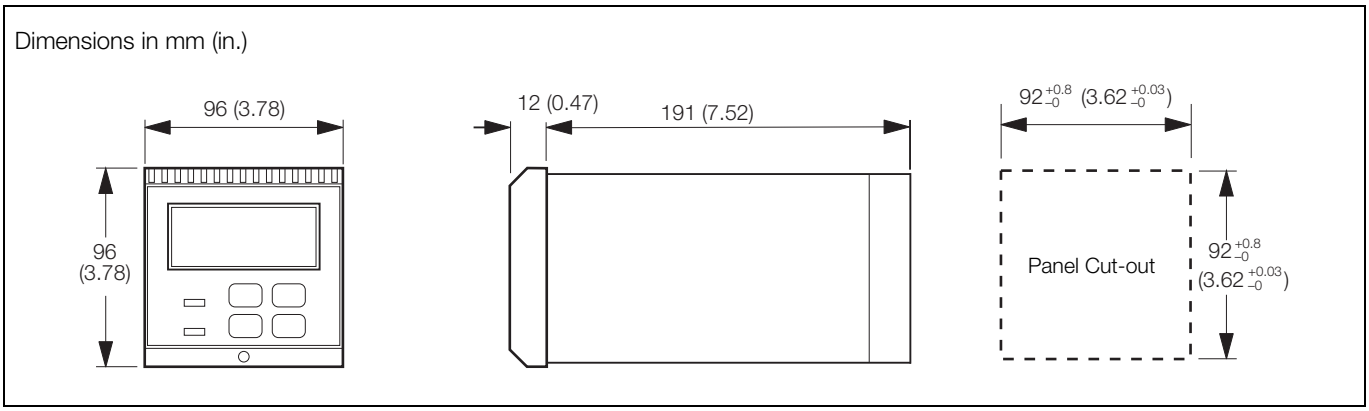


Fig. 3.6 Overall Dimensions

Referring to Fig. 3.5:

1. Cut a hole in the panel (see Fig. 3.6 for dimensions). Analyzers may be close stacked to DIN 43835.
2. Loosen the retaining screw on each panel clamp.
3. Remove the panel clamp and anchors from the analyzer case.
4. Insert the analyzer into the panel cut-out.
5. Refit the panel clamps to the case, ensuring that the panel clamp anchors are located correctly in their slot.
6. Secure the analyzer by tightening the panel clamp retaining screws.

> **Caution.** The clamp must fit flat on the analyzer casing. If the clamp is bowed, the securing screw is overtight and sealing problems may occur.

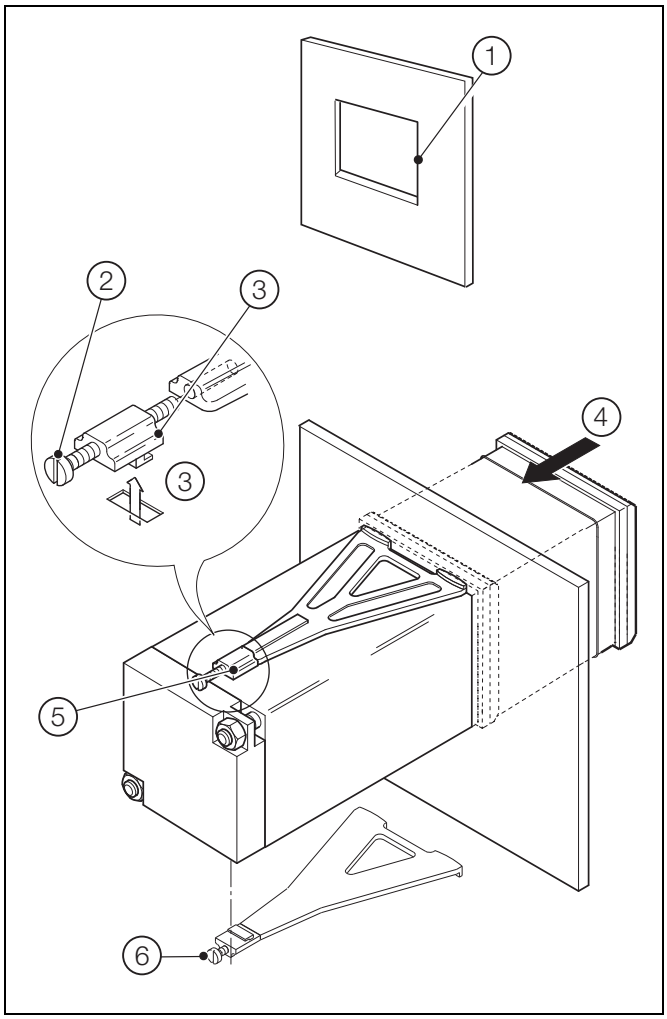


Fig. 3.7 Panel-mounting

3.3 Mounting the Turbidity Sensor

Systems and sensors are shown in Table 2.1 on page 3. The main components of each sensor are identified in Fig. 2.2 on page 4.

Referring to Figs 3.8 or 3.9:

1. Mount the sensor in the orientation shown using the bracket(s) provided, ensuring it is mounted within 5° of its vertical axis.
2. Connect the sample inlet and sample drain tubes.
3. Referring to Fig. 3.10, connect the sample outlet tube.

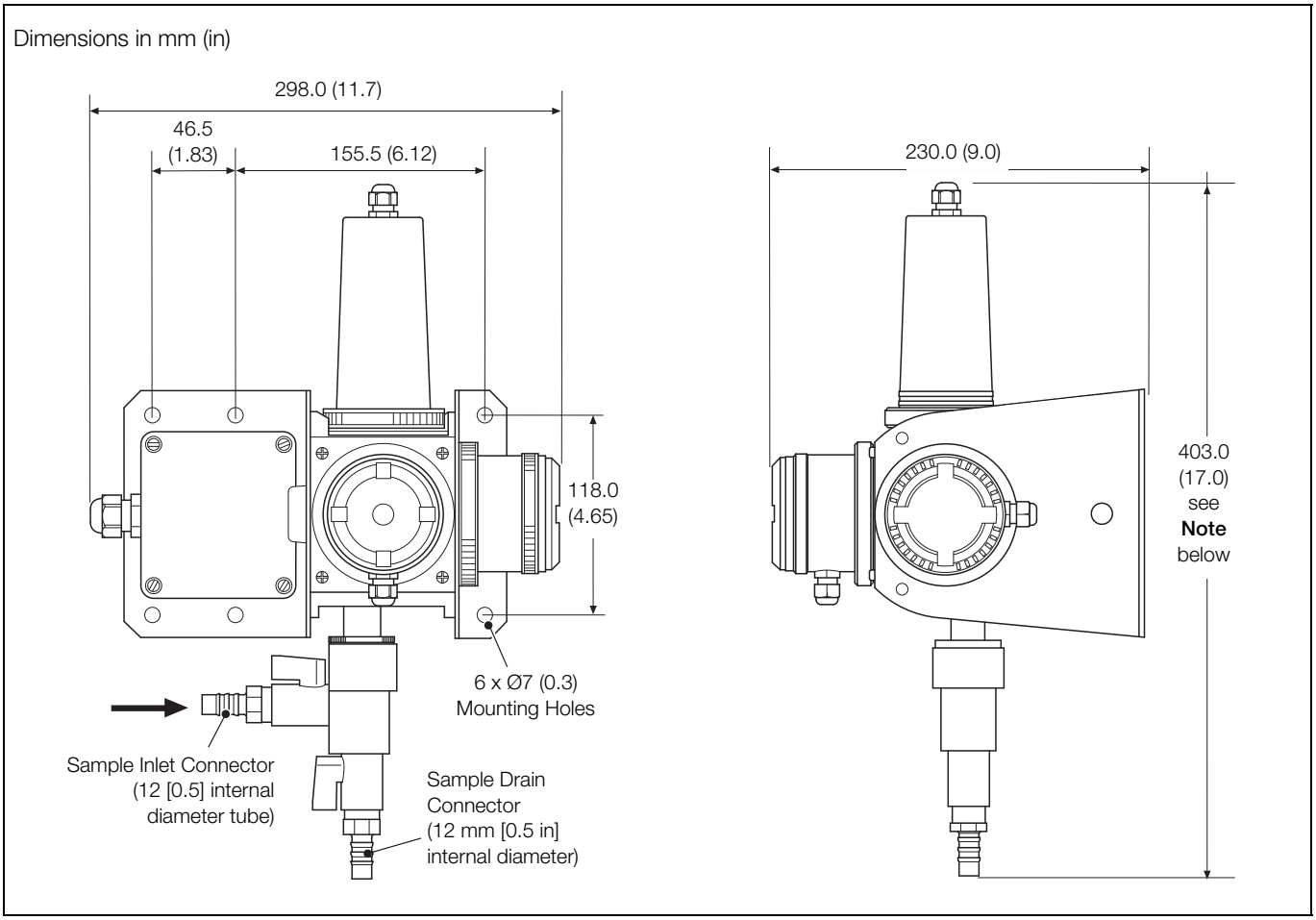


Fig. 3.8 Sensor Dimensions (With Optional Wiper Unit)

Note. Allow a further 30 mm (1.2 in) (approximately) clearance above the wiper unit for the bend in the wiper unit cable.

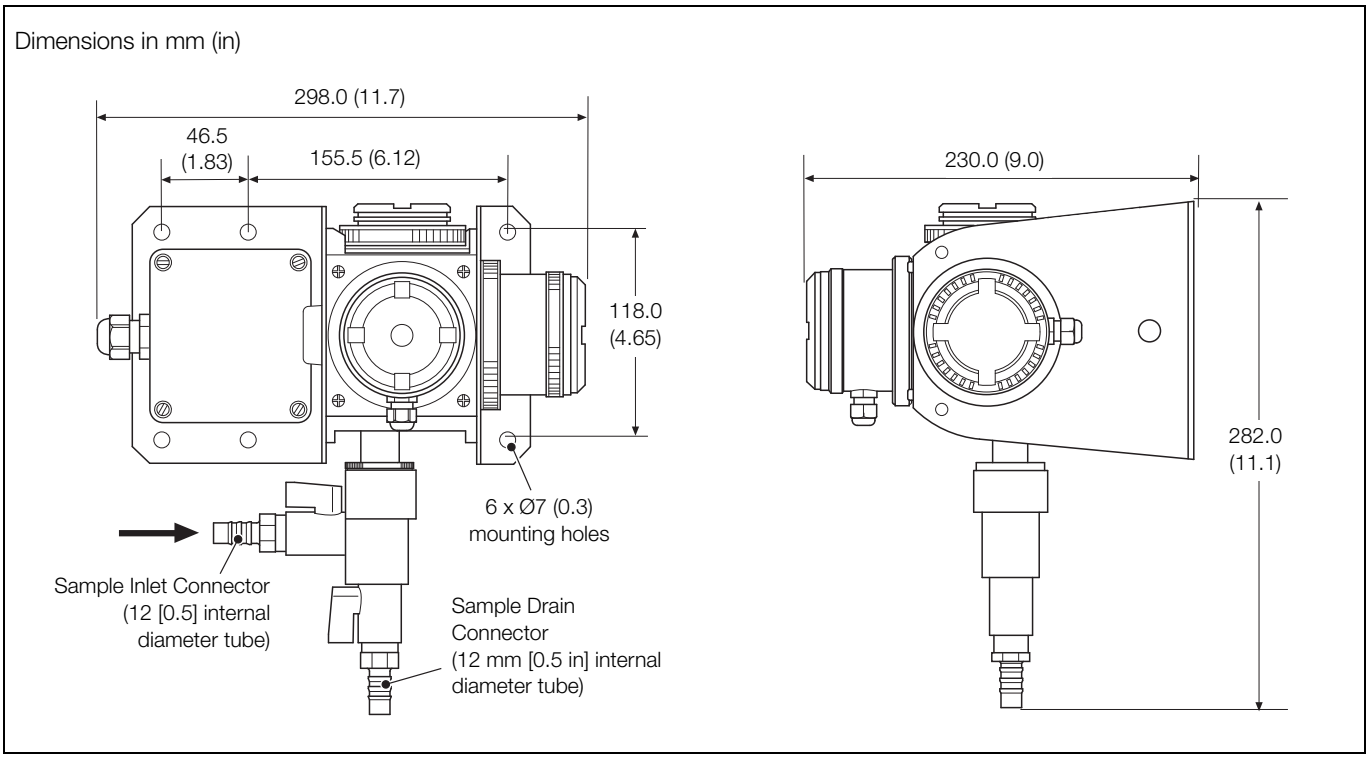


Fig. 3.9 Sensor Dimensions (Without Optional Wiper Unit)

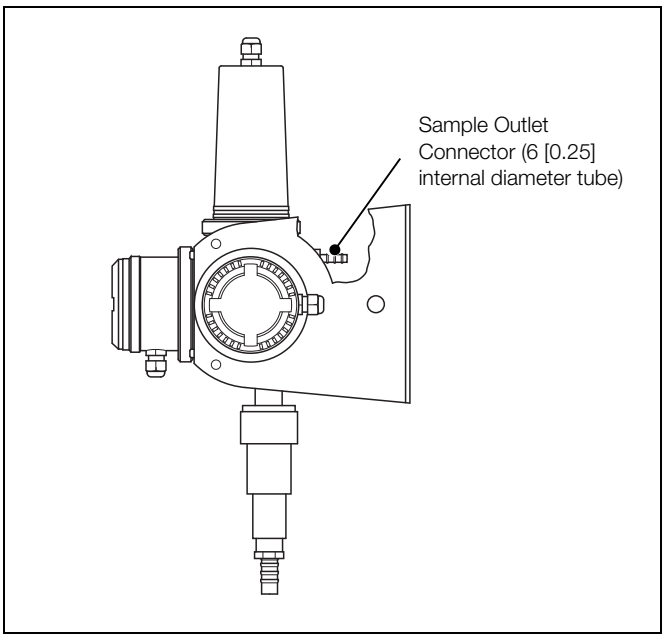


Fig. 3.10 7998 Series – Sample Outlet Connector Location

3.3.1 Sample Flowrate

Set a minimum flowrate of 0.5 l min^{-1} to prevent solids settling in the pipework. Increase the flowrate if necessary but **do not** exceed the maximum flow rate of 1.5 l min^{-1}.

When measuring turbidity, it is important that additional sources of light scattering, such as gas bubbles in the sample, are eliminated. An optional debubbler (part number 7997 500) is available to eliminate gas bubbles – refer to Section 3.4, page 10.

3.4 Installing the Optional De-bubbler

3.4.1 Mounting the De-bubbler

Note. The de-bubbler **MUST** be mounted vertically with the flow upwards.

Dimensions in mm (in)

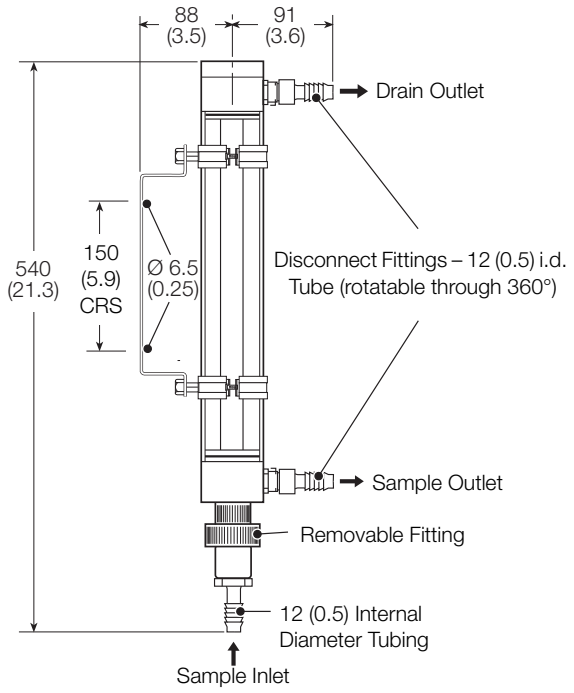


Fig. 3.11 De-Bubbler Mounting Information (Debubbler Part Number 7997 500)

3.4.2 Set Up Procedure for De-bubbler

With a system that includes a de-bubbler, referring to Fig. 3.12:

1. Open the 'sample in' isolating valve (A) such that the overflow from the de-bubbler is at a minimum.
2. Adjust the sample flow through the turbidity system using flow regulating valve (B).

Note. Sample regulating valves together with a flow indicator are recommended to ensure easy maintenance and consistent performance. These devices are not supplied with the 7998 Turbidity systems.

Dimensions in mm (in)

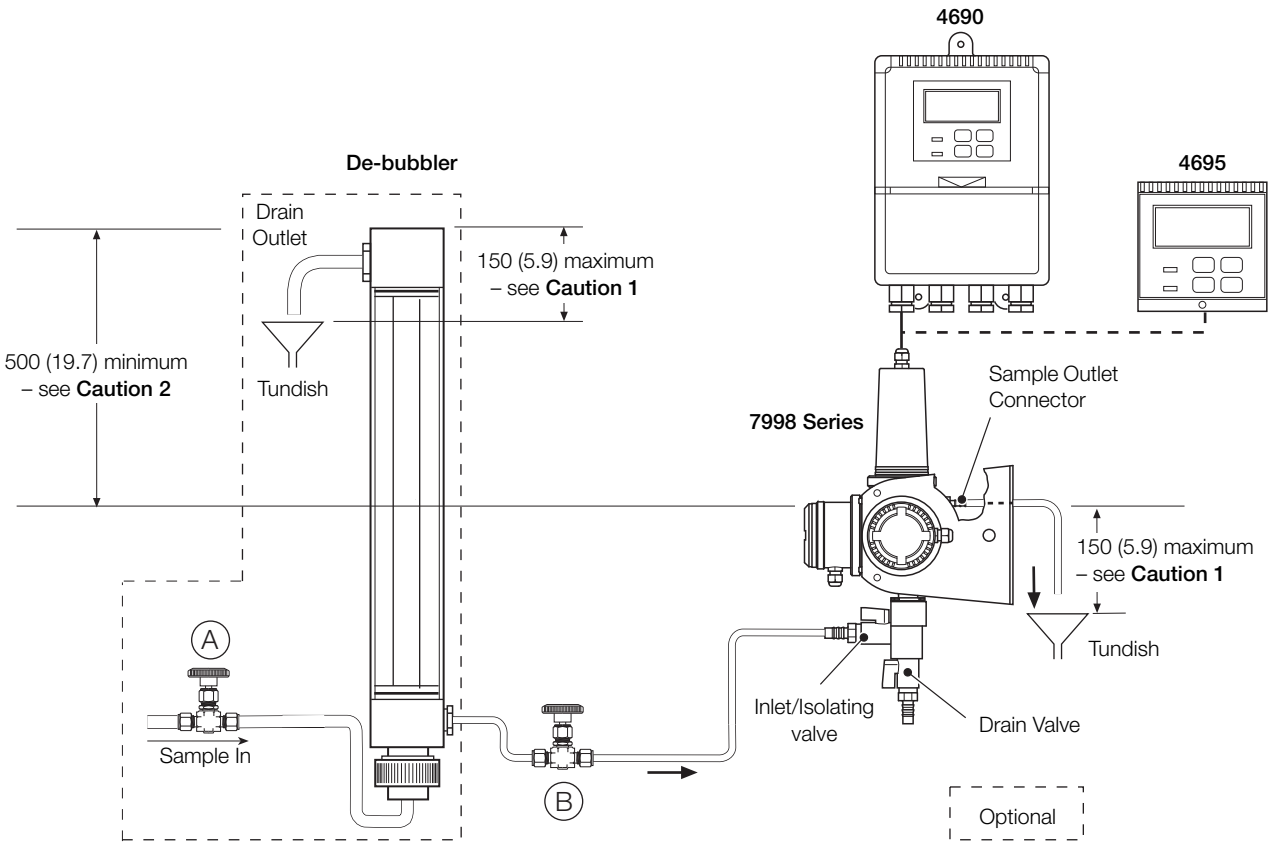


Fig. 3.12 Typical System Installation for 7998 Series Turbidity Systems

Caution.

1. To prevent degassing of the sample and very erratic readings, do not exceed this measurement.
2. This is the minimum installation distance that ensures adequate flowrate through the sensor. Increase this distance as necessary if using long or small-bore tubing.

4 Electrical Connections

Warning.

- Although certain analyzers are fitted with internal fuse protection, a suitably rated external disconnecting device such as a switch or circuit breaker conforming to local safety standards must be fitted to the final installation.
- Before making any connections, ensure that the power supply, any high voltage-operated control circuits and high common-mode voltages are switched off.

4.1 Access to Terminals

4.1.1 Wall- / Pipe-mount Analyzer

Referring to Fig. 4.1:

1. Slide cover down, pull out slightly and slide it off.
2. Release captive screws.
3. Remove protection cover.

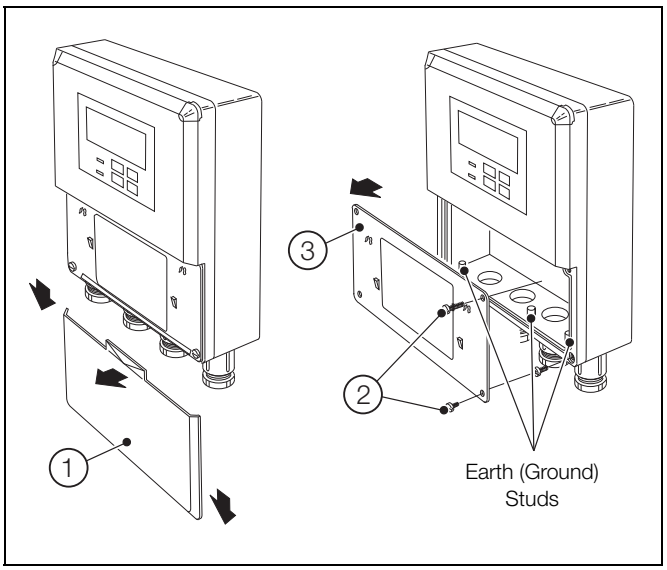


Fig. 4.1 Access to Terminals – Wall- / Pipe-mount Analyzer

4.1.2 Panel-mount Analyzer

Referring to Fig. 4.2:

1. Remove securing nuts.
2. Remove cover.
3. Remove mains terminals protection cover.

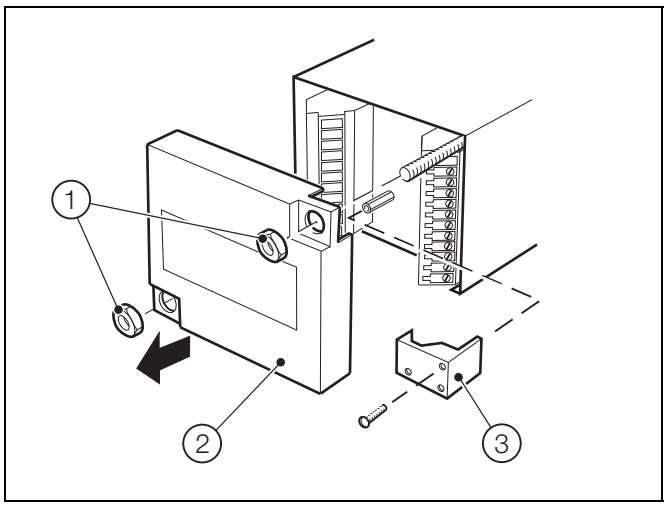


Fig. 4.2 Access to Terminals – Panel-mount Analyzer

4.2 Safety Information

Warning. The power supply earth (ground) **must** be connected to ensure safety to personnel, reduction of the effects of RFI and correct operation of the power supply interference filter.

Note.

- Stud terminal(s) is (are) fitted to the analyzer case for bus-bar earth (ground) connection – see Figs. 4.1, 4.4 and 4.5.
- The cable length between the turbidity sensor and the 4690 / 4695 analyzer is provided as ordered and terminated at the sensor. Shorten or lengthen the cable as required for the installation.
- Always route the signal cable and mains-carrying/relay cables separately, ideally in earthed (grounded) metal conduit.

  Ensure that the cables enter the analyzer through the glands nearest the appropriate screw terminals and are short and direct. Do not tuck excess cable into the terminal compartment.
- Ensure a moisture-tight fit when using cable glands, conduit fittings and blanking plugs/bungs (M20 holes). The M16 glands ready-fitted to wall-mount analyzers accept cable of between 4 and 7 mm diameter.
- The relay contacts are voltage-free and must be connected appropriately in series with the power supply and the alarm/control device that they are to actuate. Ensure that the contact rating is not exceeded. Refer also to Section 4.2.1 for relay contact protection details when the relays are to be used for switching loads.
- Do not exceed the maximum load specification for the selected current retransmission range – refer to Section 11, page 37.

  The retransmission output is isolated therefore the –ve terminal **must** be connected to earth (ground) if connecting to the isolated input of another device.

4.2.1 Relay Contact Protection and Interference Suppression

If the relays are used to switch loads on and off, the relay contacts can become eroded due to arcing. Arcing also generates radio frequency interference (RFI) that can cause analyzer malfunction and incorrect readings. To minimize the effects of RFI, arc suppression components are required; resistor/capacitor networks for AC applications or diodes for DC applications. These components can be connected either across the load or directly across the relay contacts. On 4690 / 4695 analyzers, fit the RFI components to the relay terminal block together with the supply and load wires – see Fig. 4.3.

For AC applications, the value of the resistor/capacitor network depends on the load current and inductance that is switched. Initially, fit a 100R/0.022 µF RC suppressor (part no. B9303) as shown in Fig. 4.3A. If the analyzer malfunctions (incorrect readings) or resets (display shows *88888*) the value of the RC network is too low for suppression – use an alternative value. If the correct value cannot be obtained, contact the manufacturer of the switched device for details on the RC unit required.

For DC applications, fit a diode as shown in Fig. 4.3B. For general applications use an IN5406 type (600 V peak inverse voltage at 3A – part no. B7363).

Note. For reliable switching, the minimum voltage must be greater than 12 V and the minimum current greater than 100 mA.

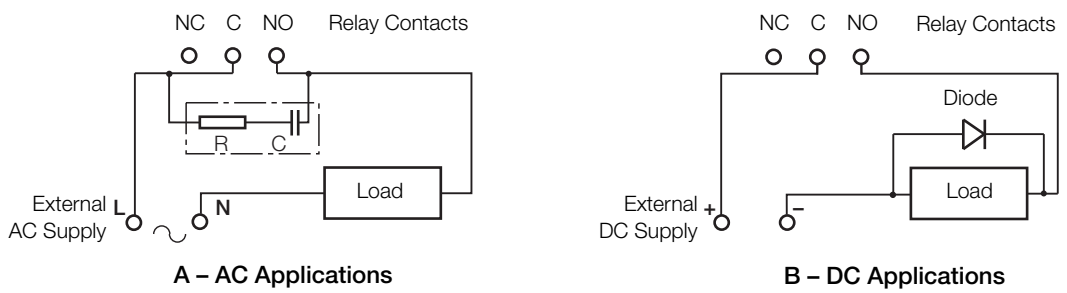


Fig. 4.3 Relay Contact Protection

4.3 Connections

Mounting	Terminal Number						
Wall	1	2	3	4	5	6	7
Panel	12	11	10	9	8	7	6
	Cleaner initiate pulse	+12 V Switched emitter supply	+12 V Cleaner / Receiver supply	Signal input	Cleaner detect signal		0 V common
						Link	

Table 4.1 Analyzer Input Connections

4.3.1 Wall- / Pipe-mount Analyzer Connections

Note.

- Refer to Fig. 4.1, page 12 for access to terminals.
- Slacken terminal screws fully before making connections.

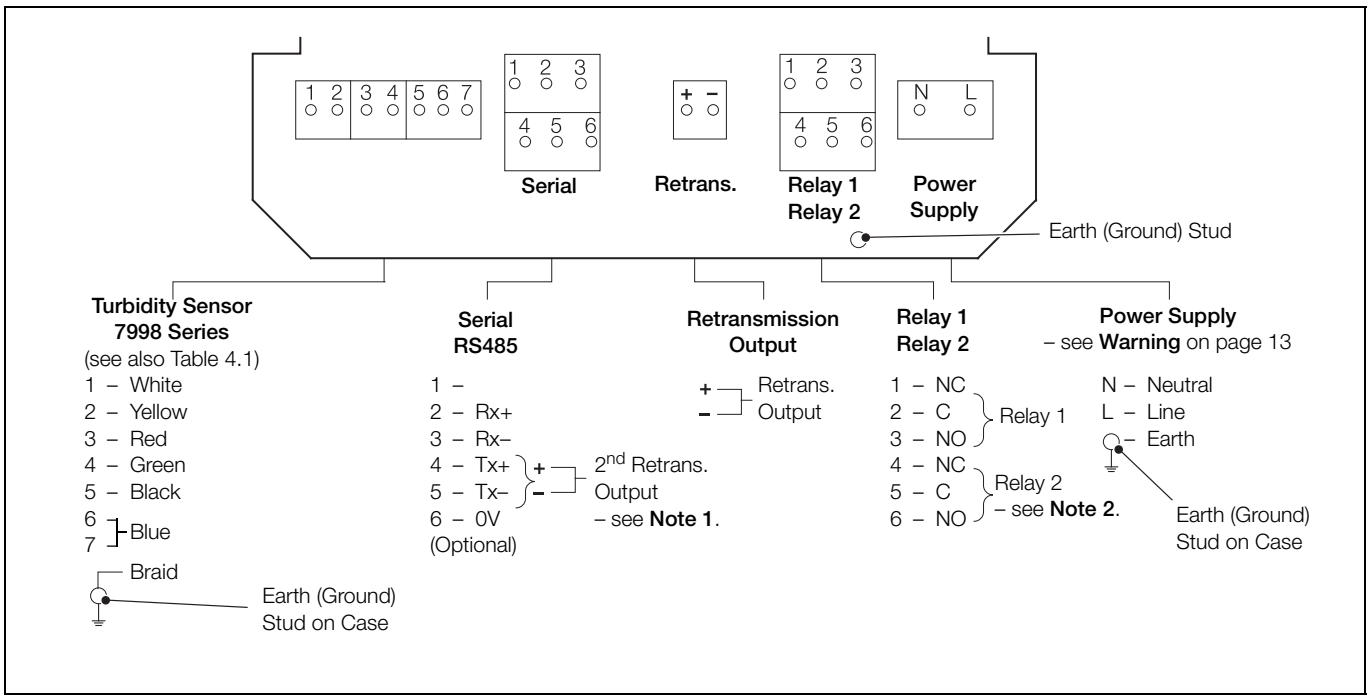


Fig. 4.4 Wall- / Pipe-mount Analyzer Connections

Note.

1. A second retransmission output is available if the RS485 serial communications facility is not used.
2. If **Test Cleaner** is set to YES (see page 28), Relay 2 becomes 'Failed Wiper Alarm' relay.

4.3.2 Panel-mount Analyzer Connections

Note.

- Refer to Fig. 4.2, page 12 for access to terminals.
- Slacken terminal screws fully before making connections.

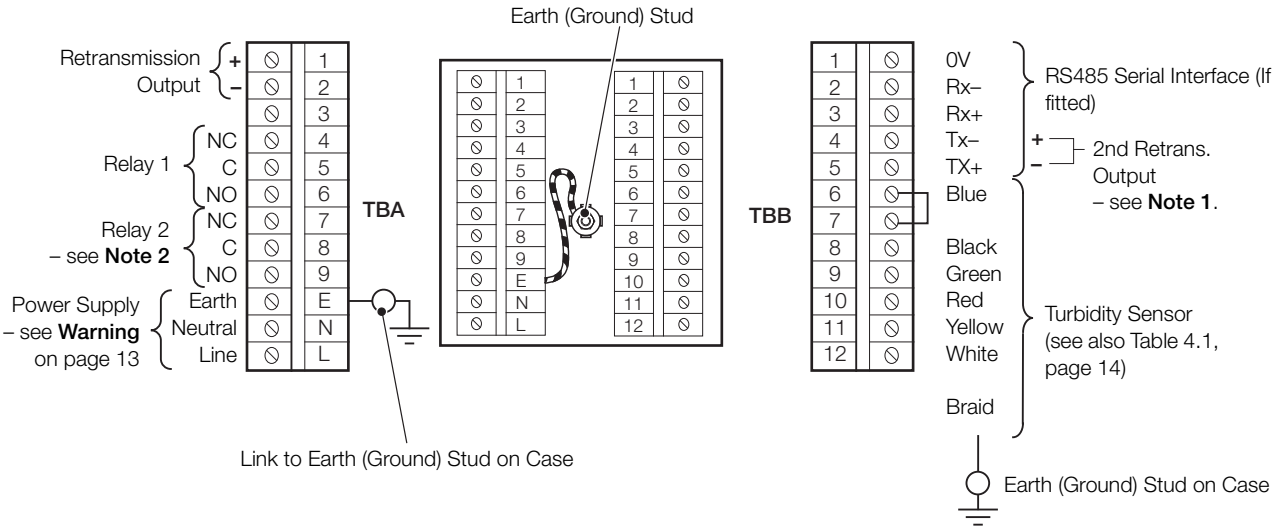


Fig. 4.5 Panel-mount Analyzer Connections

Note.

1. A second retransmission output is available if the RS485 serial communications facility is not used.
2. If **Test Cleaner** is set to YES (see page 28), Relay 2 becomes 'Failed Wiper Alarm' relay.

4.4 Selecting the Mains Voltage

4.4.1 Wall- / Pipe-mount Analyzer

Referring to Fig. 4.6:

1. Slide cover down, pull out slightly and slide it off.
2. Release 4 captive screws.
3. Remove protection cover.
4. Remove 2 screw caps (if fitted).
5. Remove 6 front panel screws.
6. Remove front panel.
7. Set voltage selector switch as required.

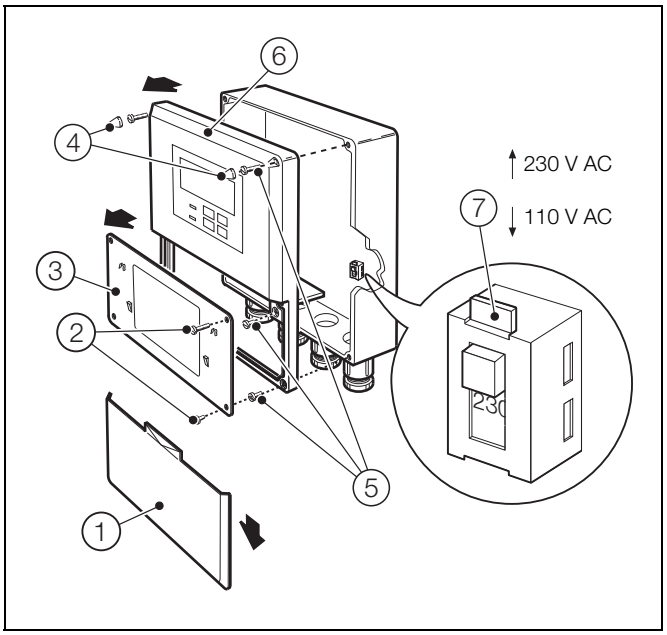


Fig. 4.6 Selecting Mains Voltage – Wall- / Pipe-mount Analyzer

4.4.2 Panel-mount Analyzer

Referring to Fig. 4.7:

1. Release captive screw.
2. Remove analyzer from its case.
3. Set voltage selector switch as required.

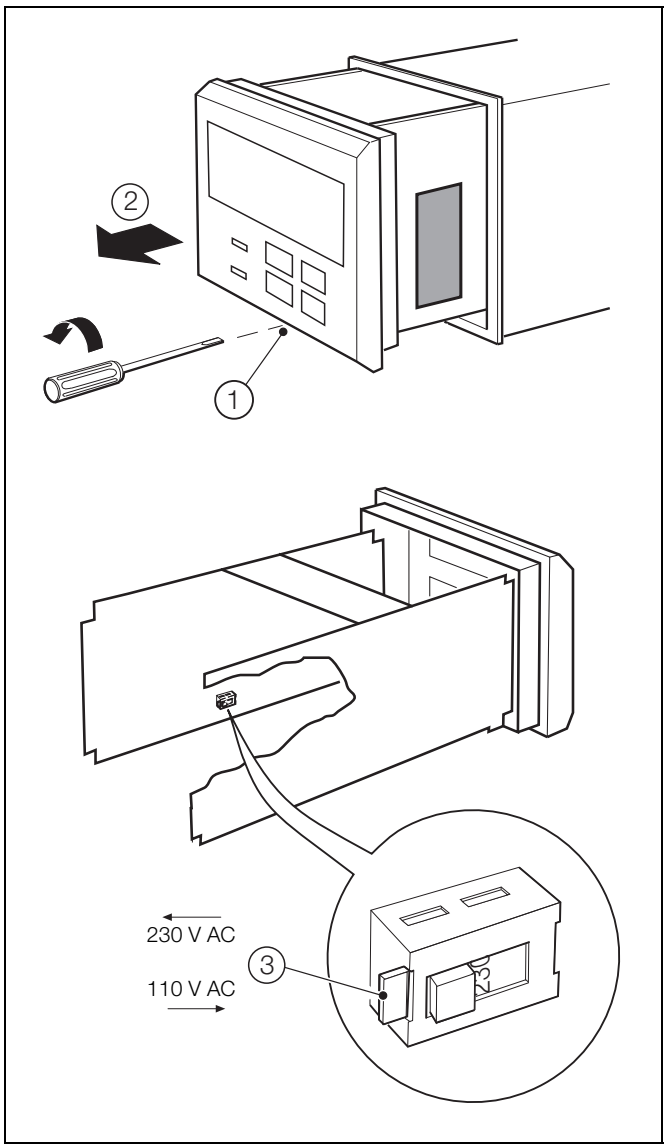


Fig. 4.7 Selecting Mains Voltage – Panel-mount Analyzer

4.5 Turbidity Sensor Connections

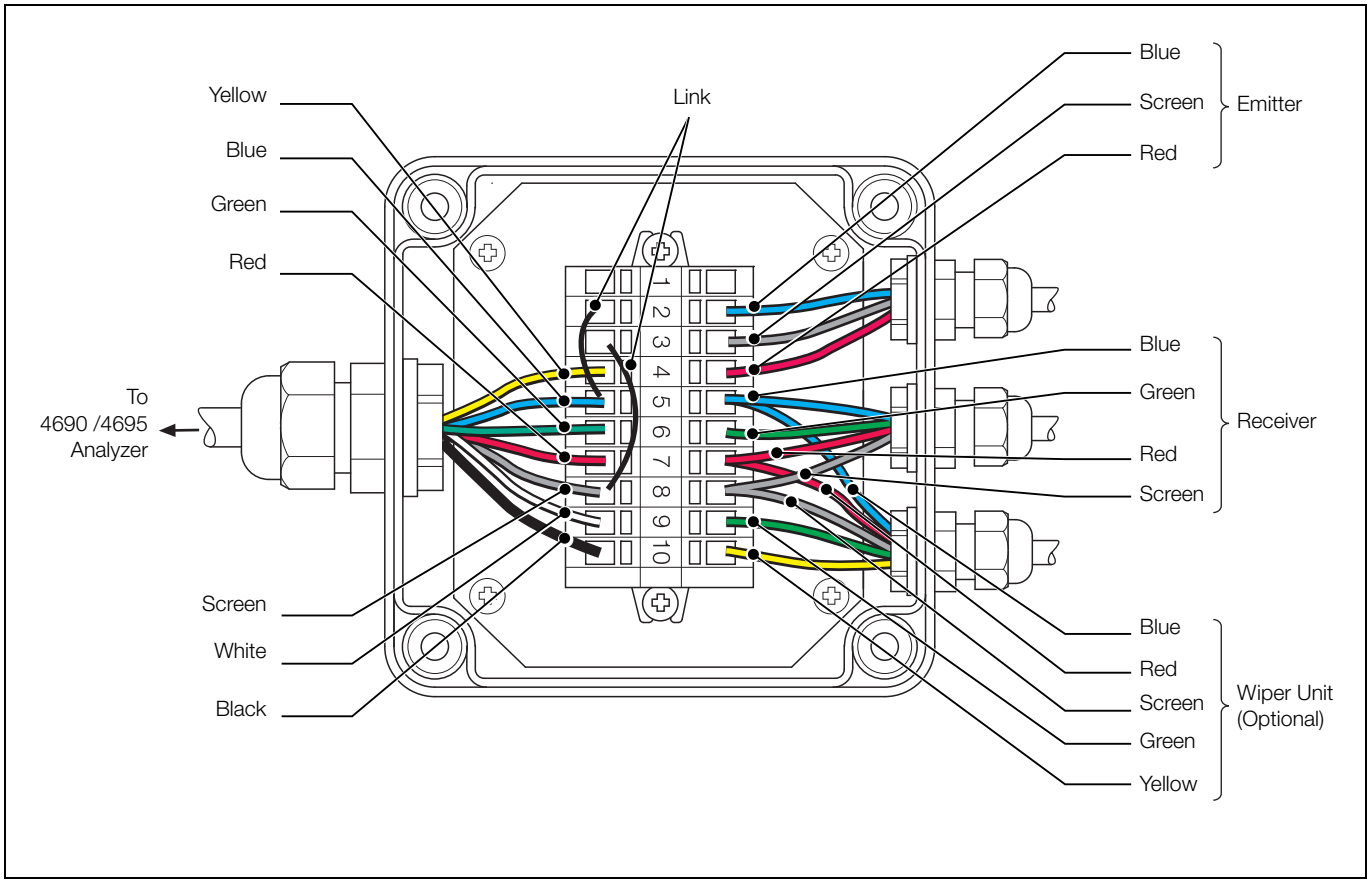


Fig. 4.8 Turbidity Sensor Junction Box Connections

5 Controls and Display

5.1 Display

The display comprises a 5-digit, 7-segment digital upper display line and a 16-character dot-matrix lower display line. The upper display line shows actual values of turbidity, temperature, alarm set points or programmable parameters. The lower display line shows the associated units or programming information.

5.2 Control Familiarization

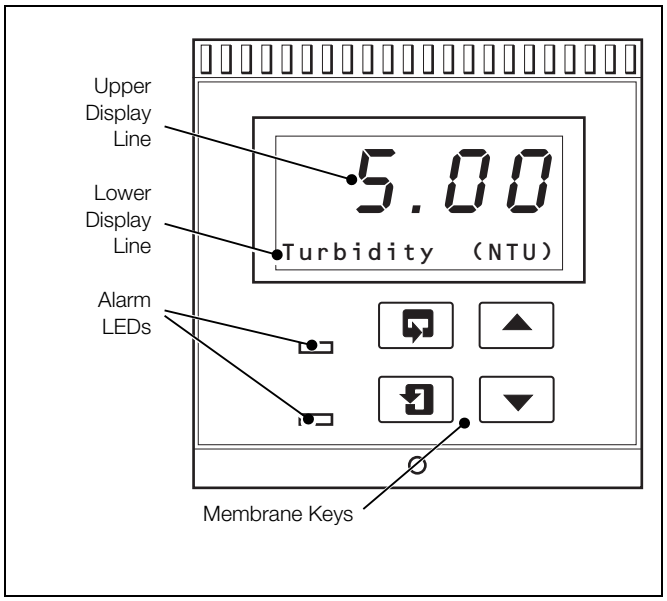


Fig. 5.1 Controls and Display

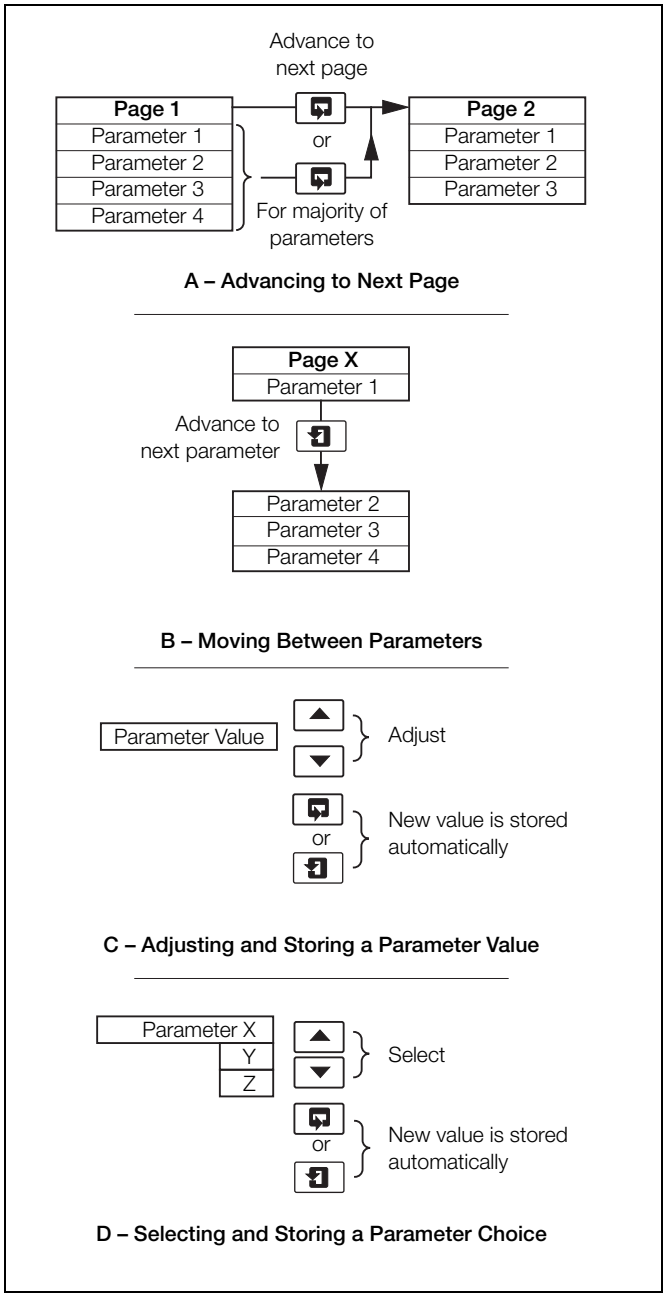


Fig. 5.2 Membrane Key Functions

6 Operation

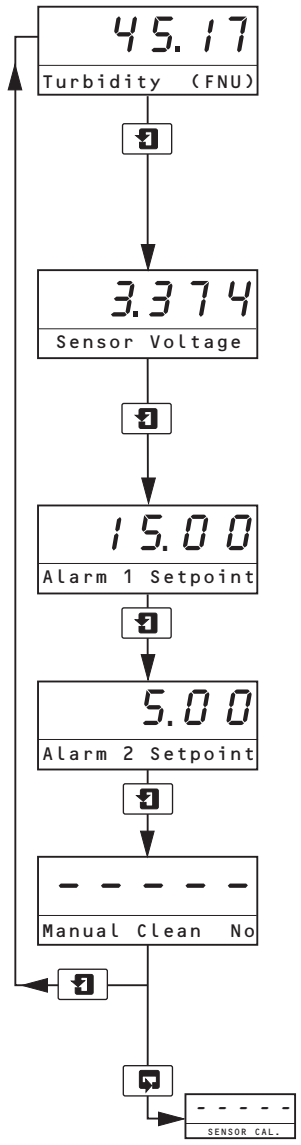
6.1 Analyzer Start-up

Ensure all electrical connections have been made and switch on the power supply. If the system is being commissioned for the first time, calibration (refer to Section 7, page 20) and parameter programming (refer to Section 8.3, page 27) are required.

6.2 Operation – Turbidity Measurement Mode

Operation in the Turbidity measurement mode comprises an **Operating** page and a **Turbidity Calibration** page. The **Operating** page is a general use page in which parameters are viewed only and cannot be altered. To alter or program a parameter, refer to the programming pages in Section 8. The **Turbidity Calibration** page enables a calibration to be carried out. A 5-digit calibration code is used to prevent unauthorized access to the **Turbidity Calibration** page. The value is preset at 00000 to allow access during commissioning, but should be changed to a unique value, known only to authorized operators, in the **Set Up Outputs** page – see page 30.

6.2.1 Operating Page



Measured Turbidity (Units)

The measured turbidity value is displayed in the units selected in the **Set Up Parameter** page – see Section 8.3, page 27.

Press ↵ to advance to next page

or

Press ▶ to advance to next parameter.

Sensor Voltage

The sensor voltage displayed is the output from the optical receiver. The optical system (the emitter and the receiver) are configured to produce the 0 to 3 V outputs from zero to full scale, providing an indication of the performance of the optical system.

Alarm 1 Set Point

The set point value and relay / LED action are programmable – refer to Section 8.4, page 29.

Alarm 2 Set Point

The set point value and relay / LED action are programmable – see refer to Section 8.4, page 29.

Manual Clean

Note. Displayed only if the turbidity sensor is fitted with a wiper unit – see Table 2.1, page 3.

Press the ▲ key to initiate a manual clean. `Manual Clean Yes` is displayed for one minute. The automatic clean sequence is then reset and `Manual Clean No` displayed.

Advance to **Calibration** page – see Section 7, page 20.

7 Calibration

A key feature of the 4690 Series Turbidity system is the dry secondary calibration standard. This is designed to simplify routine calibration verification and minimizes the need for chemical standards.

Each dry calibration standard is verified against a primary formazine standard before delivery and the nominal turbidity value is indicated on the label.

For regulatory monitoring, use the secondary calibration standard for monthly calibration verification and monitor it for deterioration periodically using a primary standard.

Definitions

- **Primary Standards**

  Turbidity standards that are traceable and equivalent to the reference turbidity standard, within statistical errors. Formazine is the most commonly acceptable form of primary standard. The other is a commercially manufactured liquid suspension of Styrene divinylbenzene polymer beads (SDB). Primary standards are used to calibrate a turbidity analyzer directly or to calibrate a secondary standard.

- **Secondary Standards**

  Standards that the manufacturer (or an independent testing organization) has certified give analyzer calibration results equivalent (within certain limits) to the results obtained when the analyzer is calibrated with a primary standard.

- **Calibration**

  A procedure that checks or adjusts an analyzer's accuracy by comparison with a defined standard or reference.

- **Calibration Verification**

  A procedure used to check whether or not the calibration of the analyzer is within certain limits.

7.1 Care and Maintenance of Secondary Standards

ABB's secondary standards may be used repeatedly but must be monitored for deterioration.

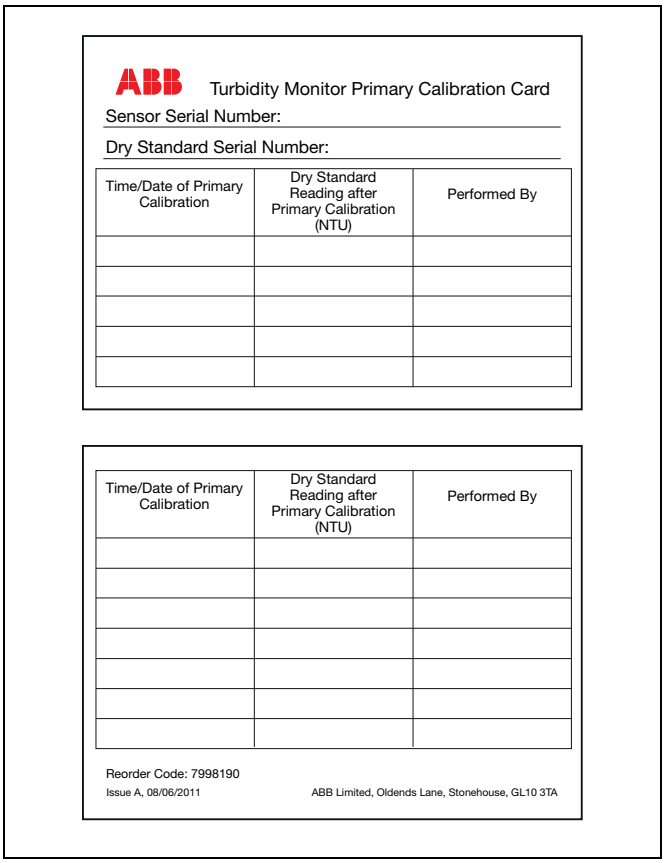
All secondary standards can change gradually with time. Deterioration can be detected by measuring the turbidity value of the secondary standard after calibration of the analyzer with a primary calibration standard.

It is recommended that secondary standards are rechecked against a primary standard on the analyzer they are intended to be used with every 3 months.

If comparison with a primary standard shows that the turbidity value of the secondary standard has changed the secondary standard can be assigned a new turbidity value for use in future calibration verification.

Included with each sensor is a calibration record card kit for recording the value of the secondary standard compared to the primary calibration data for each individual analyzer with which the secondary standard is used.

Additional calibration record card kits can be purchased from ABB (part no. 7998190 for pack of 3).


ABB Turbidity Monitor Primary Calibration Card

Sensor Serial Number:

Dry Standard Serial Number:

Time/Date of Primary Calibration	Dry Standard Reading after Primary Calibration (NTU)	Performed By

Time/Date of Primary Calibration	Dry Standard Reading after Primary Calibration (NTU)	Performed By

Reorder Code: 7998190

Issue A, 08/06/2011

ABB Limited, Oldends Lane, Stonehouse, GL10 3TA

Fig. 7.1 Example of Calibration Record Card

To minimize deterioration of the secondary standard:

- Carefully wipe off any residual moisture after use.
- Clean the prism with lint-free cloth.
- Avoid direct contact with the dry standard rod – fingerprints on the surface may alter its stated value.
- Store in the container provided when not in use and keep in a dry place.

7.2 Performing a Calibration Verification with a Secondary Standard

To check the calibration:

1. Close the isolating valve installed upstream of the sensor.
2. Close the sensor inlet valve and open the drain valve. Allow the sensor to drain.
3. Carefully remove the wiper unit (7998 001, 002, 011 and 012) or the wiper plug (7998 006, 007, 016 and 017) to aid complete drainage of the system. When the system is empty, close the drain valve.

   Caution. When removing the wiper unit **do not** put excessive leverage on the wiper as there is a risk of bending the wiper arm out of 90 °. On removal of wiper, check wiper arm has not been bent.

4. Thoroughly dry the flow chamber internally using clean tissue.
5. Thoroughly clean and dry the emitter and receiver lenses using clean tissue.

   Note. If condensation forms on the emitter and receiver lenses, leave the sensor open to enable the lenses to reach ambient temperature before attempting calibration.

6. Insert the dry calibration standard with the zero NTU indication (see Figs 7.2 or 7.3) facing the optical receiver, ensuring the locating lug engages correctly – see Fig. 7.4.

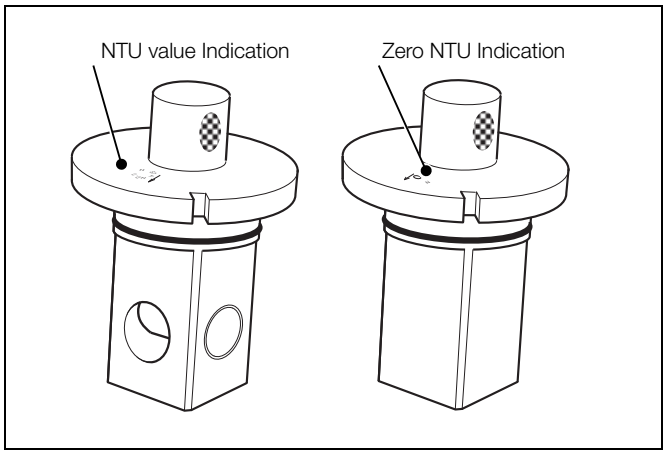


Fig. 7.2 Dry Calibration Standard for Low Range Sensors

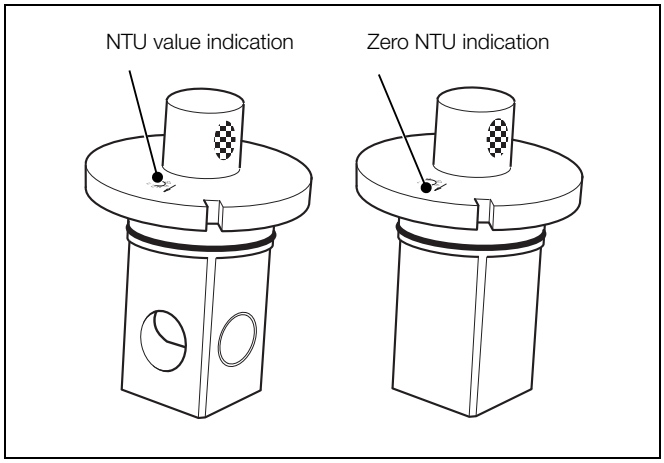


Fig. 7.3 Dry Calibration Standard for High Range Sensors

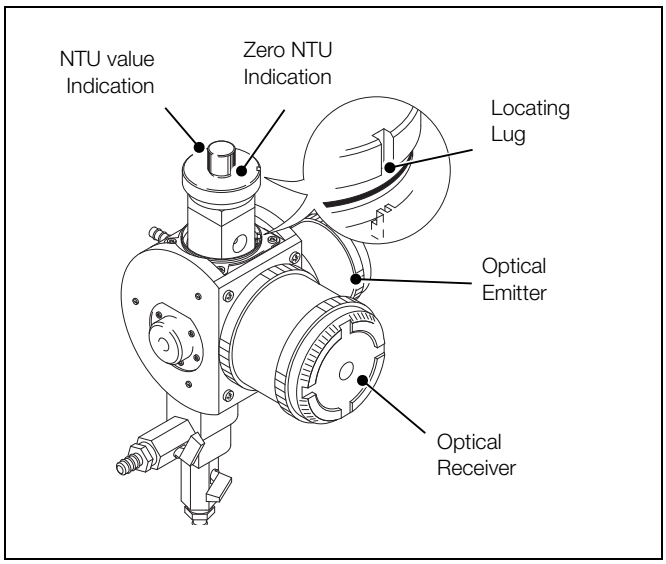


Fig. 7.4 Inserting Dry Standard

7. Note the reading on the display.

8. Remove the dry standard, rotate it through 180° and refit it, ensuring that the NTU value indication (see Figs 7.2 or 7.3) faces the receiver and the locating lug engages correctly – see Fig. 7.4.
9. Note the reading on the display.
10. If the readings noted at steps 7 and 9 exceed ±5 % of dry standard value, repeat the procedure from step 4. If readings are still outside this range, calibrate the sensor.
11. Remove the dry standard and place it in its storage container.
12. Refit the wiper unit (7998 011 and 012) or wiper plug (7998 016 and 017).
13. Open the inlet valve and ensure that the flow through the sensor is 0.5 to 1.5 l min^{-1}

7.3 Performing a Calibration with a Primary Standard

Note. Before performing a wet standard calibration, ensure a stock formazine solution is available. If a stock solution is not available, 24 hours must elapse before a freshly-prepared solution can be used.

To prepare the sensor assembly for wet (Formazine) calibration:

1. Close the isolating valve installed upstream of the sensor.
2. Close the sensor inlet valve and open the drain valve. Allow the sensor to drain.
3. Carefully remove the wiper unit (7998 011 and 012) or the wiper plug (7998 016 and 017) to aid complete drainage of the system. When the system is empty, close the drain valve.

   Caution. When removing the wiper unit **do not** put excessive leverage on the wiper as there is a risk of bending the wiper arm out of 90 °. On removal of wiper, check wiper arm has not been bent.

4. Thoroughly dry the flow chamber internally using clean tissue.
5. Thoroughly clean and dry the emitter and receiver lenses using clean tissue.

   Note. If condensation forms on the emitter and receiver lenses, leave the sensor open to enable the lenses to reach ambient temperature before attempting calibration.

6. Insert the dry calibration standard with the zero NTU indication (see Figs 7.5 or 7.6, page 23) facing the optical receiver, ensuring the locating lug engages correctly – see Fig. 7.7.

   Note. Do not touch the light reflecting parts of the standard.

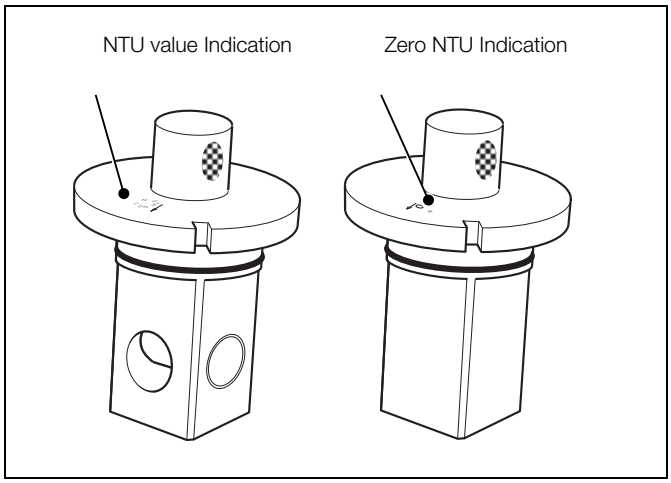


Fig. 7.5 Dry Calibration Standard for Low Range Sensors

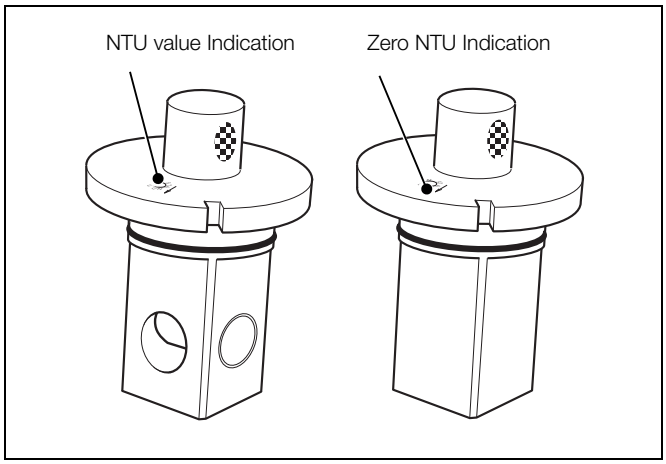


Fig. 7.6 Dry Calibration Standard for High Range Sensors

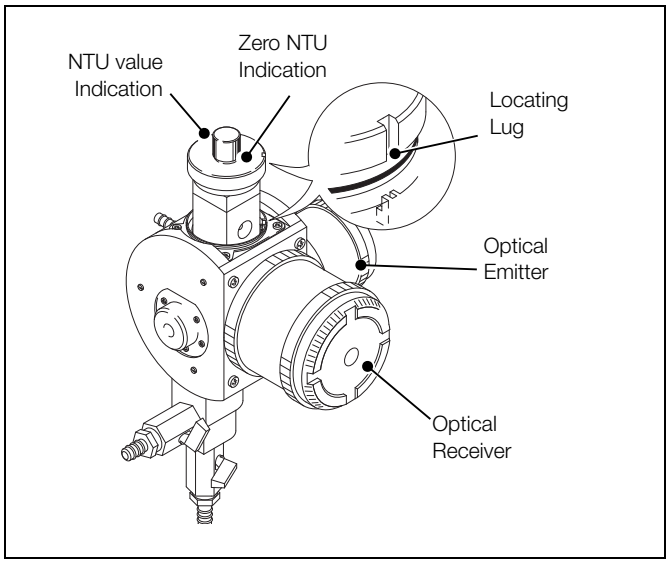
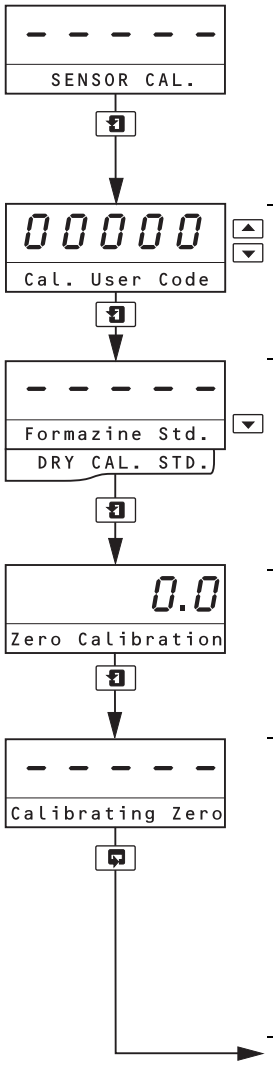


Fig. 7.7 Inserting Dry Standard

7. Calibrate the sensor as follows:



Sensor Calibration

Press ↵ to advance to next page

or

Press ↵ to advance to next parameter.

Calibration Security Code

Enter the required calibration code number, between 00000 and 19999. If an incorrect value is entered, access to calibration is prevented and the `SENSOR CAL.` page is displayed.

Dry Standard Calibration

Press the ▼ key to select `Formazine Std.`

Zero Calibration

Press the ↵ key. The display changes to `Calibrating Zero`.

Calibrating Zero

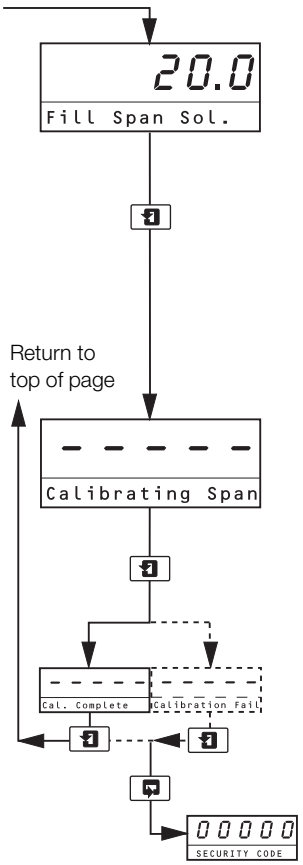
After approximately one minute, the display changes to `Fill Span Sol.` if zero calibration is successful.

If `Cal Fail` is displayed, remove the dry standard and ensure the emitter and receiver lenses are clean and dry. Refit the dry standard, ensuring it is fitted correctly (see step 6, page 22) and repeat the procedure.

Note. Do not touch the light reflecting parts of the standard.

Continued on next page.

Continued from previous page



Fill Span Solution

1. Remove the dry standard and place it in its storage container.

   Note. Do not touch the light reflecting parts of the standard.

2. Fill the flow chamber with the formazine span solution and refit the wiper unit or wiper plug.
3. Using the ▲ and ▼ keys, set the display to the NTU value of the formazine span solution.
4. Press the ↵ key. The display changes to `Calibrating Span`.

   Note. If span calibration is not required, press the ↵ key again to advance to `Cal. Complete`.

Calibrating Span

After approximately one minute, the display changes to `Cal. Complete` if calibration is successful.

1. Remove the wiper unit or wiper plug.
2. Drain the flow chamber, ensuring all the formazine span solution is removed.
3. Refit the wiper unit or wiper plug and open the inlet valve.

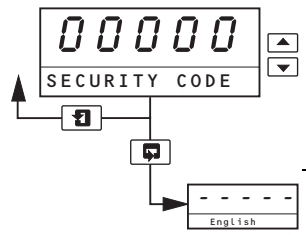
If `Cal Fail` is displayed, drain the flow chamber, remove the wiper unit or wiper plug and clean the emitter and receiver lenses. Repeat the calibration procedure ensuring that an in-date or fresh formazine solution is used and that the **Fill Span Solution** parameter is set to the NTU value of the formazine span solution.

Advance to **Access to Configuration** pages – see Section 8.1, page 26.

8 Configuration and Electrical Calibration

8.1 Access to Configuration Pages

A 5-digit security code is used to prevent unauthorized access to the configuration pages.

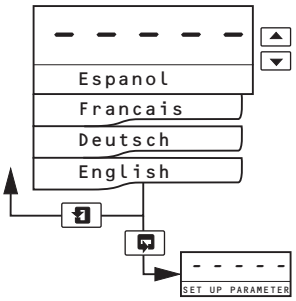


Security Code

Enter the required code number, between 00000 and 19999, to gain access to the configuration pages. If an incorrect value is entered, access to subsequent configuration pages is prevented and the Operating Page is displayed.

Advance to **Language** page – see Section 8.2 below.

8.2 Language Page

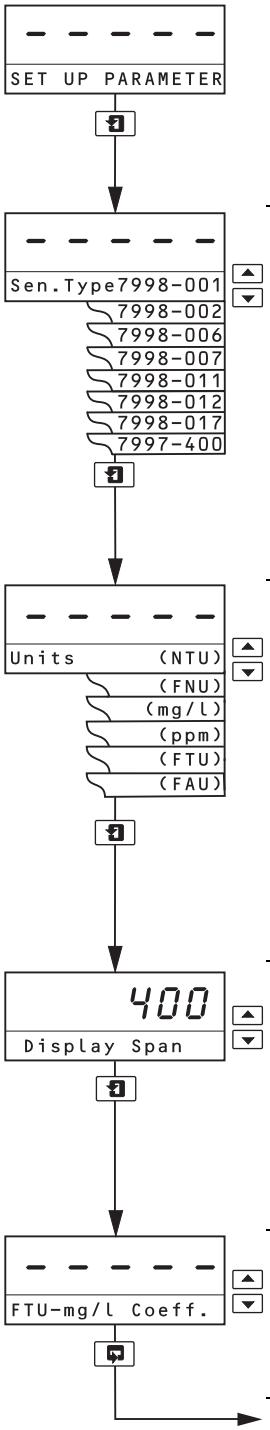


Language

Using the ▲ and ▼ keys, select the required language.

Advance to **Set Up Parameter** page – see Section 8.3, page 27.

8.3 Set Up Parameter Page



Set Up Parameter

Press ↵ to advance to next page

or

Press ▶ to advance to next parameter.

Sensor Type

Using the ▲ and ▼ keys, select the required sensor:

7998-001
7998–002
7998–006
7998–007
7998–011
7998–012
7998–016
7998–017

7998–400 (Refer to separate manual IM/4670)

Units

Using the ▲ and ▼ keys, select the required measurement units:

NTU (Nephelometry Units)

FNU (Formazine Nephelometry Units)

mg/l (milligrams suspended solids per litre) – 7998-002/007/012/017 sensors only

ppm (parts per million suspended solids) – 7998-002/007/012/017 sensors only

Note. FTU and FAU units are applicable only to 7997–400 series sensors – refer to IM/4670

Display Span

Using the ▲ and ▼ keys, select the required span value.

The minimum and maximum values that can be selected are determined by the **Sensor Type** selected above. The display flashes at turbidity values higher than the selected span value but indicates correctly up to the range of the sensor – see Table 2.1 on page 3.

The display span also sets the correct output span. Alarm values cannot be set outside this range.

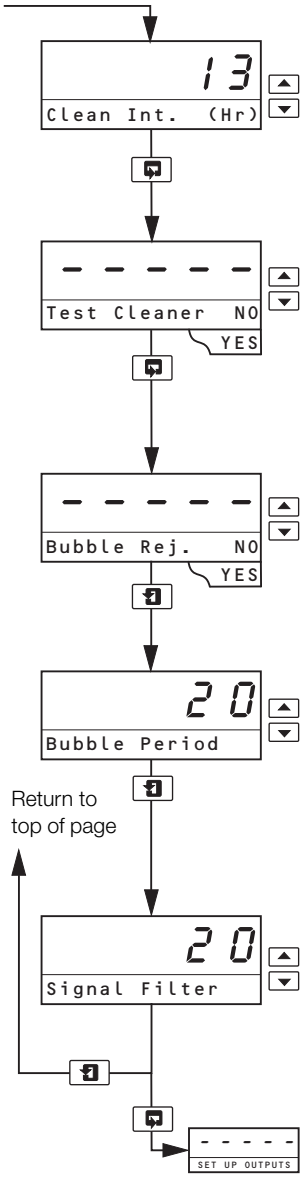
Correction Factor

Note. Displayed only if **Units** is set to mg/l or ppm

Using the ▲ and ▼ keys, select the required correction factor to between 0.2 and 5.0.

Continued on next page.

Continued from previous page



Cleaning Interval

Note. Displayed only if **Sensor Type** is set to 7998-001, 7998-002, 7998-011 or 7998-012

Using the ▲ and ▼ keys, select the cleaning interval required. Values available are: 15 mins, 30 mins, 45 mins, 1 hr, then 1 hour increments to a maximum of 24 hours.

Test Cleaner

Note. Displayed only if **Sensor Type** is set to 7998-001, 7998-002, 7998-011 or 7998-012

Select YES to activate the wiper unit diagnostics function and enable visual indication of wiper unit function.

Select No to deactivate the wiper unit diagnostics function.

Bubble Rejection

Use in applications where degassing of the sample takes place.

When set to YES, the analyzer ignores short duration spikes in the turbidity reading caused by the formation of small bubbles in the flowcell due to degassing.

Bubble Period

Note. Displayed only if **Bubble Rej.** is set to YES

Using the ▲ and ▼ keys, adjust the value to between 2 and 60 seconds until short duration spikes are no longer seen on the display.

Note. A value of 20 seconds is normally sufficient for most applications.

Signal Filter

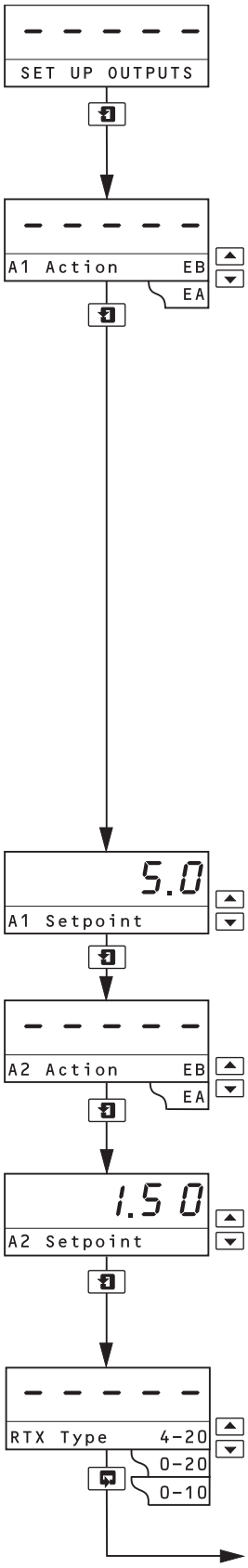
Use in applications where the turbidity readings are noisy.

Using the ▲ and ▼ keys, adjust the value to between 4 and 180 seconds.

Note. If **Bubble Rej.** is set to YES, set a value of 4 seconds for optimum performance.

Advance to **Set Up Outputs** page – see Section 8.4, page 29.

8.4 Set Up Outputs Page



Set Up Outputs

Press ⏎ to advance to next page

or

Press ▶ to advance to next parameter.

Alarm 1 Action

For 'Fail-safe' alarm operation the relay's alarm state must be the same as the power-down state, (the relay is de-energized).

For high alarm operation the relay must be Energized Below (EB) the alarm set point.

For low alarm operation the relay must be Energized Above (EA) the alarm set point.

The alarm LEDs are lit in the alarm condition.

Select the required alarm 1 action from the following table:

Alarm Action	LED Condition for Input Above Set Point	LED Condition for Input Below Set Point	Relay Condition for Input Above Set Point	Relay Condition for Input Below Set Point
EB	ON	OFF	De-energized	Energized
EA	OFF	ON	Energized	De-energized

The set point band is defined as the actual value of the set point plus or minus the hysteresis value. The hysteresis value is ±1 % of the set points. Alarm action occurs if the input value is above or below the set point band. If the input moves within the set point band the last alarm action is maintained.

Alarm 1 Set Point

Using the ▲ and ▼ keys, set the alarm 1 set point to any value within the selected display span – see **Display Span** on page 27. The set point value is subject to hysteresis as detailed above.

Alarm 2 Action

Note. Displayed only if **Test Cleaner** is not set to YES – see **Test Cleaner** on page 28 (set automatically to Wiper Unit Failed Alarm if **Test Cleaner** is set to YES).

Repeat as for **Alarm 1 Action** above.

Alarm 2 Set Point

Note. Displayed only if **Test Cleaner** is not set to YES – see **Test Cleaner** on page 28 (set automatically to Wiper Unit Failed Alarm if **Test Cleaner** is set to YES).

Repeat as for **Alarm 1 Set Point** above.

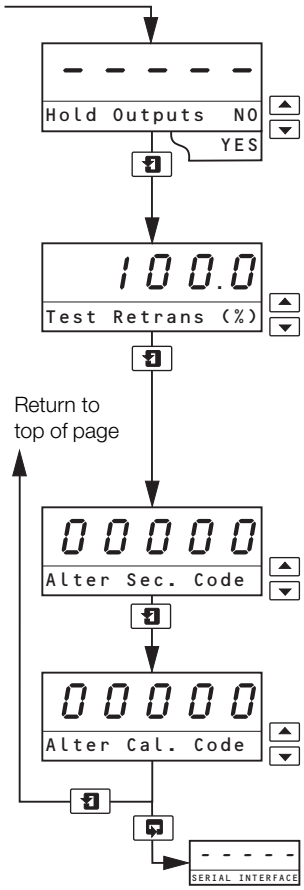
Retransmission Type

Using the ▲ and ▼ keys, select the retransmission current output range required, from 0 to 10, 0 to 20 or 4 to 20 mA.

The current output range is assigned to the selected display span – see **Display Span** on page 27.

Continued on next page.

Continued from previous page



Hold Outputs during Calibration

Select YES to hold the retransmission and alarm outputs to prevent inadvertent operation during calibration.

Test Retransmission Output

The analyzer transmits automatically a test signal of 0, 25, 50, 75 or 100 % of the retransmission range selected on page 29. The % test signal selected is shown on the upper display.

Example – for a selected range of 0 to 20 mA and 50 % retransmission test signal, 10 mA is transmitted.

Select the required retransmission test signal.

Alter Configuration Security Code

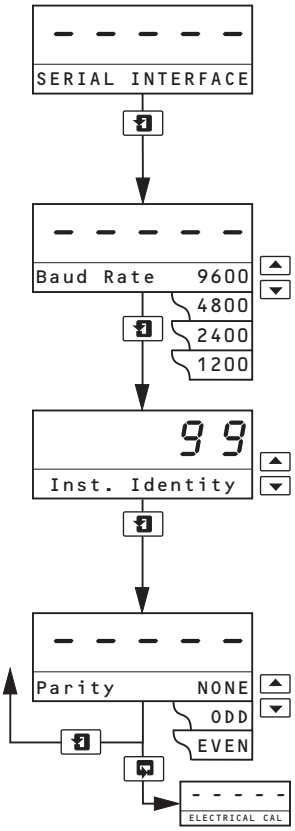
Set the security code to a value between 00000 and 19999.

Alter Calibration Security Code

Set the security code to a value between 00000 and 19999.

Advance to **Set Up Serial Interface** page.

8.5 Set Up Serial Interface Page



Serial Interface

Press ↵ to advance to next page

or

Press ⇥ to advance to next parameter.

Baud Rate

Using the ▲ and ▼ keys, select the baud rate required from 1200, 2400, 4800 or 9600 baud.

Instrument Identity

Using the ▲ and ▼ keys, select a value between 1 and 99 to identify the analyzer on the network.

Parity

Using the ▲ and ▼ keys, select the parity required, None, Odd or Even.

Advance to **Electrical Calibration** page – see Section 8.6.3, page 33.

8.6 Electrical Calibration

Caution. The analyzer is calibrated by the Company prior to despatch and an electrical calibration should not be necessary. If an electrical calibration is carried out, suitably calibrated and verifiable test equipment must be used.

8.6.1 Equipment Required

1. Millivolt source: 0 to 4000 mV.
2. Digital milliammeter (current output measurement): 0 to 20 mA.

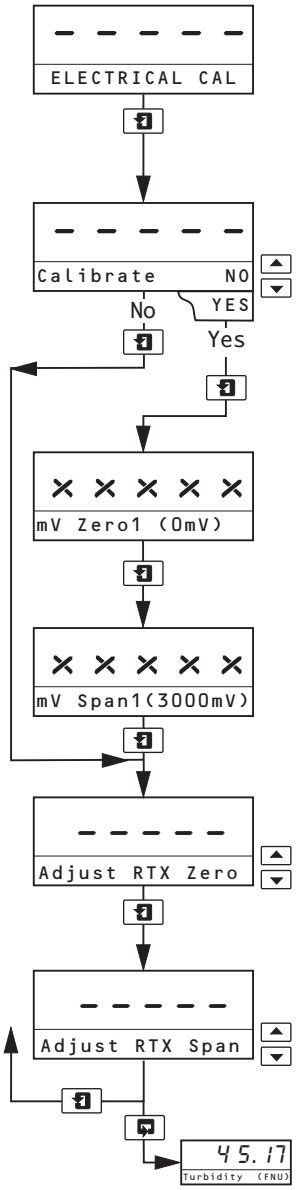
8.6.2 Preparation

1. Isolate the analyzer and turbidity sensor from the power supply and disconnect the sensor and current output from the analyzer's terminal block – see Fig. 4.4, page 14 (wall-/pipe-mount analyzer) or Fig. 4.5, page 15 (panel-mount analyzer).
2. **Wall- / Pipe-mount Analyzer**
   a. Connect the millivolt source '+' and '–' to terminals 4 and 7 respectively.
   b. Connect the milliammeter to the retransmission output terminals.
   c. Ensure the earth on the millivolt source is connected to the earth stud.

   Panel-mount Analyzer
   a. Connect the millivolt source '+' and '-' to terminals 9 and 6 respectively.
   b. Connect the milliammeter to the retransmission output terminals.
   c. Ensure the earth on the millivolt source is connected to the earth stud.
3. Switch on the supply and allow ten minutes for the circuits to stabilize.
4. Select **ELECTRICAL CAL** page and proceed as in Section 8.6.3, following.

8.6.3 Electrical Calibration Page

In this section the actual values denoted by '**xxxxx**' are unimportant and are used only to determine display reading stability when carrying out the electrical calibration procedure.



Electrical Calibration

Press ↵ to advance to next page

or

Press ↵ to return to the **Operating** page – see Section 6.2.1, page 19.

Calibrate

Select **YES** to access the electrical calibration sequence.

Select **NO** to advance to **Adjust RTX Zero**.

mV Zero1 (0mV)

Set the millivolt source to 0 mV and allow the analyzer display to stabilize.

mV Span1 (3000mV)

Set the millivolt source to 3000 mV and allow the analyzer display to stabilize.

Adjust Retransmission Zero

Set the milliammeter reading to 4 mA.

Adjust Retransmission Span

Set the milliammeter reading to 20 mA.

Note. The retransmission range selected in the **Set Up Outputs** page does not affect the reading.

Return to the **Operating** page – see Section 6.2.1, page 19.

9 Maintenance

The servicing schedule in Table 9.1 is a guide only. Because the turbidity systems are designed for a wide range of applications, where the nature of the sample can vary considerably, it may be necessary to amend the schedule to suit the particular installation and sample conditions.

Task	Recommended Frequency
Wiper blade replacement	Quarterly
Light source (EPA 180.1) replacement	Annually
LED light source (ISO 7027) replacement kit	Every 5 years

Table 9.1 Suggested Maintenance Schedule

9.1 Sensor Cleaning

9.1.1 Sensors Without Wiper Unit

These sensors are normally used on clean water samples and, under normal conditions, may require only manual monthly cleaning of the flow chamber. However, if a high turbidity breakthrough occurs, clean the flow chamber immediately to ensure accurate readings.

9.1.2 Sensors With Wiper Unit

The required automatic cleaning frequency of the flow chamber and optical windows of the sensors can be determined only by plant experience. It is recommended that checks are made at appropriate intervals.

10 Fault Finding

10.1 Error Messages

If erroneous or unexpected results are obtained, the fault may be indicated by an error message – see Table 10.1. The majority of problems are overcome by thorough cleaning of the flowcell optical windows and / or a sensor calibration.

Error Message	Description and Remedy
`Cal Fail`	Indicates that the expected step change between a zero and span calibration was not produced by the sensor (zero response from the sensor). 1. Repeat calibration. 2. If using a dry calibration standard, ensure that the optical windows on the dry standard are clean and dry. 3. If using solutions: Check that the flowcell has been thoroughly cleaned and rinse well between solutions Check both zero and formazine solutions 4. Check electrical connections to sensor. 5. Using a suitable voltmeter, check the sensor 12 V supplies, both at the analyzer terminals and sensor junction box – see Table 4.1 on page 14 for details. 6. Check the analyzer's response to an electrical input by injecting 0 and 3 V into the following terminals and noting the reading displayed in **Sensor Voltage** in the **Operating** page (see Section 6.2.1, page 19): Wall- / pipe-mount–ve to terminal 7 +ve to terminal 4 Panel-mount –ve to terminal 6 +ve to terminal 9 Small errors in displayed voltage can be removed by electrical calibration. Large errors indicate an electronic fault.
`Cleaner Fail`	Indicates that the analyzer was unable to detect the correct operation of the wiper unit; either the wiper unit did not rotate or failed to park in the correct position. 1. Check the electrical connections to the sensor. 2. Using a suitable voltmeter, check the sensor 12 V supplies, both at the analyzer terminals and sensor junction box – see Figs 4.4, 4.5 and 4.8 on pages 14, 15 and 17 for connection details. 3. Check operation of the wiper unit by disconnecting the white lead from the analyzer terminal block (Cleaner Initiate signal) and touching it briefly to the 0 V terminal – see Table 4.1 on page 14 for details. This initiates a cleaning cycle, that can be observed when the wiper unit is removed from the flowcell.
`NV Memory Error`	Indicates that the contents of the nonvolatile memory has not been read correctly during power up. To rectify the problem, switch off the power, wait 10 seconds and switch on again. If the problem persists contact the Company.

Table 10.1 Error Messages

10.2 Unstable or Erratic Readings

There are a number of possible causes of unstable or erratic readings. Check for air bubbles in the sample. This may be due to degassing of the sample, caused by either a drop in sample pressure or a rise in temperature. Frequent cleaning of the optical windows helps to prevent the build-up of bubbles. If bubbles are observed it is recommended that the optional de-bubbler unit is installed – see Section 3.4, page 10.

Where the noise level gradually gets worse over a period of time, this usually indicates that solids are building up in the flowcell. Increasing the flowrate through the flowcell may reduce this build up. Ultimately the flowcell needs to be cleaned manually.

10.3 Intermittent Short Term Spikes in Turbidity Readings

This is usually caused by bubbles passing through the light path within the flowcell. The bubbles are a result of degassing. Degassing is not an instantaneous process and it is possible that it is taking place after the sample has gone through the de-bubbler. The bubbles start to form in the sample pipework and the flowcell. As they grow gradually, the bubbles finally release and flow through the light path, causing a spike in the turbidity reading.

The analyzer can be programmed for Bubble Rejection to remove short-term spikes from the readings – see page 28. For optimum operation, operate the wiper unit frequently to prevent bubbles building up on the windows.

11 Specification

Sensor

Range

Low range 0 to 40 NTU
High range 0 to 400 NTU

Measurement principle

90 ° scattered light measurement.
Compliant to ISO 7027

Maximum linearity

Typically <1.0 %

Accuracy[1, 2]

Low range version ±2 % of reading

High range version ±5 % of reading or 0.3 NTU

Repeatability[3]

0 to 200 NTU <1 %

200 to 400 NTU 2 %

Limit of Detection[4]

Low range version: 0.003 NTU

High range version: 0.3 NTU

Response time

T90 < 1 min at 1 l/min^{-1}

Flow rate

0.5 to 1.5 l/min (0.13 to 0.39 gall [US]/min)

Integral wiper cleaning system

Programmable operational frequency every 0.25 hour, 0.5 hour, 0.75 hour or multiples of 1 hour up to 24 hours

Sample operating temperature

0 to 50 °C (32 to 122 °F)

Sample pressure

Up to 3 bar (43.5 psi)

Ambient operating temperature

0 to 50 °C (32 to 122 °F)

Ambient operating humidity

Up to 95 % RH

[1]Maximum measured error across full measurement range (limited by uncertainty in Formazine standards).

[2]Tested in accordance with IEC 61298 Parts 1-4: Edition 2.0 2008-10.

[3]Tested in accordance with MCERTS: Performance Standards and Test Procedures for Continuous Water Monitoring Equipment. Version 3.1: Environment Agency 2010.

[4]Tested in accordance with BS ISO 15839: 2003.

Wetted parts – materials used

Cell body unit

- Black POM (Polyoxymethylene) Copolymer
- Spectrosil 2000 fused silica
- Nitrile (O-ring)
- Epoxy preform (cured) – Uni-forms 5034-00
- Polyamide 6
- Nickel plated brass
- PTFE

Wiper unit

- Black Polycarbonate, 10% Glass Fibre filled – Lexan 500R
- Stainless Steel (SS 316 S13/S11) w/ Chemical Black – MIL-C13924 class 4
- Silicone grease (WRC Approved) – Unisilkon L 250 L
- 2-part Epoxy Adhesive (cured) – Robnor PX800F/NC
- EPDM (ethylene propylene diene Monomer) black

Analyzer

Measured value
5-digit x 7-segment backlit LCD

Information
16-character, single line, dot matrix, backlit LCD

Units of measurement
All models: NTU and FNU
mg/l and ppm for models high range models

Accuracy
±0.2 % of reading, ±1 digit

Linearity
±0.1 % FSD

Auto-clean timing (7998011, 7998012)
Programmable 15 min, 30 min, 45 min or 1 hour up to 24 hours in 1 hour increments

Environmental Data

Operating temperature limits
–20...55 °C (–4...131 °F)

Storage temperature limits
–25...55 °C (–13...131 °F)

Operating humidity limits
Up to 95 % RH non-condensing

Power Supply

Voltage requirements
100...130 V, 200...260 V, 50/60 Hz

Power consumption
< 6 VA AC

Error due to power supply variation
Less than 0.1 % for +6 % –20 % variation from nominal supply

Insulation
Mains to earth (line to ground) 2 kV RMS

Relay Outputs and Set Points

No. of relays
2

Relay contacts
Single pole changeover
Rating 250 V AC 250 V DC max.
3 A AC, 3 A DC max.
Loading (non-inductive) 750 VA 30 W max.
(inductive) 750 VA 3 W max.

Insulation
2 kV RMS contacts to earth (ground)

No. of set points
2

Set point adjustment
Programmable

Set point hysteresis
±1 % fixed

Local set point annunciation
Red LED

Retransmission

No. of retransmission signals
One fully isolated programmable 0...10 mA, 0...20 mA or 4...20 mA
Optional second current output

Accuracy
±0.25 % FSD ±0.5 % reading

Resolution
0.1 % at 10 A, 0.05 % at 20 mA

Max. load resistance
750 Ω (20 A max.)

Mechanical Data

Model 4690/500

Wall-mounting	
Protection	IP66/NEMA4X
Dimensions	160 mm (6.30 in.) wide x 214 mm (8.43 in.) high x 68 mm (2.68 in.) deep
Weight	2 kg (4½ lb)

Model 4695/500

Panel-mounting	(¼ DIN)
Protection	IP66/NEMA4X front
Dimensions	96 mm (3.78 in.) wide x 96 mm (3.78 in.) high x 191 mm (7.52 in.) deep
Weight	1.5 kg (3¼ lb)
Panel cut-out:	$92^{+0.8}_{-0}$ mm x $92^{+0.8}_{-0}$ mm ($3.62^{+0.03}_{-0}$ in. x $3.62^{+0.03}_{-0}$ in.)

DS/4690–EN Rev. B

12 Spares and Consumables

12.1 Maintenance Kits

Part Number	Description	Kit Contents
7998023	Wiper blade pack	4 x 7997203
7998044	Replacement LED kit (ISO infrared LED version)	1 x 7998126, 1 x 7998021
7998032	Replacement lamp kit (EPA white light version)	1 x 7998125, 1 x 7998021

12.2 Accessories

Part Number	Description	Kit Contents
7998047	Dry standard LOW for use with ISO infrared LED version	7998181 dry standard + calibration certificate
7998048	Dry standard HIGH for use with ISO infrared LED version	7998183 dry standard + calibration certificate
7998035	Dry standard LOW for use with EPA white light version	7998171 + calibration certificate
7998036	Dry standard HIGH for use with EPA white light version	7998173 + calibration certificate

12.3 Upgrade Kits

Part Number	Description	Kit Contents
7998022	Wiper unit upgrade kit	1 each of: 7998140 0216580 – cable gland and locknut 7998023 – wiper blade pack 7998317 – wiper cap

12.4 Strategic Spares

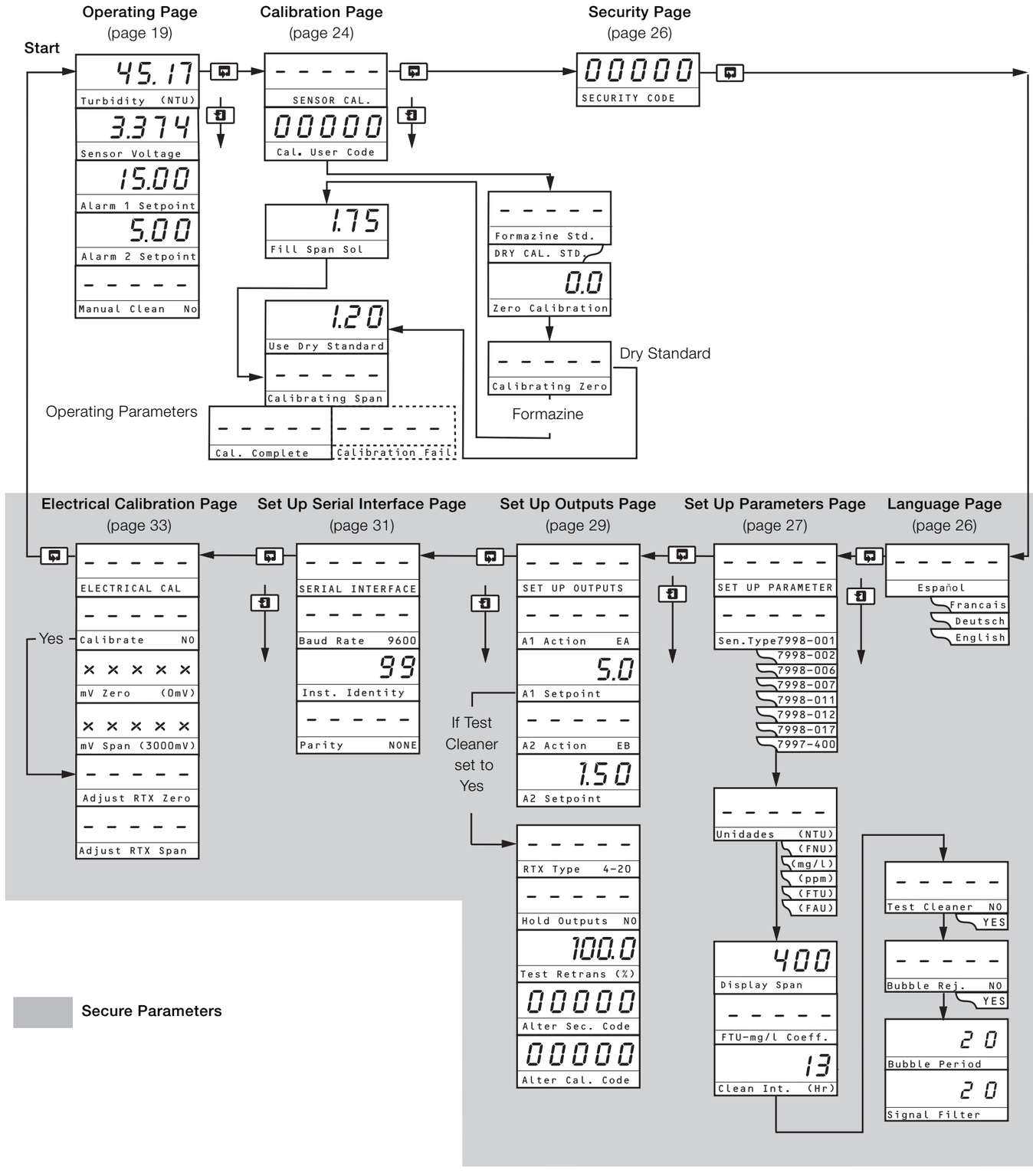
Part Number	Description	Kit Contents
7998025	Emitter unit (EPA white light version)	1 x 7998100
7998027	Receiver unit (EPA white light 0 to 40 NTU)	1 x 7998105
7998028	Receiver unit (EPA white light 0 to 400 NTU)	1 x 7998106
7998024	Feed/drain kit	1 x 7998149, 2 x 0216509, 2 x 0216510
7998026	Emitter unit (ISO infrared LED version)	1 x 7998101
7998029	Receiver unit (infrared LED 0 to 40 NTU)	1 x 7998107
7998030	Receiver unit (infrared LED 0 to 400 NTU)	1 x 7998108
7998037	Replacement ball valves	2 x 0216509
7998038	Replacement hose connectors	2 x 0216510
7998039	Replacement wiper O-ring	2 x 0211346
7998031	O-ring spares kit	1 each of: 0211051, 0211317, 0211346 2 each of: 0211223, 0211314,
7998021	Replacement endcaps	2 x 7998130
7998020	Wiper plug assembly	1 x 7998148
7998190	Cal record card kit	3 x 7998385 – cal record card kit 1 x 0219319 – Vispass bespoke 1 x STT3367 – 250 mm (10 in.) cable tie
7998049	Wiper unit replacement	1 x 7998140 – wiper unit 1 x 7998023 – wiper blade pack

12.5 Software

Part Number	Description	Kit Contents
7998040	7998 Turbidity EPROM (basic)	1 x 46803000 BASIC
7998041	7998 Turbidity EPROM (second retransmission)	1 x 46803001 2ND RETRANS
7998042	7998 Turbidity EPROM (Modbus)	1 x 46803002 MODBUS
7998043	7998 Turbidity EPROM (PROFIBUS)	1 x 46803003 PROFIBUS

12.6 De-bubbler

Item	Description	Part Number
1	O-ring large (3 off)	0211 322
2	O-ring small (2 off)	0211 138
3	Quick-fit connector (2 off)	7997 511


Start
Operating Page
(page 19)
45.17
Turbidity (NTU)
3.374
Sensor Voltage
15.00
Alarm 1 Setpoint
5.00
Alarm 2 Setpoint
- - - - -
Manual Clean No
Calibration Page
(page 24)
- - - - -
SENSOR CAL.
00000
Cal. User Code
Security Page
(page 26)
00000
SECURITY CODE
1.75
Fill Span Sol
1.20
Use Dry Standard
- - - - -
Calibrating Span
- - - - -
Cal. Complete
- - - - -
Calibration Fail
Operating Parameters
- - - - -
Formazine Std.
DRY CAL. STD
0.0
Zero Calibration
- - - - -
Calibrating Zero
Formazine
Dry Standard
Electrical Calibration Page
(page 33)
Set Up Serial Interface Page
(page 31)
Set Up Outputs Page
(page 29)
Set Up Parameters Page
(page 27)
Language Page
(page 26)
ELECTRICAL CAL
Calibrate NO
Yes
mV Zero (0mV)
mV Span (3000mV)
Adjust RTX Zero
Adjust RTX Span
SERIAL INTERFACE
Baud Rate 9600
99
Inst. Identity
Parity NONE
SET UP OUTPUTS
A1 Action EA
5.0
A1 Setpoint
A2 Action EB
1.50
A2 Setpoint
If Test Cleaner set to Yes
RTX Type 4-20
Hold Outputs NO
100.0
Test Retrans (%)
00000
Alter Sec. Code
00000
Alter Cal. Code
SET UP PARAMETER
Sen.Type 7998-001
7998-002
7998-006
7998-007
7998-011
7998-012
7998-017
7997-400
Unidades (NTU)
(FNU)
(mg/l)
(ppm)
(FTU)
(FAU)
400
Display Span
FTU-mg/l Coeff.
13
Clean Int. (Hr)
Español
Francais
Deutsch
English
Test Cleaner NO
YES
Bubble Rej. NO
YES
20
Bubble Period
20
Signal Filter
Secure Parameters

Products and customer support

Automation Systems
For the following industries:
- Chemical & Pharmaceutical
- Food & Beverage
- Manufacturing
- Metals and Minerals
- Oil, Gas & Petrochemical
- Pulp and Paper

Drives and Motors
- AC and DC Drives, AC and DC Machines, AC Motors to 1kV
- Drive Systems
- Force Measurement
- Servo Drives

Controllers & Recorders
- Single and Multi-loop Controllers
- Circular Chart and Strip Chart Recorders
- Paperless Recorders
- Process Indicators

Flexible Automation
- Industrial Robots and Robot Systems

Flow Measurement
- Electromagnetic Flowmeters
- Mass Flowmeters
- Turbine Flowmeters
- Wedge Flow Elements

Marine Systems & Turbochargers
- Electrical Systems
- Marine Equipment
- Offshore Retrofit and Refurbishment

Process Analytics
- Process Gas Analysis
- Systems Integration

Transmitters
- Pressure
- Temperature
- Level
- Interface Modules

Valves, Actuators and Positioners
- Control Valves
- Actuators
- Positioners

Water, Gas & Industrial Analytics Instrumentation
- pH, Conductivity and Dissolved Oxygen Transmitters and Sensors
- Ammonia, Nitrate, Phosphate, Silica, Sodium, Chloride, Fluoride, Dissolved Oxygen and Hydrazine Analyzers
- Zirconia Oxygen Analyzers, Katharometers, Hydrogen Purity and Purge-gas Monitors, Thermal Conductivity

Customer support
We provide a comprehensive after sales service via a Worldwide Service Organization. Contact one of the following offices for details on your nearest Service and Repair Centre.

UK
ABB Limited
Tel: +44 (0)1453 826661
Fax: +44 (0)1453 829671

USA
ABB Inc.
Tel: +1 215 674 6000
Fax: +1 215 674 7183

Client Warranty
Prior to installation, the equipment referred to in this manual must be stored in a clean, dry environment, in accordance with the Company's published specification. Periodic checks must be made on the equipment's condition. In the event of a failure under warranty, the following documentation must be provided as substantiation:
- A listing evidencing process operation and alarm logs at time of failure.
- Copies of all storage, installation, operating and maintenance records relating to the alleged faulty unit.

Contact us

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www.abb.com

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Power and productivity for a better world™

11.3 - A2 – AMTROL PRESSURIZED TANK

INSTALLATION, OPERATION & MAINTENANCE
INSTRUCTIONS D'INSTALLATION, D'OPÉRATION ET DE MAINTENANCE
INSTRUCTIONS INSTRUCCIONES DE INSTALACIÓN, OPERACIÓN Y MANTENIMIENT

1400 Division Road, West Warwick, RI 02893 ▲ T: 401.884.6300 ▲ F: 401.885.2567 ▲ www.amtrol.com

Well-X-Trol® Professional
Pre-pressurized Water System Well Tanks
Réservoirs de puit de système d'eau à pressurisation initiale
Tanques hidroneumáticos prepresurizados para sistemas de agua

WARNING: REVIEW ALL GENERAL SAFETY AND PRODUCT INFORMATION PRIOR TO INSTALLATION.

AVERTISSEMENT : EXAMINER TOUTES LES INFORMATIONS CONCERNANT LA SÉCURITÉ ET LE PRODUIT AVANT SON INSTALLATION.

ADVERTENCIA: ANTES DE INSTALARLO, REPASE LA INFORMACIÓN GENERAL DE SEGURIDAD Y L INFORMACIÓN ACERCA DEL PRODUCTO.

Your WELL-X-TROL® Professional well tank by AMTROL® has been carefully assembled and factory tested. To enjoy the full service your WELL-X-TROL® well tank can provide, you should read and follow all of the instructions in this manual. When all installation steps have been completed, make sure you also follow the enclosed post-installation and start-up checklists before using your AMTROL product. You should also read carefully the sections describing proper product maintenance, and follow the required procedures as you use your WELL-X-TROL®. **Return this booklet to its original envelope, and keep it with the WELL-X-TROL®.** This manual may become out-of-date by later amendments. Check our web site, **www.amtrol.com,** or ask your AMTROL supplier for any updates relating to your product. **This product comes with a limited seven (7) year warranty, see AMTROL Limited Warranty for details.**

Our goal is to ensure you are fully satisfied with your new well tank. If any questions or concerns arise, call Technical Service at 401-535-1216.

Ce réservoir de puits WELL-X-TROL® Professional d'Amtrol a été assemblé et testé à l'usine avec soin. Pour utiliser toute la fonctionnalité que peut offrir le réservoir WELL-X-TROL®, veuillez lire et suivre toutes les instructions de ce manuel. Après avoir effectué toutes les étapes de l'installation, il faut s'assurer de suivre aussi les listes ci-jointes de contrôle après installation et de démarrage avant d'utiliser ce produit AMTROL. Lire aussi avec soin les sections décrivant la maintenance appropriée à ce produit et suivre les procédures requises pour l'utilisation du WELL-X-TROL®. Remettre en place ce livret dans sa pochette d'origine et le conserver avec le WELL-X-TROL®. Ce manuel peut être l'objet de révisions ultérieures. Consulter notre site Internet à www.amtrol.com ou demander au fournisseur AMTROL les mises à jour concernant ce produit.

Notre but est d'assurer une entière satisfaction pour ce nouveau WELL-X-TROL®. Pour toute question ou problème, contacter le Service technique au 401-535-1216.

Su tanque hidroneumático WELL-X-TROL® Professional fabricado por AMTROL ha sido cuidadosamente ensamblado y probado en fábrica. Para que pueda disfrutar por completo el servicio que su tanque hidroneumático WELL-X-TROL® le puede proveer, le recomendamos que lea y siga todas las instrucciones de este manual. Cuando complete todos los pasos de instalación, y antes de usar su producto AMTROL, cerciórese de seguir las listas de verificación posinstalación y de puesta en marcha. Asimismo, le recomendamos que lea cuidadosamente las secciones que describen el mantenimiento apropiado del producto y que, al usar su WELL-X-TROL®, siga los procedimientos requeridos. Vuelva a colocar este folleto en su sobre original y téngalo junto a su WELL-X-TROL®. Este manual puede quedar desactualizado por enmiendas posteriores, por lo que le recomendamos que verifique en nuestro sitio de Web, www.amtrol.com, o que le pregunte a su proveedor de productos AMTROL, si hay alguna actualización para su producto.

Nuestra meta es asegurar su completa satisfacción con su nuevo WELL-X-TROL®. Si tiene alguna pregunta o inquietud, llame al Servicio Técnico al 401-535-1216.

THIS IS THE SAFETY ALERT SYMBOL. IT IS USED TO ALERT YOU TO POTENTIAL PERSONAL INJURY AND OTHER HAZARDS. OBEY ALL SAFETY MESSAGES THAT FOLLOW THIS SYMBOL TO REDUCE THE RISK OF POSSIBLE INJURY AS WELL AS PROPERTY DAMAGE.

VOICI LE SYMBOLE D'ALERTE DE SÉCURITÉ. IL EST UTILISÉ POUR SIGNALER LES RISQUES D'ACCIDENT OU AUTRES DANGERS. IL FAUT RESPECTER TOUS LES MESSAGES DE SÉCURITÉ QUI SUIVENT CE SYMBOLE AFIN DE RÉDUIRE LES RISQUES POTENTIELS DE BLESSURE OU DE DOMMAGE MATÉRIEL.

ESTE ES EL SÍMBOLO DE ALERTA DE SEGURIDAD. SE USA PARA ALERTARLE DE POSIBLES LESIONES Y OTROS PELIGROS. PARA REDUCIR EL RIESGO LESIONES, ASÍ COMO DE DAÑOS MATERIALES, OBEDEZCA TODOS LOS MENSAJES DE SEGURIDAD QUE ACOMPAÑAN A ESTE SÍMBOLO.

1. GENERAL SAFETY INFORMATION

⚠ WARNING **THIS TANK, LIKE MOST TANKS UNDER PRESSURE, WILL OVER TIME CORRODE OR FAIL AND/OR MAY BURST AND/OR LEAK OR FLOOD (AND IN RARE CASES EXPLODE) WHICH CAN CAUSE SERIOUS OR FATAL PERSONAL INJURY AND PROPERTY DAMAGE. TO MINIMIZE RISK, A LICENSED PROFESSIONAL MUST INSTALL AND PERIODICALLY INSPECT AND SERVICE THE UNIT. A DRIP PAN, CONNECTED TO AN ADEQUATE DRAIN MUST BE INSTALLED IF LEAKING OR FLOODING CAN CAUSE PROPERTY DAMAGE.**

⚠ WARNING **READ CAREFULLY THE PRODUCT INSTALLATION, OPERATING AND MAINTENANCE MANUAL. FAILURE TO FOLLOW THE INSTRUCTIONS AND WARNINGS IN THE MANUAL MAY RESULT IN SERIOUS OR FATAL INJURY AND/OR PROPERTY DAMAGE, AND WILL VOID THE PRODUCT WARRANTY. THIS PRODUCT MUST BE INSTALLED BY A QUALIFIED PROFESSIONAL. FOLLOW ALL APPLICABLE LOCAL AND STATE CODES AND REGULATIONS, IN THE ABSENCE OF SUCH CODES, FOLLOW THE CURRENT EDITIONS OF THE NATIONAL PLUMBING CODE AND NATIONAL ELECTRIC CODE, AS APPLICABLE.**

⚠ CAUTION **AS IN ALL PLUMBING PRODUCTS AND WATER STORAGE VESSELS, BACTERIA CAN GROW IN YOUR WELL-X-TROL®, ESPECIALLY DURING TIMES OF NON-USE. CONSULT YOUR LOCAL PLUMBING OFFICIAL REGARDING ANY STEPS YOU MAY WISH TO TAKE TO SAFELY DISINFECT YOUR HOME'S PLUMBING SYSTEM.**

⚠ WARNING **FOLLOW ALL OF THE INSTRUCTIONS AND RECOMMENDATIONS CONTAINED IN THIS MANUAL, AND THE FOLLOWING ADDITIONAL SPECIFIC WARNINGS. FAILURE TO DO SO IS UNSAFE AND CAN CAUSE SERIOUS EXPLOSION, SERIOUS OR FATAL PERSONAL INJURY AND PROPERTY DAMAGE.**

⚠ WARNING **EXPLOSION OR RUPTURE HAZARD. THE WELL-X-TROL MUST BE OPERATED SO THAT THE MAXIMUM SYSTEM PRESSURE DOES NOT EXCEED 150 PSI OR LOCAL CODE REQUIREMENTS WHICHEVER IS LESS.**

⚠ WARNING **A RELIEF VALVE WITH A MAXIMUM RELIEF PRESSURE OF 125 PSI MUST BE INSTALLED IN THE SYSTEM. THE RELIEF VALVE MUST BE CAPABLE OF DISCHARGING THE RATED CAPACITY OF THE PUMP AT THE MAXIMUM SYSTEM PRESSURE.**

⚠ WARNING **FAILURE TO UTILIZE A PROPERLY SIZED WELL-X-TROL (BASED ON THE FOLLOWING SIZING INSTRUCTIONS) WILL RESULT IN EXCESSIVE STRAIN ON THE PUMP AND MAY ULTIMATELY LEAD TO PRODUCT FAILURE, LEAKING OR FLOODING AND PROPERTY DAMAGE.**

⚠ WARNING **DANGER! EXPLOSION HAZARD. IF YOU ADJUST THE PRE-CHARGE PRESSURE OR ADD PRESSURE TO A TANK THAT IS CORRODED OR DAMAGED OR WITH DIMINISHED INTEGRITY THE TANK CAN BURST OR EXPLODE, POSSIBLY CAUSING SERIOUS OR FATAL PERSONAL INJURY AND/OR PROPERTY DAMAGE.**

- **ONLY ADJUST THE PRE-CHARGE AS DESCRIBED IN THIS MANUAL WHEN THE TANK IS NEW OR WHEN THE INTEGRITY OF THE TANK AND LACK OF INTERNAL OR EXTERNAL CORROSION IS CONFIRMED.**
- **ONLY QUALIFIED PROFESSIONALS SHOULD CHECK, ADJUST OR RE-CHARGE THE PRE-CHARGE OF TANKS.**

⚠ WARNING **DANGER! EXPLOSION HAZARD. WHEN THE WELL-X-TROL HAS BEEN IN SERVICE AND A CHANGE TO A HIGHER PRE-CHARGE PRESSURE IS NECESSARY DUE TO A REQUIRED CHANGE IN THE PRESSURE SWITCH SETTING, FAILURE TO FOLLOW INSTRUCTIONS BELOW CAN CAUSE A RUPTURE OR EXPLOSION, POSSIBLY CAUSING SERIOUS OR FATAL PERSONAL INJURY, AND/OR PROPERTY DAMAGE. DO NOT ADJUST OR ADD PRESSURE IF THERE HAS BEEN A LOSS OF AIR. DO NOT ADJUST THE PRE-CHARGE PRESSURE IF THERE IS VISIBLE EXTERIOR CORROSION. DO NOT ADJUST THE PRE-CHARGE PRESSURE IF THERE HAS BEEN A REDUCTION OF THE PUMP CYCLE TIME OR THE PRE-CHARGE PRESSURE COMPARED TO ITS INITIAL SETTING. THIS IS BECAUSE REDUCTION IN PUMP CYCLE TIME CAN RESULT FROM LOSS OF TANK AIR PRESSURE WHICH IN TURN CAN MEAN THERE MAY BE INTERNAL CORROSION AND ANY RE-PRESSURIZATION OR ADDITIONAL PRESSURE COULD RESULT IN RUPTURE OR EXPLOSION.**

⚠ WARNING **CHLORINE & AGGRESSIVE WATER: THE WATER QUALITY CAN SIGNIFICANTLY INFLUENCE THE LIFE OF THIS PRODUCT. YOU SHOULD TEST FOR CORROSIVE ELEMENTS, ACIDITY, TOTAL SOLIDS AND OTHER RELEVANT CONTAMINANTS, INCLUDING CHLORINE AND TREAT YOUR WATER APPROPRIATELY TO INSURE SATISFACTORY PERFORMANCE AND PREVENT PREMATURE FAILURE. FOR YOUR SAFETY, THE INFORMATION IN THIS MANUAL MUST BE FOLLOWED TO MINIMIZE THE RISK OF ELECTRIC SHOCK, PROPERTY DAMAGE OR PERSONAL INJURY. PROPERLY GROUND TO CONFORM WITH ALL GOVERNING CODES AND ORDINANCES.**

⚠ WARNING **INSTALL OR STORE WHERE TANK WILL NOT BE EXPOSED TO TEMPERATURES BELOW FREEZING OR ABOVE 100ºF. WATER FREEZING IN THE SYSTEM WILL BREAK IT. DO NOT ATTEMPT TO TREAT WATER OVER 100°F.**

⚠ WARNING **USE ONLY LEAD-FREE SOLDER AND FLUX FOR ALL SWEAT-SOLDER CONNECTIONS, AS REQUIRED BY STATE AND FEDERAL CODES.**

NOTE: INSPECT FOR SHIPPING DAMAGE AND NOTIFY FREIGHT CARRIER OR STORE WHERE PURCHASED IMMEDIATELY IF DAMAGE IS PRESENT. TO AVOID RISK OF PERSONAL INJURY AND PROPERTY DAMAGE, IF THE PRODUCT APPEARS TO BE MALFUNCTIONING OR SHOWS SIGNS OF CORROSION, CALL A QUALIFIED PROFESSIONAL IMMEDIATELY. CURRENT COPIES OF THE PRODUCT MANUAL CAN BE VIEWED AT WWW.AMTROL.COM. USE PROPER SAFETY EQUIPMENT WHEN INSTALLING.

FAILURE TO FOLLOW THE ABOVE WARNINGS MAY RESULT IN SERIOUS OR FATAL PERSONAL INJURY OR DEATH AND/OR PERSONAL PROPERTY DAMAGE, AND WILL VOID THE WARRANTY.

2. AMTROL INC. LIMITED PRODUCT WARRANTY

Products covered: all Products manufactured by AMTROL Inc. (“AMTROL”).

This warranty cannot be transferred – it is extended only to the original Purchaser or First User of the Product. By accepting and keeping this Product you agree to all of the warranty terms and limitations of liability described below.

IMPORTANT WARNING – READ CAREFULLY THE INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS MANUAL (“MANUAL”) to avoid serious personal injury and/or property damage and to ensure safe use and proper care of this product.

Who Receives AMTROL’s Product Warranty

All purchasers or first users of the new Product. The Warranty is non-transferable.

What is covered by this Warranty

AMTROL warrants to the purchaser or first user of the new Product that at the time of manufacture, the Product is free from defects in material and workmanship. Any warranty claim must be made within one (1) year unless another time period is set forth in the Manual, measured from the time the Product was purchased.

What AMTROL Will Do If You Have a Covered Warranty Claim

In the event of a breach of the foregoing warranty, AMTROL will at its option either make repairs to correct any defect in material or workmanship or supply and ship either new or used replacement parts or products. AMTROL will not accept any claims for labor or other costs.

What This Warranty Does Not Cover — Exclusions and Limitations

This Warranty does not cover any failure or problem unless it was caused by a defect in material or workmanship. In addition, this Warranty shall not apply:

- if the Product is not correctly installed, operated, repaired or maintained as described in the Manual provided with the Product;
- to any failure or malfunction resulting from abuse (including freezing); improper or negligent: handling, shipping (by anyone other than AMTROL), storage, use, operation, accident; or alteration, lightning, flood or any other environmental condition;
- to any failure or problem resulting from the use of the Product for any purpose other than those specified in the accompanying Manual or alteration of any part of the product;
- if the Product is used anywhere except the United States, its territories or possessions, or Canada;
- this Warranty does not cover labor costs, shipping charges, service charges, delivery expenses, administrative fees or any costs incurred in removing or reinstalling the Product;
- this Warranty does not cover any claims submitted to AMTROL or an AMTROL-authorized distributor or retailer more than 30 days after expiration of the applicable warranty time period described in this Warranty;
- this Warranty also does not cover repair or replacement costs not authorized in advance by AMTROL.

Additional Warranty Limitations

ALL IMPLIED WARRANTIES, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE SPECIFICALLY DISCLAIMED.

Limitations of Remedies

THE REMEDIES CONTAINED IN THIS WARRANTY ARE THE PURCHASER’S OR FIRST USER’S EXCLUSIVE REMEDIES. IN NO CIRCUMSTANCES WILL AMTROL BE LIABLE FOR MORE THAN, AND PURCHASER-FIRST USER’S REMEDIES SHALL NOT EXCEED, THE PRICE PAID FOR THE PRODUCT. IN NO CASE SHALL AMTROL BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM NONDELIVERY OR FROM THE USE, MISUSE, OR INABILITY TO USE THE PRODUCT OR FROM DEFECTS IN THE PRODUCT OR FROM AMTROL’S OWN NEGLIGENCE OR OTHER TORT. This exclusion applies regardless of whether such damages are sought for breach of warranty, breach of contract, negligence, strict liability, in tort or under any other legal theory. Such damages include, but are not limited to, inconvenience, loss or damage to property, mold, loss of profits, loss of savings or revenue, loss of use of the Products or any associated equipment, facilities, buildings or services, downtime, and the claims of third parties including customers.

What To Do If You Have a Problem Covered By This Warranty

Any covered Warranty service must be authorized by AMTROL. Contact the person from whom you purchased the Product, who must receive authorization from an AMTROL distributor or AMTROL. If you do not receive a prompt response, call AMTROL directly at 877-517-9673. Notice of a Warranty claim should be submitted by the authorized distributor to AMTROL at the following address:

AMTROL Inc.
Warranty Claim Dept.
1400 Division Rd.
West Warwick, RI 02893

Before AMTROL determines to provide any replacement part or Product, it may as a pre-condition to making such a determination require that the warranty claimant ship the Product, postage prepaid to an authorized AMTROL distributor, or to AMTROL and provide proof of purchase evidenced by the original sales receipt or Product registration.

Replacement Product Warranty

In case of replacement of a Product or any component part, AMTROL reserves the right to make changes in the design, construction, or material of the substitute components or products, which shall be subject to all of the terms and limitations of this Warranty, except that the applicable warranty periods shall be reduced by the amount of time the warranty claimant owned the product prior to submitting notification of the warranty claim.

AMTROL Inc. • 1400 Division Road • W. Warwick, Rhode Island 02893 • Telephone 401-884-6300 • Fax 401-885-2567 Revised 7/03

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3. PRE-INSTALLATION CHECKLIST

IMPORTANT STEPS AND DECISIONS REQUIRED BEFORE INSTALLATION

❑ THIS PRODUCT MUST BE INSTALLED AND MAINTAINED BY A LICENSED PROFESSIONAL. IN ADDITION TO THE INSTRUCTIONS IN THIS MANUAL, FOLLOW ALL APPLICABLE LOCAL AND STATE CODES OR IN THE ABSENCE OF SUCH CODES, THE CURRENT EDITIONS OF THE NATIONAL PLUMBING CODE AND THE NATIONAL ELECTRIC CODE.

❑ DRIP PAN AND DRAIN: To avoid leaking and/or property damage, install with a drip pan connected to an adequate working drain kept clear at all times.

⚠WARNING **MAXIMUM WORKING PRESSURES**

Every WELL-X-TROL is air tested to 150 psig, the maximum working pressure for the WELL-X-TROL line.

Should pressures exceed 150 psig, proper selection and sizing of an A.S.M.E. constructed WELL-X-TROL should be made.

⚠WARNING **RELIEF VALVE REQUIRED**

A relief valve should be installed which is set to open at excessive pressures (125 psig). This will protect the WELL-X-TROL and other system components should the pressure switch malfunction and fail to shut the pump off. The relief valve should be installed at the connection of the WELL-X-TROL to the system piping and have a discharge equal to the pump's capacity at 125 psig.

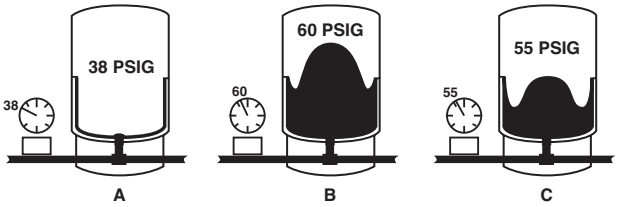
4. HOW YOUR WELL-X-TROL WORKS

OPERATING CHARACTERISTICS

The WELL-X-TROL principle employs a mechanical sealed-in heavy duty diaphragm to allow an air cushion to be pre-pressurized before leaving the factory.

Water is contained in a separate molded rigid polypropylene liner that is supported by the outside steel shell and covered by a diaphragm. This provides a completely non-corrosive water reservoir, eliminating any contact of system water with ferrous metal. The WELL-X-TROL is shipped with its total volume filled with air pressured to a standard precharge. As water enters the WELL-X-TROL, the diaphragm is flexed, compressing the air cushion, reducing its volume by the same volume of water that enters. As the volume of air decreases, the pressure in the WELL-X-TROL increases, so that it always equals the pressure exerted by the water. Since air pressure and water pressure are always equal, the diaphragm is never under any strain. It merely flexes or floats between the water and air. When properly sized, the air cushion in the WELL-X-TROL will be of sufficient volume at minimum pressure (pump cut-in) to allow a desired volume of water to enter the WELL-X-TROL with the subsequent pressure increase within the specified operating pressure range as set by the pressure switch.

NOTE: This is an example. Not all precharge pressure is 38 psi.
Not all system pressures shut pump off at 60 psi



A. Factory installed precharged air cushion. Pump off.

B. When pump starts, water enters the reservoir. At 60 psig, system is filled. Pump shuts off.

C. When water is demanded, pressure in the air chamber forces water into the system. Pump stays off.

5. INSTALLATION INSTRUCTIONS

System Connection

In-line Models WX-101, 102, 103, 105 and 200

In-line models WX-101, 102, 103 are conventionally installed directly in the main water supply line with a 3/4" connection. For model WX-200, a 1" fitting is used.

Vertical Stand Models WX-201 through WX-350

Vertical stand models WX-201 through WX-302 are equipped with an elbow system connection. The WX-201, WX-202, WX-202XL and the WX-203 have a 1" elbow. The WX-205, WX-250, WX-251, WX-255, WX-252, WX-302 and WX-350 have a 1 1/4" elbow.

Location

Proper WELL-X-TROL Location

The WELL-X-TROL should be installed as close as possible to the pressure switch. This will reduce the adverse effects of added friction loss and pressure switch bouncing, and the difference in elevation between WELL-X-TROL and switch.

⚠WARNING DANGER! EXPLOSION HAZARD. WHEN THE WELL-X-TROL HAS BEEN IN SERVICE AND A CHANGE TO A HIGHER PRE-CHARGE PRESSURE IS NECESSARY DUE TO A REQUIRED CHANGE IN THE PRESSURE SWITCH SETTING, FAILURE TO FOLLOW INSTRUCTIONS BELOW CAN CAUSE A RUPTURE OR EXPLOSION, POSSIBLY CAUSING SERIOUS OR FATAL PERSONAL INJURY, AND/OR PROPERTY DAMAGE.

- **DO NOT ADJUST OR ADD PRESSURE IF THERE HAS BEEN A LOSS OF AIR.**
- **DO NOT ADJUST THE PRE-CHARGE PRESSURE IF THERE IS VISIBLE EXTERIOR CORROSION.**
- **DO NOT ADJUST THE PRE-CHARGE PRESSURE IF THERE HAS BEEN A REDUCTION OF THE PUMP CYCLE TIME OR THE PRE-CHARGE PRESSURE COMPARED TO ITS INITIAL SETTING. THIS IS BECAUSE REDUCTION IN PUMP CYCLE TIME CAN RESULT FROM LOSS OF TANK AIR PRESSURE WHICH IN TURN CAN MEAN THERE MAY BE INTERNAL CORROSION AND ANY RE-PRESSURIZATION OR ADDITIONAL PRESSURE COULD RESULT IN RUPTURE OR EXPLOSION.**

Adjusting Precharge

Prior to Installation

Step 1. Remove protective air valve cap

Step 2. Check precharge pressure (pressure should be + or - 10% of the factory setting)

Step 3. Release or add air as necessary to make the precharge pressure 2 psig below the pressure switch pump cut-in setting. (Example, if you have a WX-202XL with a precharge of 38 psig, and you have a pressure switch setting of 30/50 psig, adjust precharge of your WX-202XL from 38 psig to 28 psig.)

Step 4. Replace protective air valve cap. Peel off backing of label and apply over air valve cap.

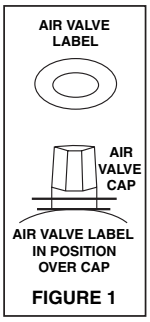


FIGURE 1

⚠WARNING Explosion Hazard. Failure to follow these instructions can cause a rupture or explosion possibly causing serious or fatal injury, flooding, and / or property damage.

System Connection

1. Locate the WELL-X-TROL in the final desired location.

2. Level as necessary.

3. To eliminate friction loss, do not reduce the pipe size from the pump to the WELL-X-TROL.

Start Up

Fine Tuning Procedures

Many times the actual pressure switch will vary from the standard pressure range indicated. These variations could cause a momentary lag of water delivery, as the pressure switch is not "tuned to the WELL-X-TROL precharge pressure".

1. Fill the system and WELL-X-TROL until pump cuts off.

2. Open one or more fixtures to drain the WELL-X-TROL.

3. If there is a momentary pause in the water flow from the time the WELL-X-TROL is emptied and the pump starts, adjust pump cut-in setting clockwise slightly (see figure 2).

4. Close fixtures and refill WELL-X-TROL to pump cut off. Check time to fill.

5. Open fixtures and see if pause in water is eliminated. If not, continue adjusting pressure switch.

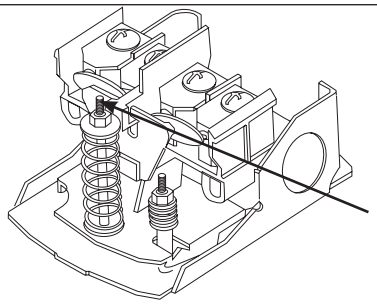


FIGURE 2

Adjusting Precharge After Installation

Step 1. Drain tank of all water. Check precharge pressure in the WELL-X-TROL Tank.

Step 2. Release or add air as necessary to make the recharge pressure 2 psig below the pressure switch pump cut-in setting.

All WELL-X-TROL "Underground Tanks" are designed for direct burial and must be installed in the vertical position **only**. To eliminate danger of freezing, tank should be buried below the frost line.

The following steps should be taken when installing a WELL-X-TROL "Underground Tanks":

1. Make sure that the tank will be buried below the frost line and above the water table.

2. Remove plastic bag and check tank precharge. Factory precharge is 38 psig. Replace air stem cap securely. Follow adjusting precharge procedure.

3. Important: Install tank on firm **rock-free earth**.

4. The Water lines from the pump to the tank and switch location should be the same size to prevent switch cycling.

5. Check the system for performance and inspect for leaks.

6. Important: Backfill hole with sand. Firmly tamp fill to prevent settling. Failure to do so will shorten tank life.

7. Fill out pressure tank location sticker and affix to power panel or other visible surface so tank can be easily located at a later time

1. INFORMATIONS GÉNÉRALES DE SÉCURITÉ

⚠ AVERTISSEMENT **COMME LA PLUPART DES RÉSERVOIRS SOUS PRESSION, CE RÉSERVOIR SE CORRODERA OU SE ROMPRA AU BOUT D'UN CERTAIN TEMPS, ET/OU IL POURRA ÉCLATER ET/OU PRÉSENTER DES FUITES OU CAUSER UNE INONDATION (ET, DANS DES CAS RARES, IL POURRA EXPLOSER), QUI POURRAIT CAUSER DES BLESSURES GRAVES OU LA MORT, AINSI QUE DES DOMMAGES MATÉRIELS. POUR RÉDUIRE LES RISQUES AU MINIMUM, UN SPÉCIALISTE HABILITÉ DOIT INSTALLER ET, PÉRIODIQUEMENT, INSPECTER ET FAIRE L'ENTRETIEN DE L'APPAREIL. UNE CUVE D'ÉGOUTTEMENT RACCORDÉE À UNE ÉVACUATION ADÉQUATE DOIT ÊTRE INSTALLÉE SI LES FUITES OU L'INONDATION PEUVENT CAUSER DES DOMMAGES MATÉRIELS.**

⚠ AVERTISSEMENT **COMME DANS TOUS LES PRODUITS DE TUYAUTERIE ET LES RÉSERVOIRS DE STOCKAGE D'EAU, DES BACTÉRIES PEUVENT SE FORMER DANS LE WELL-X-TROL, SURTOUT QUAND IL N'EST PAS UTILISÉ. CONSULTER UN SPÉCIALISTE LOCAL DE TUYAUTERIE POUR DÉTERMINER LES MESURES À PRENDRE POUR DÉSINFECTER EN TOUTE SÉCURITÉ LE SYSTÈME DE TUYAUTERIE RÉSIDENTIEL.**

⚠ AVERTISSEMENT **SUIVRE TOUTES LES INSTRUCTIONS ET RECOMMANDATIONS CONTENUES DANS CE MANUEL ET LES AVERTISSEMENTS SPÉCIFIQUES ADDITIONNELS CI-DESSOUS. SINON, CELA CRÉERAIT UNE CONDITION D'INSÉCURITÉ QUI POURRAIT CONDUIRE À UNE EXPLOSION SÉRIEUSE, DES BLESSURES GRAVES OU LA MORT, ET DES DOMMAGES MATÉRIELS.**

⚠ AVERTISSEMENT **RISQUE D'EXPLOSION OU DE RUPTURE. UNE SOUPAPE DE DÉTENTE DOIT ÊTRE INSTALLÉE POUR EMPÊCHER LES PRESSIONS SUPÉRIEURES À 8,8 KG/CM^2 (125 PSIG) OU À LA VALEUR MAXIMALE EXIGÉE PAR LE CODE LOCAL (SI INFÉRIEURE).**

⚠ AVERTISSEMENT **RISQUE D'EXPLOSION OU DE RUPTURE. LE WELL-X-TROL DOIT ÊTRE UTILISÉ DE FAÇON QUE LA PRESSION NE DÉPASSE PAS 125 PSIG.**

⚠ AVERTISSEMENT **SI UN WELL-X-TROL DIMENSIONNÉ CORRECTEMENT (EN FONCTION DES INSTRUCTIONS DE DIMENSIONNEMENT CI-DESSOUS) N'EST PAS UTILISÉ, LA POMPE SERA SOUMISE À UNE CHARGE EXCESSIVE, CE QUI POURRAIT FINALEMENT CONDUIRE À LA DÉFAILLANCE, AUX FUITES OU À L'INONDATION DU PRODUIT ET À DES DOMMAGES MATÉRIELS.**

⚠ AVERTISSEMENT **DANGER ! RISQUE D'EXPLOSION. SI ON AJUSTE LA PRESSION DE PRÉCHARGE OU ON AUGMENTE LA PRESSION D'UN RÉSERVOIR CORRODÉ OU ENDOMMAGÉ OU DONT L'INTÉGRITÉ EST RÉDUITE, LE RÉSERVOIR PEUT ÉCLATER OU EXPLOSER, CE QUI POURRAIT CAUSER DES BLESSURES GRAVES OU MORTELLES ET/OU DES DOMMAGES MATÉRIELS.**
• AJUSTER SEULEMENT LA PRESSION DE CHARGE INITIALE COMME INDIQUÉ DANS CE MANUEL LORSQUE LE RÉSERVOIR EST NEUF OU LORSQUE SON INTÉGRITÉ ET L'ABSENCE DE CORROSION INTERNE OU EXTERNE ONT ÉTÉ CONFIRMÉES.
• SEULS LES PROFESSIONNELS QUALIFIÉS PEUVENT VÉRIFIER, AJUSTER OU RECHARGER LA PRÉCHARGE DES RÉSERVOIRS.

⚠ AVERTISSEMENT **DANGER ! RISQUE D'EXPLOSION. LORSQUE LE WELL-X-TROL A ÉTÉ EN SERVICE PENDANT UN CERTAIN TEMPS ET LA PRESSION DE CHARGE INITIALE DOIT ÊTRE AUGMENTÉE À CAUSE D'UN CHANGEMENT NÉCESSAIRE DU RÉGLAGE DU PRESSOSTAT, SI LES INSTRUCTIONS CI-DESSOUS NE SONT PAS SUIVIES, CELA PEUT CAUSER UNE RUPTURE OU UNE EXPLOSION, ET POURRAIT ENTRAÎNER DES BLESSURES GRAVES OU MORTELLES ET/OU DES DOMMAGES MATÉRIELS.**
• NE PAS AJUSTER NI AUGMENTER LA PRESSION SI DE L'AIR S'EST ÉCHAPPÉ.
• NE PAS AJUSTER LA PRESSION DE CHARGE INITIALE S'IL EXISTE DES SIGNES DE CORROSION À L'EXTÉRIEUR.
• NE PAS AJUSTER LA PRESSION DE CHARGE INITIALE EN CAS DE RÉDUCTION DU TEMPS DE CYCLE DE LA POMPE OU DE LA PRESSION DE CHARGE INITIALE PAR RAPPORT À SA VALEUR D'ORIGINE. EN EFFET, LA RÉDUCTION DU TEMPS DE CYCLE DE LA POMPE PEUT ÊTRE DUE À LA PERTE DE PRESSION D'AIR DANS LE RÉSERVOIR, LAQUELLE PEUT ÊTRE CAUSÉE PAR LA CORROSION INTERNE, ET DANS CE CAS LA REMISE SOUS PRESSION OU L'AUGMENTATION DE LA PRESSION POURRAIT CONDUIRE À UNE RUPTURE OU À UNE EXPLOSION.

⚠ AVERTISSEMENT **LA QUALITÉ DE L'EAU PEUT AFFECTER CONSIDÉRABLEMENT LA DURÉE DE SERVICE DU PRODUIT. IL FAUT TESTER L'EAU POUR DÉCELER LES ÉLÉMENTS CORRODANTS ÉVENTUELS, MESURER SON ACIDITÉ, LA CONCENTRATION TOTALE DES SOLIDES ET AUTRES CONTAMINANTS APPROPRIÉS, Y COMPRIS LE CHLORE, ET LA TRAITER D'UNE FAÇON ADÉQUATE POUR ASSURER UNE BONNE PERFORMANCE ET EMPÊCHER LES PANNES PRÉMATURÉES.**

⚠ AVERTISSEMENT **INSTALLER OU STOCKER DANS UN ENDROIT OÙ LE RÉSERVOIR NE SERA PAS EXPOSÉ AUX TEMPÉRATURES INFÉRIEURES À LA TEMPÉRATURE DE CONGÉLATION OU SUPÉRIEURES À 37,8°C (100°F), NE PAS EXPOSER AUX INTEMPÉRIES DE TOUTE NATURE. SI L'EAU GÈLE DANS LE SYSTÈME, CE DERNIER TOMBERA EN PANNE. NE PAS ESSAYER DE TRAITER L'EAU À UNE TEMPÉRATURE SUPÉRIEURE À 37,8°C (100°F).**

⚠ AVERTISSEMENT **UTILISER UNIQUEMENT DE LA SOUDURE ET UN FLUX SANS PLOMB POUR TOUTES LES CONNEXIONS DE SOUDURE PAR RESSUAGE, COMME REQUIS PAR LES CODES RÉGIONAUX ET NATIONAUX.**

REMARQUE : INSPECTER POUR DÉCELER LES DOMMAGES ÉVENTUELS D'EXPÉDITION ET AVISER LE TRANSPORTEUR OU LE MAGASIN DE VENTE IMMÉDIATEMENT SI DES DOMMAGES EXISTENT.

REMARQUE : VEUILLEZ LIRE DANS LEUR ENTIER LE MANUEL DU PROPRIÉTAIRE ET LES INSTRUCTIONS D'INSTALLATION AVANT D'INSTALLER CE NOUVEAU PRODUIT AMTROL. SAUVEGARDER TOUS LES DOCUMENTS ET MANUELS POUR QU'ILS SERVENT DE RÉFÉRENCE ULTÉRIEURE.

REMARQUE : UTILISER UN ÉQUIPEMENT DE SÉCURITÉ APPROPRIÉ POUR L'INSTALLATION.

REMARQUE : IL FAUT RESPECTER TOUS LES CODES DE PLOMBERIE.

REMARQUE : SI LES AVERTISSEMENTS CI-DESSUS NE SONT PAS RESPECTÉS, CELA PEUT CONDUIRE À DES BLESSURES SÉRIEUSES OU MORTELLES ET/OU DES DOMMAGES MATÉRIELS, ET CAUSERA L'ANNULATION DE LA GARANTIE.

SI LES AVERTISSEMENTS CI-DESSUS NE SONT PAS RESPECTÉS, CELA POURRA CONDUIRE À DES BLESSURES GRAVES OU LA MORT ET/OU DES DOMMAGES MATÉRIELS, ET ANNULERA LA GARANTIE

2. GARANTIE LIMITÉE DE PRODUIT AMTROL

Produits couverts : tous les produits fabriqués par AMTROL Inc. (“AMTROL”).

Cette garantie ne peut pas être cédée – elle est offerte uniquement à l’Acheteur initial ou au Premier Utilisateur du Produit. En acceptant et en conservant ce Produit, vous convenez de toutes les dispositions et limitations de responsabilité de la garantie décrites ci-dessous.

AVERTISSEMENT IMPORTANT – LIRE AVEC SOIN LE MANUEL D’INSTRUCTIONS D’INSTALLATION, FONCTIONNEMENT ET MAINTENANCE (le “MANUEL”) pour éviter les blessures graves et/ou les dommages matériels et pour s’assurer de la sécurité d’utilisation et du bon entretien de ce produit.

Qui reçoit la garantie de produit d’AMTROL

Tous les acheteurs ou les premiers utilisateurs du Produit neuf. La garantie n’est pas cessible.

Qu’est-ce qui est couvert par cette Garantie

AMTROL® garantit à l’acheteur ou au premier utilisateur du Produit neuf que, au moment de sa fabrication, le Produit était dépourvu de vice de matériau ou de fabrication. Toute réclamation de garantie doit être déposée dans un délai d’un (1) an après la date d’achat du Produit, sauf si d’autres délais sont précisés dans le Manuel.

Ce que fera AMTROL en cas de réclamation couverte par la garantie

En cas de violation de la garantie ci-dessus, AMTROL choisira soit d’effectuer des réparations afin de corriger tout vice de matériau ou de fabrication soit de fournir et d’expédier des pièces ou des produits de rechange, neufs ou non. AMTROL n’acceptera pas de réclamation pour les dépenses de main d’œuvre ou autres.

Ce que cette Garantie ne couvre pas - Exclusions et Limitations

Cette Garantie ne couvre pas les défaillances ou les problèmes qui n’ont pas été causés par un vice de matériau ou de fabrication. En outre, cette Garantie n’est pas applicable :

- Si le Produit n’a pas été correctement installé, utilisé, réparé ou maintenu comme indiqué dans le Manuel fourni avec le Produit ;
- À toute panne ou défaillance causée par un abus (y compris le gel) ; une manutention, expédition (par un tiers autre que Amtrol), stockage, utilisation, opération, accident inappropriés ou négligents; ou une altération, la foudre, l’inondation ou toute autre condition environnementale;
- À toute panne ou problème causé par l’utilisation du Produit pour toute raison autre que celles spécifiées dans le Manuel joint ou par l’altération d’une partie quelconque du produit ;
- Si le Produit est utilisé dans tout endroit autre qu’aux États-Unis, ses territoires ou possessions, ou au Canada ;
- Cette Garantie ne couvre pas les coûts de main d’œuvre, les frais d’expédition, les commissions, les frais de livraison, les frais administratifs ou toute autre dépense subie pour reprendre ou réinstaller le Produit ;
- Cette Garantie ne couvre aucune réclamation déposée auprès de Amtrol ou d’un concessionnaire ou détaillant autorisé de Amtrol plus de 30 jours après l’expiration de la période applicable de garantie décrite dans cette Garantie ;
- Cette Garantie ne couvre pas non plus les frais de réparation ou de remplacement qui n’ont pas été autorisés au préalable par AMTROL.

Limitations de garantie supplémentaires

TOUTES LES GARANTIES TACITES, INCLUANT LES GARANTIES TACITES DE QUALITÉ MARCHANDE ET D’APTITUDE À UN USAGE PARTICULIER, SONT SPÉCIFIQUEMENT REJETÉES.

Limitations des remèdes

LES REMEDES CONTÈNUS DANS CETTE GARANTIE REPRESENTENT LES REMEDES EXCLUSIFS DE L’ACHETEUR OU DU PREMIER UTILISATEUR. AMTROL NE SAURAIT EN AUCUN CAS ETRE RESPONSABLE POUR UNE SOMME SUPERIEURE AU PRIX D’ACHAT DU PRODUIT, ET LES REMEDES DE L’ACHETEUR/PREMIER UTILISATEUR NE DEPASSERONT PAS CE PRIX. AMTROL NE SERA EN AUCUN CAS TENU RESPONSABLE POUR TOUS DOMMAGES-INTERETS SPECIAUX, INDIRECTS, FORTUITS OU ACCESSOIRES, QU’ILS RESULTENT OU NON DE LA NON-LIVRAISON OU DE LA NON-UTILISATION, LA MAUVAISE UTILISATION OU L’IMPOSSIBILITE D’UTILISATION DU PRODUIT, OU DE DEFAUTS DU PRODUIT OU DE LA NEGLIGENCE OU AUTRE FAUTE DE AMTROL. Cette exclusion est applicable, que les dommages-intérêts soient ou non demandés pour violation de garantie, rupture de contrat, négligence, responsabilité stricte, dans le cadre d’un délit civil ou selon toute autre théorie juridique. Ces dommages-intérêts incluent, sans pour autant que cette énumération soit limitative, l’incommodité, les pertes ou les dommages matériels, les moisissures, les pertes de bénéfice, les pertes d’argent économisé ou les pertes de chiffre d’affaires, les pertes d’utilisation des Produits ou de tout équipement, installation, immeuble ou service associé, les temps morts et les réclamations de tiers, incluant les clients.

Que faut-il faire en cas de problème couvert par cette Garantie

Toute réparation couverte par la Garantie doit être autorisée par AMTROL. Contacter la personne auprès de laquelle le Produit a été acheté, et qui doit recevoir l’autorisation d’un concessionnaire AMTROL ou l’autorisation de AMTROL. Si la réponse se fait attendre, contacter AMTROL directement au numéro 877-517-9673. La notification de réclamation de garantie doit être soumise par le concessionnaire autorisé de AMTROL à l’adresse ci-dessous:

AMTROL Inc.
Warranty Claim Dept.
1400 Division Rd.
West Warwick, RI 02893 USA

Avant que AMTROL ne décide de fournir une pièce ou un Produit de rechange, il peut exiger, en tant que condition préalable à cette prise de décision, que le demandeur de garantie envoie le Produit en port payé chez un concessionnaire AMTROL autorisé ou chez AMTROL et fournisse un justificatif d’achat sous forme du récépissé de vente d’origine ou de l’enregistrement du Produit.

Garantie du Produit de rechange

En cas de remplacement d’un Produit ou de toute autre pièce, AMTROL se réserve le droit d’apporter des modifications à la conception, la construction ou les matériaux des pièces ou des produits de substitution, lesquels seront soumis à toutes les dispositions et limitations de cette Garantie, sauf que les périodes de garantie applicables seront réduites par la période au cours de laquelle le demandeur de garantie avait possédé le produit avant de soumettre la notification de réclamation de garantie.

Le symbole AMTROL, AMTROL, Well-X-Trol, Champion, Wel-Flo, Ex-trol, Fill-Trol, Therm-X-Trol et Boilermate sont des marques déposées de AMTROL Inc.

Revised 7/03

3. LISTE DE CONTRÔLE AVANT L'INSTALLATION

ÉTAPES ET DÉCISIONS IMPORTANTES ET NÉCESSAIRES AVANT L'INSTALLATION

❑ CE PRODUIT DOIT ÊTRE INSTALLÉ ET MAINTENU PAR UN SPÉCIALISTE HABILITÉ. EN PLUS DES INSTRUCTIONS DE CE MANUEL, SUIVRE TOUS LES CODES LOCAUX ET RÉGIONAUX APPLICABLES OU, DANS LEUR ABSENCE, LES DERNIÈRES VERSIONS DU CODE NATIONAL DE LA TUYAUTERIE ET DU CODE NATIONAL DE L'ÉLECTRICITÉ

❑ BAC D'ÉGOUTTEMENT ET ÉVACUATION: Pour éviter les fuites et/ou les dommages matériels, installer avec un bac d'égouttement connecté à un drain en bon état de marche et débouché en permanence.

⚠ AVERTISSEMENT **PRESSIONS MAXIMALES DE MARCHE**
Chaque WELL-X-TROL est testé à 150 psig, la pression de marche maximale de la conduite WELL-X-TROL. Si la pression doit dépasser 150 psig, il faut sélectionner et dimensionner avec soin un WELL-X-TROL dont la construction est conforme à A.S.M.E.

⚠ AVERTISSEMENT **SOUPAPE DE DÉTENTE NÉCESSAIRE**
Une soupape de détente doit être installée et réglée pour s'ouvrir aux pressions excessives (125 psig et plus). Cela protègera le WELL-X-TROL et les autres composants du système au cas où le pressostat ne fonctionnerait pas correctement et n'arrêterait pas la pompe. La soupape de détente doit être installée au niveau du raccordement du WELL-X-TROL à la tuyauterie du système, et doit avoir une pression de refoulement égale à la capacité de la pompe, soit 125 psig.

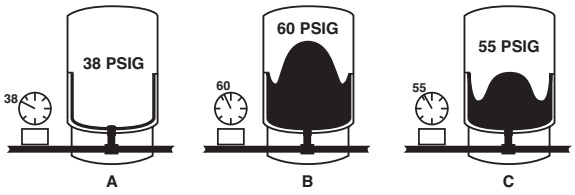
4. FONCTIONNEMENT DU WELL-X-TROL

CARACTÉRISTIQUES OPÉRATIONNELLES

Le principe du réservoir de puits est d'utiliser un diaphragme mécanique scellé renforcé permettant d'assurer la pressurisation initiale d'un coussin d'air avant l'expédition de l'usine.

L'eau est contenue dans un récipient indépendant en polypropylène rigide moulé, soutenu par la coque extérieure en acier et recouvert par un diaphragme. Le tout forme un réservoir d'eau sans corrosion, en éliminant tout contact entre l'eau du système et les métaux ferreux. Pour l'expédition, le WELL-X-TROL est complètement rempli d'air à une pression typique de charge initiale. À mesure que l'eau pénètre dans le WELL-X-TROL, le diaphragme se courbe, en comprimant le coussin d'air, ce qui réduit son volume d'une quantité égale au volume d'eau qui est entré. À mesure que le volume d'air diminue, la pression du WELL- X-TROL augmente, de façon à être toujours égale à la pression exercée par l'eau. Étant donné que la pression d'air et la pression d'eau restent toujours égales, le diaphragme n'est jamais soumis à une charge. Il se courbe ou flotte simplement entre l'eau et l'air. S'il a une taille appropriée, le coussin d'air dans le WELL-X-TROL aura un volume suffisant à la pression minimum (pression d'activation de la pompe) pour laisser le volume d'eau désiré entrer dans le WELL-X-TROL, et pour permettre d'augmenter la pression dans la plage spécifiée des pressions opérationnelles, telle que définie par le pressostat.

REMARQUE : Ceci est un exemple. La pression de charge initiale n'est pas toujours de 38 psi. La pression du système arrête pas toujours la pompe à 60 psi



A. Coussin d'air à charge initiale, installé à l'usine. Pompe arrêtée.

B. Lorsque la pompe démarre, l'eau pénètre dans le réservoir.À 60 psig, le système est rempli. La pompe s'arrête.

C. Sur demande d'eau, la pression dans la chambre à air

5. INSTRUCTIONS D'INSTALLATION

Raccordement du système

Modèles en ligne WX-101, 102, 103, 105 et 200

Les modèles en ligne WX-101, 102 et 103 sont traditionnellement installés directement dans la conduite principale d'alimentation d'eau avec une connexion de 3/4 pouce. Pour le modèle WX-200, un raccord de 1 pouce est utilisé.

Modèles à support vertical WX-201 à WX-350

Les modèles à support vertical WX-201 à WX-302 sont équipés d'une connexion de système coudée. Les WX-201, WX-202, WX-202XL et WX-203 ont un coude de 1 pouce. Les WX-205, WX-250,WX-251, WX-255, WX-252, WX-302 et 350 ont un coude de 1 1/4 pouces.

Emplacement

Emplacement approprié du WELL-X-TROL

Le WELL-X-TROL doit être installé aussi près que possible du pressostat. Cela réduit les effets nuisibles des pertes dues à l'augmentation des frottements, des mouvements du pressostat et de la différence de hauteur entre le WELL-X-TROL et le pressostat.

⚠ AVERTISSEMENT **DANGER! RISQUE D'EXPLOSION. LORSQUE LE WELL-X-TROL A ÉTÉ EN SERVICE PENDANT UN CERTAIN TEMPS ET LA PRESSION DE CHARGE INITIALE DOIT ÊTRE AUGMENTÉE À CAUSE D'UN CHANGEMENT NÉCESSAIRE DU RÉGLAGE DU PRESSOSTAT, LE NON-RESPECT DES INSTRUCTIONS CI-DESSOUS PEUT CAUSER UNE RUPTURE OU UNE EXPLOSION, RISQUE DE BLESSURES GRAVES OU MORTELLES.**

- **NE PAS AJUSTER NI AUGMENTER LA PRESSION SI DE L'AIR S'EST ÉCHAPPÉ.**
- **NE PAS AJUSTER LA PRESSION DE CHARGE INITIALE S'IL EXISTE DES SIGNES DE CORROSION À L'EXTÉRIEUR.**
- **NE PAS AJUSTER LA PRESSION DE CHARGE INITIALE EN CAS DE RÉDUCTION DU TEMPS DE CYCLE DE LA POMPE OU DE LA PRESSION DE CHARGE INITIALE PAR RAPPORT À SA VALEUR D'ORIGINE. EN EFFET, LA RÉDUCTION DU TEMPS DE CYCLE DE LA POMPE PEUT ÊTRE DUE À LA PERTE DE PRESSION D'AIR DANS LE RÉSERVOIR, LAQUELLE PEUT ÊTRE CAUSÉE PAR LA CORROSION INTERNE, ET DANS CE CAS LA REMISE SOUS PRESSION OU L'AUGMENTATION DE LA PRESSION POURRAIT CONDUIRE À UNE RUPTURE OU À UNE EXPLOSION.**

Ajustement de la charge initiale

Avant l'installation

Étape 1. Retirer le capuchon de protection de la soupape à air

Étape 2. Vérifier la pression de charge initiale (elle devrait être égale au réglage d'usine avec une tolérance de + ou - 10%)

Étape 3. Retirer ou ajouter de l'air selon les besoins pour amener la pression de charge initiale à 2 psig au-dessous de la pression d'activation de pompe du pressostat. Exemple : pour un WX-202XL avec une charge initiale de 38 psig et un réglage de pressostat de 30/50 psig, abaisser la charge initiale du WX-202XL de 38 psig à 28 psig.

Étape 4. Remettre en place le capuchon de protection de la soupape à air. Retirer le dos de l'étiquette et la placer sur le capuchon de la soupape à air.

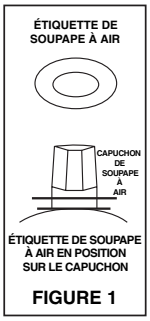


FIGURE 1

⚠ AVERTISSEMENT **Risque d'explosion. Si ces instructions ne sont pas suivies, cela peut causer une rupture ou une explosion pouvant conduire à des blessures graves ou la mort, l'inondation et/ou les dommages matériels.**

Raccordement du système

1. Placer le WELL-X-TROL dans son emplacement définitif.

2. Mettre l'appareil de niveau selon les besoins.

3. Pour éliminer les pertes de friction, ne pas réduire la taille du tuyau entre la pompe et le WELL-X-TROL.

Démarrage

Procédures de réglage fin

Souvent, la pression réelle du pressostat ne sera pas dans la plage de pression nominale indiquée. Ces variations pourraient causer un retard momentané de la livraison d'eau, car le pressostat n'est pas "accordé à la pression de charge initiale du WELL-X-TROL".

1. Remplir le système et le WELL-X-TROL jusqu'à ce que la pompe s'arrête.

2. Ouvrir un ou plusieurs robinets pour vider le WELL-X-TROL.

3. Si le débit d'eau subit une interruption momentanée après que le WELL-X-TROL ait été vidé et la pompe ait démarré, ajuster le réglage d'activation de la pompe légèrement dans le sens horaire (voir la figure 2).

4. Fermer les robinets et remplir à nouveau le WELL-X-TROL jusqu'à l'arrêt de la pompe. Vérifier le temps nécessaire au remplissage.

5. Ouvrir les robinets et déterminer si l'interruption de l'alimentation d'eau a été éliminée. Sinon, continuer à ajuster le pressostat.

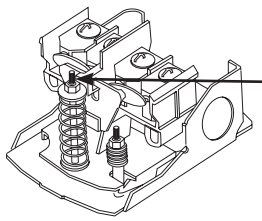


FIGURE 2

Réglage de la pression dans le sens horaire pour augmenter la pression d'arrêt, dans le sens antihoraire pour diminuer la pression d'arrêt

Réglage de la charge initiale après l'installation

Étape 1. Vider complètement le réservoir. Vérifier la pression de charge initiale dans le réservoir WELL-X-TROL.

Étape 2. Retirer ou ajouter de l'air selon les besoins pour amener la pression de charge initiale à 2 psig au-dessous de la pression d'activation de pompe du pressostat.

Tous les "réservoirs souterrains" WELL-X-TROL sont conçus pour être enterrés et doivent être installés **uniquement** en position verticale. Pour éliminer les risques de gel, le réservoir doit être enterré en dessous de la profondeur limite du gel.

Les étapes suivantes doivent être exécutées pour installer des "réservoirs souterrains" WELL-X-TROL:

1. S'assurer que le réservoir va être enterré en dessous de la profondeur limite de gel et au-dessus de la nappe phréatique.

2. Retirer le sac en plastique et vérifier la charge initiale du réservoir. La charge initiale d'usine est de 38 psig. Remettre en place avec soin le capuchon de la valve d'air. Suivre la procédure de réglage de la charge initiale.

3. Important: Installer le réservoir sur la **terre ferme**, sans pierre.

4. Les conduites d'eau entre la pompe et les emplacements du réservoir et du pressostat doivent avoir la même taille pour éviter les cycles du pressostat

5. Vérifier la performance du système et faire une inspection pour déceler les fuites éventuelles.

6. Important: Remblayer le trou avec du sable. Bien damer le remblai pour empêcher les tassements. Sinon, cela réduira la durée de service du réservoir.

7. Remplir l'autocollant d'emplacement du réservoir pressurisé et le placer sur le panneau d'alimentation ou une autre surface visible de façon à pouvoir facilement localiser le réservoir à une date ultérieure.

1. INFORMACIÓN GENERAL DE SEGURIDAD

⚠ ADVERTENCIA ESTE TANQUE, TAL COMO SUCEDE CON LA MAYORÍA DE LOS TANQUES BAJO PRESIÓN, CON EL CORRER DEL TIEMPO SE VA A CORROER Y/O PODRÍA ESTALLAR Y/O TENER FUGAS O INUNDARSE (Y EN CASOS RAROS, EXPLOTAR), LO CUAL PUEDE CAUSAR LESIONES PERSONALES GRAVES O FATALES Y DAÑOS MATERIALES. PARA REDUCIR ESTE RIESGO, LA UNIDAD DEBE SER INSTALADA E INSPECCIONADA Y RECIBIR MANTENIMIENTO PERIÓDICO DE UN INSTALADOR PROFESIONAL CERTIFICADO. SI EXISTE LA POSIBILIDAD DE QUE UNA PÉRDIDA O INUNDACIÓN PUEDA CAUSAR DAÑOS MATERIALES, SE DEBE INSTALAR UNA BANDEJA RECOLECTORA DE FUGAS, CONECTADA A UN DRENAJE ADECUADO.

⚠ PRECAUCIÓN TAL COMO SUCEDE CON TODOS LOS PRODUCTOS DE INSTALACIONES SANITARIAS Y RECIPIENTES DE ALMACENAMIENTO DE AGUA, PUEDEN DESARROLLARSE BACTERIAS EN SU WELL-X-TROL, ESPECIALMENTE DURANTE PERÍODOS DE NO FUNCIONAMIENTO. CONSULTE CON SU FUNCIONARIO DE INSTALACIONES SANITARIAS LOCAL SOBRE LOS PASOS QUE DEBE SEGUIR PARA DESINFECTAR CON SEGURIDAD EL SISTEMA DE INSTALACIONES SANITARIAS DE SU CASA.

⚠ ADVERTENCIA SIGA TODAS LAS INSTRUCCIONES Y RECOMENDACIONES QUE HAY EN ESTE MANUAL, ASÍ COMO LAS SIGUIENTES ADVERTENCIAS ESPECÍFICAS. EL NO HACERLO ES INSEGURO Y PUEDE CAUSAR UNA EXPLOSIÓN GRAVE, LESIONES PERSONALES GRAVES O FATALES Y DAÑOS MATERIALES.

⚠ ADVERTENCIA PELIGRO DE EXPLOSIÓN O RUPTURA. SE DEBE INSTALAR UNA VÁLVULA DE ALIVIO CON EL FIN DE EVITAR QUE HAYA UNA PRESIÓN MAYOR QUE 125 LPPC (LIBRAS POR PULGADA CUADRADA, U 8.75 KG/CM^2), O LO QUE INDIQUE EL REGLAMENTO LOCAL, LO QUE SEA MENOR.

⚠ ADVERTENCIA PELIGRO DE EXPLOSIÓN O RUPTURA. EL WELL-X-TROL SE DEBE OPERAR DE MANERA TAL QUE NO SE EXCEDA UNA PRESIÓN MANOMÉTRICA DE 125 LPPC (8.75 Kg/cm^2).

⚠ ADVERTENCIA LA UTILIZACIÓN DE UN WELL-X-TROL QUE NO SEA DE LA DIMENSIÓN ADECUADA (CON BASE EN LAS SIGUIENTES INSTRUCCIONES DE DIMENSIONAMIENTO) PUEDE PRODUCIR ESFUERZOS EXCESIVOS EN LA BOMBA, QUE A SU VEZ PUEDEN CAUSAR FALLAS DEL PRODUCTO, PÉRDIDAS E INUNDACIÓN, Y DAÑOS MATERIALES.

⚠ ADVERTENCIA ¡PELIGRO! RIESGO DE EXPLOSIÓN. SI USTED AJUSTA LA PRESIÓN DE PRECARGA O AUMENTA LA PRESIÓN DE UN TANQUE QUE ESTÁ CORROÍDO O DAÑADO, O CUYA INTEGRIDAD HA SIDO COMPROMETIDA, DICHO TANQUE PODRÍA REVENTARSE O EXPLOTAR, EXISTIENDO LA POSIBILIDAD DE QUE ESTO PROVOQUE LESIONES GRAVES O FATALES Y DAÑOS MATERIALES.

- SÓLO AJUSTE LA PRECARGA COMO SE DESCRIBE EN ESTE MANUAL CUANDO EL TANQUE SEA NUEVO O CUANDO SE CONFIRME SU INTEGRIDAD Y QUE NO TENGA PÉRDIDAS INTERNAS O EXTERNAS.
- LA PRECARGA DE LOS TANQUES SÓLO DEBE SER REVISADA, AJUSTADA Y RECARGADA POR UN PROFESIONAL CALIFICADO.

⚠ ADVERTENCIA ¡PELIGRO! RIESGO DE EXPLOSIÓN. SI DESPUÉS DE QUE EL WELL-X-TROL HA ESTADO EN SERVICIO, ES NECESARIO SUBIR SU PRESIÓN DEBIDO A UN CAMBIO REQUERIDO EN EL AJUSTE DEL INTERRUPTOR DE PRESIÓN, DE NO SEGUIRSE LAS INSTRUCCIONES A CONTINUACIÓN, PODRÍA OCURRIR UNA RUPTURA O EXPLOSIÓN, CON LA POSIBILIDAD DE QUE OCURRAN LESIONES GRAVES O FATALES Y DAÑOS MATERIALES.

- NO AJUSTE O AUMENTE LA PRESIÓN SI HA HABIDO PÉRDIDA DE AIRE.
- NO AJUSTE LA PRESIÓN DE PRECARGA SI SE OBSERVA CORROSIÓN EN EL EXTERIOR.
- NO AJUSTE LA PRESIÓN DE PRECARGA SI HUBO ALGUNA REDUCCIÓN EN EL CICLO DE OPERACIÓN DE LA BOMBA O EN LA PRESIÓN DE PRECARGA, COMPARADA CON SU VALOR INICIAL. ESTO SE DEBE A QUE LA REDUCCIÓN DEL CICLO DE OPERACIÓN DE LA BOMBA PUEDE SER CAUSADA POR UNA PÉRDIDA DE PRESIÓN DE AIRE DEL TANQUE, LO QUE A SU VEZ, PUEDE SER UN SÍNTOMA DE CORROSIÓN INTERNA, POR LO QUE CUALQUIER REPRESURIZACIÓN O PRESIÓN ADICIONAL PODRÍA PRODUCIR UNA RUPTURA O EXPLOSIÓN.

⚠ ADVERTENCIA LA CALIDAD DEL AGUA PUEDE AFECTAR DE MANERA SIGNIFICATIVA LA VIDA DE SU PRODUCTO. USTED DEBE PROBARLA PARA DETECTAR EN ELLA ELEMENTOS CORROSIVOS, ACIDEZ, SÓLIDOS TOTALES Y OTROS CONTAMINANTES DE CONSIDERACIÓN, INCLUYENDO CLORO, Y TRATAR EL AGUA DE MANERA APROPIADA, A FIN DE ASEGURAR UN DESEMPEÑO SATISFACTORIO Y DE PREVENIR FALLAS PREMATURAS.

⚠ ADVERTENCIA INSTALE O ALMACENE EL TANQUE EN UN LUGAR EN EL QUE NO ESTÉ EXPUESTO A TEMPERATURAS BAJO CERO O MAYORES QUE 100°F (38°C); NO SE EXPONGA A NINGÚN TIPO DE CLIMA EN EXTERIORES. EL CONGELAMIENTO DEL AGUA EN EL SISTEMA LO ROMPERÁ. NO TRATE AGUA A MÁS DE 100°F (38°C).

⚠ ADVERTENCIA SÓLO USE SOLDADURA Y FUNDENTE SIN PLOMO EN LAS CONEXIONES SOLDADAS, TAL COMO LO REQUIEREN LOS REGLAMENTOS ESTATALES Y FEDERALES.

NOTA: REVISE SI EL PRODUCTO SUFRIÓ DAÑOS DURANTE LA TRANSPORTACIÓN Y, SI ESTÁ DAÑADO, NOTIFÍQUELO DE INMEDIATO AL TRANSPORTISTA O A LA TIENDA DONDE LO ADQUIRIÓ.

POR FAVOR LEA EL MANUAL DEL PROPIETARIO Y LAS INSTRUCCIONES DE INSTALACIÓN ANTES DE INSTALAR SU NUEVO PRODUCTO AMTROL. GUARDE LA DOCUMENTACIÓN Y LOS MANUALES PARA REFERENCIA FUTURA.DE

AL INSTALARLO, UTILICE EQUIPO DE SEGURIDAD ADECUADO.

SE DEBEN CUMPLIR TODOS LOS REGLAMENTOS DE PLOMERÍA.

EL INCUMPLIMIENTO DE LAS ADVERTENCIAS ANTERIORES PUEDE TRAER COMO CONSECUENCIA LESIONES PERSONALES GRAVES O FATALES Y DAÑOS PERSONALES Y MATERIALES, ADEMÁS DE QUE ANULARÁ LA GARANTÍA.

DE NO SEGUIRSE LAS ADVERTENCIAS ANTERIORES, PODRÍAN PRODUCIRSE LESIONES PERSONALES GRAVES O LA MUERTE, Y/O DAÑOS MATERIALES, Y SE ANULARÁ LA GARANTÍA.

2. GARANTÍA LIMITADA SOBRE LOS PRODUCTOS DE AMTROL

Productos cubiertos: todos los productos manufacturados por AMTROL Inc. (“AMTROL”).

Esta garantía es intransferible; se concede únicamente al comprador original o al primer usuario del producto. Al aceptar y conservar este producto, usted acepta todos los términos de la garantía, así como las limitaciones de responsabilidad que se describen a continuación.

ADVERTENCIA IMPORTANTE: LEA CON ATENCIÓN EL MANUAL DE INSTRUCCIONES DE INSTALACIÓN, OPERACIÓN Y MANTENIMIENTO (“MANUAL”) para prevenir graves lesiones personales y daños materiales, así como para asegurar la adecuada utilización y cuidado de este producto.

Para asegurar la cobertura de su garantía, envíe por correo la tarjeta de registro del producto en un plazo de 30 días a partir de la fecha de compra; de otra manera, para cualquier reclamo relacionado con la garantía, se requerirá comprobación de la compra.

¿Quién recibe la garantía de los productos AMTROL?

Todos los compradores o primeros usuarios de un producto nuevo. La garantía no es transferible.

¿Qué cubre esta garantía?

AMTROL® garantiza al comprador o al primer usuario del producto nuevo que, al momento de manufactura, dicho producto está libre de defectos materiales y de mano de obra. Cualquier reclamación de garantía se debe efectuar en un plazo de un (1) año a partir de la fecha de compra, a menos que en el manual se especifique un plazo distinto.

¿Qué hará AMTROL si usted tiene un reclamo cubierto por la garantía?

En caso de incumplimiento de la garantía anterior, AMTROL, a opción suya, efectuará las reparaciones necesarias para corregir cualquier defecto material o de mano de obra, o suministrará y enviará piezas o productos de repuesto nuevos o usados. AMTROL no aceptará ningún reclamo por mano de obra u otros costos.

¿Qué no queda cubierto por esta garantía? Exclusiones y limitaciones

Esta garantía no cubre ninguna falla ni ningún problema, a menos que haya sido causado por defectos materiales o de mano de obra. Además, esta garantía no aplicará:

- Si el producto no ha sido instalado, operado, reparado o mantenido correctamente, según lo descrito en el manual que se suministra con él;
- A ninguna falla o funcionamiento defectuoso que resulte a consecuencia de maltrato (incluyendo congelamiento); manejo, embarque (por terceros distintos de AMTROL), almacenamiento, utilización u operación inadecuados o negligentes; accidente; alteración; rayos; inundación; o cualquier otra condición medioambiental;
- A cualquier falla o problema que resulte del uso del producto para cualquier fin distinto de los que se especifican en el manual adjunto, o por la alteración de cualquier parte del producto;
- Si el producto se utiliza en cualquier parte fuera de los Estados Unidos, sus territorios o posesiones, o Canadá;
- Esta garantía no cubre los costos de mano de obra, gastos de envío, costos de servicio, gastos de entrega, cargos administrativos ni ningún otro costo en el que se incurra por remover o reinstalar el producto.
- Esta garantía no cubre ningún otro reclamo remitido a AMTROL o a un distribuidor o minorista autorizado de AMTROL más de 30 días después del periodo aplicable de garantía que se describe en esta garantía;
- Esta garantía tampoco cubre los costos de reparación y de reemplazo no autorizados por AMTROL por adelantado.

Limitaciones adicionales de la garantía

TODAS LAS GARANTÍAS IMPLÍCITAS, INCLUYENDO LAS GARANTÍAS IMPLÍCITAS DE COMERCIALIZACIÓN E IDONEIDAD PARA UN FIN PARTICULAR, SON DENEGADAS ESPECÍFICAMENTE.

Limitaciones de los remedios

LOS REMEDIOS CONTENIDOS EN ESTA GARANTÍA SON EXCLUSIVOS PARA EL COMPRADOR O EL PRIMER USUARIO.

BAJO NINGUNA CIRCUNSTANCIA SERÁ RESPONSABLE AMTROL POR MÁS QUE EL PRECIO PAGADO POR EL PRODUCTO; DE LA MISMA MANERA, LOS REMEDIOS DEL COMPRADOR O PRIMER USUARIO NO EXCEDERAN DICHO PRECIO. EN NINGÚN CASO SERÁ RESPONSABLE AMTROL POR NINGÚN DAÑO ESPECIAL, INDIRECTO, INCIDENTAL O CONSIGUIENTE, SEA RESULTADO DE LA FALTA DE ENTREGA O DEL USO, MAL USO O INCAPACIDAD PARA USAR EL PRODUCTO, NI POR DEFECTOS EN EL PRODUCTO NI POR NEGLIGENCIA PROPIA DE AMTROL, NI POR NINGÚN OTRO AGRAVIO. Esta exclusión es aplicable sin importar si se busca la reparación de dichos daños por incumplimiento de la garantía, incumplimiento de contrato, negligencia, responsabilidad estricta, bajo agravio o bajo cualquier otra teoría legal. Tales daños incluyen, sin estar limitados a, inconveniencia, pérdidas o daños materiales, moho, pérdidas de ganancias, pérdida de ahorros o ingresos, pérdida del uso de los productos o de cualquier equipo, instalaciones, edificios o servicios asociados, tiempo de baja, y las reclamaciones de terceros, incluyendo clientes.

¿Qué hacer si tiene un problema cubierto por esta garantía?

Cualquier servicio de garantía cubierto debe ser autorizado por AMTROL. Comuníquese con la persona que le vendió el producto, la cual **tiene** que recibir autorización de un distribuidor de AMTROL o de AMTROL mismo. Si no recibe una respuesta pronta, llame a AMTROL directamente al 877-517-9673. El distribuidor autorizado debe remitir el aviso de un reclamo de garantía a AMTROL a la siguiente dirección:

AMTROL, Inc.
Warranty Claim Dept.
1400 Division Rd.
W. Warwick, RI 02893

Antes de que AMTROL determine proveer partes o productos de repuesto, como condición previa para tal determinación podría requerir que el reclamante de la garantía envíe el producto, con porte prepagado, a un distribuidor autorizado de AMTROL, o a AMTROL, y que proporcione prueba de su compra, usando como evidencia el recibo original de compra o el registro del producto.

Garantía sobre los productos de reemplazo

En caso de que se reemplace un producto o componente, AMTROL se reserva el derecho de efectuar cambios al diseño, construcción y material de los componentes o productos de reemplazo, los cuales estarán sujetos a todos los términos y limitaciones de esta garantía, excepto que los periodos de garantía aplicables se reducirán en un tiempo igual al tiempo que el reclamante de la garantía haya sido el propietario del producto antes de remitir la notificación del reclamo de garantía.

El logotipo de AMTROL, AMTROL, Well-X-Trol, Champion, Wel-Flo, Ex-trol, Fill-Trol, Therm-X-Trol y Boilermate son marcas registradas de AMTROL Inc.

Revised 7/03

3. LISTA DE VERIFICACIÓN PREINSTALACIÓN

PASOS Y DECISIONES IMPORTANTES QUE SE REQUIEREN TOMAR ANTES DE LA INSTALACIÓN

❑ ESTE PRODUCTO DEBE SER INSTALADO Y MANTENIDO POR UN PROFESIONAL CERTIFICADO. ADEMÁS DE LAS INSTRUCCIONES CONTENIDAS EN ESTE MANUAL, CUMPLA CON TODOS LOS CÓDIGOS LOCALES Y ESTATALES APLICABLES O, SI NO LOS HUBIERA, CON LAS EDICIONES ACTUALES DEL CÓDIGO NACIONAL DE INSTALACIONES SANITARIAS Y EL CÓDIGO NACIONAL ELÉCTRICO.

❑ BANDEJA RECOLECTORA Y DRENAJE: Con el fin de evitar fugas y daños materiales, instálese con una bandeja para goteo conectada a un drenaje que funcione apropiadamente y que se mantenga libre de obstrucciones en todo momento.

⚠ ADVERTENCIA **PRESIONES MÁXIMAS DE OPERACIÓN** Todos los tanques hidroneumáticos WELL-X-TROL son probados a una presión manométrica de 150 lppc (10.55 Kg/cm^2), que es la presión máxima de operación para la línea del WELL-X-TROL. Si las presiones excedieran la presión manométrica de 150 lppc (10.55 Kg/cm^2), se debe considerar la selección y dimensionamiento de un WELL-X-TROL construido de acuerdo con las normas A.S.M.E.

⚠ ADVERTENCIA **SE REQUIERE UNA VÁLVULA DE ALIVIO** Se debe instalar una válvula de alivio ajustada de modo que se abra cuando haya exceso de presión [presión manométrica de 125 lppc (8.75 Kg/cm^2) o más]. Esto protegerá a su WELL-X-TROL y al resto de los componentes del sistema en caso de que el interruptor de presión falle y no pare la bomba. La válvula de alivio debería instalarse en la conexión de su WELL-X-TROL con las tuberías del sistema, y deberá tener una descarga equivalente a la capacidad de la bomba a una presión de 125 lppc (8.75 Kg/cm^2).

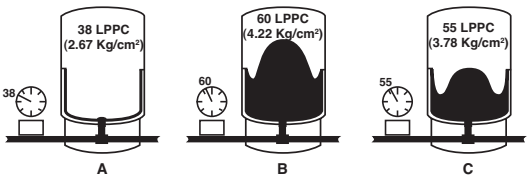
4. CÓMO FUNCIONA SU WELL-X-TROL

CARACTERÍSTICAS DE OPERACIÓN

El principio del WELL-X-TROL se basa en un diafragma mecánico sellado de trabajo pesado que permite la prepresurización de un colchón de aire antes de salir de la fábrica.

El agua es contenida en un recipiente rígido separado, moldeado de polipropileno, soportado por la carcasa de acero exterior y cubierto por un diafragma. Esto hace que el depósito de agua sea no corrosivo, ya que elimina el contacto del agua del sistema con metales ferrosos. EL WELL-X-TROL se embarca de la fábrica con su volumen total lleno de aire a una presión de precarga estándar. Al entrar el agua al WELL-X-TROL, el diafragma se flexiona, comprimiendo el colchón de aire y reduciendo su volumen en una cantidad equivalente al volumen del agua que entra. A medida que el volumen de aire disminuye, la presión en el WELL-X-TROL aumenta, de manera que siempre es igual a la presión ejercida por el agua. Dado que la presión del aire y la presión del agua siempre son iguales, el diafragma nunca está sujeto a un esfuerzo. Simplemente se flexiona o flota entre el agua y el aire. Cuando está apropiadamente dimensionado, el colchón de aire en el WELL-X-TROL va a tener volumen suficiente a la presión mínima (de arranque de la bomba) para permitir que el volumen de agua deseado entre al tanque de reserva de agua con el consiguiente aumento de presión dentro del rango de presión de operación especificado, según lo fijado por el interruptor de presión.

NOTA: Este es un ejemplo. Las presiones de precarga no siempre son de 38 lppc (2.67 Kg/cm^2). Las presiones de apagado de la bomba no siempre son de 60 lppc (4.22 Kg/cm^2).



A. Colchón de aire precargado de fábrica. Bomba apagada.

B. Al ponerse en marcha la bomba, el agua entra al depósito. Al llenarse el sistema a 60 lppc (4.22 Kg/cm^2), la bomba se para.

C. Cuando hay una demanda de agua, la presión en la cámara de aire fuerza agua dentro del sistema. La bomba permanece apagada.

5. INSTRUCCIONES DE INSTALACIÓN

Conexión del sistema

Modelos en lÌnea WX-101, 102, 103, 105 y 200

Los modelos en línea WX-101, 102 y 103 se instalan convencionalmente de manera directa a la tubería principal de suministro de agua, con una conexión de 3/4". Para el modelo WX-200 se usa un conector de 1".

Modelos verticales WX-201 a WX-350

Los modelos verticales WX-201 a WX-302 están equipados con un sistema de conexión con codo.

Los modelos WX-201, WX-202, WX-202XL y WX-203 tienen un codo de 1". Los modelos WX-205, WX-250, WX-251, WX-255, WX-252, WX-302 y WX-350 tienen un codo de 1 1/4".

Ubicación

Ubicación correcta del WELL-X-TROL

El WELL-X-TROL deberá instalarse lo más cerca posible al interruptor de presión. Con esto se reducirán los efectos adversos provocados por las pérdidas por fricción y por el rebote del interruptor de presión, así como por la diferencia de elevación entre el Well-X-Trol y el interruptor.

⚠ ADVERTENCIA ¡PELIGRO! RIESGO DE EXPLOSIÓN. SI DESPUÉS DE QUE EL WELL-X-TROL HA ESTADO EN SERVICIO, ES NECESARIO SUBIR SU PRESIÓN DEBIDO A UN CAMBIO REQUERIDO EN EL AJUSTE DEL INTERRUPTOR DE PRESIÓN, EL NO SEGUIR LAS INSTRUCCIONES SIGUIENTES PUEDE PROVOCAR UNA RUPTURA O EXPLOSIÓN, PROVOCANDO POSIBLES LESIONES PERSONALES GRAVES O FATALES, Y/O DAÑOS MATERIALES.

• NO AJUSTE O AUMENTE LA PRESIÓN SI HA HABIDO PÉRDIDA DE AIRE.

• NO AJUSTE LA PRESIÓN DE PRECARGA SI SE OBSERVA CORROSIÓN EN EL EXTERIOR.

• NO AJUSTE LA PRESIÓN DE PRECARGA SI HUBO ALGUNA REDUCCIÓN EN EL CICLO DE OPERACIÓN DE LA BOMBA O EN LA PRESIÓN DE PRECARGA, COMPARADA CON SU VALOR INICIAL. ESTO SE DEBE A QUE LA REDUCCIÓN EN EL CICLO DE OPERACIÓN DE LA BOMBA PUEDE SER CAUSADA POR UNA PÉRDIDA DE PRESIÓN DE AIRE DEL TANQUE, LO QUE A SU VEZ, PUEDE SER UN SÍNTOMA DE CORROSIÓN INTERNA, POR LO QUE CUALQUIER REPRESURIZACIÓN O PRESIÓN ADICIONAL PODRÍA PRODUCIR UNA RUPTURA O EXPLOSIÓN.

Ajuste de la precarga

Antes de la instalación

Paso 1. Quite la tapa de protección de la válvula de aire.

Paso 2. Verifique la presión de precarga (la presión debe ser +/- 10% del valor de fábrica).

Paso 3. Libere o agregue aire, según sea necesario, para que la presión manométrica de precarga sea 2 lppc (0.14 Kg/cm^2) menor que el ajuste del interruptor de presión para el arranque de la bomba. (Ejemplo, si se tiene un WX-202XL con una presión manométrica de precarga de 38 lppc (2.7 Kg/cm^2) y el interruptor está ajustado a una presión manométrica entre 30 y 50 lppc (2.1 y 3.5 Kg/cm^2), reduzca la precarga de su WX-202XL de 38 lppc (2.7 Kg/cm^2) a 28 lppc (2 Kg/cm^2).

Paso 4. Vuelva a colocar la tapa de protección de la válvula de aire. Separe el reverso de la etiqueta y péguela en dicha tapa.



FIGURA 1

⚠ ADVERTENCIA Peligro de explosión. Si no se siguen estas instrucciones, puede suceder una ruptura o explosión que puede causar lesiones graves o fatales, inundación, y/o daños materiales.

Conexión del sistema

1. Coloque el WELL-X-TROL en su lugar definitivo.

2. Nivélelo según sea necesario.

3. Para eliminar las pérdidas por fricción, no coloque ninguna reducción en la tubería entre la bomba y el WELL-X-TROL.

Puesta en marcha

Procedimientos de ajuste fino

Muchas veces el punto de operación del interruptor de presión será diferente de la gama de presiones indicada. Estas variaciones pueden causar una demora momentánea en el suministro de agua, ya que el interruptor de presión no está “sintonizado con la presión de precarga del Well-X-Trol”.

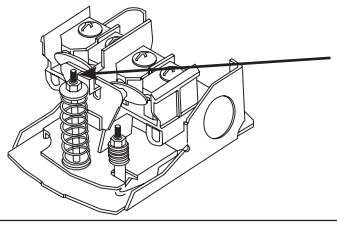
1. Llene el sistema y el WELL-X-TROL hasta que la bomba se detenga.

2. Abra uno o varios grifos para drenar el WELL-X-TROL.

3. Si hubiere alguna pausa momentánea en el flujo de agua entre el instante en que se vacíe el WELL-X-TROL y el momento en que se ponga en marcha la bomba, ajuste ligeramente el punto de arranque de la bomba en sentido horario (vea la figura 2).

4. Cierre los accesorios y vuelva a llenar el WELL-X-TROL hasta que la bomba se pare. Verifique el tiempo que hace falta para llenarlo.

5. Abra los accesorios y fíjese si se eliminó la pausa en el flujo de agua. Si no fuese así, siga ajustando el interruptor de presión.


FIGURA 2

Ajuste de la presión: para aumentar la presión de parada de la bomba gírelo en sentido horario; para reducir la presión de parada de bomba, gírelo en sentido antihorario.

Ajuste de la precarga después de la instalación

Paso 1. Drene toda el agua del tanque. Verifique la presión de precarga en el WELL-X-TROL.

Paso 2. Libere o agregue aire, según sea necesario, para que la presión de precarga sea 2 lppc (0.14 Kg/cm^2) menor que el ajuste del interruptor de presión para el arranque de la bomba.

Todos los “Tanques bajo tierra” WELL-X-TROL están diseñados para ser enterrados directamente y solamente se deben instalar en posición vertical. Para evitar el peligro de congelamiento, el tanque se debe enterrar debajo del nivel de congelamiento

Al instalar un “Tanque bajo tierra” WELL-X-TROL, se deben seguir los siguientes pasos:

1. Cerciórese de que el tanque esté enterrado por debajo del nivel de congelamiento y por encima de la napa de agua.

2. Saque el envoltorio plástico y verifique la precarga del tanque. El valor de precarga de fábrica es de 38 lppc (2.7 Kg/cm^2). Vuelva a colocar la tapa y ajústela firmemente. Siga el procedimiento de ajuste de precarga

3. Importante: instale el tanque sobre tierra firme sin rocas.

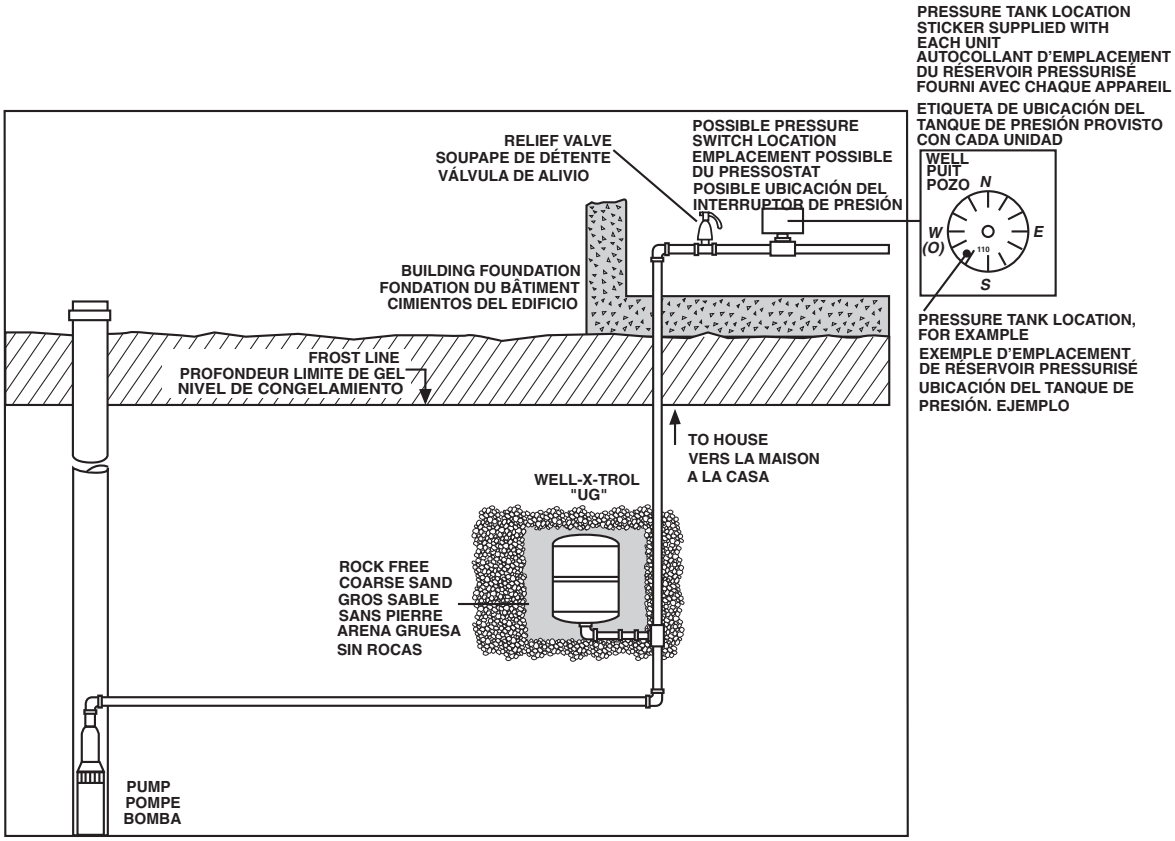
4. El diámetro de los tubos de agua entre la bomba al tanque y en el lugar donde se encontrará el interruptor debe ser igual, para evitar que el interruptor funcione erráticamente.

5. Verifique el rendimiento del sistema y fíjese que no haya pérdidas.

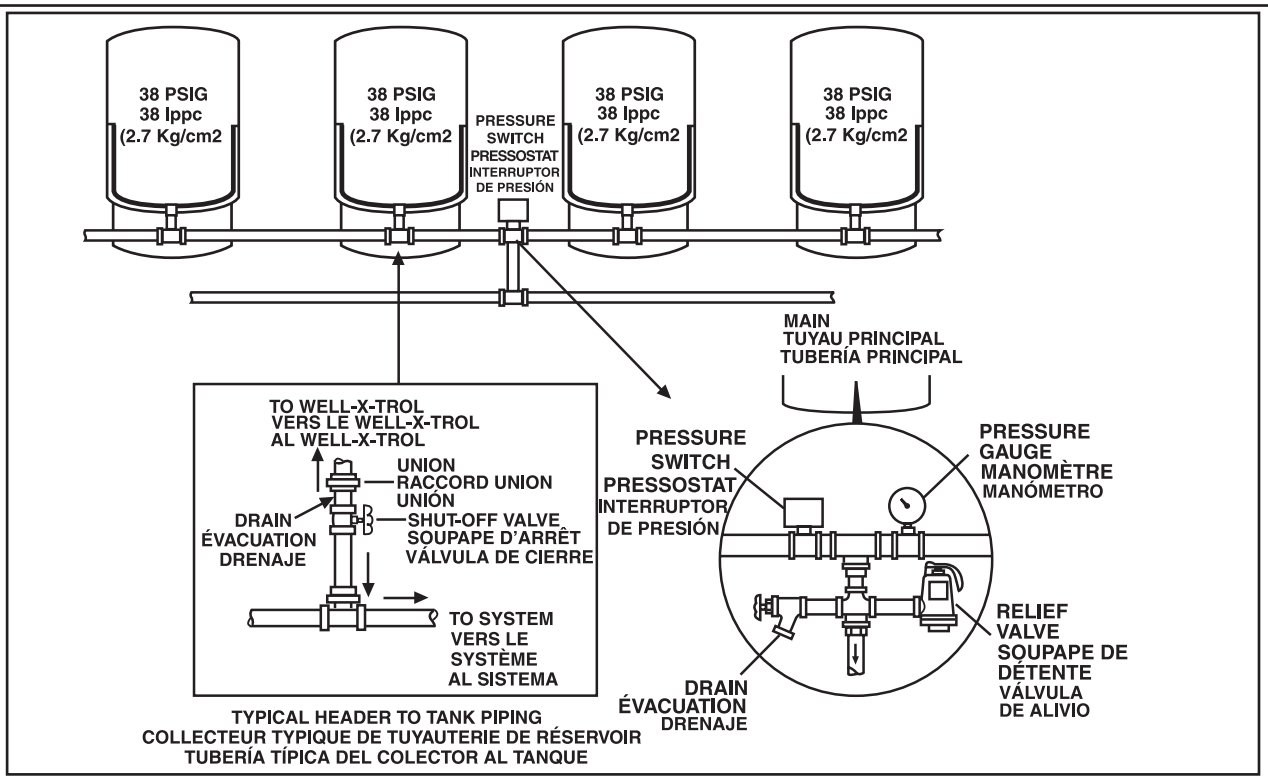
6. Importante: rellene el hueco con arena. Aprisione firmemente el relleno para evitar hundimientos. Si no se hace esto, se puede acortar la vida del tanque.

7. Complete la etiqueta de ubicación del tanque y péguela en el panel de alimentación u otra superficie visible, para facilitar la ubicación de dicho tanque en el futuro.

6. UNDERGROUND INSTALLATION
INSTALLATION SOUTERRAINE
INSTALACIÓN BAJO TIERRA



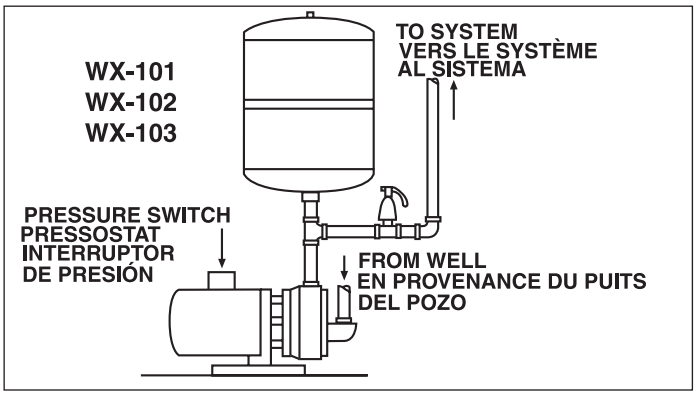
7. MANIFOLD INSTALLATIONS
INSTALLATIONS À RAMPE DE DISTRIBUTION
INSTALACIÓN DE COLECTORES



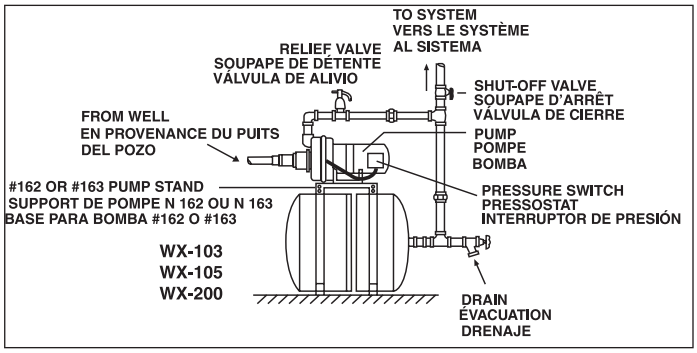
TYPICAL HEADER TO TANK PIPING
COLLECTEUR TYPIQUE DE TUYAUTERIE DE RÉSERVOIR
TUBERÍA TÍPICA DEL COLECTOR AL TANQUE

8. RECOMMENDED INSTALLATIONS
INSTALLATIONS RECOMMANDÉES
INSTALACIONES RECOMENDADAS

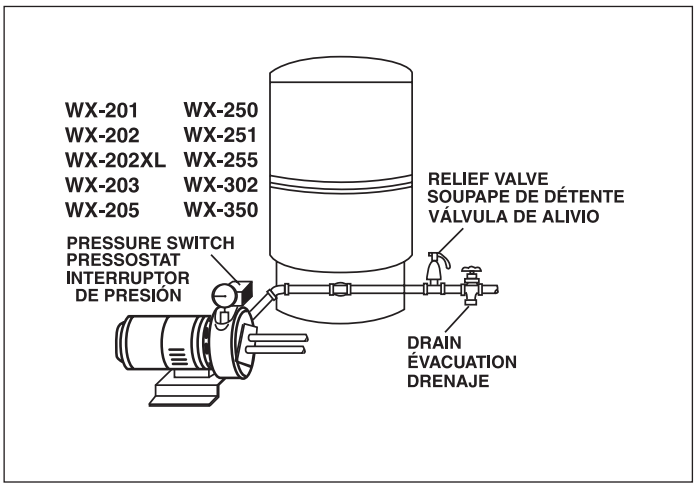
WX-100 Series WELL-X-TROL with tank mounted at jet pump.
WELL-X-TROL série WX-100 avec réservoir monté sur pompe à jet.
WELL-X-TROL serie WX-100, con tanque montado en la bomba de chorro.



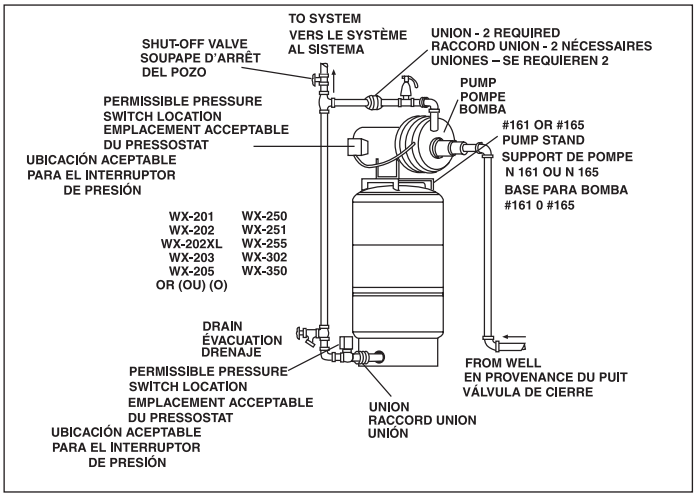
WX-103 or WX-200 with pump stand. WX-200 with pump stand mounting jet pump.
WX-103 ou WX-200 avec le support de pompe. WX-200 avec le support de pompe et le montage de pompe à jet.
WX-103 o WX-200 con base para bomba. WX-200 con base para bomba a chorro.



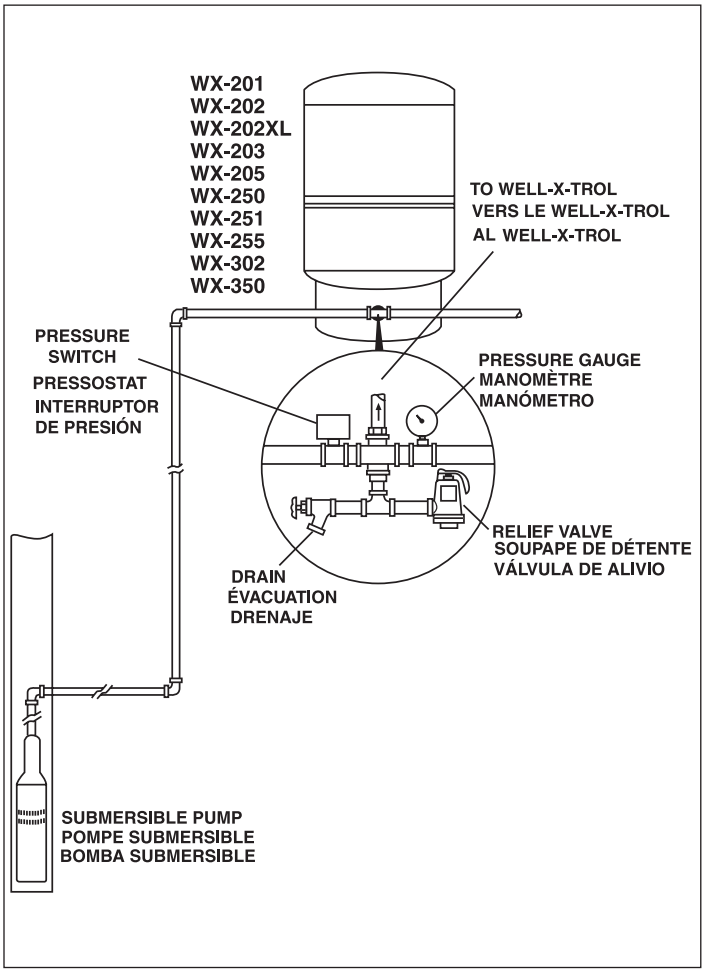
WX-201 through WX-350 WELL-X-TROL installed on-line with jet pump.
WELL-X-TROL WX-201 à WX-350, installé en ligne avec la pompe à jet.
WELL-X-TROL WX-201 a WX-350 instalado en línea con una bomba de chorro



WX-201 through WX-350 WELL-X-TROL use pump stand.
WELL-X-TROL WX-201 à WX-350 utilisant le support de pompe.
WELL-X-TROL WX-201 a WX-350, usando base para bomba.



WX-201 through WX-350 WELL-X-TROL installed on-line using submersible pump.
WELL-X-TROL WX-201 à WX-350, installé en ligne avec pompe submersible.
WELL-X-TROL WX-201 a WX-350, instalado en ÌÌnea usando una bomba sumergible.



SERVICE RECORD
REGISTRE D'ENTRETIEN
REGISTRO DE SERVICIO

DATE DATE FECHA	SERVICE PERFORMED ENTRETIEN EFFECTUÉ SERVICIO REALIZADO	COMMENTS COMMENTAIRES COMENTARIOS	CONTRACTOR ENTREPRENEUR CONTRATISTA

Model Number / Numéro de modèle / Modelo

GPM Flow from Well / Débit (gallons/minute) du puits / Flujo del pozo en GPM

Pump cut in / Activation de la pompe / Arranque de la bomba

Pump cut out / Arrêt de la pompe / Parada de la bomba

Tank pre-charge / Charge initiale du réservoir / Precarga del tanque

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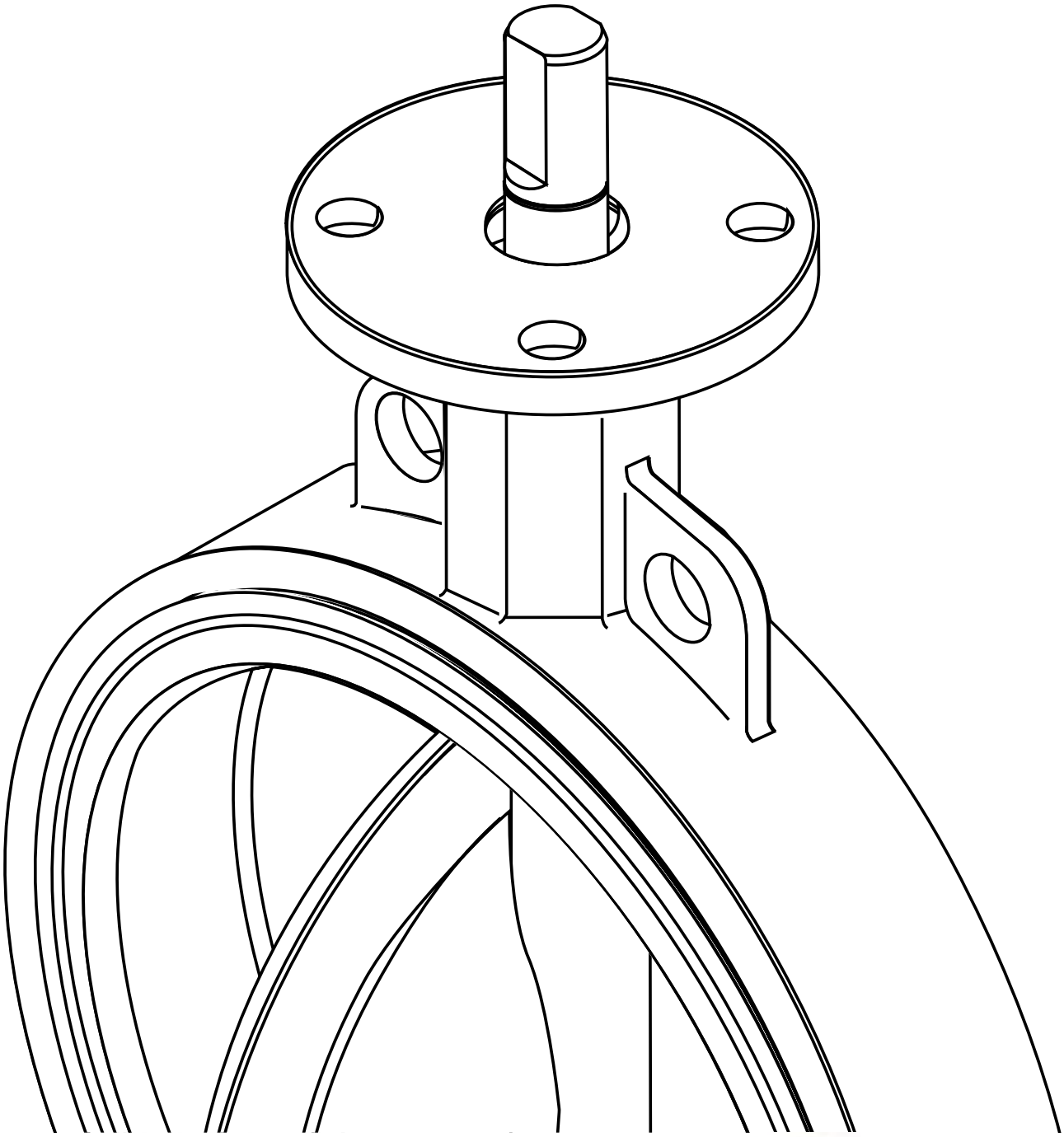
11.4 - B1 – BRAY BUTTERFLY VALVE

Bray CONTROLS

OPERATION AND MAINTENANCE MANUAL

RESILIENT SEATED BUTTERFLY VALVES

20/21, 22/23, 30/31, 3A/3AH, 31H, 31U, 32/33, 35/36, 36H



The High Performance Company

Table Of Contents:

PAGE

Safety Instructions: Definition Of Terms 1

Introduction 1

Shipment & Storage 1

Installation Considerations 2

Valves With Spring Return Actuators 2

- Fail Open Assembly 2
- Fail Closed Assembly 2

Valve Location And Orientation In Piping 3

- Valve Orientation Diagrams 4-6

Installation Procedure 6-9

- PTFE Seated Butterfly Valves in Plastic Flanges 9

Maintenance & Repair 9

Appendix 'A' - S20/21 Disassembly/Assembly Instructions 10-11

Appendix 'B' - S22/23 Disassembly/Assembly Instructions 12-13

Appendix 'C' - S30/31 Disassembly/Assembly Instructions 14-15

Appendix 'D' - S3A/3AH Disassembly/Assembly Instructions 16-17

Appendix 'E' - S31H Disassembly/Assembly Instructions 18-19

Appendix 'F' - S31U Disassembly/Assembly Instructions 20-21

Appendix 'G' - S32/33 Disassembly/Assembly Instructions 22-24

Appendix 'H' - S35/36 (Taper Pin Disc/Stem Connection)
Disassembly/Assembly Instructions 25-27

Appendix 'I' - S35/36 (Internal Spline or Keyed Disc/Stem Connection)
Disassembly/Assembly Instructions 28-33

Appendix 'J' - S36H Disassembly/Assembly Instructions 34-36

FOR INFORMATION ON THESE PRODUCTS AND OTHER BRAY PRODUCTS
PLEASE VISIT US AT OUR WEB PAGE - www.bray.com

Safety Instructions - Definition of Terms

READ AND FOLLOW THESE INSTRUCTIONS
SAVE THESE INSTRUCTIONS

WARNING	indicates a potentially hazardous situation which, if not avoided, **could** result in death or serious injury.
CAUTION	indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	used without the safety alert symbol indicates a potential situation which, if not avoided, may result in an undesirable result or state, including property damage.

Introduction

Historical Experience

Based on over twenty years experience in the butterfly industry, Bray can state without question the majority of all field problems for resilient seated butterfly valves are directly related to poor installation procedures. For this reason, it is very important all distributor salespeople educate their customers regarding proper installation of resilient seated butterfly valves.

Butterfly Valve Seat / Disc Function

Before reviewing the proper installation, maintenance, and repair procedures for resilient seated butterfly valves, let's discuss the seat-disc function of a butterfly valve. The seat in a resilient seated butterfly valve has molded o-rings on its flange face. **As a result, no gaskets are required as these o-rings serve the function of a gasket.** The flange face and molded o-rings of the seat extend beyond the body face-to-face to ensure sealing at the flange faces. The seat material, which extends past the face is compressed in installation and flows toward the center of the valve seat I.D.

In essence, the elastomer seat acts as a liquid, and the displaced elastomer moves toward the point of least resistance. The seat I.D. of all resilient seated butterfly valves is smaller than the disc O.D. This difference, the disc-seat interference, plus the increased interference due to the elastomer movement toward the seat center after installation, has been engineered so as to be the basis for pressure rating capability and the related seating/unseating torques. **Any change in this interference due to improper installation directly affects the pressure rating and seating/unseating torques.**

Finally, unlike many valve types, the resilient seated butterfly valve's disc actually extends beyond the face of the valve body at given angles of opening (say, 30° or more) when installed between flanges.

CAUTION

It is very important before installation to ensure the critical chord dimension of the disc at the full open position is less than the adjacent pipe flange I.D.

Shipment & Storage

A. The seat, disc, stem and bushing of the resilient seated butterfly valve should be coated with silicone lubricant unless specified otherwise as recommended by Bray Technical Bulletin 1028.

B. The disc should be positioned at 10° open. **Note**: See page 2 for special considerations for valves with spring return actuators.

C. Valves should be stored indoors with a preferred temperature range from 40° F (4°C) to 85° F (29°C).

D. When valves are stored for a long time, open and close the valves once every 3 months.

E. Ship and store valves so that no heavy loads are applied to the bodies.

Installation Considerations – Piping and Valve Orientation and Placement

Piping and Flanged Compatibilities

Piping

These valves have been engineered so that the critical disc chord dimension at the full open position will clear the adjacent inside diameter of most types of piping, including Schedule 40, lined pipe, heavy wall, etc.

Metal Flanges

Resilient seated butterfly valves have been designed to be suitable for all types of flanges (ASME, DIN, JIS and other international flange standards), whether flat-faced, raised face, slip-on, weld-neck, etc. Proper alignment of any butterfly valve between flanges is critical to good performance of the valve. The flange bolts must also be evenly tightened around the circumference of the valve, providing consistent flange compression of the molded o-ring in the seat face.

Since Bray does not recommend the use of gaskets between flanges on resilient seated butterfly valves, a uniform flange face is critical to proper valve sealing. Most weld-neck and slip-on flanges conforming to ASME specifications have an appropriate flange face. Types A and B butt-weld stub-end flanges also provide a suitable mating surface for the molded o-ring.

It should be noted that Type C butt-weld stub-end flanges have an "as formed" flange face. The varying surface of this flange face can create sealing problems between any resilient-seated butterfly valve and the flange face. For this reason, Type C flanges are not recommended for use with resilient-seating butterfly valves.

Non-Metallic Flanges

When non-metallic flanges, such as plastic or PVC, are used with resilient seated butterfly valves, care must be taken not to over-tighten the flange bolts. The inherent flexibility of these non-metallic flange materials allow them to be over-tightened relatively easily. Flexing caused by this over-tightening can actually reduce the compression of the valve between the flanges, causing leaks between the valve and the flange face. Proper alignment and firm, even, but not excessive tightening of flange bolts are especially important with non-metallic flanges. In some cases, non-metallic flanges of low quality will not mate tightly with butterfly valves regardless of the care taken during installation.

Valves with Spring Return Actuators

1. Fail Closed Assemblies

If the valve is supplied with an actuator, the butterfly valve is shipped in the full closed position (as no air pressure is present to compress the springs and open the disc).

CAUTION

Installing the valve with the disc in the full closed position may create a compression set on the seat causing higher than expected torques or premature seat failure. It is recommended to:

- Remove the actuator. Be sure to scribe the valve and actuator to ensure the re-installed actuator is in the exact same quadrant as originally configured
- Install the valve per the attached installation tag instructions
- Re-install the actuator ensuring it is in the proper quadrant

2. Fail Open Assemblies

If the valve is supplied with an actuator, the butterfly valve disc is shipped in the full open position (as no air pressure is present to compress the springs and close the valve disc.) The sealing surface, or disc edge, is therefore exposed. Damage to that surface will cause premature seat failure.

CAUTION

Use caution installing the valve being careful not to damage the disc edge. It is recommended to:

- Remove the actuator. Be sure to scribe the valve and actuator to ensure the re-installed actuator is in the exact same quadrant as originally configured
- Install the valve per the attached installation tag instructions
- Re-install the actuator ensuring it is in the proper quadrant

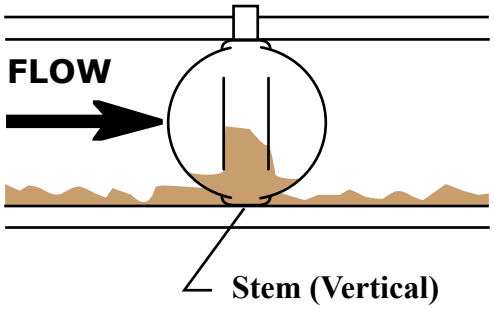
3. Valve Location

a. Resilient seated butterfly valves should be installed if possible a minimum of 6 pipe diameters from other line elements, i.e., elbows, pumps, valves, etc. of course, 6 pipe diameters are not always practical, but it is important to achieve as much distance as possible.

b. Where the resilient seated butterfly valve is connected to a check valve or pump, use an expansion joint between them to ensure the disc does not interfere with the adjacent equipment.

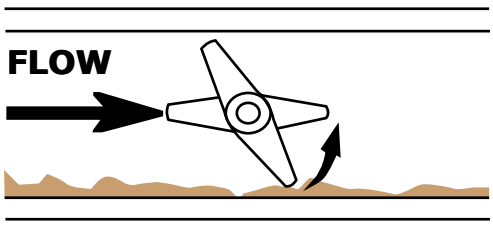
4. Valve Orientation

a. In general, Bray recommends the resilient seated valve be installed with the stem in the vertical position and the actuator mounted vertically directly above the valve; however, there are those applications as discussed below where the stem should be horizontal. **NOTE:** Bray does not recommend valves be installed in an upside-down position.



INCORRECT INSTALLATION

Sludge builds up on disc



Stem (Horizontal)

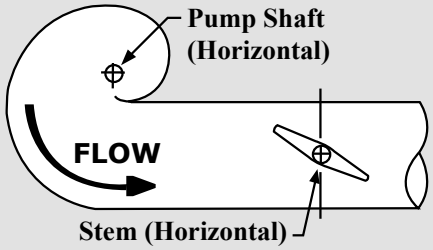
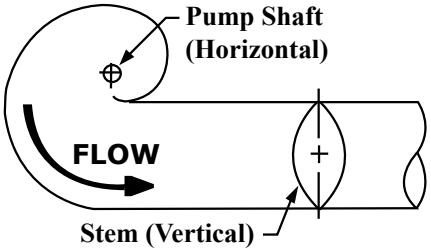
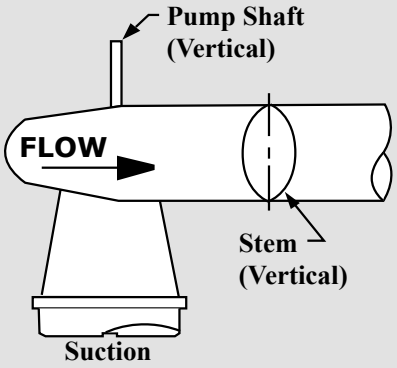
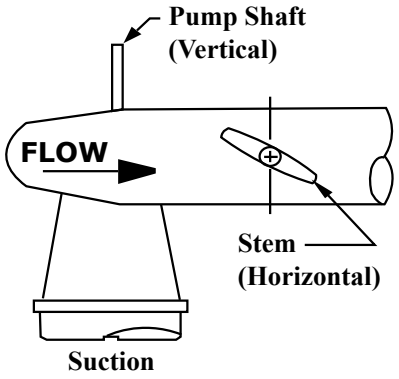
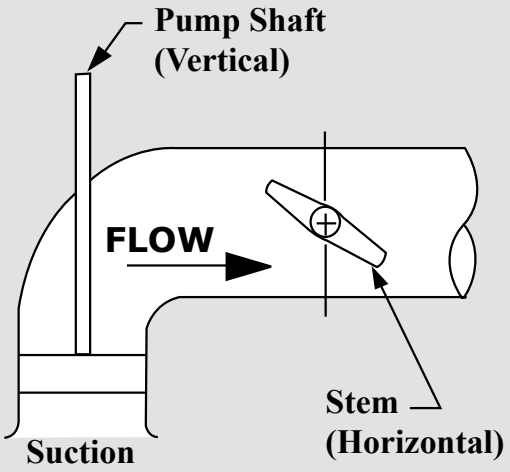
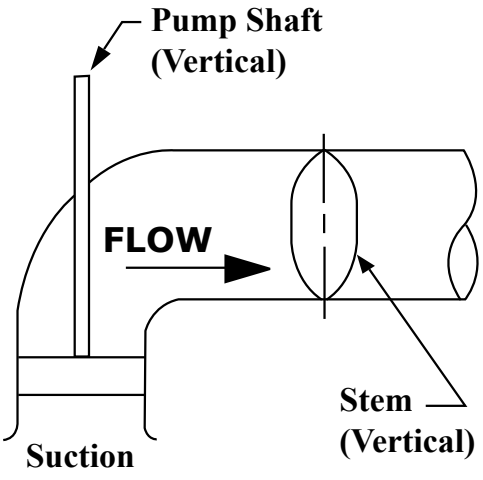
CORRECT INSTALLATION

Sludge passes under disc

b. For slurries, sludge, mine tailing, pulp stock, dry cement, and any media with sediment or particles, Bray recommends the resilient seated valve be installed with the stem in the horizontal position with the lower disc edge opening in the downstream direction.

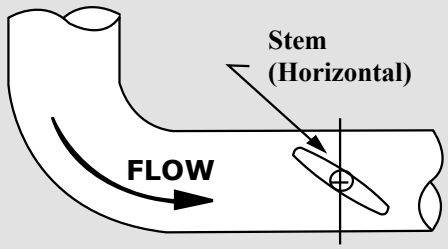
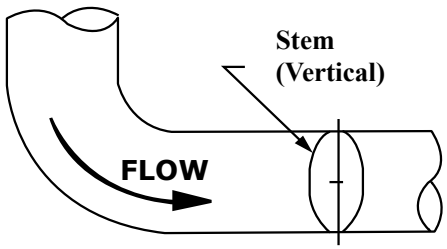
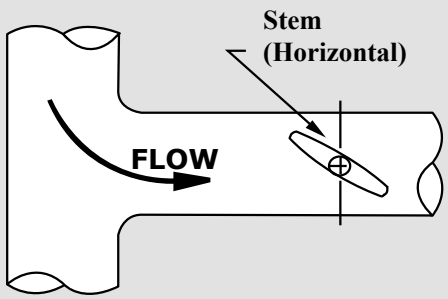
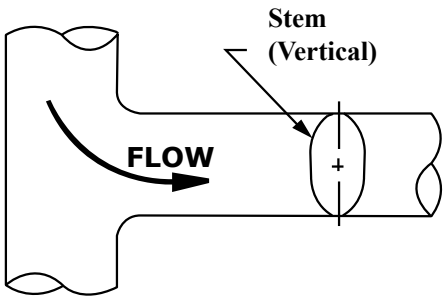
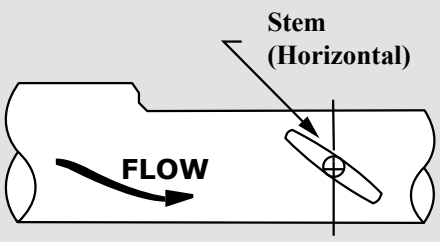
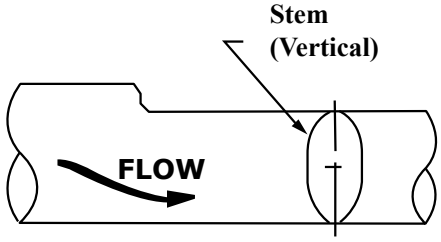
Valve Orientation (Continued)

c. Resilient seated butterfly valve located at the discharge of a pump should be oriented as follows:

	INCORRECT INSTALLATION	CORRECT INSTALLATION
i.) For centrifugal Pump – Pump shaft horizontal and stem vertical		
ii.) Centrifugal Pump – Pump shaft vertical & stem horizontal		
iii.) Axial Pump – Pump shaft vertical & stem vertical		

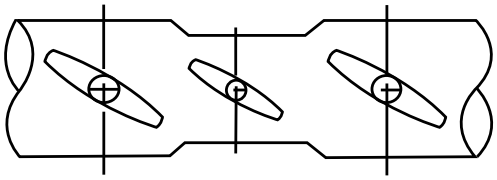
Valve Orientation (Continued)

d. Butterfly valves located downstream of a bend or pipe reducer should be oriented as follows:

	INCORRECT INSTALLATION	CORRECT INSTALLATION
i.) Bend		
ii.) Tee		
iii.) Pipe Reducer		

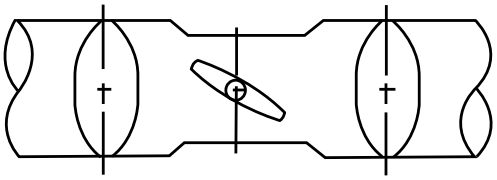
Valve Orientation (Continued)

e. Butterfly valves in combination for control/isolation applications should be installed as follows:



INCORRECT INSTALLATION

Combination with all valve stems in the same direction accelerates possible noise, vibration, & erosion problems.



CORRECT INSTALLATION

Combination with the stem of the control valve at right angle to those of other valves tends to cancel the drift of the fluid, and reduces noises, vibration, and erosion.

Installation Procedure

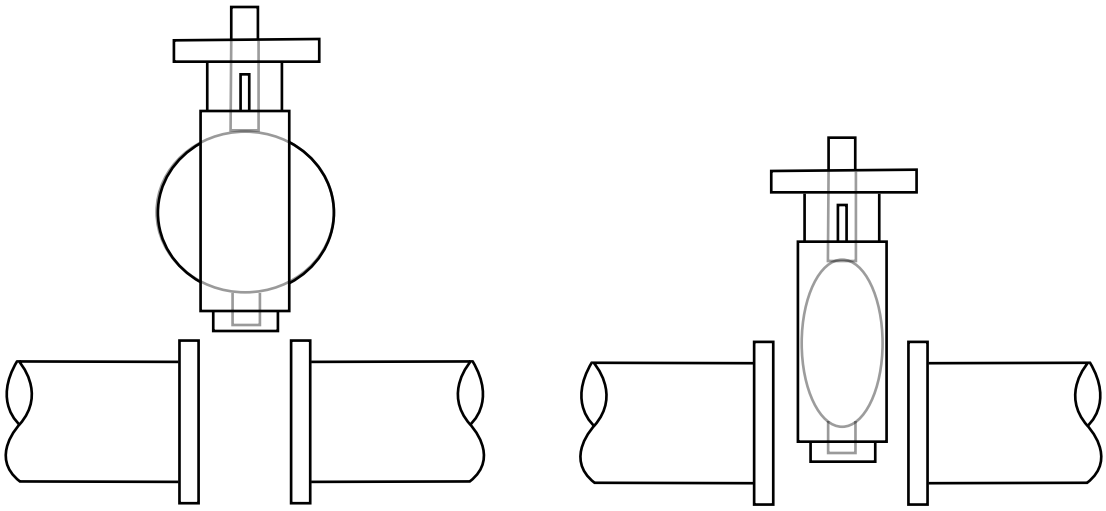
A. General Installation

1. Make sure the pipeline and pipe flange faces are clean. Any foreign material such as pipe scale, metal chips, welding slag, welding rods, etc., can obstruct disc movement or damage the disc or seat.
2. The Bray elastomer seat has molded o-rings on the face of the seat. **As a result, no gaskets are required as these o-rings serve the function of a gasket.**
3. Align the piping and then spread the pipe flanges a distance apart so as to permit the valve body to be easily dropped between the flanges without contacting the pipe flanges ***(see figure 1 page 6).***
4. Check to see that the valve disc has been positioned to a partially open position, with the disc edge about 1/2 inch to 3/8 inch inside the face of the seat, (approximately 10° open) ***(see figure 1 page 6)*** **Note: See page 2 for special consideration for valves with spring return actuators.**
5. Insert the valve between the flanges as shown in figure 1 of page 6, taking care not to damage the seat faces. Always pick the valve up by the locating holes or by using a nylon sling on the neck of the body.

WARNING

Never pick up the valve by the actuator or operator mounted on top of the valve.

Figure 1 – Insert Resilient Seated Butterfly Valve Between Flanges



INCORRECT INSTALLATION

CAUTION

Pipe not spread, disc opened beyond valve body face; Results; Disc edge damaged when it hits pipe flange.

CORRECT INSTALLATION

Pipe spread and aligned, disc rotated; Results; no undesirable beginning seating/ unseating torque, disc edge protected.

6. Place the valve between the flanges, center it, and then span the valve body with all flange bolts, but do not tighten the bolts. Carefully open the disc to the full open position, making sure the disc does not hit the adjacent pipe I.D. Now systematically remove jack bolts or other flange spreaders, and hand-tighten the flange bolts as shown in **Figure 2** below. Very slowly close the valve disc to ensure disc edge clearance from the adjacent pipe flange I.D. Now open the disc to full open and tighten all flange bolts per specification as shown in **Figure 2**. Finally, repeat a full close to full open rotation of the disc to ensure proper clearances ***(See figures 3 & 4 page 7)***.

Figure 2 – Flange Bolt Tightening Pattern

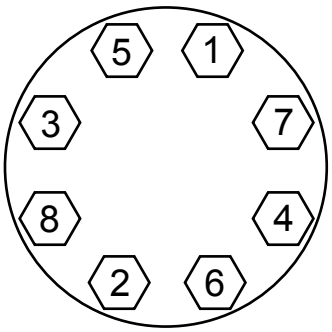
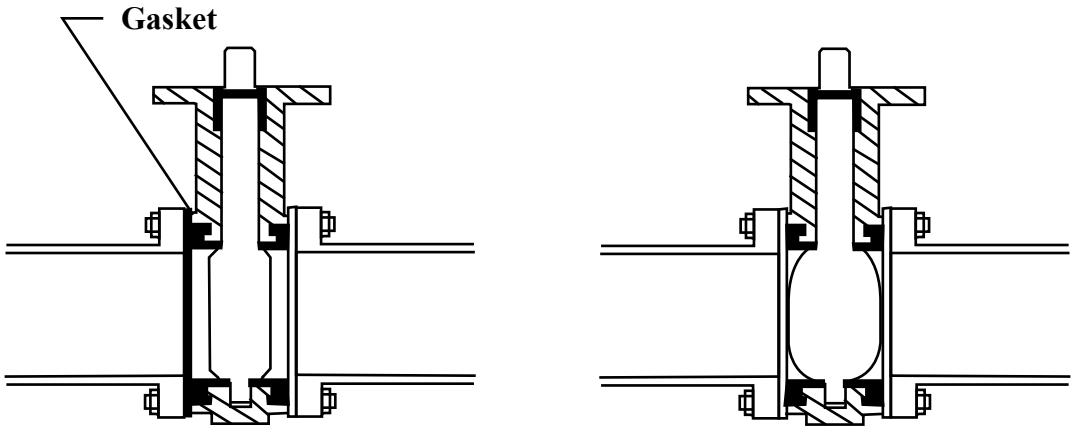


Figure 3 – Initial Centering & Flanging of Valve



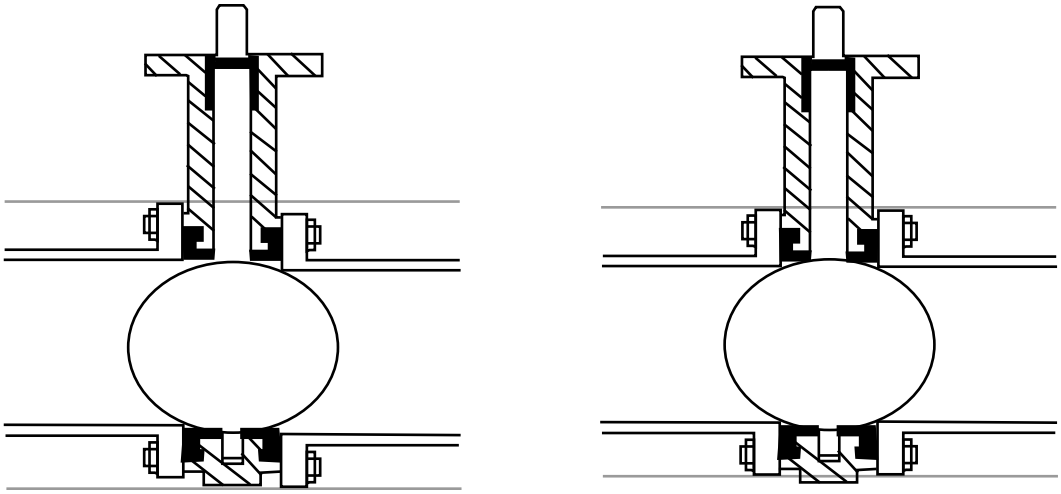
INCORRECT INSTALLATION

Disc in closed position; gaskets used; Results – Seat distorted and over-compressed causing high initial unseating torque problems.

CORRECT INSTALLATION

Bolts snugged, not torqued tight, disc edge within body face-to-face but not fully closed, no flange gaskets; Results: No disc edge damage, proper sealing allowed.

Figure 4 – Final Aligning & Tightening of Flange Bolts



INCORRECT INSTALLATION

Piping misaligned; Results Disc O.D. strikes pipe I.D. causing disc edge damage, increased torque & leakage. Seat face o-rings will not seal properly with incorrectly aligned piping.

CORRECT INSTALLATION

Piping aligned properly when bolts tightened, disc in full open position; Results – disc clears adjacent pipe I.D., seat face seals properly, no excessive initial torque.

When resilient seated butterfly valves are to be installed between ASME welding type flanges, care should be taken to abide by the following procedure to ensure no damage will occur to the seat:

1. Place the valve between the flanges with the flange bores and valve body aligned properly. The disc should be in the 10° open position.
2. Span the body with the bolts.
3. Take this assembly of flange-body-flange and align it properly to the pipe.
4. Tack weld the flanges to the pipe.
5. When tack welding is complete, remove the bolts and the valve from the pipe flanges and complete the welding of the flanges. Be sure to let the pipe and flanges cool before installing the valve.

CAUTION

Never complete the welding process (after tacking) with the valve between pipe flanges. This causes severe seat damage due to heat transfer.

Installation of Bray PTFE Seated Butterfly Valves in Plastic Flanges.

Bray recommends the following guidelines when PTFE Seated Valves are installed between plastic flanges:

1. The valve body should be coated with epoxy, not nylon. The extra thickness of the nylon coating slightly reduces the seat compression, and every advantage to maximize seat compression should be taken with plastic flanges.
2. The plastic flange can be either one piece construction, or two piece construction comprised of a stub end and a backup ring.
3. The plastic flange style can be butt-weld, socket or slip-on, but butt-weld and socket are preferred.
4. The plastic flange face must be flat. Concave and convex flange faces are not acceptable. This includes flange faces that were originally flat but later distorted into a concave shape by over tightening the flange bolts.
5. The plastic flange face surface may have grooves or serrations, provided the grooves do not exceed .100" (2.54 mm) in width or .020" (.508 mm) in depth. If the grooves are less than .100" (2.54 mm) in width, the groove depth must not exceed the width. However, fine conentric or "phonograph record" grooves are acceptable regardless of the groove depth.
6. Flange gaskets must not be used with PTFE seats, since they create an uncontrolled over compression that can buckle the PTFE and damage the seat. If a damaged face, a flange gasket can appear to cure the leak to atmosphere, while simultaneously damaging the PTFE seat and creating a second leak across the disc or up the stem hole. Leaks across the plastic flange must be cured without the use of gaskets, by proper selection and installation of the flange.
7. The bolts holding plastic flanges should be installed in strict conformance to the recommended practices of the plastic flange manufacturer. This usually involves aligning the flanges accurately, using lubricated bolts, and tightening the bolts in the proper sequence and to the specified torque. Uniform stress across the flange prevents leakage.

Maintenance and Repair

The many Bray features minimize wear and maintenance requirements. No routine lubrication is required. **All components – stem, disc, seat, bushing, stem seal, etc., are field replaceable, no adjustment is required**. If components require replacement, the valve may be removed from the line by placing the disc in the near closed position, then supporting the valve and removing the flange bolts.

WARNING No valve maintenance, including removal of manual or power actuators, should be performed until the piping system is completely depressurized.

Appendix A

Disassembly/Assembly Instructions

Series 20/21 Resilient Seated Butterfly Valves

Disassembly

1. Remove handle, gear operator or power actuator from actuator mounting flange.
2. Remove the body bolts and pull the lower body half away from the seat.
3. Pull the seat and disc stem from the upper body half.
4. Remove bushing and seal from the upper body.
5. Push the seat into an oval shape and remove the disc stem by withdrawing the short stem end first.

Assembly

1. Push the long stem end of the disc into the seat.
2. Then push the seat over the disc's short stem.
3. Place the disc stem and seat into the upper body half.
4. Align the lower body with the upper body and position lower body in the seat.

NOTICE	The body halves have a matching casting node on one side only to ensure correct assembly of body halves.

5. Replace the body bolts and tighten.
6. Install the stem seal, then the stem bushing.

   Note: It is recommended that the stem bushing be coated with a light amount of silicone grease before installation in the valve body. This coating of silicone grease will assist in keeping the stem bushing in the valve body until an actuator is mounted on the valve.

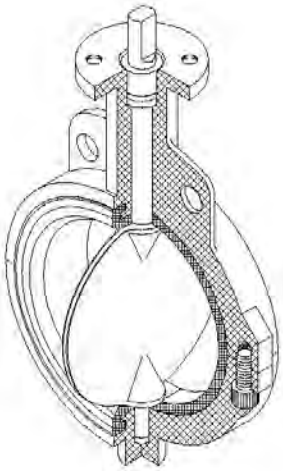
7. Replace handle, manual gear operator or power actuator on the actuator mounting flange.

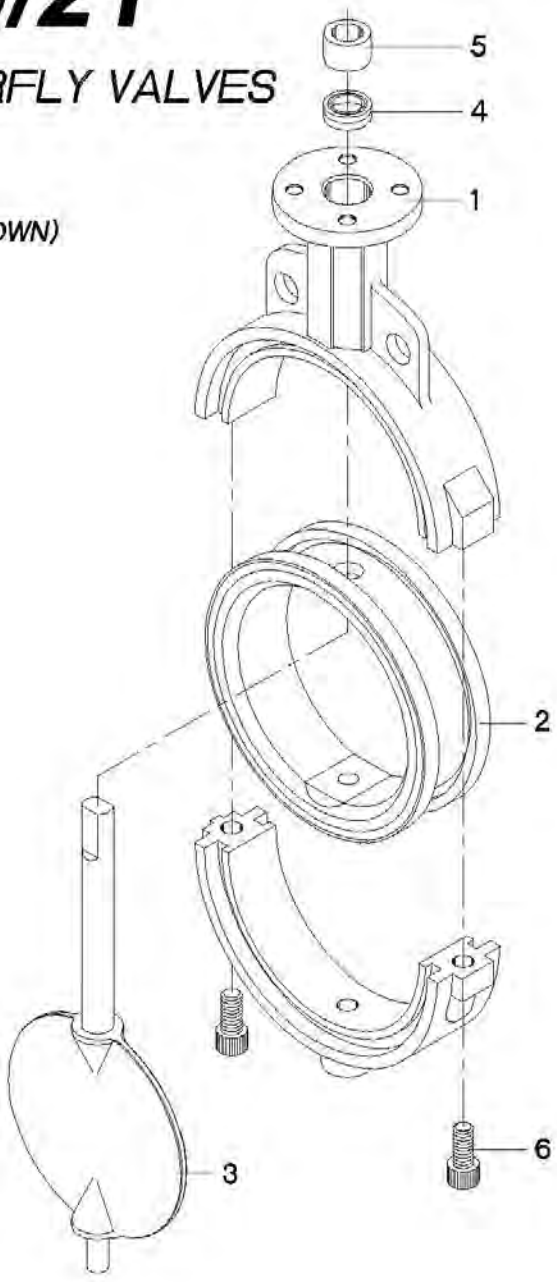
Appendix A

SERIES 20/21

RESILIENT SEATED BUTTERFLY VALVES

1 BODY (S20 WAFER STYLE SHOWN)
2 SEAT
3 DISC STEM
4 STEM SEAL
5 STEM BUSHING
6 BODY BOLT





Appendix B

Disassembly/Assembly Instructions

Series 22/23 Resilient Seated Butterfly Valves

Disassembly –

1. Remove the handle, gear operator, or power actuator from actuator mounting flange.
2. Remove the "Spirolox"® retaining ring and the two C-ring stem retainers from the stem hole.
3. Then remove the stem, bushing and seal.
4. Remove the disc from the seat, protecting the disc edge at all times.
5. Remove the seat energizer from the stems and seat.
6. Remove the lower and upper stems from the disc or remove the lower stem if the upper stem is connected to the disc
7. Compress the seat just enough to allow the disc to be removed along with the seal capsules.
8. Remove the retainer bushing and upper stem seal.

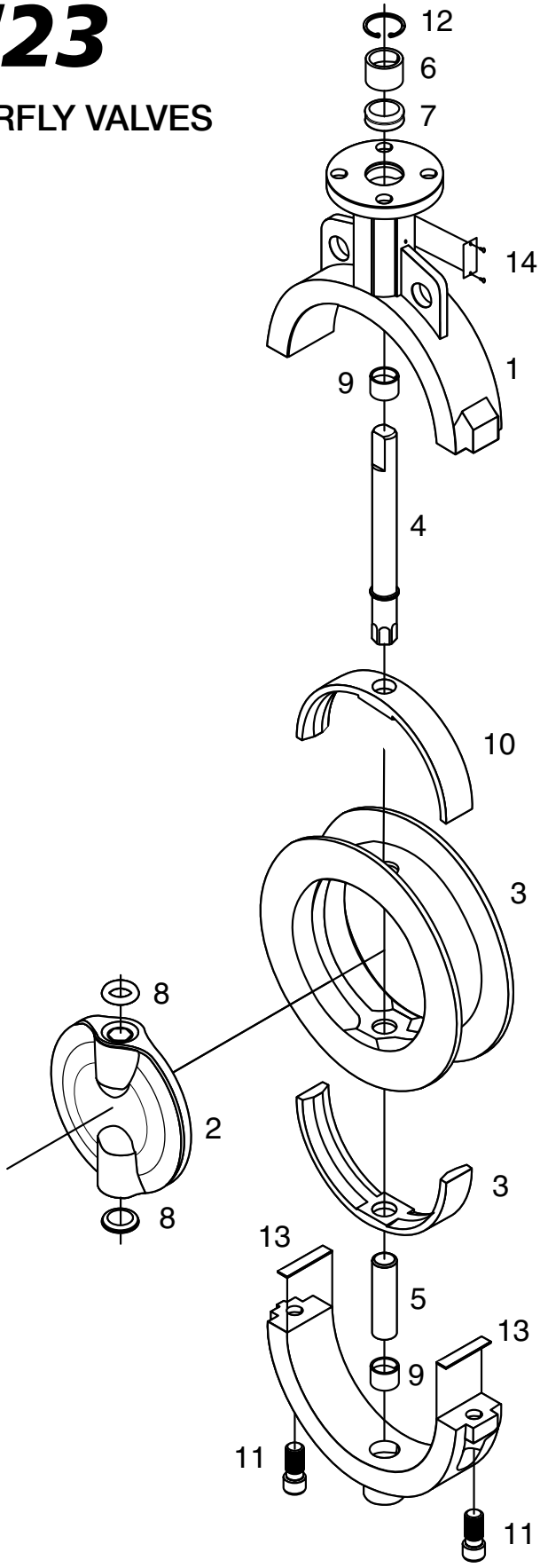
Assembly –

1. Install the stem bearings in upper and lower body halves.
2. Place the body seal strip on the lower body half, overlapping the body width by approximately 0.19" on both sides.
3. Press the seat to make the I.D. elliptical, then insert the shaft seals and place the disc into the seat. Rotate the disc hubs into alignment with the seat.
4. Insert the upper and lower stems.
5. Slip one seat energizer strip onto the lower portion of the upper shaft.
6. Insert the upper shaft with the pre-installed seat energizer strip into the disc/seat sub assembly.
7. Drive the upper shaft into the disc and slip one seat energizer strip onto the lower shaft.
8. Rotate the disc into the open position and insert the disc/seat/stems/energizer sub assembly into the upper body half.
9. Place the lower body half over the seat, and ensure that both body halves are properly aligned (identified by cast-on markings.
10. Attach and tighten the body fasteners.

SERIES 22/23

RESILIENT SEATED BUTTERFLY VALVES

1. BODY
2. DISC
3. SEAT
4. UPPER STEM
5. LOWER STEM
6. BUSHING
7. UPPER STEM SEAL
8. SEAL CAPSULE
9. BEARING
10. SEAT ENERGIZER
11. CAP SCREW
12. RETAINER
13. BODY SEAL
14. ID TAG



Appendix C

Disassembly/Assembly Instructions

Series 30/31 Resilient Seated Butterfly Valves

Disassembly –

1. Remove the handle, gear operator, or power actuator from actuator mounting flange.
2. Remove the "Spirolox"® retaining ring and the two C-ring stem retainers from the stem hole.
3. Then remove the stem, bushing and seal.
4. Remove the disc from the seat, protecting the disc edge at all times.
5. Push the seat into an oval shape, and then remove the seat from the body.

Assembly –

1. Push the valve seat into an oval and push it into the body with seat stem holes aligned to body stem holes.

NOTICE	When installing the seat the larger hole should be on top and the smaller hole should be on bottom.

2. Insert stem seal and bushing.
3. Push stem into the stem hole of the body until the bottom of the stem is flush with the inner top edge of the seat.
4. Install a light coating of silicone or grease on the I.D. of seat. Insert the disc into the seat by lining up the disc holes with the stem holes of the seat.

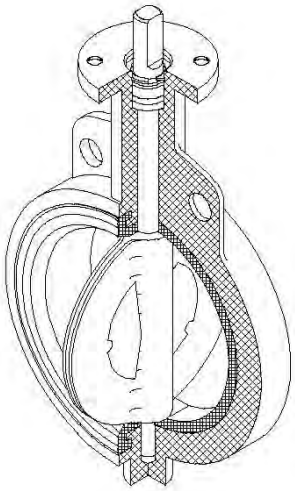
   Note: The broached double "D" flats in the disc must be toward the bottom of the valve body.

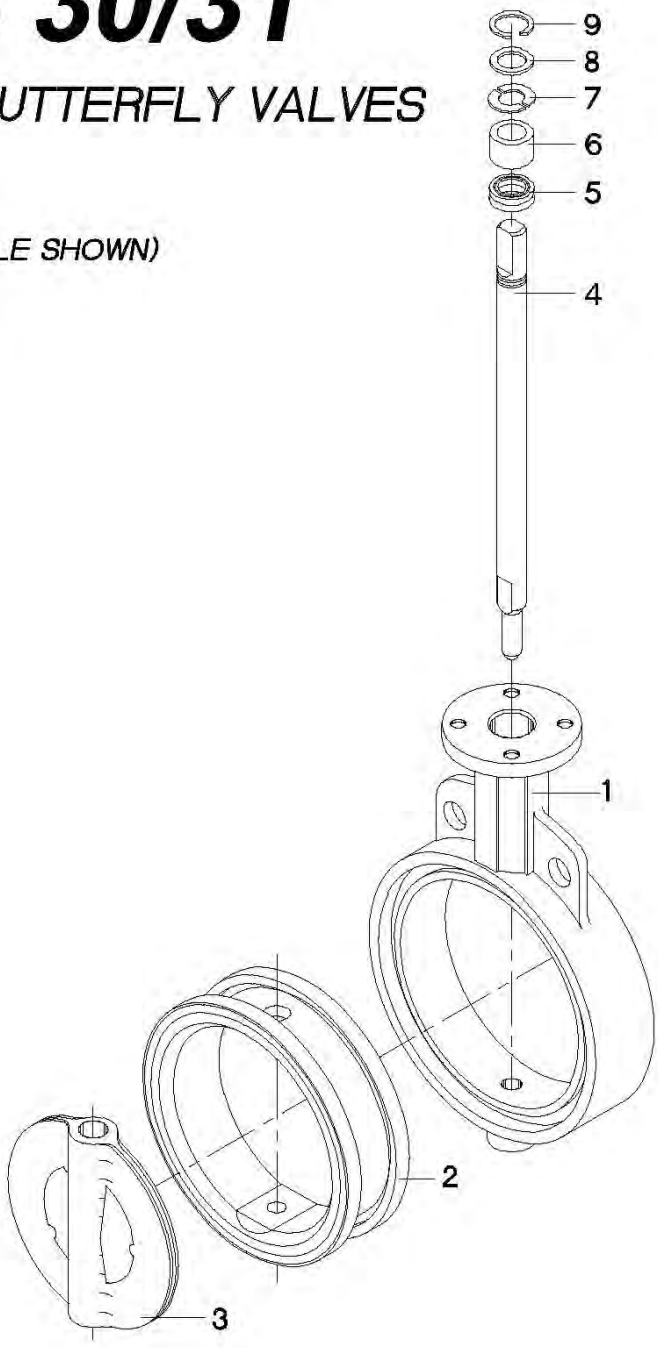
5. With a downward pressure and rotating the stem back and forth, push the stem until the stem touches the bottom of the body stem hole.
6. Make certain that when pushing the stem through the disc bottom, the broached flats of stem and disc are aligned.
7. Replace the stem bushing and two stem retainers, then replace the "Spirolox"® retaining ring back into position.
8. Replace handle, manual gear operator or power actuator on the actuator mounting flange.

SERIES 30/31

RESILIENT SEATED BUTTERFLY VALVES

1 BODY (S30 WAFER STYLE SHOWN)
2 SEAT
3 DISC
4 STEM
5 STEM SEAL
6 STEM BUSHING
7 STEM RETAINER
8 THRUST WASHER
9 RETAINING RING





Appendix D

Disassembly/Assembly Instructions

Series 3A/3AH Resilient Seated Butterfly Valves

Disassembly –

1. Remove the handle, gear operator, or power actuator from actuator mounting flange.
2. Remove the "Spirolox"® retaining ring and the two C-ring stem retainers from the stem hole.
3. Then remove the stem, bushing and seal.
4. Remove the disc from the seat, protecting the disc edge at all times.

   Note: The seat is bonded to the body and is not easily field replaceable. Please contact your local Bray representative for seat replacement.

Assembly –

1. Insert stem seal and bushing.
2. Push stem into the stem hole of the body until the bottom of the stem is flush with the inner top edge of the seat.
3. Install a light coating of silicone or grease on the I.D. of seat. Insert the disc into the seat by lining up the disc holes with the stem holes of the seat.

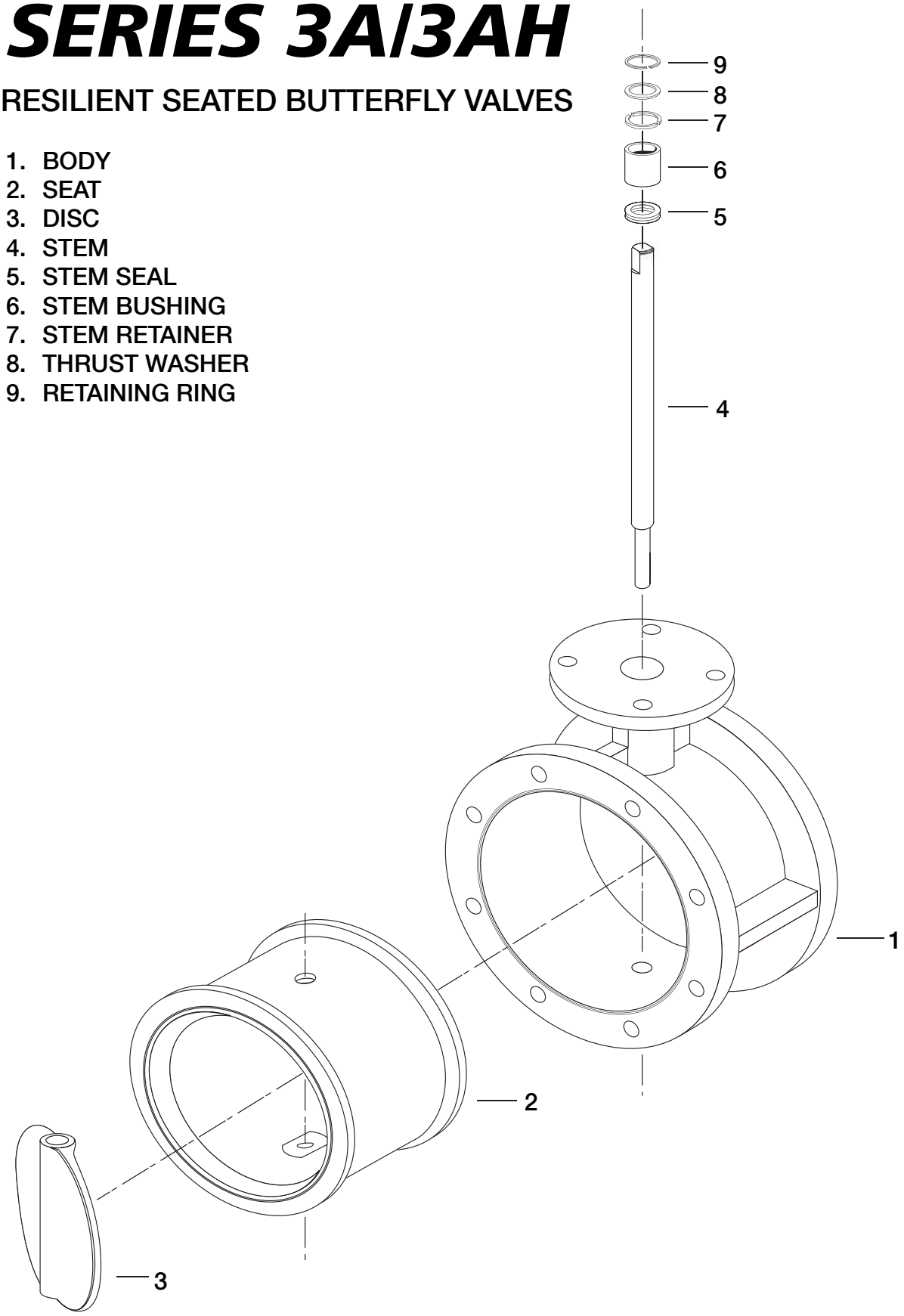
   Note: The broached double "D" flats in the disc must be toward the bottom of the valve body.

4. With a downward pressure and rotating the stem back and forth, push the stem until the stem touches the bottom of the body stem hole.
5. Make certain that when pushing the stem through the disc bottom, the broached flats of stem and disc are aligned.
6. Replace the stem bushing and two stem retainers, then replace the "Spirolox"® retaining ring back into position.
7. Replace handle, manual gear operator or power actuator on the actuator mounting flange.

SERIES 3A/3AH

RESILIENT SEATED BUTTERFLY VALVES

1. BODY
2. SEAT
3. DISC
4. STEM
5. STEM SEAL
6. STEM BUSHING
7. STEM RETAINER
8. THRUST WASHER
9. RETAINING RING



Appendix E

Disassembly/Assembly Instructions

Series 31H Resilient Seated Butterfly Valves

Disassembly –

1. Remove the handle, gear operator, or power actuator from actuator mounting flange.
2. Remove the "Spirolox"® retaining ring and the two C-ring stem retainers from the stem hole.
3. Then remove the stem, bushing and seal.
4. Remove the disc from the seat, protecting the disc edge at all times.

Note: Valve is provided with the seat bonded to the body and therefore is not easily field replaceable. Please contact your local Bray representative for seat replacement.

Assembly –

1. Insert stem seal and bushing.
2. Push stem into the stem hole of the body until the bottom of the stem is flush with the inner top edge of the seat.
3. Install a light coating of silicone or grease on the I.D. of seat. Insert the disc into the seat by lining up the disc holes with the stem holes of the seat.

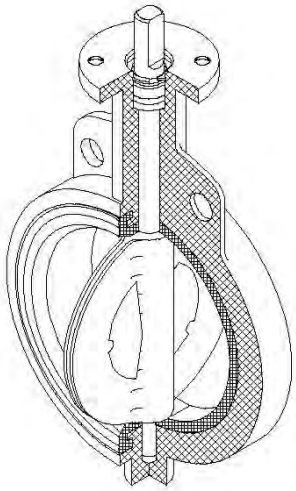
Note: The broached double "D" flats in the disc must be toward the bottom of the valve body.

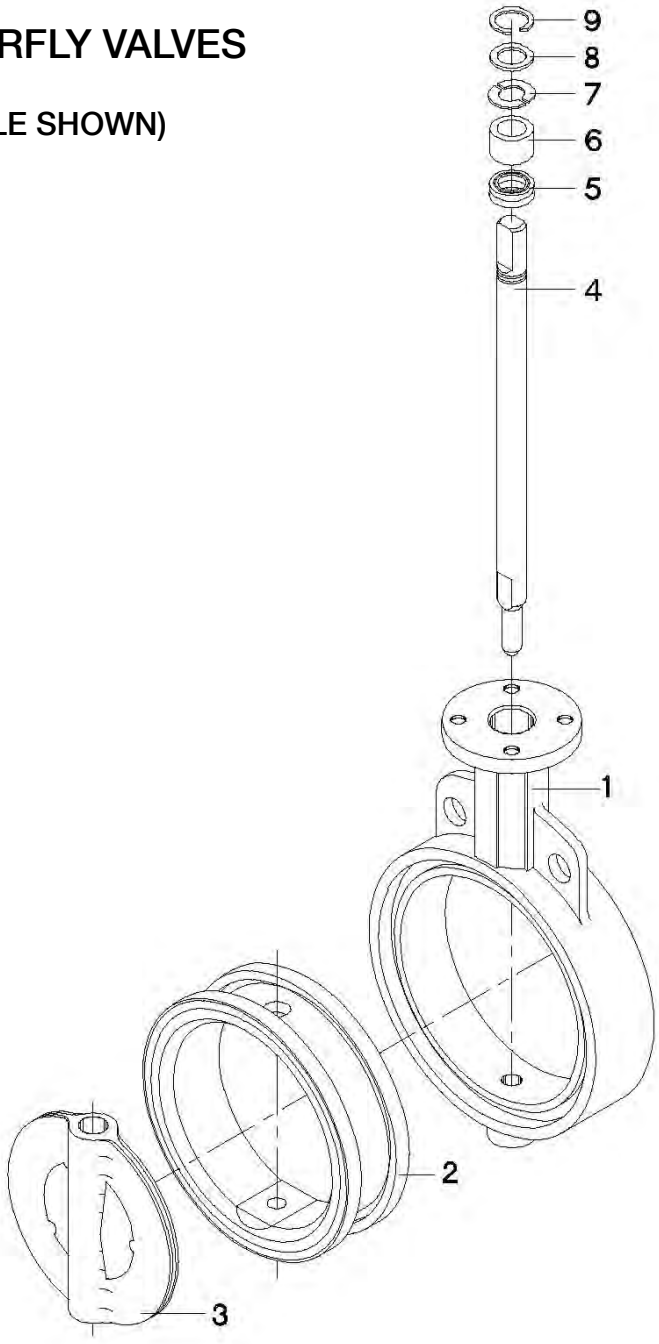
4. With a downward pressure and rotating the stem back and forth, push the stem until the stem touches the bottom of the body stem hole.
5. Make certain that when pushing the stem through the disc bottom, the broached flats of stem and disc are aligned.
6. Replace the stem bushing and two stem retainers, then replace the "Spirolox"® retaining ring back into position.
7. Replace handle, manual gear operator or power actuator on the actuator mounting flange.

SERIES 31H

RESILIENT SEATED BUTTERFLY VALVES

1. BODY (S30 WAFER STYLE SHOWN)
2. SEAT
3. DISC
4. STEM
5. STEM SEAL
6. STEM BUSHING
7. STEM RETAINER
8. THRUST WASHER
9. RETAINING RING





Appendix F

Disassembly/Assembly Instructions
Series 31U Resilient Seated Butterfly Valves

Disassembly –

1. Remove the handle, gear operator, or power actuator from actuator mounting flange.
2. Remove the "Spirolox"® retaining ring and the two C-ring stem retainers from the stem hole.
3. Then remove the top stem bushing and seal, upper stem and retaining rod.
4. Remove the disc from the seat, protecting the disc edge at all times.
5. The upper and lower stem bearings will remain in the valve behind the seat.

   Note: The seat is bonded to the body and is not easily field replaceable. Please contact your local Bray representative for seat replacement.

Assembly –

1. Install a light coating of silicone or grease on the I.D. of seat.
2. Insert the lower stem inside the disc before inserting the disc into the seat.
3. Insert the disc into the seat by lining up the disc holes with the stem holes of the seat.
4. Line up the disc using a T-Bar (Allan key style)
5. With a downward pressure and rotating the T-Bar back and forth, push the lower stem until the lower stem touches the bottom of the body stem hole recess.

   Note: The broached double "D" flats in the disc must be toward the bottom of the valve body.

6. Make certain that when pushing the stem through the disc bottom, the broached flats of stem and disc are aligned.
7. Insert the spacer bar and upper stem into the disc and valve.
8. Replace the top stem bushing and seal and two stem retainers.
9. Then replace the two "C" ring stem retainers and the "Spirolox"® retaining ring back into position in the top stem hole.

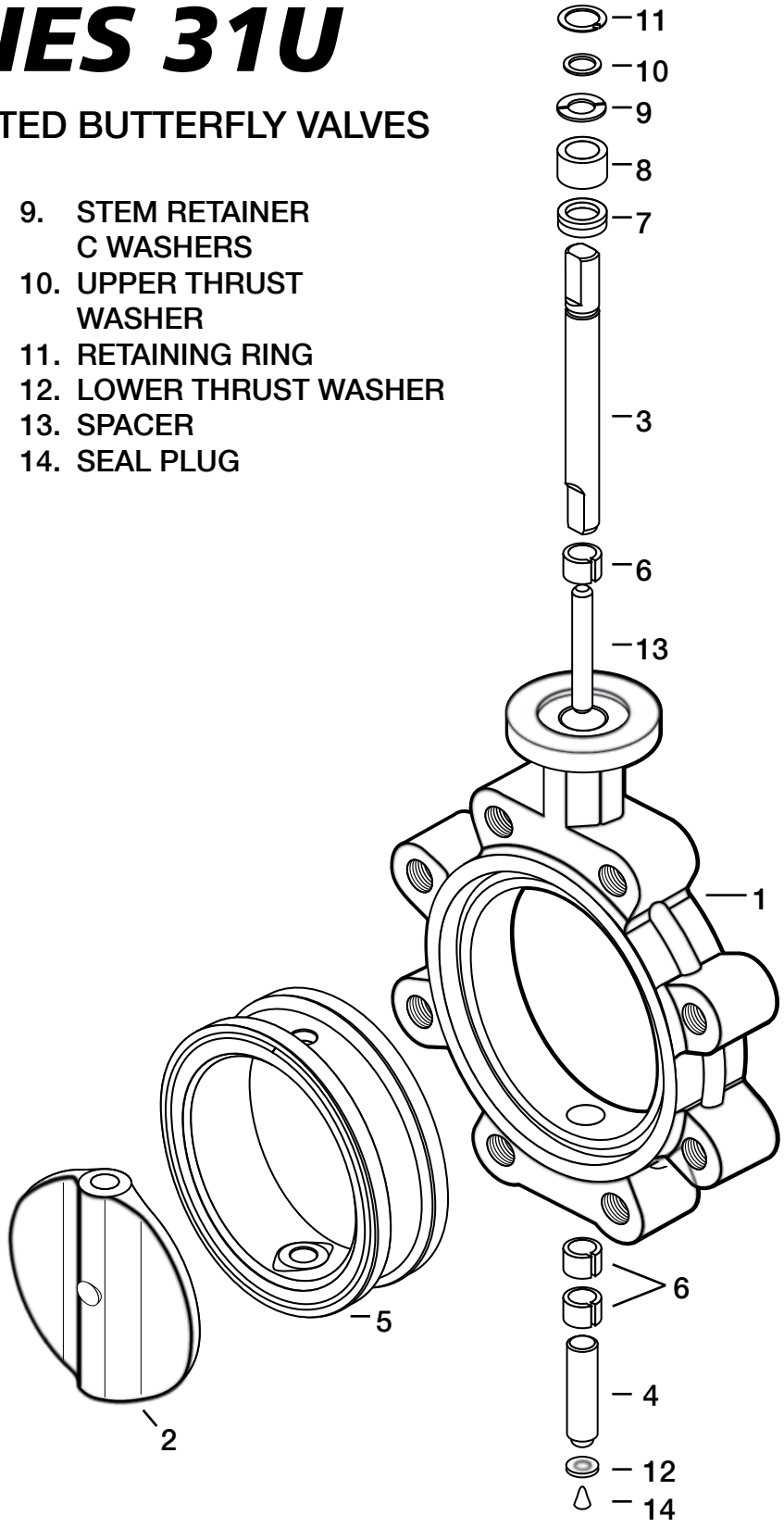
   Note: It is recommended that a torque and seat test be done to confirm all is in order with the maintenance of the valve.

10. Replace the handle, manual gear operator or power actuator on the actuator mounting flange.

SERIES 31U

RESILIENT SEATED BUTTERFLY VALVES

1. BODY
2. DISC
3. UPPER STEM
4. LOWER STEM
5. SEAT
6. BEARING
7. STEM SEAL
8. STEM BUSHING
9. STEM RETAINER C WASHERS
10. UPPER THRUST WASHER
11. RETAINING RING
12. LOWER THRUST WASHER
13. SPACER
14. SEAL PLUG



Appendix G

Disassembly/Assembly Instructions
Series 32/33 Resilient Seated Butterfly Valves

Disassembly –

1. Remove the gear operator or power actuator from the actuator mounting flange.
2. Secure the valve in a horizontal position with the taper-pin nuts facing upward.

CAUTION

Prior to removal of the valve stem the valve disc must be secured and supported to insure it does not drop out of the valve body once the stem is removed. Lay the valve down with two wood blocks located under the disc at the 6 o'clock and 12 o'clock positions making sure the blocks are in close contact with the disc but not supporting the valve.

3. Remove the packing gland by removing the retaining screws and sliding the gland off the top of the stem.
4. Remove bottom plate and thrust bearing to expose bottom of stem.
5. Remove nuts and washers from ends of taper pins and drive taper pins out of the disc. Avoid damaging the disc coating or surface when removing taper-pins.
6. Once taper-pins are removed, drive the stem, bushing, and packing out of the valve body through the top.
7. Remove the disc from the seat, protecting disc edge at all times.
8. Push the seat into an oval shape, and then remove the seat from the body.

Appendix G (Cont'd)

Disassembly/Assembly Instructions
Series 32/33 Resilient Seated Butterfly Valves

Assembly –

1. Replace bottom thrust bearing and plate.
2. Push the seat into an oval and push it into the body with seat stem holes aligned to body stem holes.
3. De-bur taper-pin grooves in the stem.
4. Push stem into stem hole of body until the bottom of the stem is flush with the inner top edge of the seat.

   Note: The end of the stem containing the keyway must be toward the top of the valve body.

5. Install a light coating of silicone or grease on the I.D. of the seat.
6. Insert the disc into the seat by lining up the disc hole with the upper stem hole of the seat.
7. With a downward pressure and rotating the stem back and forth, push the stem until the stem touches the bottom of the body stem hole.

   Note: Make certain that when pushing the stem to the bottom of the body, the taper-pin grooves in the stem line up with the holes in the disc face.

8. Tap the taper-pins into their holes from the large side of the hole, making sure the pins fit tightly in the hole and allow no movement of the stem in the disc.

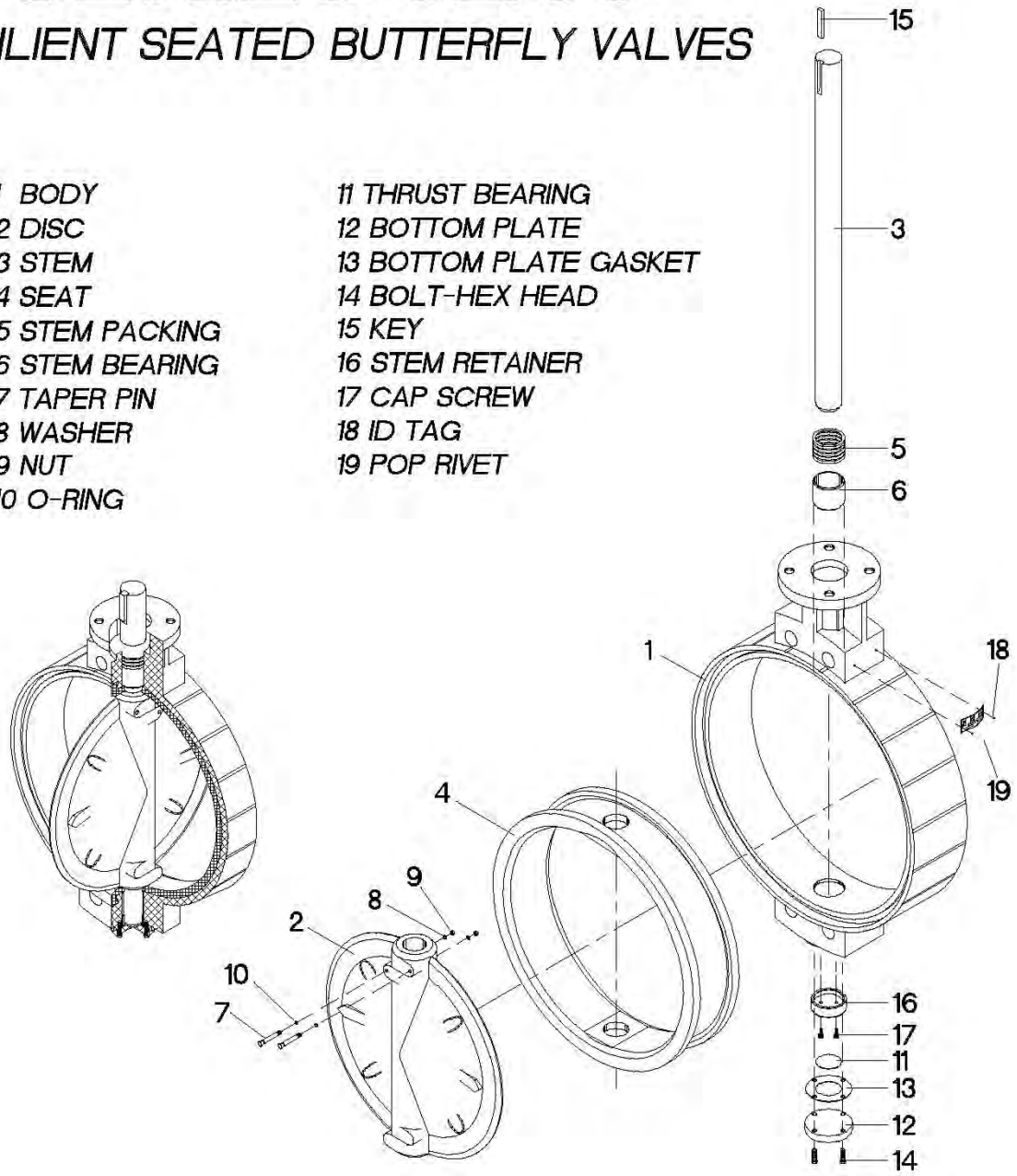
   Note: Ensure that the taper-pin o-rings are in place before completing valve assembly.

9. Replace the washers and nuts on the ends of the taper-pins.
10. Replace bushing, packing, and packing gland, and then tighten the retaining screws snugly.
11. Replace manual gear operator or power actuator on the actuator mounting flange.

SERIES 32/33

RESILIENT SEATED BUTTERFLY VALVES

1 BODY
2 DISC
3 STEM
4 SEAT
5 STEM PACKING
6 STEM BEARING
7 TAPER PIN
8 WASHER
9 NUT
10 O-RING
11 THRUST BEARING
12 BOTTOM PLATE
13 BOTTOM PLATE GASKET
14 BOLT-HEX HEAD
15 KEY
16 STEM RETAINER
17 CAP SCREW
18 ID TAG
19 POP RIVET



Appendix H

Disassembly/Assembly Instructions
Series 35/36 Resilient Seated Butterfly Valves
(Taper Pin Disc/Stem Connection)

Disassembly –

1. Remove the gear operator or power actuator from the actuator mounting flange.
2. Secure the valve in a horizontal position with the taper-pin nuts facing upward.

⚠ **CAUTION**	Prior to removal of the valve stem the valve disc must be secured and supported to insure it does not drop out of the valve body once the stem is removed. Lay the valve down with two wood blocks located under the disc at the 6 o'clock and 12 o'clock positions making sure the blocks are in close contact with the disc but not supporting the valve.

3. Remove the packing gland by removing the retaining screws and sliding the gland off the top of the stem.
4. Remove bottom plate and thrust bearing to expose bottom of stem.
5. Remove nuts and washers from ends of taper pins and drive taper pins out of the disc. Avoid damaging the disc coating or surface when removing taper-pins.
6. Once taper-pins are removed, drive the stem, bushing, and packing out of the valve body through the top.
7. Remove the disc from the seat, protecting disc edge at all times.
8. Push the seat into an oval shape, and then remove the seat from the body.

Note: Valves 54" and larger are provided with the seat bonded to the body and therefore is not easily field replaceable. Please contact your local Bray representative for seat replacement.

Appendix H (Cont'd)

Disassembly/Assembly Instructions
Series 35/36 Resilient Seated Butterfly Valves
(Taper Pin Disc/Stem Connection)

Assembly –

1. Replace bottom thrust bearing and plate.
2. Push the seat into an oval and push it into the body with seat stem holes aligned to body stem holes.

   Note: Valves 54" and larger are provided with the seat bonded to the body and therefore is not easily field replaceable. Please contact your local Bray representative for seat replacement.
3. De-bur taper-pin grooves in the stem.
4. Push stem into stem hole of body until the bottom of the stem is flush with the inner top edge of the seat.

   Note: The end of the stem containing the keyway must be toward the top of the valve body.
5. Install a light coating of silicone or grease on the I.D. of the seat.
6. Insert the disc into the seat by lining up the disc hole with the upper stem hole of the seat.
7. With a downward pressure and rotating the stem back and forth, push the stem until the stem touches the bottom of the body stem hole.

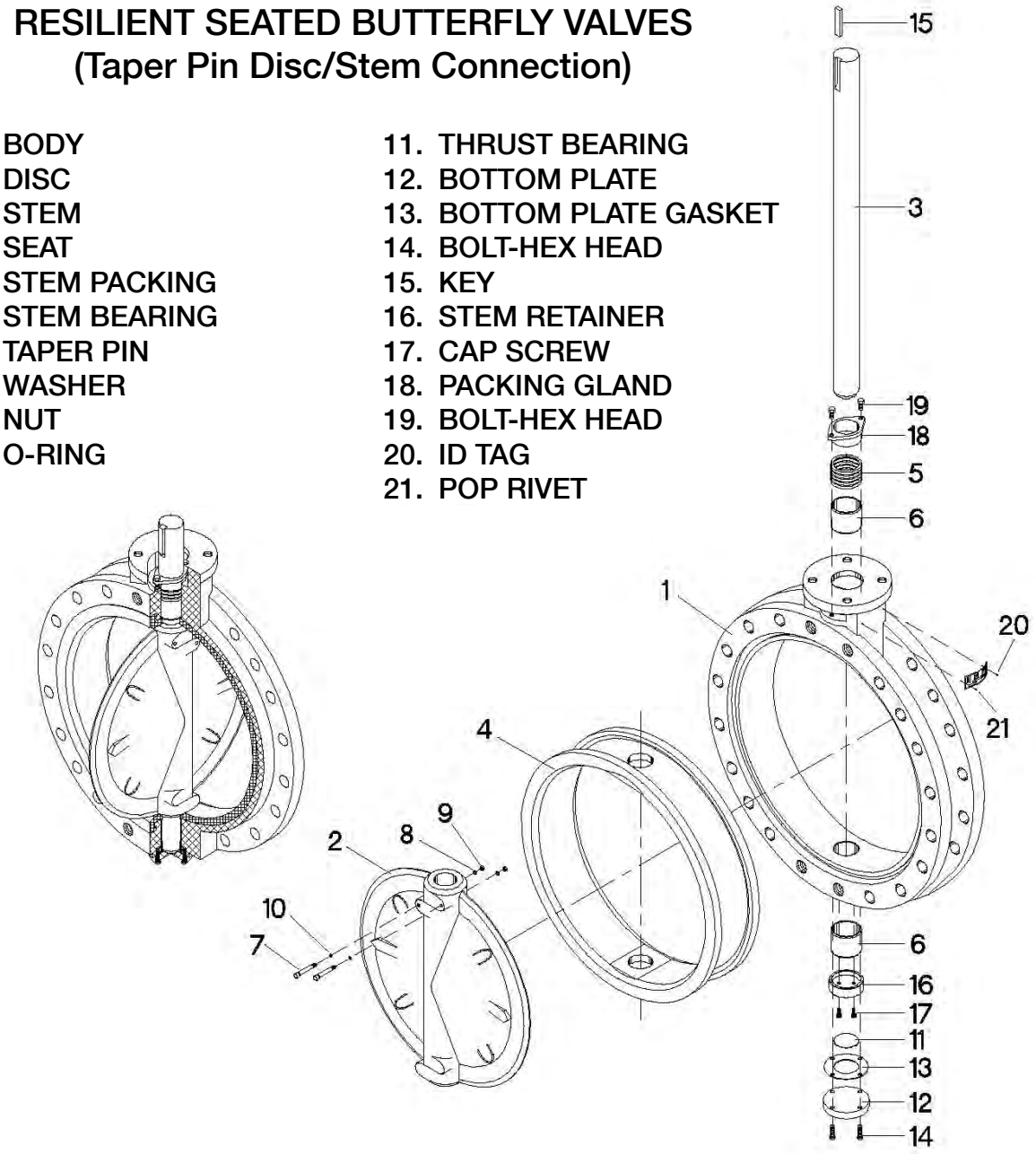
   Note: Make certain that when pushing the stem to the bottom of the body, the taper-pin grooves in the stem line up with the holes in the disc face.
8. Tap the taper-pins into their holes from the large side of the hole, making sure the pins fit tightly in the hole and allow no movement of the stem in the disc.

   Note: Ensure that the taper-pin o-rings are in place before completing valve assembly.
9. Replace the washers and nuts on the ends of the taper-pins.
10. Replace bushing, packing, and packing gland, and then tighten the retaining screws snugly.
11. Replace manual gear operator or power actuator on the actuator mounting flange.

SERIES 35/36

RESILIENT SEATED BUTTERFLY VALVES
(Taper Pin Disc/Stem Connection)

1. BODY
2. DISC
3. STEM
4. SEAT
5. STEM PACKING
6. STEM BEARING
7. TAPER PIN
8. WASHER
9. NUT
10. O-RING
11. THRUST BEARING
12. BOTTOM PLATE
13. BOTTOM PLATE GASKET
14. BOLT-HEX HEAD
15. KEY
16. STEM RETAINER
17. CAP SCREW
18. PACKING GLAND
19. BOLT-HEX HEAD
20. ID TAG
21. POP RIVET



Appendix I
Disassembly/Assembly Instructions
Series 35/36 Resilient Seated Butterfly Valves
(Internal Spline or Keyed Disc/Stem Connection)

Disassembly –

1. Remove the gear operator or power actuator from the actuator mounting flange.
2. Secure the valve in a horizontal position.

⚠ **CAUTION**	Prior to removal of the valve stems the valve disc must be secured and supported to insure it does not drop out of the valve body once the stems are removed. Lay the valve down with two wood blocks located under the disc at the 6 o'clock and 12 o'clock positions making sure the blocks are in close contact with the disc but not supporting the valve.

3. Removal of the lower valve stem:

   a. Remove the bottom plate screws, bottom plate, bottom plate gasket and thrust bearing.

   b. Remove the locking nut from the tie bolt.

   c. Remove the stem retainer.

   d. Secure a hoist to the lower stem (end is imperial threaded).

   e. Then use the hoist to remove the lower stem from the valve body.

   f. Remove the stem bearing.

4. Removal of the upper valve stem:

   a. Remove the packing gland by removing the retaining screws and sliding the gland off the top of the stem.

   b. Secure a hoist to the upper stem (end is imperial threaded).

   c. Then use the hoist to remove the upper stem including the tie bolt from the valve body.

5. Removal of the valve disc:

   a. Remove the wood blocks noted above from below the disc.

   b. Using a rubber hammer, pound one area of the disc (ex. 12 o'clock position) repeatedly until the disc clears the face of the valve body.

Appendix I (Cont'd)
Disassembly/Assembly Instructions
Series 35/36 Resilient Seated Butterfly Valves
(Internal Spline or Keyed Disc/Stem Connection)

Disassembly –

6. Removal of packing and bearings:
    a. Remove the stem packing.
    b. Use a slotted screwdriver to carefully remove the upper and lower stem bearings.
7. Removal of the valve seat:

Note: Valves 54" and larger are provided with the seat bonded to the body and therefore is not easily field replaceable. Please contact your local Bray representative for seat replacement.

WARNING

a. Set the valve body in an upright position and secure it in a floor vice capable of handling the weight of the valve body and seat.

Note: Be sure to not clamp the seat in the vice.

b. Insert a slotted screwdriver into the space between the body and the seat on the face of the valve at the 12 o'clock position.

c. Carefully leverage the seat away from the body.

d. Push the seat into an oval shape and remove the seat from the body.

Assembly –

1. Installation of the valve seat:

Note: Valves 54" and larger are provided with the seat bonded to the body and therefore is not easily field replaceable. Please contact your local Bray representative for seat replacement.

WARNING

a. Set the valve body in an upright position and secure it in a floor vice capable of handling the weight of the valve body and seat.

Note: Be sure to not clamp the seat in the vice.

b. Check to assure the interior surface of the valve body is clean.

c. Install a light coating of silicone lubricant on the interior surface of the valve body.

d. Push the seat into an oval and push it into the body with seat stem holes aligned to the body stem holes.

Appendix I (Cont'd)
Disassembly/Assembly Instructions
Series 35/36 Resilient Seated Butterfly Valves
(Internal Spline or Keyed Disc/Stem Connection)

Assembly –

2. Installation of the valve disc:

   Note: Before installing the disc, check to assure the upper and lower stems are matched to the upper and lower stem holes in the disc.

   a. With the valve still in the vice in a vertical position, hoist the upper stem with the splined end or the double keyed end pointing upward.

   b. Push the upper stem into the stem hole of the upper body until the bottom of the stem exceeds the upper stem hole of the seat by 20-50 mm.

   c. Apply a light coating of silicone or grease on the I.D. of the seat.

   d. Insert the disc into the seat with the splined end or the double keyed end up.

   e. Push the disc into the seat while inserting the upper stem into the upper stem hole in the disc.

   f. Adjust the disc to assure the lower stem hole of the disc is properly aligned with the lower body stem hole.

3. Installation of the lower stem:

   a. Close the valve so that the disc is inside the edge of the seat.

   b. Carefully place the valve in a horizontal position assuring that there is no damage to the body and disc coatings and disc edge.

   c. Insert the stem bearing into the bottom stem hole of the body.

   d. Insert the lower stem into the body and disc.

      Note: The cone-shaped end of the lower stem should be toward the center of the disc.

Appendix I (Cont'd)
Disassembly/Assembly Instructions
Series 35/36 Resilient Seated Butterfly Valves
(Internal Spline or Keyed Disc/Stem Connection)

Assembly –

4. Installation of the upper stem:

CAUTION	a. Hoist the valve to an angle and secure it (be careful not to go to high so the lower stem does not drop out).

   b. Remove the upper stem from the valve.

   c. Screw the tie bolt with lock nut to the splined or the double keyed end of the upper stem, tighten the lock nut and insert the upper stem into the valve with the tie bolt end first.

   Note: The tie bolt will go through the disc and reach to the bottom of the valve

   Note: During this step, the keyway of the upper stem should be vertical to the front face of the valve.

5. Installation of packing and bearings (upper valve stem):

   a. Insert the stem bearing into the top hole of the body followed by the stem packing and packing gland follower.

   b. Use two hexagon bolts to fasten the packing gland.

6. Installation of packing and bearings (lower valve stem):

   a. Insert the stem retainer into the bottom hole of the body using a nut to fasten it.

   b. Install the locking nut on the tie bolt.

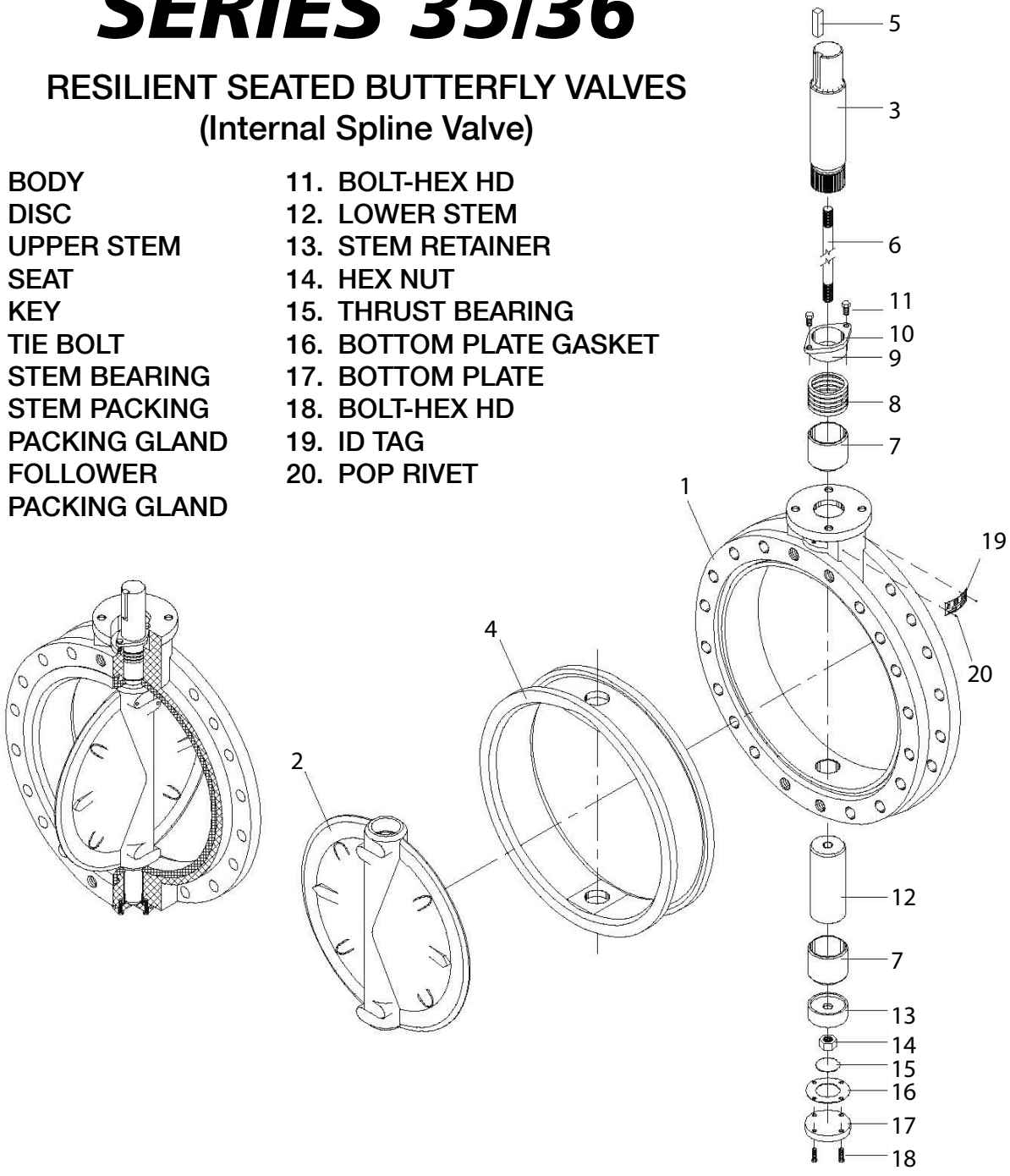
   c. Install the thrust bearing, bottom plate gasket and bottom plate follower.

   d. Use four hexagon bolts to fasten the bottom plate tightly.

SERIES 35/36

RESILIENT SEATED BUTTERFLY VALVES
(Internal Spline Valve)

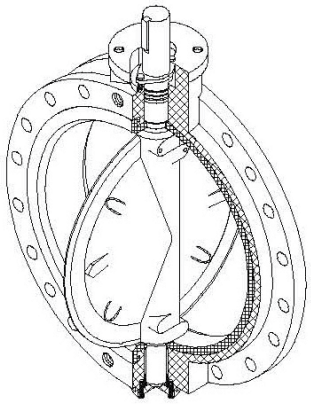
1. BODY
2. DISC
3. UPPER STEM
4. SEAT
5. KEY
6. TIE BOLT
7. STEM BEARING
8. STEM PACKING
9. PACKING GLAND FOLLOWER
10. PACKING GLAND
11. BOLT-HEX HD
12. LOWER STEM
13. STEM RETAINER
14. HEX NUT
15. THRUST BEARING
16. BOTTOM PLATE GASKET
17. BOTTOM PLATE
18. BOLT-HEX HD
19. ID TAG
20. POP RIVET

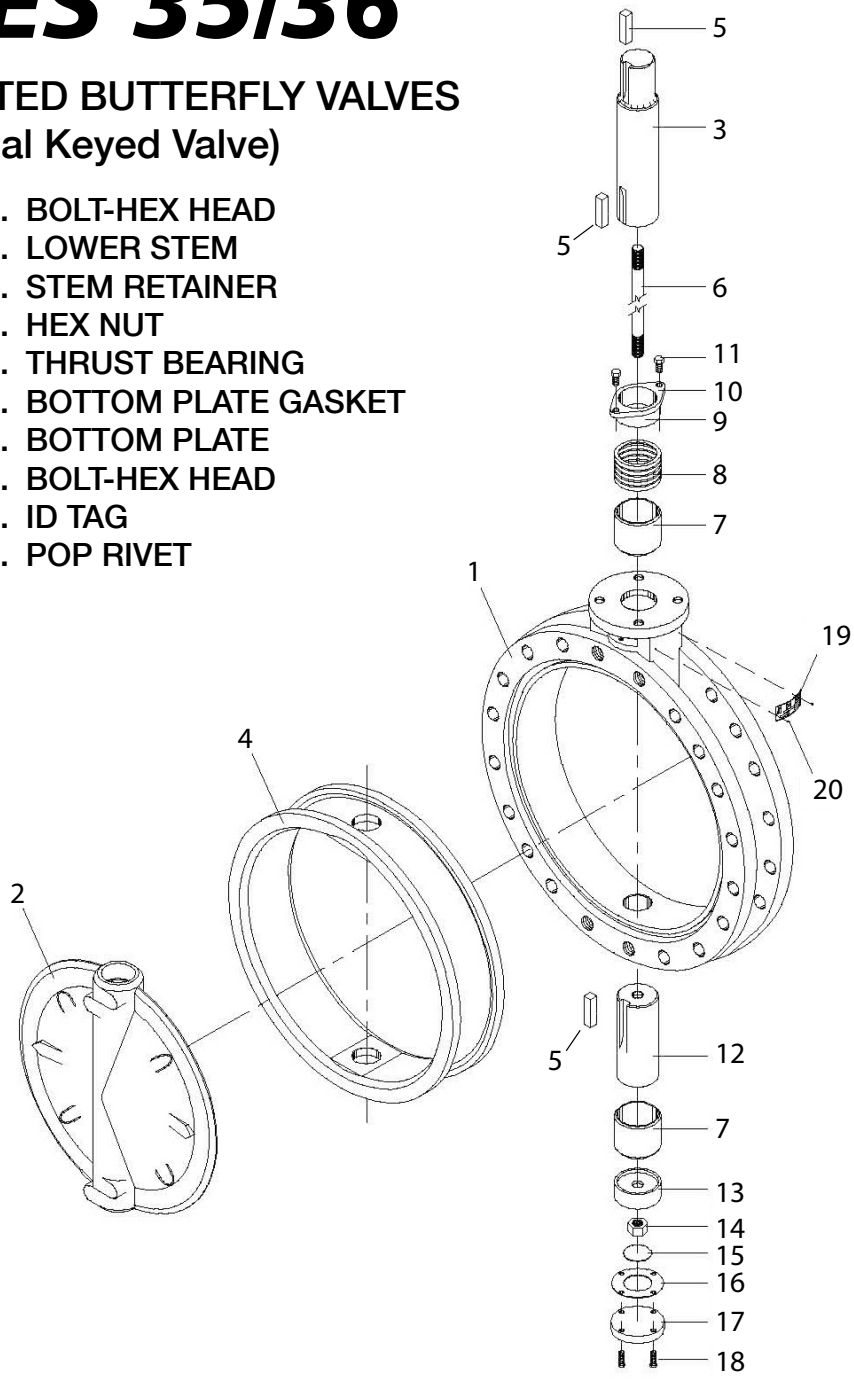


SERIES 35/36

RESILIENT SEATED BUTTERFLY VALVES
(Internal Keyed Valve)

1. BODY
2. DISC
3. UPPER STEM
4. SEAT
5. KEY
6. TIE BOLT
7. STEM BEARING
8. STEM PACKING
9. PACKING GLAND FOLLOWER
10. PACKING GLAND
11. BOLT-HEX HEAD
12. LOWER STEM
13. STEM RETAINER
14. HEX NUT
15. THRUST BEARING
16. BOTTOM PLATE GASKET
17. BOTTOM PLATE
18. BOLT-HEX HEAD
19. ID TAG
20. POP RIVET





Appendix J

Disassembly/Assembly Instructions
Series 36H Resilient Seated Butterfly Valves

Disassembly –

1. Remove the gear operator or power actuator from the actuator mounting flange.
2. Secure the valve in a horizontal position with the taper-pin nuts facing upward.

⚠ **CAUTION**	Prior to removal of the valve stem the valve disc must be secured and supported to insure it does not drop out of the valve body once the stem is removed. Lay the valve down with two wood blocks located under the disc at the 6 o'clock and 12 o'clock positions making sure the blocks are in close contact with the disc but not supporting the valve.

3. Remove the packing gland by removing the retaining screws and sliding the gland off the top of the stem.
4. Remove bottom plate and thrust bearing to expose bottom of stem.
5. Remove nuts and washers from ends of taper pins and drive taper pins out of the disc. Avoid damaging the disc coating or surface when removing taper-pins.
6. Once taper-pins are removed, drive the stem, bushing, and packing out of the valve body through the top.
7. Remove the disc from the seat, protecting disc edge at all times.

Note: Valve is provided with the seat bonded to the body and therefore is not easily field replaceable. Please contact your local Bray representative for seat replacement.

Appendix J (Cont'd)

Disassembly/Assembly Instructions
Series 36H Resilient Seated Butterfly Valves

Assembly –

1. Replace bottom thrust bearing and plate.
2. De-bur taper-pin grooves in the stem.
3. Push stem into stem hole of body until the bottom of the stem is flush with the inner top edge of the seat.

   Note: The end of the stem containing the keyway must be toward the top of the valve body.

4. Install a light coating of silicone or grease on the I.D. of the seat.
5. Insert the disc into the seat by lining up the disc hole with the upper stem hole of the seat.
6. With a downward pressure and rotating the stem back and forth, push the stem until the stem touches the bottom of the body stem hole.

   Note: Make certain that when pushing the stem to the bottom of the body, the taper-pin grooves in the stem line up with the holes in the disc face.

7. Tap the taper-pins into their holes from the large side of the hole, making sure the pins fit tightly in the hole and allow no movement of the stem in the disc.

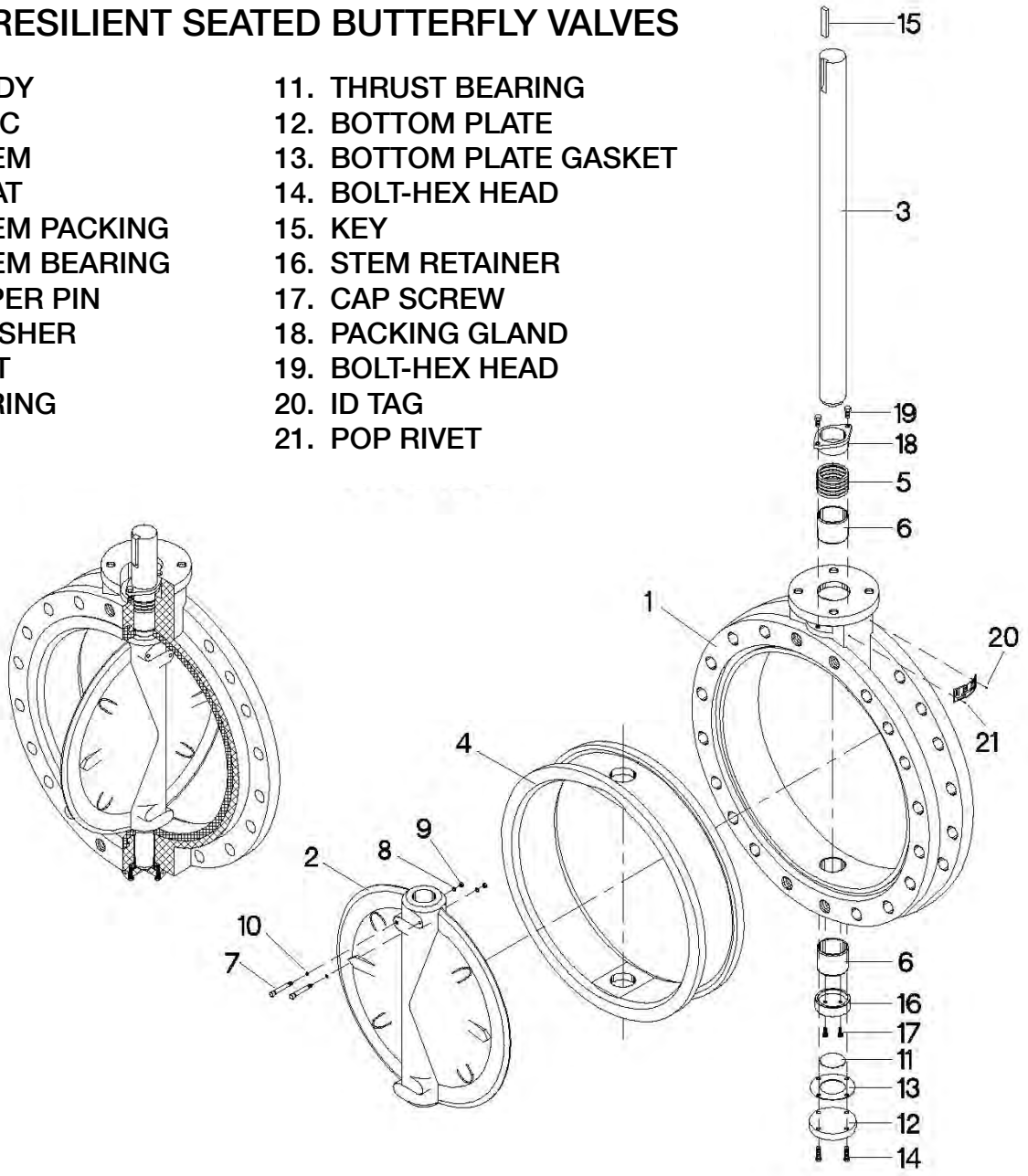
   Note: Ensure that the taper-pin o-rings are in place before completing valve assembly.

8. Replace the washers and nuts on the ends of the taper-pins.
9. Replace bushing, packing, and packing gland, and then tighten the retaining screws snugly.
10. Replace manual gear operator or power actuator on the actuator mounting flange.

SERIES 36H

RESILIENT SEATED BUTTERFLY VALVES

1. BODY
2. DISC
3. STEM
4. SEAT
5. STEM PACKING
6. STEM BEARING
7. TAPER PIN
8. WASHER
9. NUT
10. O-RING
11. THRUST BEARING
12. BOTTOM PLATE
13. BOTTOM PLATE GASKET
14. BOLT-HEX HEAD
15. KEY
16. STEM RETAINER
17. CAP SCREW
18. PACKING GLAND
19. BOLT-HEX HEAD
20. ID TAG
21. POP RIVET










Bray CONTROLS

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OM-RSBFV-001 08-2012

11.5 - C1 – CHAMPION CHECK VALVE

CHAMPION VALVES INC.

MODEL CVR and CV
WAFER CHECK VALVE
RETAINERLESS DESIGN

APPLICATION AND OPERATION

The Champion Valves, Inc. ("CVI") Wafer Check valve is a self-operating check valve designed to prevent the backflow of gas or liquid media. Initial opening of the Wafer Check's discs begins when the upstream pressure exceeds the downstream pressure and the effective torque of the spring. This pressure is called the "cracking" pressure. Once the Wafer Check's discs open, flow velocity determines the position and stability of the discs.

If the flow velocity upstream of the Wafer Check decreases and/or stops, the springs force the discs to a closed position. Ideally, the discs will be fully closed just prior to flow reversal, thus alleviating the potential for water hammer.

LIMITATIONS AND PRECAUTIONS

Wafer Check valves are not recommended for the following service conditions.

- Pulsating flows
- Service condition requiring a "Full Port" opening
- Installation directly to a butterfly valve or other piping accessory that may interfere with the opening or closing of Wafer Check's discs
- Vertical Flow **DOWN** without prior Factory Approval

The following precautions should be taken to insure long service life of Wafer Check valves.

- Accurate sizing of Wafer Checks is crucial to ensure an acceptable pressure drop and a long service life.
- Flow velocities should be in the following ranges:

MEDIA	FLOW RATE
Liquid	3 to 11 feet/second
	.91 to 3.35 m/second
Gas	20 to 250 feet/second
	6.1 to 76.2 m/second

P.O. BOX 12901, WILMINGTON, NC 28405
PHONE: 910-794-5547 - FAX: 910-794-5581
WEBSITE: WWW.WAFERCHECK.COM

- A minimum of 5 (five) pipe diameters should be maintained between the Wafer Check and likely causes of turbulence (i.e. pump discharge, reducers, elbows, and tees, etc.).

INSTALLATION

1. Remove the valve from carton or packing skid.
2. The protective rust proof coating on the internal parts of steel or cast iron valves should be removed by brushing out with any standard petroleum solvent (Varsol, Kerosene), and air dried. Insure internal parts operate freely.
3. Stainless Steel or Bronze valves need only to be wiped clean and installed.
4. In horizontal flow installation, the hinge pin must be vertical.
5. Insert the valve between two companion flanges of the same series as the valve and place gaskets on flange faces. The arrow on the valve or name plate indicating direction of flow should coincide with line flow. Install studs through companion flanges and tighten, using standard industry practice.
6. In liquid service we recommend valve be installed at least five (5) pipe diameters downstream from a pump discharge and/or other pipe fittings for maximum service life.

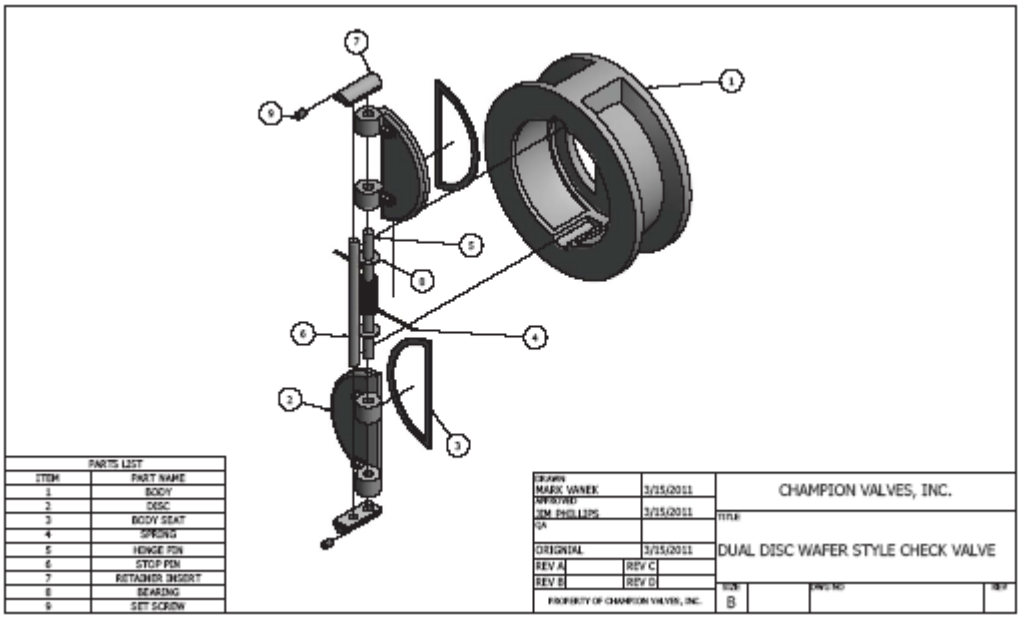
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Phone: 910-794-5547 - Fax: 910-794-5581
Website: www.waferCheck.com

CHAMPION VALVES INC.

MODEL CVR

ASSEMBLY AND DISASSEMBLY





NOTE: EYE PROTECTION IS RECOMMENDED WHEN DISASSEMBLING AND ASSEMBLING WAFER CHECK VALVES.

DISASSEMBLY

Disassembly and assembly of the Wafer Check valve is moderately simple using a hammer, allen-wrench, bronze round nose punch and Locktite thread sealant and the following instructions:

Please use caution when removing the stop or hinge shaft. Preset spring(s) may cause serious injury when tension is released.

1. Lay the body down with downstream side facing upward.

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2. Remove retainer insert set screws with allen head wrench.
3. Place two 4” x 4” boards on the flanges directly opposite of each other.
4. Carefully, without changing the distance between the two boards, set them on a hard surface.
5. Turn valve body and set the valve body on the two boards over so that the upstream side is facing upward. Make sure that the discs hang down without any interference with the boards.
6. Remove the discs from the valve by placing a brass round nose punch on the left disc’s hinge and gently tap on the punch with a hammer. Alternate this process between the left and right discs’ hinge until the discs fall free from the valve body.
7. Mark the retainer insert and valve body to insure the inserts are replaced in the same side of the valve body.
8. Remove the retainer inserts from the hinge and stop pins.
9. While maintaining pressure on spring with hand, remove the hinge pin from the discs’ hinge lugs, and spring. Release spring.

ASSEMBLY

1. Lay the body down with downstream side facing upward.
2. Lay the discs on a hard surface with disc seating surface facing downward and the disc hinge lugs together.
3. Slide hinge pin through the disc’s hinge lugs
4. Rotate the forward spring leg clockwise, with spring legs pointing downward.
5. Place wound spring between the discs on the center post
6. While maintaining pressure on spring with hand, insert hinge pin through the remaining spring(s), discs’ hinge lugs, and thrust bushing. Release spring.
7. Attach the retainer inserts to the hinge and stop pin.
8. Insert discs assembly into valve body and alternately, tap the retainer inserts into the valve body.
9. Move the valve to a position so that the hinge pin is vertical.
10. Open and close the discs to make sure there is no interference between the elastomer seat and discs’ movement.
11. If there is interference on valves with a Teflon or elastomer seat, lower the Teflon or or elastomer seat height evenly using 300 grit sandpaper, and follow the assembly instructions.
12. Apply Locktite thread sealant to retainer set screw and screw retainer insert set screw into valve body.

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Website: www.waferchecK.com

CHAMPION VALVES INC.

MODEL CV

ASSEMBLY AND DISASSEMBLY



NOTE: EYE PROTECTION IS RECOMMENDED WHEN ASSEMBLING AND DISASSEMBLING WAFER CHECK VALVES.

Disassembly and assembly of the Wafer Check valve is moderately simple using an open end wrench, Teflon tape or media compatible thread sealant and the following instructions:

DISASSEMBLY

1. Lay the body down with downstream side facing upward.
2. Remove the NPT retainer plugs from the valve body
3. Remove the stop pin.
4. While maintaining pressure on spring with hand, remove hinge pin through the remaining spring(s), discs' hinge lugs, and thrust bushing. Release spring.
5. Remove the spring(s) and discs.

ASSEMBLY

1. Lay the body down with downstream side facing upward.
2. Lay the discs inside the body, sealing surface down, with the disc hinge lugs together.
3. Place thrust bushings between the body and outer disc lug.
4. Rotate the forward spring leg clockwise, with spring legs pointing downward.
5. Place wound spring(s) between the discs on the center post
6. While maintaining pressure on spring(s) with hand, insert hinge shaft through the body, thrust bushing, discs' hinge lugs, and spring(s). Release spring(s).
7. Wrap retainer(s) and body pipe plugs with 6 rounds of Teflon tape. Screw retainer(s) into body and tighten.
8. Move hinge shaft to insure that it is free from binding on retainers.

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CHAMPION VALVES, INC. BONDS AND VULCANIZES THE ORIGINAL ELASTOMER SEAT TO THE VALVE BODY. CHAMPION VALVES DOES NOT RECOMMEND THAT THE ELASTOMER SEAT BE REPLACED, EXCEPT BY CHAMPION VALVES. CHAMPION VALVES DOES NOT WARRANT NOR SHALL CHAMPION VALVES, INC. BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES.

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11.6 - C2-1 – CHEMLINE ELECTRIC ACTUATOR

CHEMLINE Plastics Limited

Your Pipeline To Quality Valves, Strainers, Flowmeters and Controls

55 Guardsman Road
Thornhill, Ontario
L3T 6L2
Canada
Tel: 905-889-7890
Fax: 905-889-8553

INSTALLATION AND MAINTENANCE INSTRUCTIONS
For Chemline Q-Series Electric Actuator

General:

Chemline Q-Series reversing electric actuators feature capacitor run motors and permanently lubricated gear train. Standard units can provide up to 300 in-lbs. of output torque.

Q-Series models feature Nema-4X enclosures as standard and are available in 12 & 24VDC; 12 & 24VAC; 115 & 220VAC voltages.

Standard models are equipped with integral thermal overload protection (AC models) with automatic reset, independently adjustable limit switches, declutchable manual override with position indicating beacon and Zytel FR-50 glass-reinforced housing with stainless steel trim and ISO bolt circle.

Installation:

Refer to **ASSEMBLY DRAWING QACT rev 0.** And proceed as follows:

1. Loosen handle set screw (#35).
2. Remove manual override handle (#34).
3. Loosen cover screws (#33).
4. Remove cover (#27) and cover seal (#28).
5. Install conduit fitting (1/2" NPT) to actuator base (#1).
6. Make electrical connections to terminal block (#8&9) as shown on wiring schematic located inside the cover. There is a green screw on the actuator base plate (#7) for grounding per various electrical codes. NO SCREWS SHOULD BE LOOSENED EXCEPT THOSE ON THE TERMINAL STRIP. Electrical requirements are as per the chart below:

SIZE	TORQUE	115VAC		220VAC		12VDC		24VDC		12VAC		24VAC		CYCLE TIME 90 º	WEIGHT
	IN-LBS	AMP	DUTY	AMP	DUTY	AMP	DUTY	AMP	DUTY	AMP	DUTY	AMP	DUTY	(SEC)	(LBS)
QA	150	.50	100%	.8	75%	2.0	75%	4.0	75%	2.0	75%	4.0	75%	5	3.5
QB	300	.75	75%	.8	75%	2.0	75%	4.0	75%	2.0	75%	4.0	75%	5	3.5

Installation & Maintenance Instructions Q-Series Actuators cont.

7. SEVERAL PARTS MAY GET MISALIGNED OR LOOSE DURING TRANSIT. If the motor doesn't turn upon power-up, loosen all 4 motor top cap screws, then manually rotate the top spindle (rotor) and move motor from side to side as power is applied. Once the motor is turning, maintain it in position and tighten screws completely while cycling motor open and closed. This will guarantee motor's free motion when the cover is replaced. The motor should not require any more adjustment.

8. Install cover screws (#33) and tighten securely.

9. Install the manual override handle (#34) and handle set screw (#35).

10. Unit is now ready for operation. All units are completely calibrated prior to shipment. No internal adjustment should be required.

Troubleshooting

Problem	Cause	Action
The actuator does not operate.	The power source is off.	Check/turn on the power source.
	Wrong or low supply voltage to the actuator.	Check voltage with a tester and set as specified.
	The wiring is incorrect.	Check wiring against the supplied diagram (inside actuator cover).
	The motor/brake may be seized. (See installation note #7.)	Remove brake and/or loosen motor cap bolts and power actuator. Tighten bolts when proper alignment is found.
	Internal bolts may be loose.	Check/tighten all visible internal bolts.
	Travel stop cams may be loose/misadjusted.	Check/tighten/adjust all travel stop cam setscrews (2 per cam).
	Not enough operating torque.	Consult with Chemline technical staff.
	An obstruction may be in the valve.	Remove/check the valve.
The actuator operates, but the valve doesn't open or close.	The drive coupling is broken or disconnected.	Check/replace the coupling.
	The manual override is engaged or backwards.	See manual override operation below.
	The stem of the valve is broken.	Remove/check the valve.
Option doesn't function or functions erratically.	Option is misadjusted.	Adjust as per the appropriate maintenance manual or option header below.

Installation & Maintenance Instructions Q-Series Actuators cont.

Manual Override Operation

Depress the override handle (#34) and rotate within labeled limits as indicated by arrows.
To re-engage simply rotate actuator shaft (#16) within arrows until handle moves up and re-engages.
If actuator still does not respond properly, depress override handle and turn 180 degrees to re-engage in the correct quadrant.

Setting Limit Switches

Open Travel Limit Switch - (Top Switch #14) Using-declutchable manual override, move the valve into a full open position, loosen cam set screws (#22) on top cam (#21) with a 5/64" allen key and rotate cam into limit switch (#14) arm until a click is heard. This designates that the switch circuit has opened and defines a full open position. Tighten cam set screws (#22) on cam (#21).

Closed Limit Switch - (Bottom Switch #14) Using declutchable manual override, move the valve to a full closed position, loosen cam set screws (#22) on bottom cam (#21) with a 5/64" allen key and rotate cam into limit switch (#14) arm until a click is heard. This designates that the switch circuit has opened and defines a full closed position. Tighten cam set screws (#22) on cam (#21).

Adjusting the Cycle Rate Regulator

There are 2 potentiometers for both "on" time and "off" time. With both pots in the extreme CCW position, the unit will operate "on" for 1 second and be "off" for 1 second, etc. until the unit is either fully open or fully closed. To lengthen the cycle time, adjust the CRR module pots clockwise until you have the desired cycle time. However, due to the standard cycle length the adjustment of the "on" pot is limited to the standard cycle time. The CRR module is capable of 1-100 second delays in either "on" or "off" positions.

Installing a Heater/Thermostat

Open cover. Install heater into threaded hole on base plate closest to motor module. If no hole is present, drill hole in base plate about 1" towards cams from terminal side and ½" from motor using #21 drill bit. Tap hole using 10/32 tap. Thread heater into hole. Install heater lead in terminal #12. Install thermostst lead (one with shrink tubing on it) in terminal #13. Wire tie loose wiring. Test by applying power.

Installing a Heater/Thermostat on 4-20 mA board

Open cover. Install heater into threaded hole on base plate closest to motor module. If no hole is present, Drill and tap as above. Thread heater into hole. Install heater leads to J1 on QM1-2 with thermostat going to # 2 and heater going to #3. Wire tie loose wiring. Test by applying power.

Installation & Maintenance Instructions Q-Series Actuators cont.

Installing/Adjusting Centre-Off

With unit in closed position, mount 2 centre-off switches directly on top of standard switches. Install negative lobe came on shaft on top of standard cams. Set cams so that the top cam trips the switch lever traveling counterclockwise and the botton cam trips the switch lever traveling clockwise. Wiring to the extra switches should be opposite to those of the regular switches.
Note: Bottom cam should "just trip" its switch and the top cam should "just miss tripping" its switch. Run unit 90 degrees clockwise and adjust bottom cam to allow 180 degree rotation. Wire unit per drawing # CENT-OFF.

Installing 2-Wire Control with a Relay

Note: all connections to the terminal strip are done on the back side, reference drawing 0018EL.
Connect #1 on relay to #3 on the terminal strip (blue wire).
Connect #3 on relay to #2 on the terminal strip (white wire).
Connect #5 and 7 on relay to #14 on the terminal strip (white wire).
Connect #8 on relay to #15 on the terminal strip (blue wire).
Jump #1 and 16 on the terminal strip (blue wire).
Apply/wire 115VAC to # 1 and 14 on the terminal strip.
Install a customer-supplied switch to #15 and 16 on the terminal strip.

Installing Feedback Potentiometer

Install potentiometer bracket. Install main gear face up on outer shaft. Install potentiometer and gear, engaging onto larger gear drive. Wire as follows: White w/black strip from #1 on pot. to #16 on the terminal strip. Brown w/white strip from #3 on pot. to #14 on the terminal strip. Using multimeter set at 2k ohms, calibrate potentiometer with leads from meter to #15 and 16 on the terminal strip with actuator in the closed position. Multimeter should read between 95 – 100 ohms. With actuator in the open position, multimeter should also read between 95 – 100 ohms.

Installing Mechanical Brake

Remove handle and cover.
Loosen 2 motor module screws diagonally across from each other.
Install bracket with tabs up to bring the face of the bracket to its lowest point.
Install coupling over motor shaft at its lowest point, but do not bottom out on top of the motor.
Tighten set screws with .050" allen key.
Install brake mechanism. It should sit flush on the bracket and show engagement with the coupling.
Remove motor leads A and B from capacitor (on wiring diagram inside cover).
Install silver piggyback connectors on capacitor.
Install motor leads and brake leads (motor leads should be installed on the same side from where they were removed).
Wire tie loose wiring. Cycle unit and make necessary adjustments.

Installation & Maintenance Instructions Q-Series Actuators cont.

Installing Extra Limit Switches

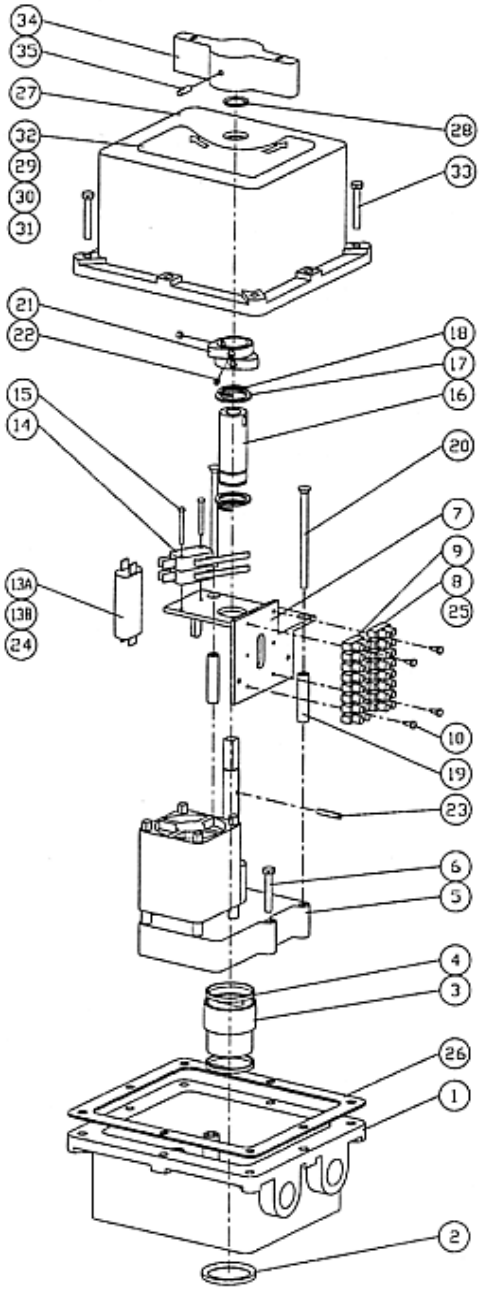
Remove cover.
Remove limit switch screws and add the extra limit switch(es) on top of the standard switches.
Install wiring harness. Harness runs from switches under motor and into terminal strips.
Wire 1 extra (bottom) switch as follows: Pink = common on switch to #6 on terminal strip.
Purple = normally closed on switch to #7 on terminal strip.
Blue = normally open on switch to #8 on terminal strip.
(Set with closed limit switch).
Wire 2nd extra (top) limit switch as follow: Brown = common on switch to #9 on terminal strip.
Green = normally closed on switch to #10 on terminal strip.
Orange = normally open on switch to #11 on terminal strip.
(Set with open limit switch).
Install and set extra cams to trip before the standard limit switches in both open and closed positions.
Wire tie loose wiring. Test by cycling unit.

Maintenance:

Q-Series actuators are manufactured with factory lubricated gear case and gear box. In most cases, this lubricant should never have to be replenished. Please consult the factory if deemed necessary.

The following spare parts should be kept on hand.
1 - Limit Switch (14) rated 15.1 Amps at 125/250/277 VAC; ½ amp at 125VDC; ¼ amp at 250VDC.
1 - Capacitor (13A) or (13B)

CAUTION: Before any maintenance is performed and to prevent ignition of hazardous atmospheres, and reduce the chance of electrical shock, NEVER remove actuator cover while circuits are live. If mounted unit is installed other than straight up, the actuator should be supported individually in order to prevent pipe/valve stresses and loosening up of fasteners.



ITEM	QTY	DESCRIPTION
1	1	BASE
2	1	BASE SEAL
3	1	OUTPUT COUPLING
4	2	COUPLING GASKET
5	1	MOTOR
6	2	MOTOR SCREW
7	1	BASE PLATE
8	1	TERMINAL BLOCK 1-8
9	1	TERMINAL BLOCK 9-16
10	4	TERMINAL BLOCK SCREW
13A	1	4.2 MFD CAPACITOR - A94
13B	1	6.7 MFD CAPACITOR - B94
14	2	LIMIT SWITCH
15	2	LIMIT SWITCH SCREW
16	1	OUTER SHAFT
17	2	OUTER SHAFT GASKET
18	2	RETAINING RING
19	2	STANDOFF
20	2	BASE PLATE SCREW
21	2	CAM
22	4	CAM SCREW
23	1	PIN
24	1	2 PC HARNESS
25	1	4 PC HARNESS
26	1	BASE GASKET
27	1	COVER
28	1	COVER SEAL
29	1	WIRE DIAGRAM LABEL
30	1	OPTION LABEL
31	1	QM II LABEL
32	1	OVERRIDE LABEL
33	8	COVER SCREW
34	1	HANDLE
35	1	HANDLE SCREW
36	1	QM II BOX

NOTE:
1. LOCATE ITEM 29 & 30 ON INSIDE SURFACES OF COVER (ITEM 27).
2. LOCATE ITEM 31 ON OUTSIDE BACK SURFACE OF COVER (ITEM 27).

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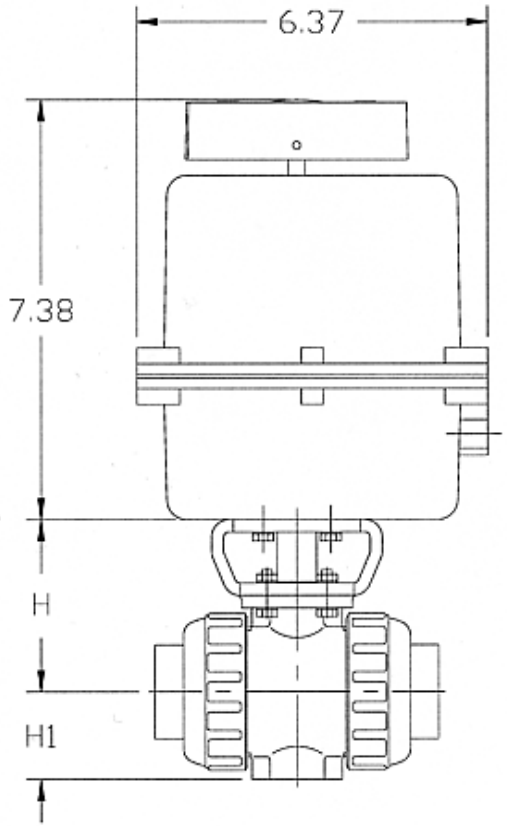
	NAME	DATE
DR	D CAMERON	9/13/01
APPD	DAVE HURLEY	9/13/01
PROD	LEO LESTER	9/13/01
WO#/SO#		
FILE	ACAD11/QM	

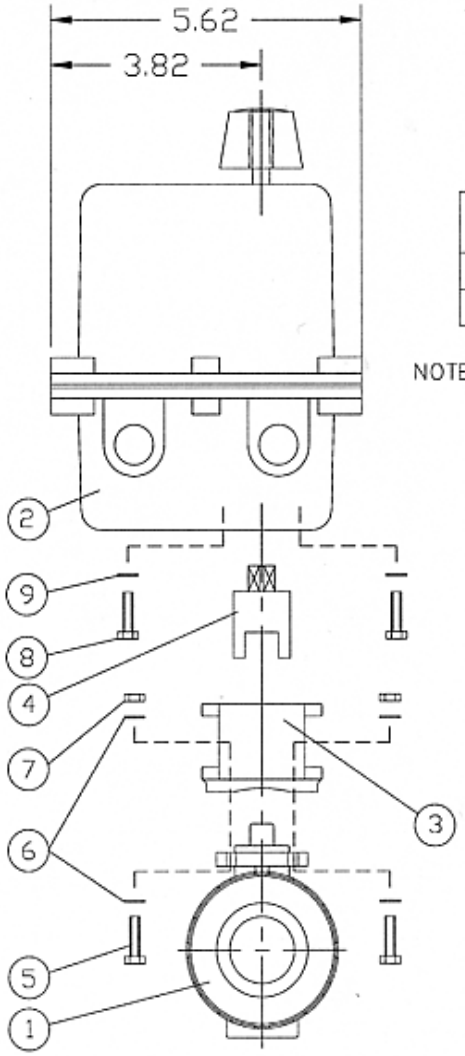
Chemline Plastics Inc.

Q-Series
Exploded View

SIZE	DWG. NO.	REV
A	QACT	0

SCALE NTS SHEET 1 OF 1





UNIT: INCH

VALVE SIZE	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
H	2.76	3.01	3.29	3.64	3.98	4.43
H1	1.14	1.38	1.54	1.85	2.17	2.60

NOTE. The shape and appearance of assembly differ a little with nominal size compared to this drawing.

ITEM	DESCRIPTION	MATERIAL	QTY
9	FLAT WASHER (M6.0)	STAINLESS STEEL	4
8	BOLT (M6.0x1-16LG)	STAINLESS STEEL	4
7	NUT (FOR 1/2" THRU 1-1/4" : M5.0x.8) (FOR 1-1/2" THRU 2" : M6.0x1)	STAINLESS STEEL	4
6	FLAT WASHER (FOR 1/2" THRU 1-1/4" : M5.0) (FOR 1-1/2" THRU 2" : M6.0)	STAINLESS STEEL	8
5	BOLT (FOR 1/2" THRU 1-1/4" : M5.0x.8-16LG) (FOR 1-1/2" THRU 2" : M6.0x1-20LG)	STAINLESS STEEL	4
4	COUPLING	STAINLESS STEEL 303	1
3	MOUNTING BRACKET	PPG	1
2	ACTUATOR SERIES 94	ZYTEL	1
1	BALL VALVE TYPE 21	PVC,CPVC,PP,PVDF	1

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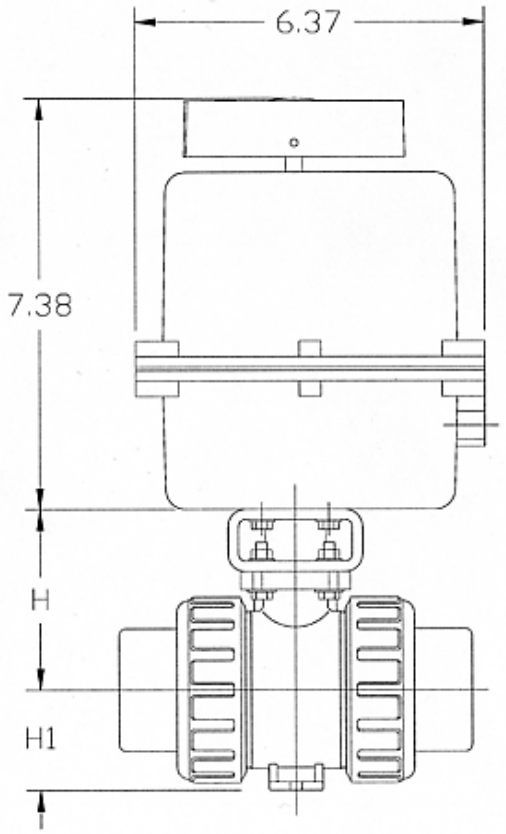
	NAME	DATE
DR	KENICHI MIYAZAKI	8/2/01
APPD	DAVE HURLEY	8/2/01
PROD	LEO LESTER	8/2/01
WO#/CO#		
FILE		

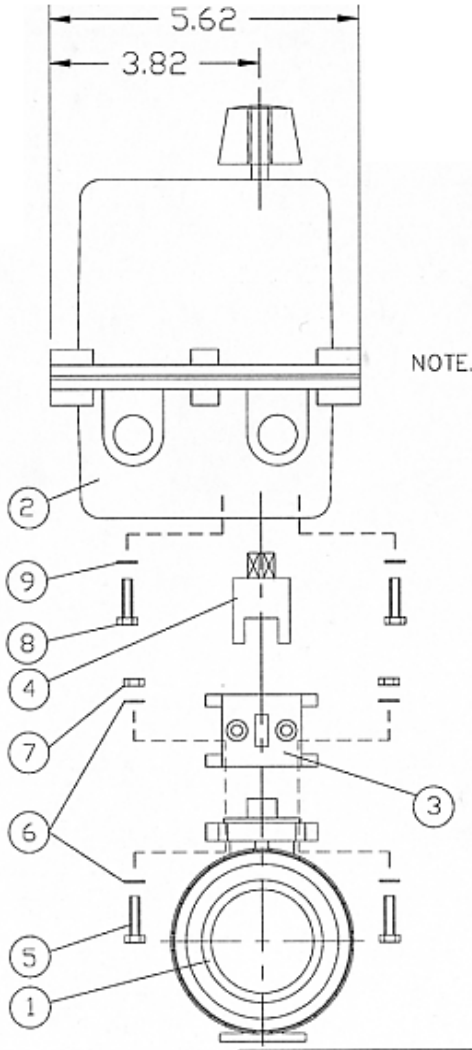
CHEMLINE PLASTICS

Q-SERIES ACTUATOR ON TYPE-21 BALL VALVE 1/2" TO 2"

SIZE	DWG. NO.	REV
A	0106BV	A

SCALE NTS SHEET 1 OF 1





UNIT: INCH

VALVE SIZE	2-1/2"	3"
H	5.12	5.47
H1	2.83	3.35

NOTE. The shape and appearance of assembly differ a little with nominal size compared to this drawing.

ITEM	DESCRIPTION	MATERIAL	QTY
9	FLAT WASHER (M6.0)	STAINLESS STEEL	4
8	BOLT (M6.0x1-16LG)	STAINLESS STEEL	4
7	NUT (M8.0x1.25)	STAINLESS STEEL	4
6	FLAT WASHER (M8.0)	STAINLESS STEEL	8
5	BOLT (M8.0x1.25-35LG)	STAINLESS STEEL	4
4	COUPLING	STAINLESS STEEL 303	1
3	MOUNTING BRACKET	PPG	1
2	ACTUATOR SERIES 94	ZYTEL	1
1	BALL VALVE TYPE 21	PVC,CPVC,PP,PVDF	1

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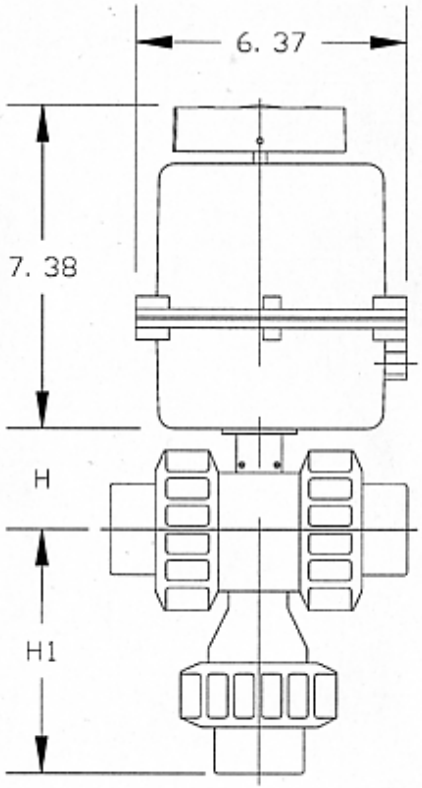
	NAME	DATE
DR	KENICHI MIYAZAKI	8/14/01
APPD	DAVE HURLEY	8/14/01
PROD	LEO LESTER	8/14/01
WO#/CO#		
FILE		

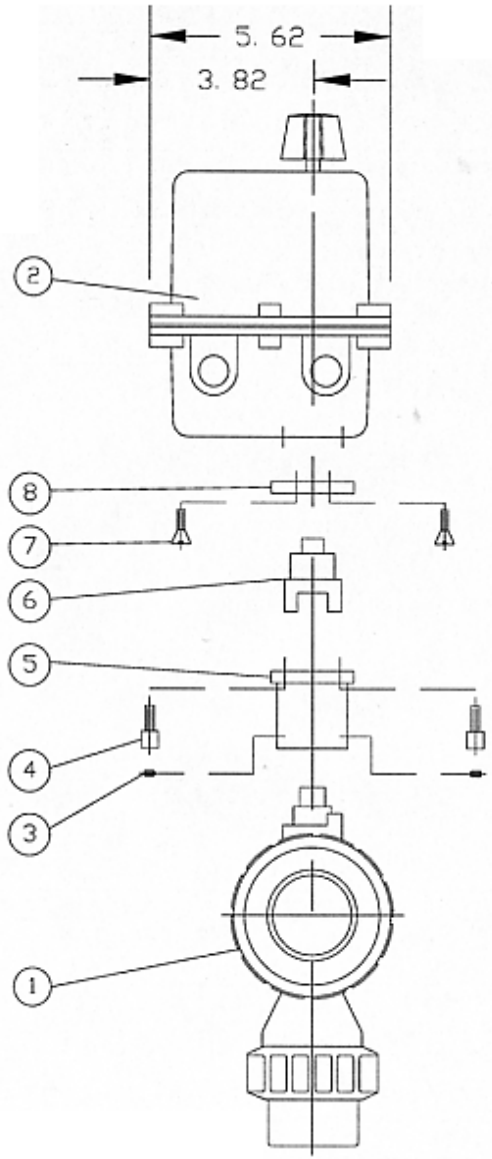
CHEMLINE PLASTICS

Q-SERIES ACTUATOR ON TYPE-21 VALVE 2-1/2" & 3"

SIZE	DWG. NO.	REV
A	0112BV	A

SCALE NTS SHEET 1 OF 1





UNIT: INCH

VALVE SIZE	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
H	1.95	2.31	2.46	2.92	3.85	4.00
H1	3.33	3.88	4.81	6.61	6.61	7.57

NOTE. The shape and appearance of assembly differ a little with nominal size compared to this drawing.

ITEM	DESCRIPTION	MATERIAL	QTY
8	PLATE MOUNTING (FOR 1-1/2" AND 2" ONLY)	ANODIZED ALUM.	1
7	SCREW FLAT HD (FOR 1-1/2" AND 2" ONLY)	300 SS	4
6	COUPLING	ANODIZED ALUM.	1
5	SADDLE	ANODIZED ALUM.	1
4	SCREW SOC HD (FOR 1/2" THRU 1-1/4" : M6x 16) (FOR 1-1/2" THRU 2" : M8x 12)	300 SS	4
3	SET SCREW (10-32x1/4")	300 SS	2
2	ACTUATOR SERIES 94	ZYTEL	1
1	MULTI PORT BALL VALVE	PVC,CPVC,PP,PVDF	1

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	NAME	DATE
DR	KENICHI MIYAZAKI	8/3/01
APPD	DAVE HURLEY	8/3/01
PROD	LEO LESTER	8/3/01
WO#/CO#		
FILE		

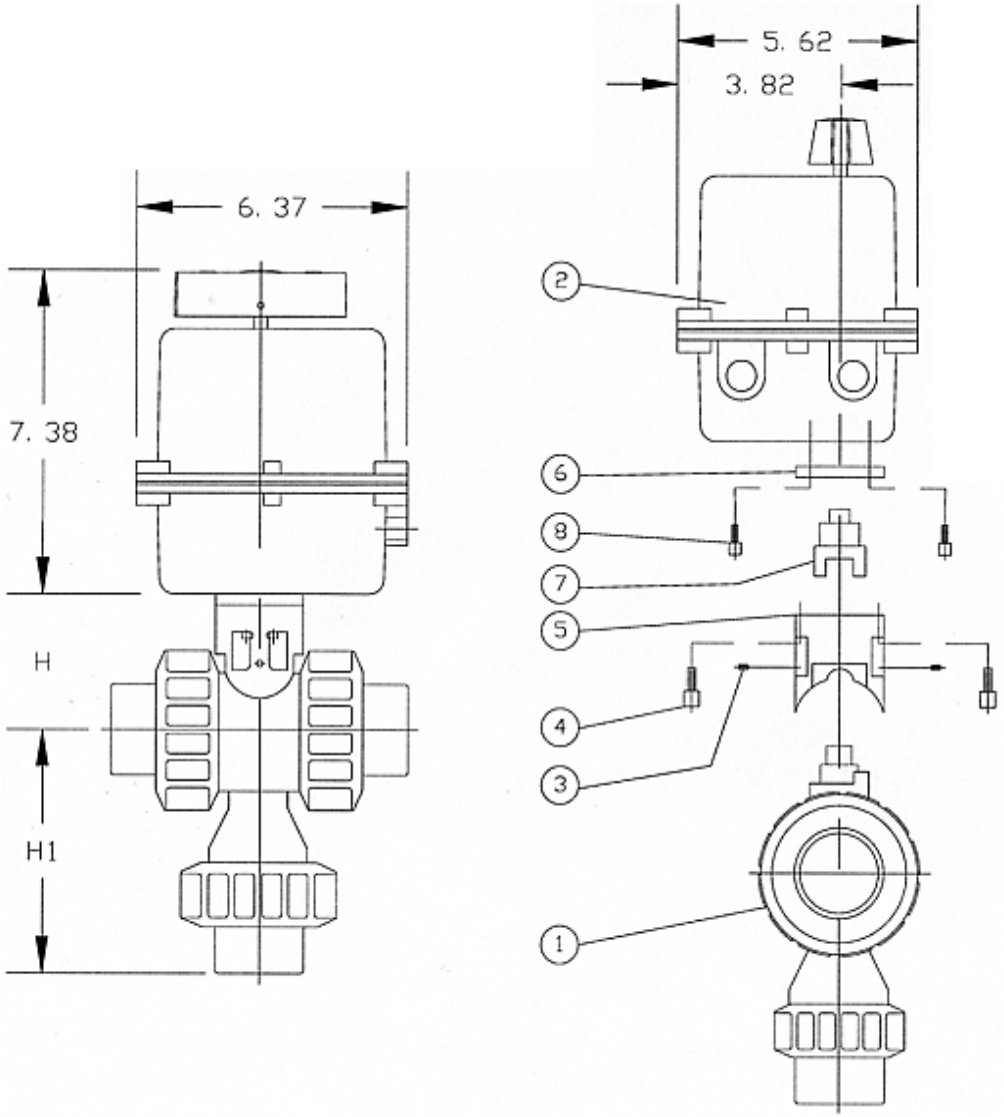
CHEMLINE PLASTICS

Q-SERIES ACTUATOR ON MULTI-PORT VALVE 1/2" TO 2"

SIZE	DWG. NO.	REV
A	0108BV	A

SCALE NTS

SHEET 1 OF 1



ITEM	DESCRIPTION	MATERIAL	QTY
8	SCREW SOC HD (M6.0x16)	300 SS	4
7	COUPLING	ANODIZED ALUM.	1
6	PLATE MOUNTING	ANODIZED ALUM.	1
5	SADDLE	PVC	1
4	SCREW SOC HD (1/4-20x11/4)	300 SS	4
3	SET SCREW (1/4-20x3/4)	300 SS	4
2	ACTUATOR SERIES 94	ZYTEL	1
1	MULTI PORT BALL VALVE	PVC,CPVC,PP,PVDF	1

UNIT: INCH

VALVE SIZE	2-1/2"	3"
H	5.12	5.50
H1	10.34	10.34

NOTE. The shape and appearance of assembly differ a little with nominal size compared to this drawing.

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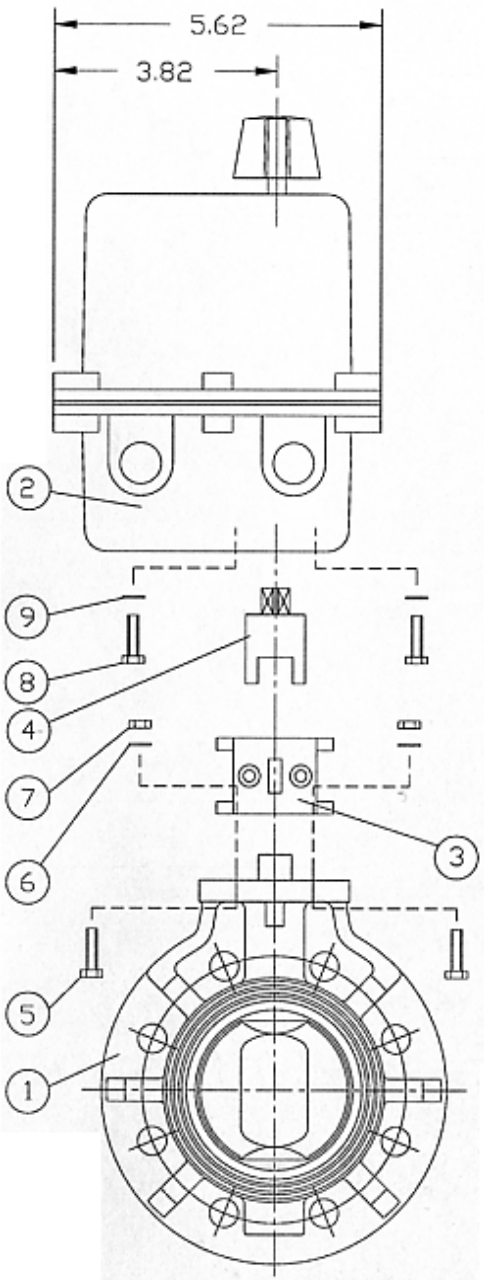
	NAME	DATE
DR	KENICHI MIYAZAKI	8/3/01
APPD	DAVE HURLEY	8/3/01
PROD	LEO LESTER	8/3/01
WO#/CO#		
FILE		

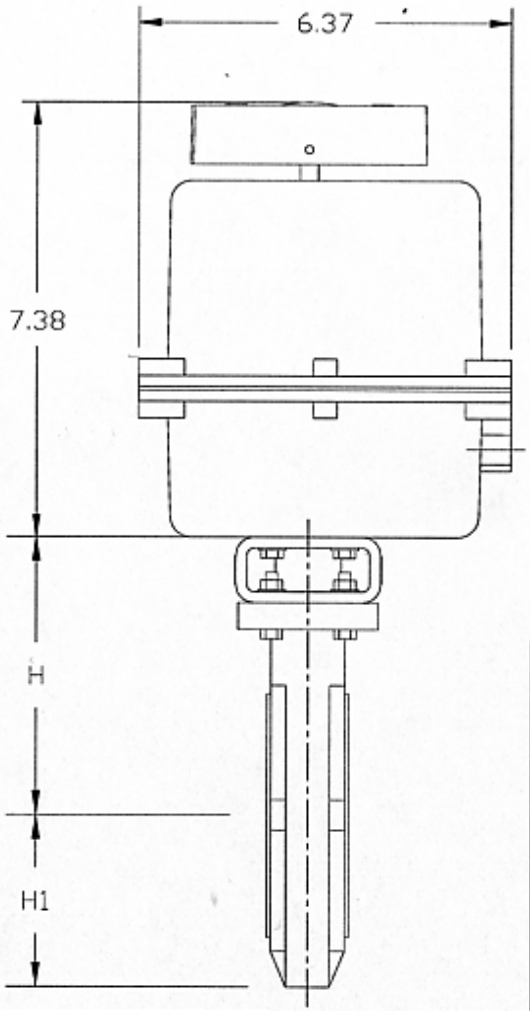
CHEMLINE PLASTICS

Q-SERIES ACTUATOR ON MULTI-PORT VALVE 2-1/2" & 3"

SIZE	DWG. NO.	REV
A	0109BV	A

SCALE NTS SHEET 1 OF 1





UNIT: INCH

VALVE SIZE	1-1/2"	2"	2-1/2"	3"	4"
H	5.51	5.75	6.18	6.46	7.16
H1	2.95	3.27	3.66	3.94	4.53

NOTE: 1. The shape and appearance of assembly differ a little with nominal size compared to this drawing.
2. For Mounting Bracket : F07xF05, F07

ITEM	DESCRIPTION	MATERIAL	QTY
9	FLAT WASHER (M6.0)	STAINLESS STEEL	4
8	BOLT (M6.0x1-16LG)	STAINLESS STEEL	4
7	NUT (FOR 1-1/2" THRU. 4" : M8.0x1.25)	STAINLESS STEEL	4
6	FLAT WASHER (FOR 1-1/2" THRU. 4" : M8.0)	STAINLESS STEEL	8
5	BOLT (FOR 1-1/2" THRU. 4" : M8.0x1.25-35LG)	STAINLESS STEEL	4
4	COUPLING	STAINLESS STEEL 303	1
3	MOUNTING BRACKET	PPG	1
2	ACTUATOR SERIES 94	ZYTEL	1
1	BUTTERFLY VALVE TYPE 56	PVC,PP,PVDF	1

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	NAME	DATE
DR	KENICHI MIYAZAKI	9/31/01
APPD	DAVE HURLEY	9/31/01
PROD	LEO LESTER	9/31/01
WO#/CO#		
FILE		

CHEMLINE PLASTICS

Q-SERIES ACTUATOR ON TYPE-56 BUTTERFLY 1-1/2" - 4"

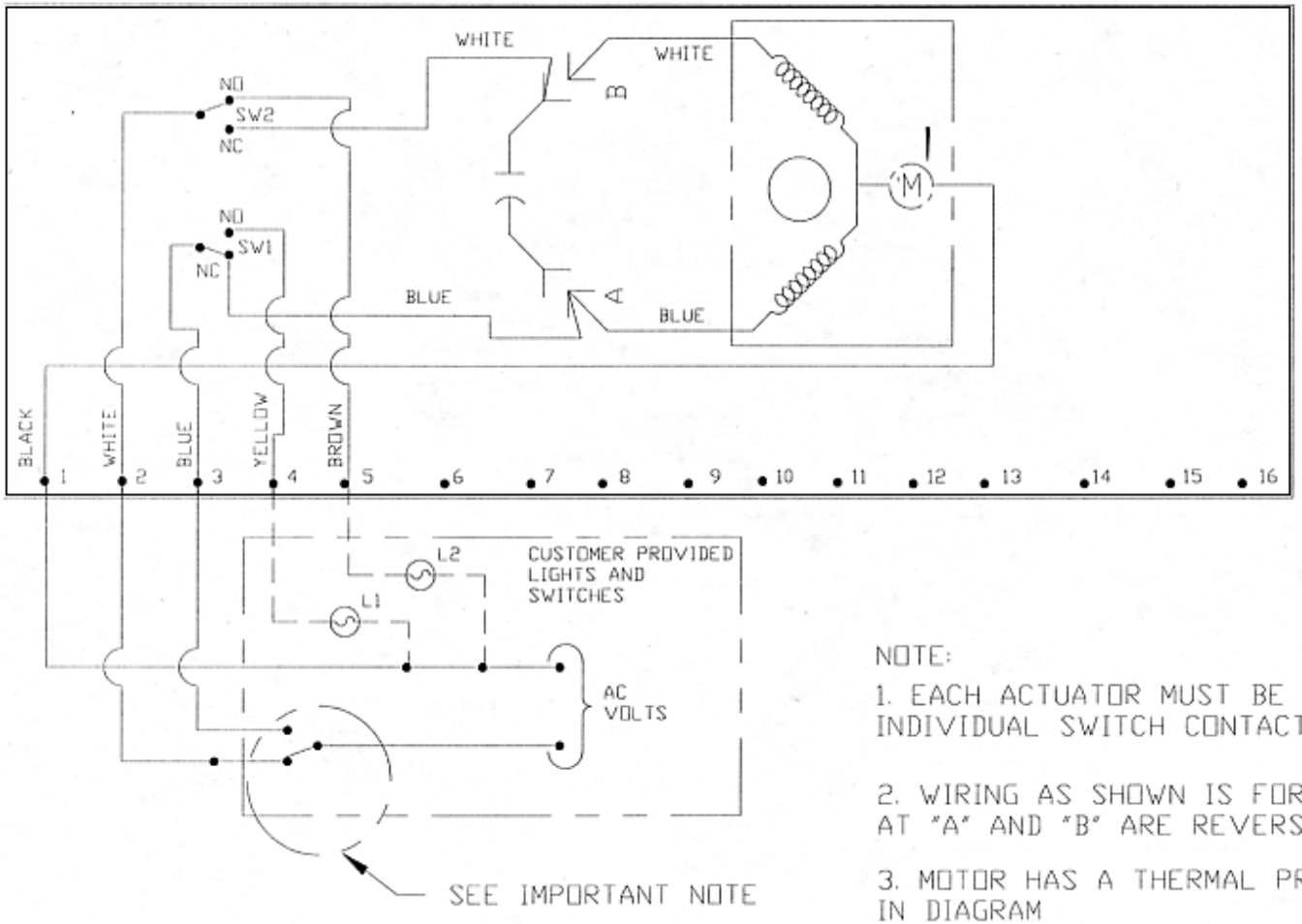
SIZE	DWG. NO.	REV
A	0203BF	A

SCALE NTS

SHEET 1 OF 1

WIRING DIAGRAM FOR 115 VAC AND 220 VAC ONLY

ACTUATOR SHOWN IN COUNTER-CLOCKWISE EXTREME OF TRAVEL, OR "OPEN" POSITION



NOTE:

1. EACH ACTUATOR MUST BE POWERED THRU ITS OWN INDIVIDUAL SWITCH CONTACTS TO AVOID CROSS FEED

2. WIRING AS SHOWN IS FOR AA & AB MOTOR LEADS AT "A" AND "B" ARE REVERSABLE FOR AC AND AD

3. MOTOR HAS A THERMAL PROTECTOR AS SHOWN BY (M) IN DIAGRAM

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	NAME	DATE
DR	KENICHI MIYAZAKI	8/3/01
APPD	DAVE HURLEY	8/3/01
PROD	LEO LESTER	8/3/01
WO#/CO#		
FILE		

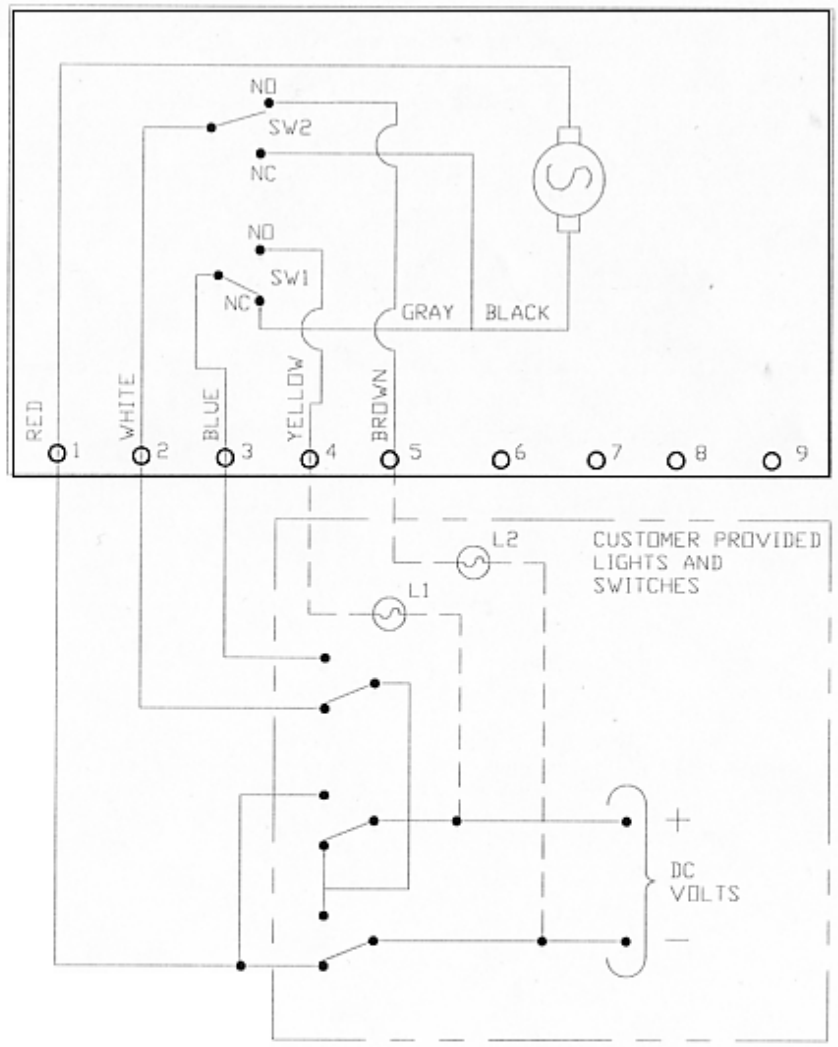
CHEMLINE PLASTICS INC.

A- & Q-SERIES WIRING DIAGRAM - 120/220VAC

SIZE	DWG. NO.	REV
A	0043EL	A

SCALE NTS SHEET 1 OF 1

DC WIRING DIAGRAM



1. ACTUATOR SHOWN IN COUNTER CLOCKWISE EXTREME OF TRAVEL OR "OPEN" POSITON
2. MOTOR LEADS REVERSED FOR 1100 & 2000 IN*LBS.

1	2	3	
-	+		= OPEN
+		-	= CLOSE

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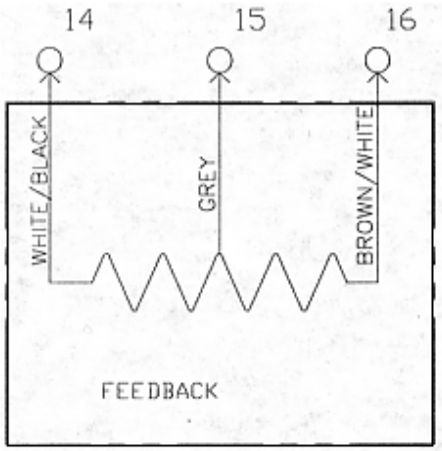
	NAME	DATE
DR	KENICHI MIYAZAKI	8/3/01
APPD	DAVE HURLEY	8/3/01
PROD	LEO LESTER	8/3/01
WO#/CO#		
FILE		

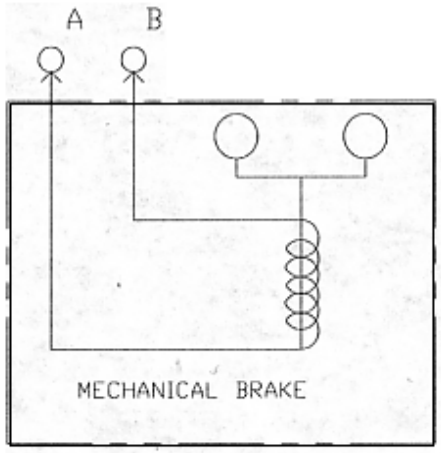
CHEMLINE PLASTICS

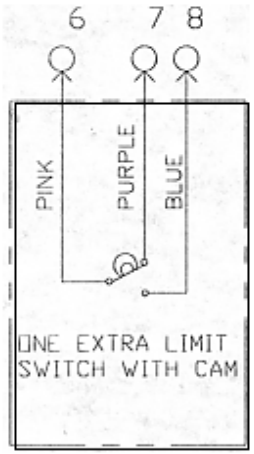
A- & Q-SERIES WIRING DIAGRAM - 12/24VDC

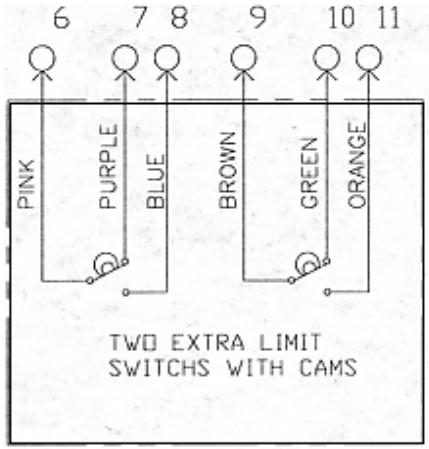
SIZE	DWG. NO.	REV
A	0044EL	A

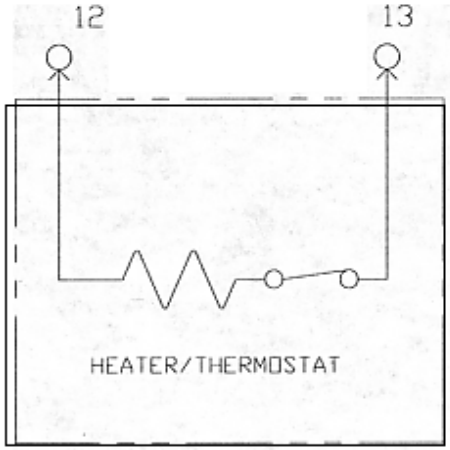
SCALE NTS SHEET 1 OF 1











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	NAME	DATE
DR	KENICHI MIYAZAKI	8/3/01
APPD	DAVE HURLEY	8/3/01
PROD	LEO LESTER	8/3/01
WO#/CO#		
FILE		

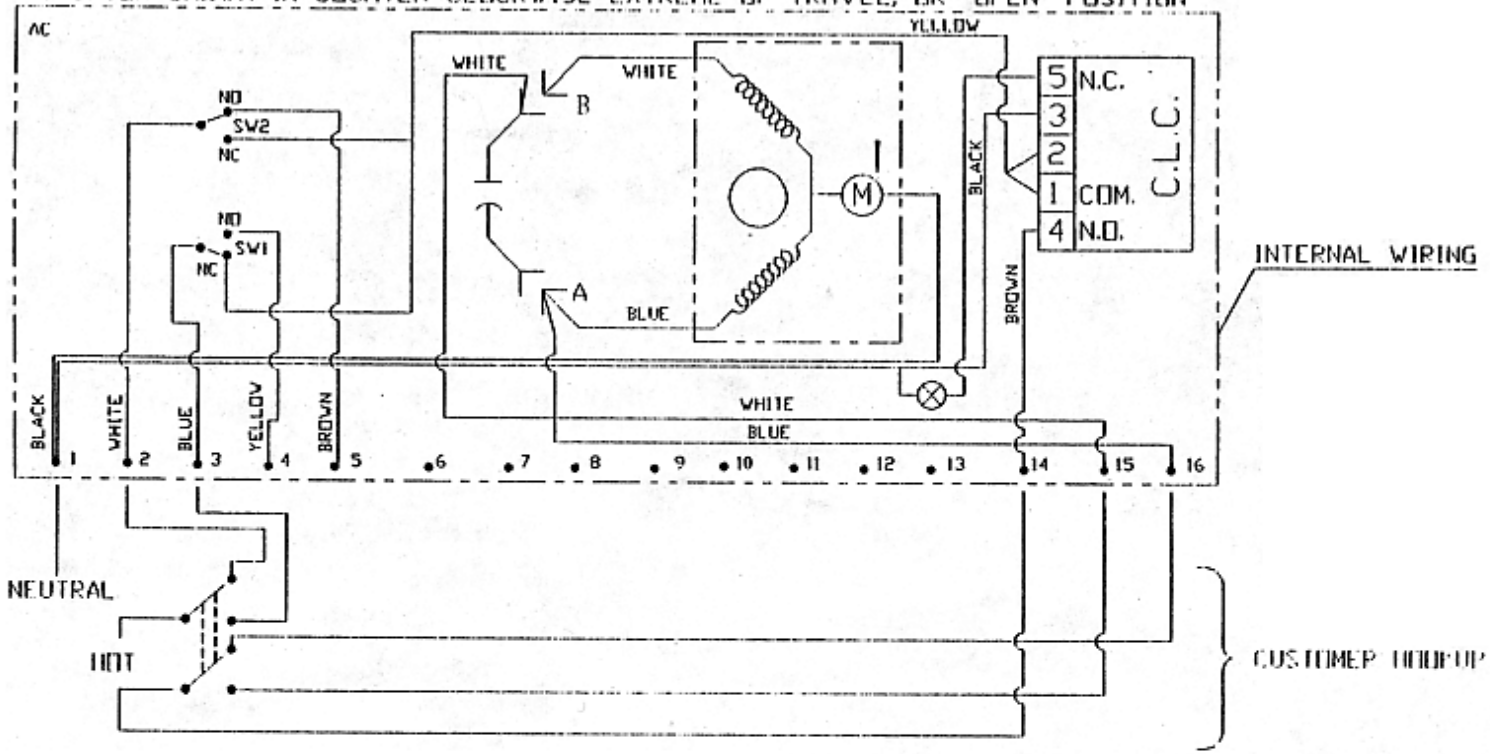
CHEMLINE PLASTICS

A- & Q-SERIES WIRING DIAGRAM - OPTIONS

SIZE	DWG. NO.	REV
A	0042EL	A
SCALE NTS	SHEET 1 OF 1	

WIRING DIAGRAM FOR 115 VAC AND 220 VAC ONLY

ACTUATOR SHOWN IN COUNTER-CLOCKWISE EXTREME OF TRAVEL, OR "OPEN" POSITION



NOTE: 1. EACH ACTUATOR MUST BE POWERED THRU ITS OWN INDIVIDUAL SWITCH CONTACTS TO AVOID CROSS FEED

2. MOTOR HAS A THERMAL PROTECTOR AS SHOWN BY Ⓜ IN DIAGRAM

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES TOLERANCES
2 PL DECIMALS ± .01
3 PL DECIMALS ± .005
ANGLES ± .5°
FRACTIONS ± 1/64

MATERIAL

FINISH

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	NAME	DATE
DR	S. SELEZNEV	5/24/96
CHK	Jun Ohki	5/24/96
APPD		
PATH	D:\ELECTRIC	

CHEMLINE PLASTICS

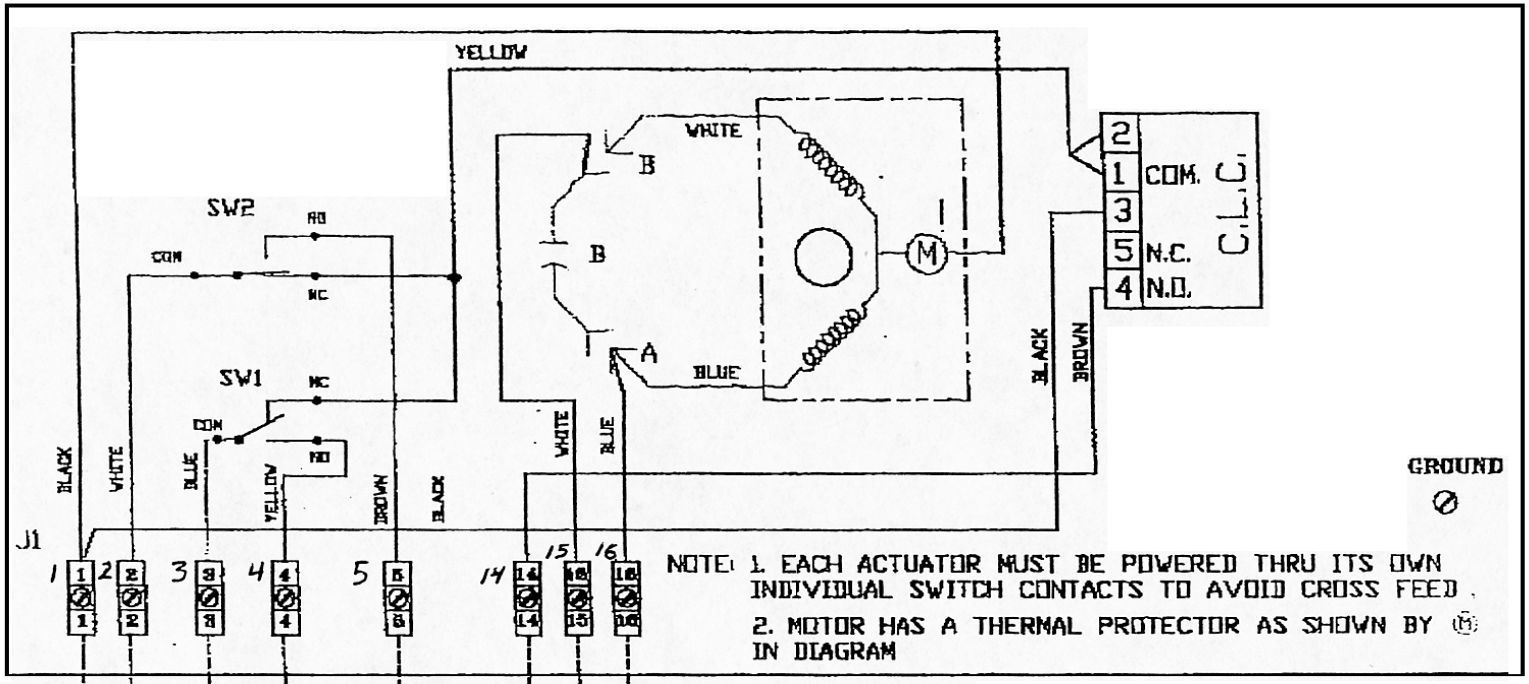
A- & Q-SERIES ACTUATOR WITH CYCLE RATE REGULATOR

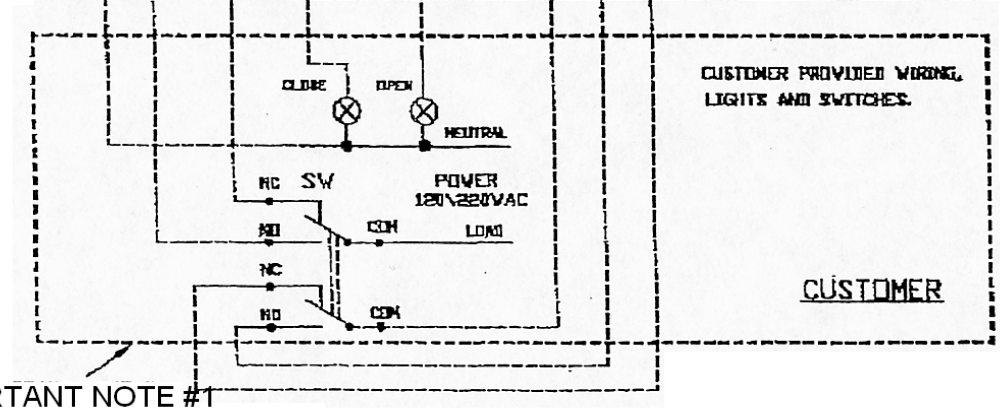
SIZE	DWG. NO.	REV
A	0001EL	1

SCALE NTS

SHEET 1 OF 1

WIRING DIAGRAM FOR 12 OR 24VDC ONLY
ACTUATOR SHOWN IN COUNTER-CLOCKWISE EXTREME OF TRAVEL, OR "OPEN" POSITION





SEE IMPORTANT NOTE #1

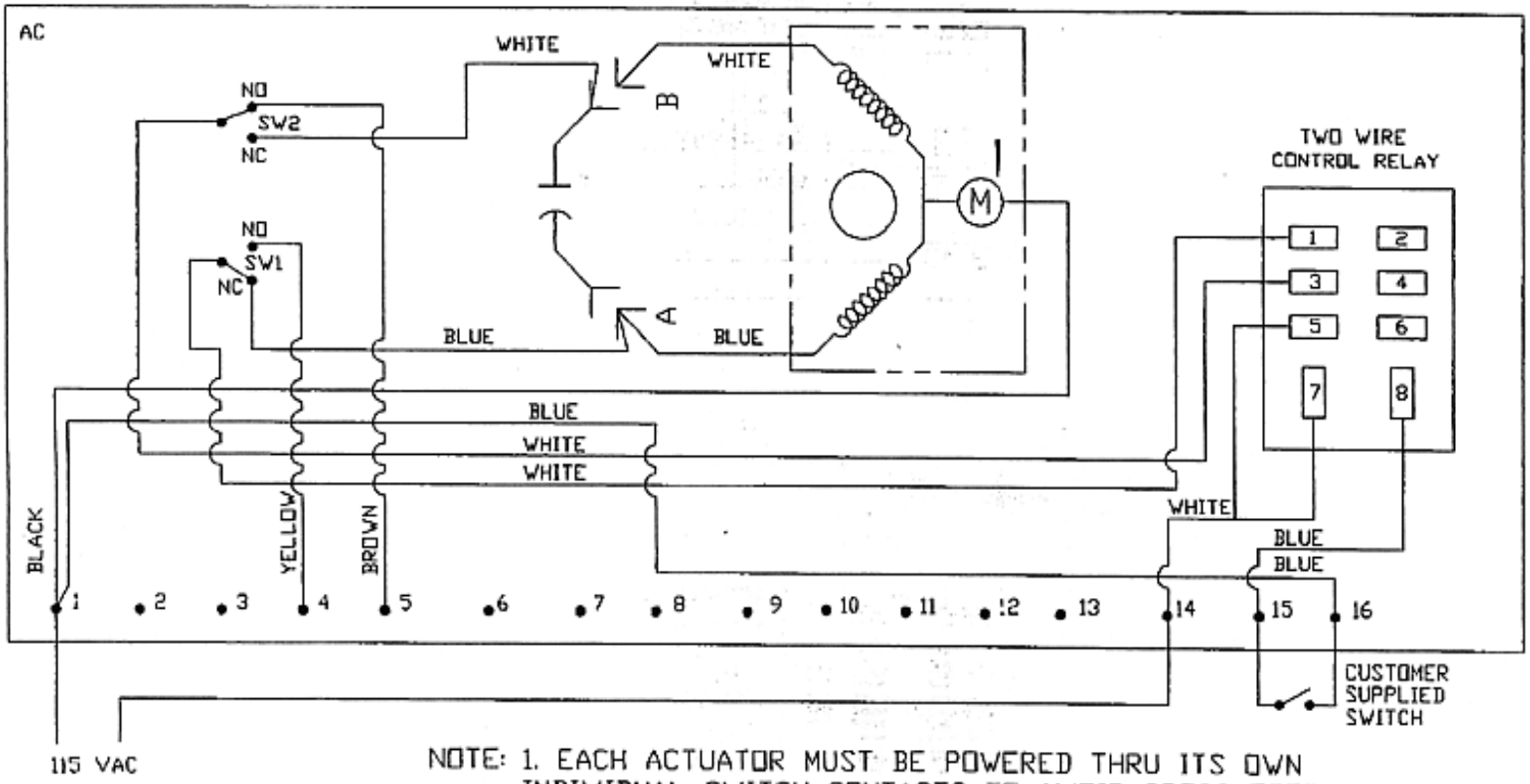
SWITCH LOCATION VIEWED
FROM TERMINAL STRIP FRONT

SW-2 CHANNEL OPEN
SW-1 CHANNEL CLOSE

UNLESS OTHERWISE SPECIFIED				THIS DRAWING AND ALL INFORMATION HEREON IS THE PROPERTY OF ASAHI/AMERICA. ANY COPYING, REPRODUCTION OR UNAUTHORIZED USE IS FORBIDDEN WITHOUT WRITTEN CONSENT.			**CHEMLINE PLASTICS**		
DIMENSIONS ARE IN INCHES					NAME	DATE	Q and A-SERIES ACTUATOR WITH CYCLE RATE REGULATOR		
MACHINING TOLERANCES:	2 PL DECIMALS	± .01		DR	V.TCHERNIAEV	08.17.00			
	3 PL DECIMALS	± .005		APPD					
	ANGULAR	± 1/2°		PROD					
	FRACTIONAL	± 1/64					SIZE A	DWG. NO. 03ACWCLC.dwg	REV 0
FABRICATION TOLERANCES:	1/2" – 8"	± 1/4		PATH	AC\03ACWCLC				
	10" AND UP	± 1/2					SCALE	SHEET 1 OF 1	
	ANGULAR	± 1.0°		WO#/CO#					
MATERIAL									
FINISH									

WIRING DIAGRAM FOR 115 VAC

ACTUATOR SHOWN IN COUNTER-CLOCKWISE EXTREME OF TRAVEL, OR "OPEN" POSITION



NOTE: 1. EACH ACTUATOR MUST BE POWERED THRU ITS OWN INDIVIDUAL SWITCH CONTACTS TO AVOID CROSS FEED

2. MOTOR HAS A THERMAL PROTECTOR AS SHOWN BY Ⓜ IN DIAGRAM

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	NAME	DATE
DR	A.SELEZNEV	2/25/97
CHK	[signature]	2/28/97
APPD		
FILE	C:\ELECTRIC	

CHEMLINE PLASTICS

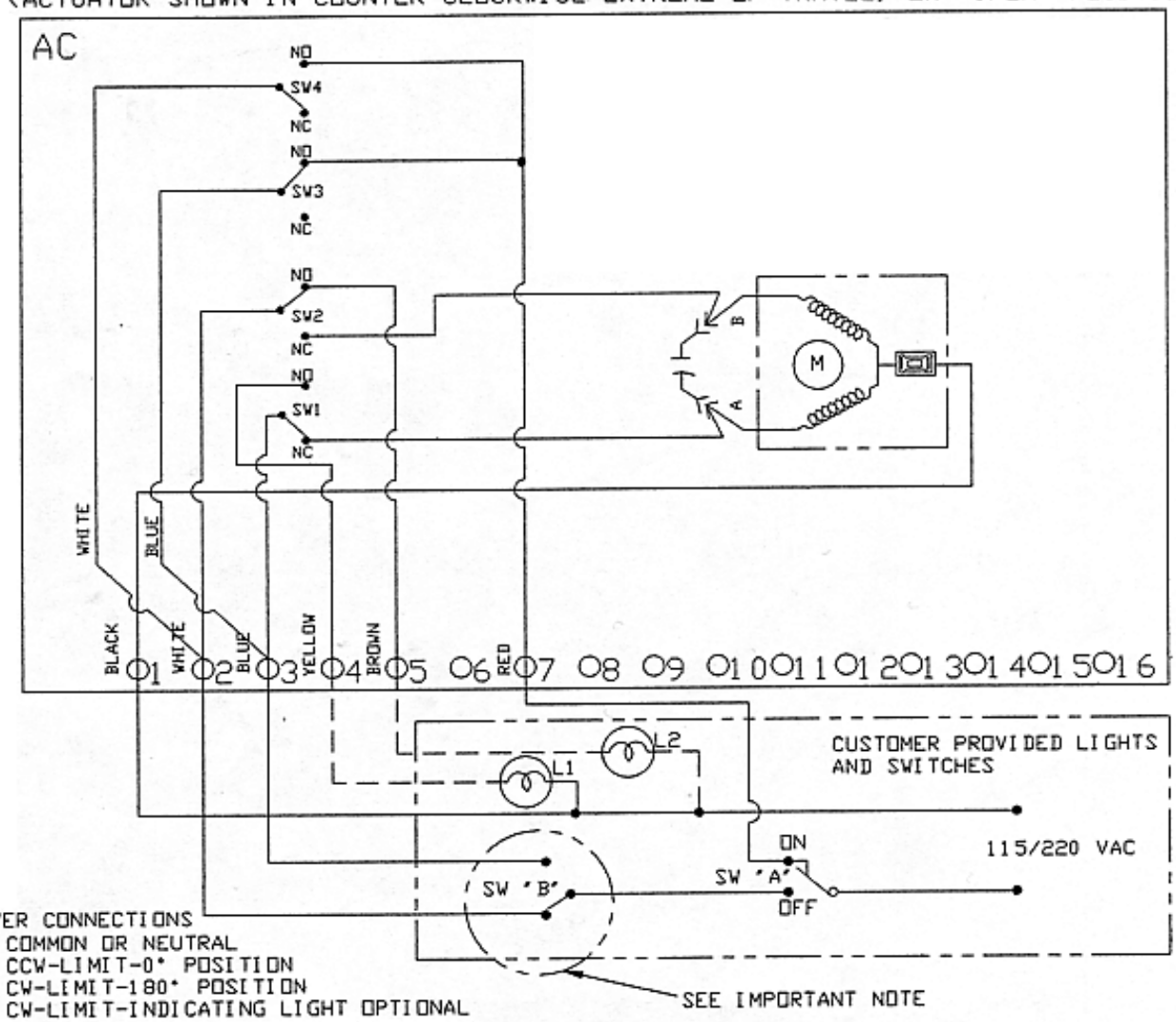
115 VAC WIRING DIAGRAM
A & Q SERIES W/ 2-WIRE CONTROL

SIZE	DWG. NO.	REV
A	0018EL	5

SCALE 1=1

SHEET 1 OF 1

(ACTUATOR SHOWN IN COUNTER-CLOCKWISE EXTREME OF TRAVEL, OR 'OPEN' POSITION)



POWER CONNECTIONS
1. COMMON OR NEUTRAL
2. CCW-LIMIT-0° POSITION
3. CW-LIMIT-180° POSITION
4. CW-LIMIT-INDICATING LIGHT OPTIONAL
5. CCW-LIMIT-INDICATING LIGHT OPTIONAL
7. CENTER-OFF-90° POSITION, BOTH DIRECTIONS

IMPORTANT
EACH ACTUATOR MUST BE POWERED THRU ITS OWN INDIVIDUAL SWITCH CONTACTS TO AVOID CROSS FEED
MOTOR HAS A 'THERMAL PROTECTOR' AS SHOWN BY IN DIAGRAM.

SWITCH LOCATION VIEWED FROM TERMINAL STRIP FRONT

SW2	SW4
SW1	SW3

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	NAME	DATE
DR	SS	6/7/96
CHK		
APPD		
FILE	C:\ELECTRIC	
	DO NOT SCALE DRAWING	

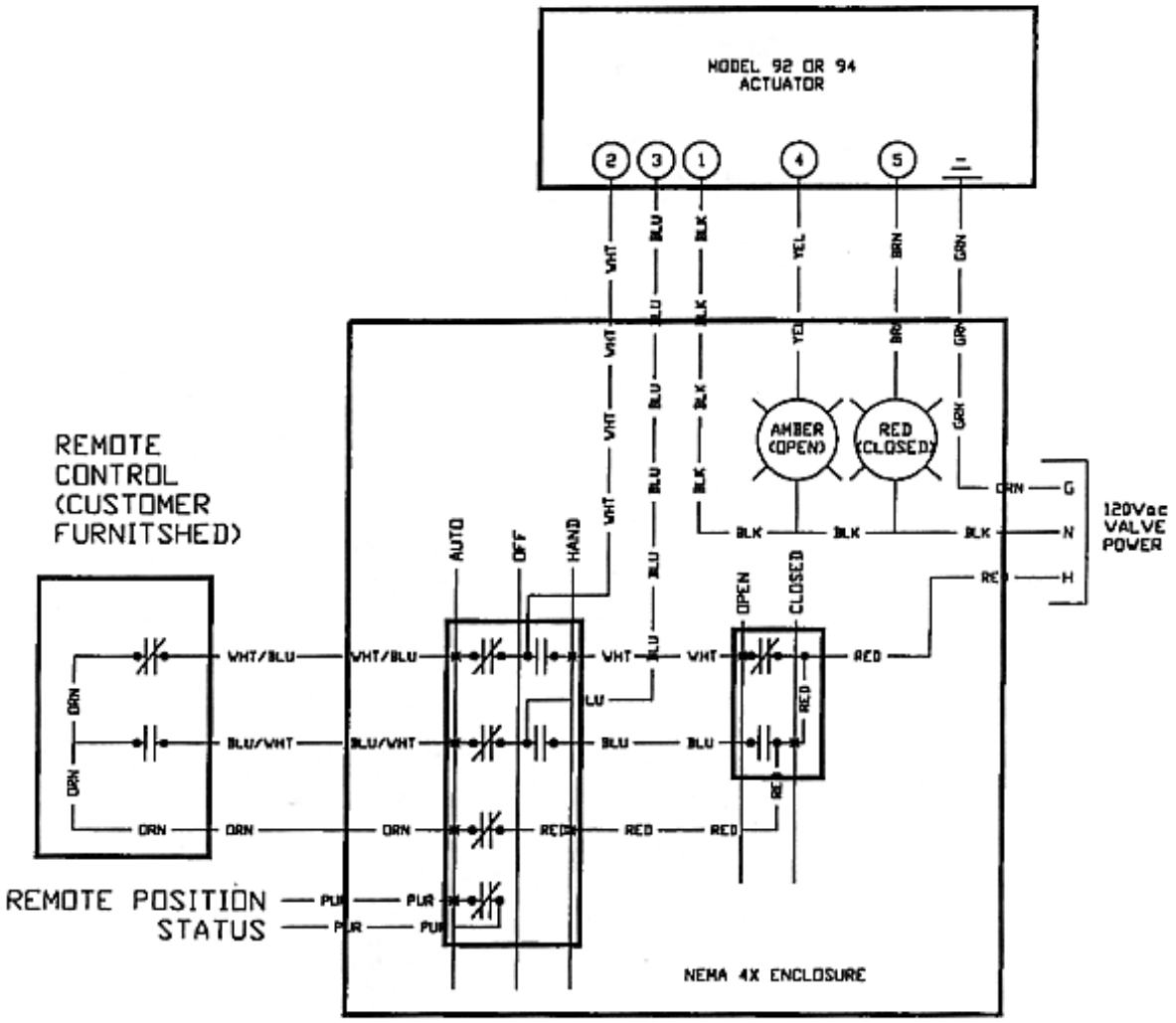
CHEMLINE PLASTICS

CENTER-OFF WIRING
A- & Q-SERIES ACTUATOR

SIZE	DWG. NO.	REV
A	CENT-OFF	1

SCALE NTS

SHEET 1 OF 1



NOTES:
ALL COMPONENTS AND ENCLOSURE ARE NEMA 4X.

ENCLOSURE IS FURNISHED WITH 8 INCH PIG TAIL FOR WIRING CONNECTION.

MANUFACTURER RESERVES THE RIGHT TO CHANGE OR MODIFY PRODUCT DESIGN OR PRODUCT WITHOUT PRIOR NOTICE.

UNLESS OTHERWISE SPECIFIED		THIS DRAWING AND ALL INFORMATION HEREON IS THE PROPERTY OF ASAHI/AMERICA. ANY COPYING, REPRODUCTION OR UNAUTHORIZED USE IS FORBIDDEN WITHOUT WRITTEN CONSENT.			CHEMLINE PLASTICS	
DIMENSIONS ARE IN INCHES			NAME	DATE	MANUAL OVERRIDE STATION MODEL 11-100	
MACHINING TOLERANCES:	2 PL DECIMALS ± .01 3 PL DECIMALS ± .005 ANGULAR ± 1/2° FRACTIONAL ± 1/64	DR	RNH	2MAY2000	SIZE A	DWG. NO. / REV 0
FABRICATION TOLERANCES:	1/2" – 8" ± 1/4 10" AND UP ± 1/2 ANGULAR ± 1.0°	APPD				
MATERIAL		PROD				
FINISH	70 µ" (0.8 µm)	PATH	C:\R13\DRAWINGS		SCALE NONE	SHEET 1 OF 1
		WO#/CO#				

11.7 - C2-2 – CHEMLINE GLOBE VALVE

CHEMLINE Plastics Limited

Your Pipeline To Quality Valves, Strainers, Flowmeters and Controls

55 Guardsman Road
Thornhill, Ontario
L3T 6L2
Canada
Tel: 905-889-7890
Fax: 905-889-8553

MAINTENANCE INSTRUCTIONS
For Chemline Globe Valves Sizes 1/2" - 2"

Maintenance (Sizes 1/2" to 2")

Refer to **ASSEMBLY DRAWING GV-01(A).** And proceed as follows:

1. Remove bonnet and stem assembly (2 through 5) by unscrewing gland nut (6). The complete stem assembly should lift out of the valve body.
   (Note: make sure there is no pressure in line prior to removing valve.)

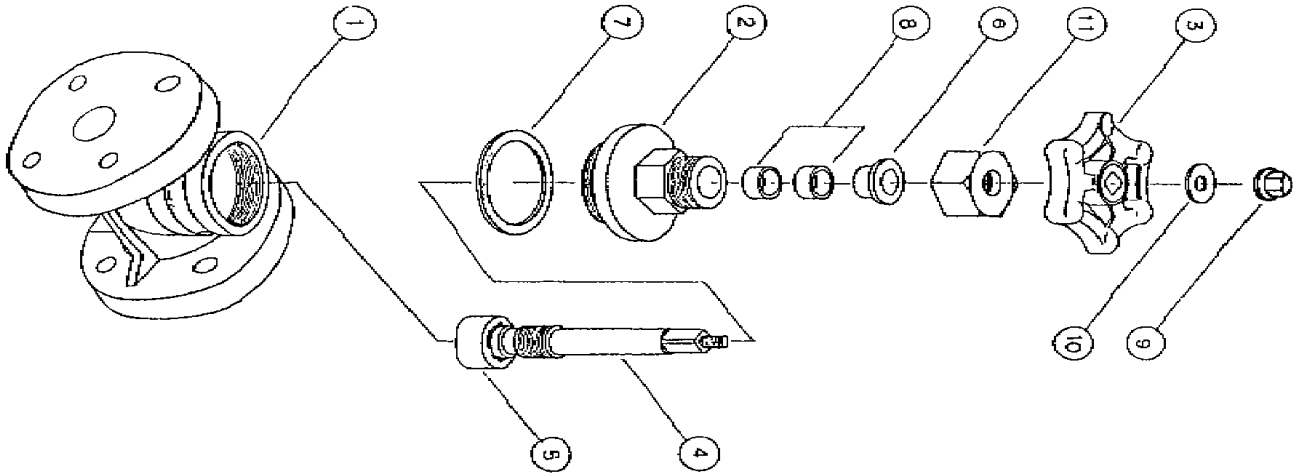
2. The stem (4) is removed from the bonnet assembly by first removing the handwheel (3) by unscrewing nut (9). Loosen the stem packing (8) and inspect for excessive wear and cracking.

3. Lubricate the seal (7) before replacing the shaft (4). Dow Corning III silicone compound recommended.

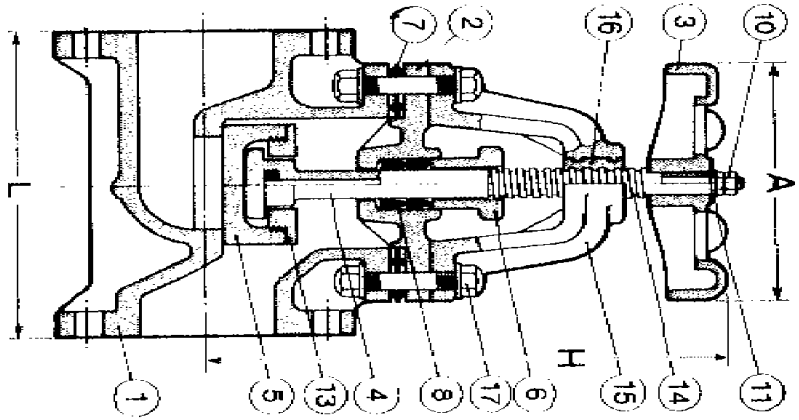
4. Inspect the body seat (1) and disc seat (5) for excessive wear and pitting. Pitting is caused by foreign objects being jammed between the sealing surfaces when closing the valve. If the disc seat (5) is damaged, replace the part.
   Important: If the body seat is damaged replace the complete valve.

5. To reassemble valve, reverse steps 1 to 4 above.

   (NOTE) When replacing the stem assembly back into the valve body, be sure that the stem NOT in the closed position. If it is, the stem may be over extended and could damage the body seat when the bonnet is re-tightened.



PART	DESCRIPTION	QTY	MATERIAL
1	BODY	1	PVC/PP
2	BONNET	1	PVC/PP
3	HANDWHEEL	1	PP
4	STEM	1	PVC/PP
5	DISC	1	PP
6	GLAND	1	PVC/PP
7	BONNET SEAL	1	EPDM
8	STEM PACKING	2	EPDM
10	NUT	1	PVC
11	WASHER	1	PVC
12	GLAND NUT	1	PVC/PP
13	DISC RETAINER	1	PP
14	STEM TOP	1	BRASS
15	YOLK	1	PP
16	YOLK SLEEVE	1	BRONZE
17	BOLT & NUT	8	SS. 304
18	STUD & NUT	2	SS. 304



TITLE: CHEMLINE GLOBE VALVE SIZES	SCALE		DATE	CHEMLINE PLASTICS	
	DR. BY				
REFERENCE: 1/2" - 2"	CHKD. BY			DWG. NO.	REV.
	APP. BY			GV01(A)	0

CHEMLINE Plastics Limited

Your Pipeline To Quality Valves, Strainers, Flowmeters and Controls

55 Guardsman Road
Thornhill, Ontario
L3T 6L2
Canada
Tel: 905-889-7890
Fax: 905-889-8553

MAINTENANCE INSTRUCTIONS
For Chemline Globe Valves Sizes 2-1/2"- 4"

Maintenance (2-1/2" - 4")

Refer to **ASSEMBLY DRAWING GV-01(B).** And proceed as follows:

1. Remove bonnet and stem assembly (2 through 5) by unscrewing gland nut (2), or by loosening and removing bolts (17). The complete stem assembly should lift out of the valve body. (Note: make sure there is no pressure in line prior to removing valve.)

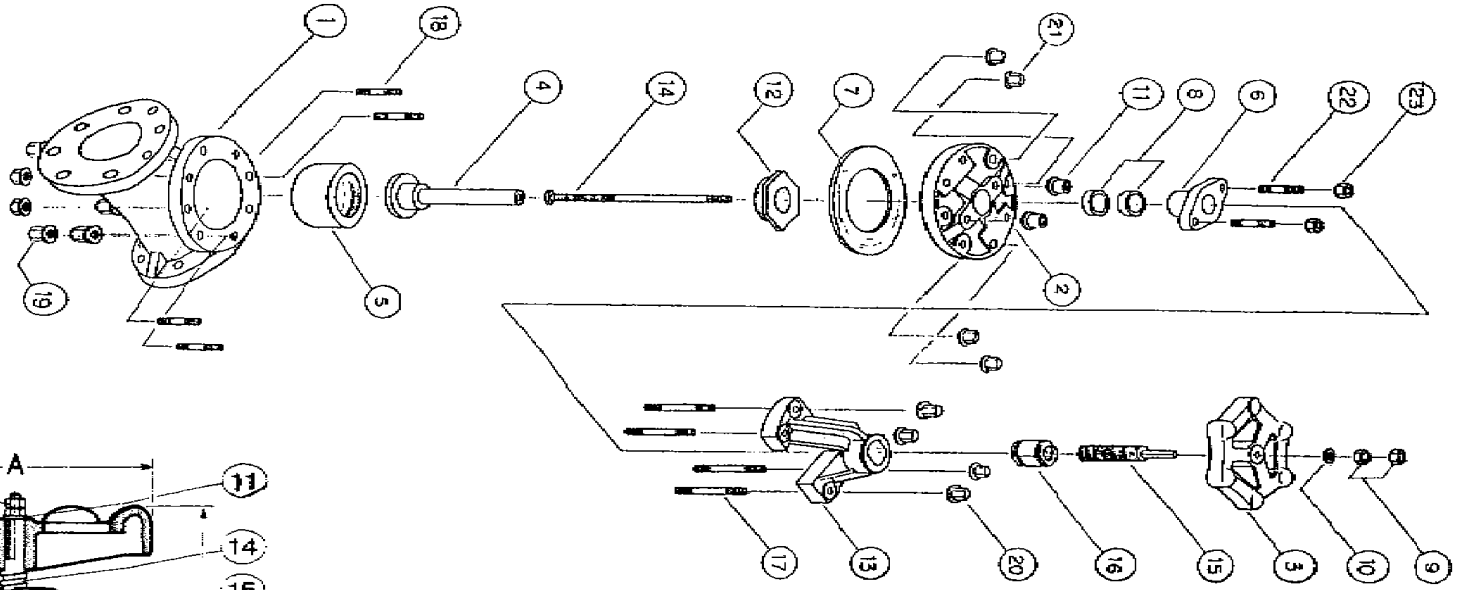
2. The stem (4) is removed from the bonnet assembly by first removing the handwheel (3) by unscrewing nut (9). Loosen the stem and inspect for excessive wear and cracking.

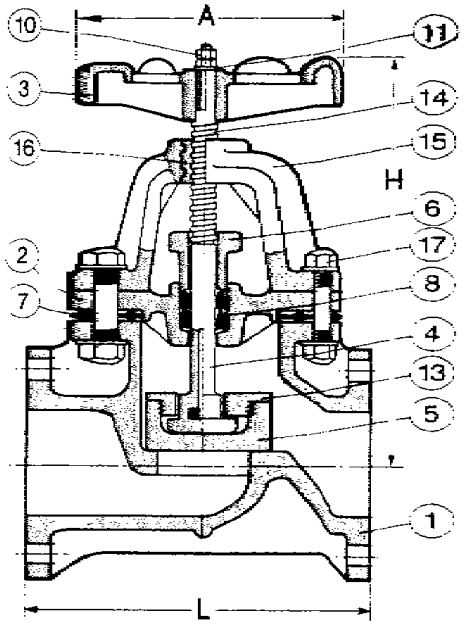
3. Lubricate the seal (7) before replacing the shaft (4). Dow Corning III silicone compound recommended.

4. Inspect the body seat (1) and disc seat (5) for excessive wear and pitting. Pitting is caused by foreign objects being jammed between the sealing surfaces when closing the valve. If the disc seat (5) is damaged, replace the part.
   Important: If the body seat is damaged replace the complete valve.

5. To reassemble valve, reverse steps 1 to 4 above.

   (NOTE) When replacing the stem assembly back into the valve body, be sure that the stem is NOT in the closed position. If it is, the stem may be over extended and could damage the body seat when the body is re-tightened.





1	BODY	1	PVC/PP	11	WASHER	1	PVC
2	PVC	1	PVC/PP	12	GLAND NUT	1	PVC/PP
3	HANDWHEEL	1	PP	13	DISC RETAINER	1	PP
4	STEM	1	PVC/PP	14	STEM TOP	1	BRASS
5	DISC	1	PP	15	YOLK	1	PP
6	GLAND	1	PVC/PP	16	YOLK SLEEVE	1	BRONZE
7	BONNET SEAL	1	EPDM	17	BOLT & NUT	8	304 S.S.
8	STEM PACKING	2	EPDM	18	STUD & NUT	2	304 S.S
10	NUT	1	PVC				

TITLE: CHEMLINE GLOBE VALVE SIZES	SCALE		DATE	CHEMLINE PLASTICS	
	DR. BY				
REFERENCE: 2 - 1/2" - 4"	CHKD. BY			DWG. NO. GV01 (B)	REV. 0
	APP. BY				

11.8 - C2-3 – CHEMLINE NEEDLE VALVE

CHEMLINE Plastics Limited

Your Pipeline To Quality Valves, Strainers, Flowmeters and Controls

55 Guardsman Road
Thornhill, Ontario
L3T 6L2
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Tel: 905-889-7890
Fax: 905-889-8553

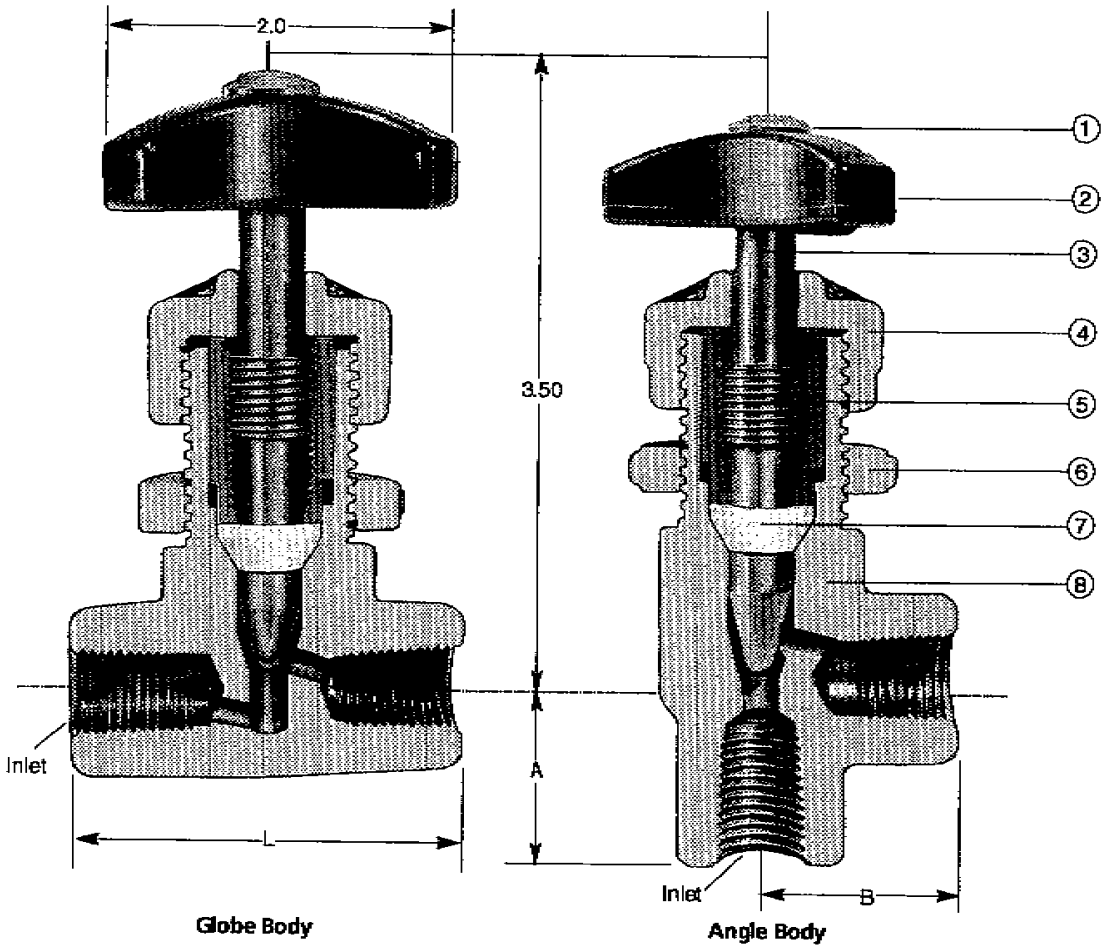
MAINTENANCE INSTRUCTIONS
For Chemline Needle Valves Sizes 1/4" - 3/8" - 1/2"

Maintenance (all sizes):

Refer to **ASSEMBLY DRAWING CNV1 rev 0.** And proceed as follows:

1. Valve can be serviced in line as unit' s complete topworks can be removed in one piece.
2. Remove panel nut (6) and lift off bonnet (4).
3. Handle (2) stem (3) and thread insert (5) will lift out in one piece.
4. Remove and inspect seal (7) for wear and abrasion.
5. Replace seal if necessary.
6. To reassemble valve follow steps 2 through 5 in reverse order.

Note: Seal wear can be compensated for by hand tightening the cap.



Globe Body

Angle Body

PARTS

No.	Part*	Pcs.	Materials
1	Coloured Button	1	PVC
2	Handle	1	PVC, CPVC, PPG
3	Stem/Needle	1	PVC, CPVC, PPG, PVDF
4	Bonnet	1	PVC, CPVC, PPG
5	Thread Insert	1	Nylon, PPG
6	Panel Nut	1	PVC, CPVC, PPG
7	Seal	1	PTFE
8	Body	1	PVC, CPVC, PPG, PVDF

*Threaded insert in reinforced Nylon for PVC and CPVC valves, PPG for PPG valves.

DIMENSIONS INCHES

Size	L	A	B	Globe	Angle	Outlet Orifice
1/4"	2.33	1.10	1.20	.187	.250	.187
3/8"	2.33	1.10	1.20	.187	.250	.187
1/2"	2.50	1.18	1.25	.218	.250	.218

CHEMLINE NEEDLE VALVES
Sizes 1/4" - 3/8" - 1/2"

CHEMLINE Plastics Limited

Dwg. No.: CNV1

11.9 - C2-4 – CHEMLINE PRESSURE RELIEF VALVE

CHEMLINE Plastics Limited

Your Pipeline To Quality Valves, Strainers, Flowmeters and Controls

55 Guardsman Road
Thornhill, Ontario
L3T 6L2
Canada
Tel: 905-889-7890
Fax: 905-889-8553

MAINTENANCE INSTRUCTIONS
For Chemline 3/8" - 1-1/2" SB Series Pressure Relief Valves

Installation:

1. Always mount a filter or strainer in the line immediately before the valve to avoid damage to the valve from dirt or particles. Valve is spring operated, therefore can be installed in any orientation.

2. **To adjust pressure use the adjustment screw (8) and a pressure gauge**.
   - the valve will be closed at the set pressure and will start to open when the operating pressure rises above the set pressure.
   - connect the compressed air supply to the inlet of the valve. Adjust the flow of the air to the desired set pressure by turning clockwise to increase the set pressure, counterclockwise to decrease it.
   - with the valve being closed, adjust the screw (8) until the valve starts to open. Fix the adjusting screw in place with the locking nut (9).

3. For installation in an application where the temperature is 0^{o} C or less. Check with Chemline Engineering
   Technical staff prior to installation.

Maintenance

Refer to **ASSEMBLY DRAWING SB10/11 rev 0.** And proceed as follows.

1. Loosen and remove cap (10).

2. Loosen counter nut (9) and remove adjustment screw (8).

3. Remove body cap (12a), body bolt (12b), body nut (12c) and washer (12d).

4. Lift up and remove bonnet (2).

5. Remove pressure plate (7a) and ball bearing (7b) to reach relief spring (3).

6. Loosen piston screw (11), remove spring plate (6) and draw piston assembly (5) downward and out of body (1).
   Note: Piston assembly (5) is all parts (5a) outer piston assembly
   (5b) inner piston assembly
   (5c) seat
   (5d) piston o-ring

Piston assembly is removed from body as a unit. It can then be further disassembled into the component parts listed above.

7 Remove diaphragm (4).

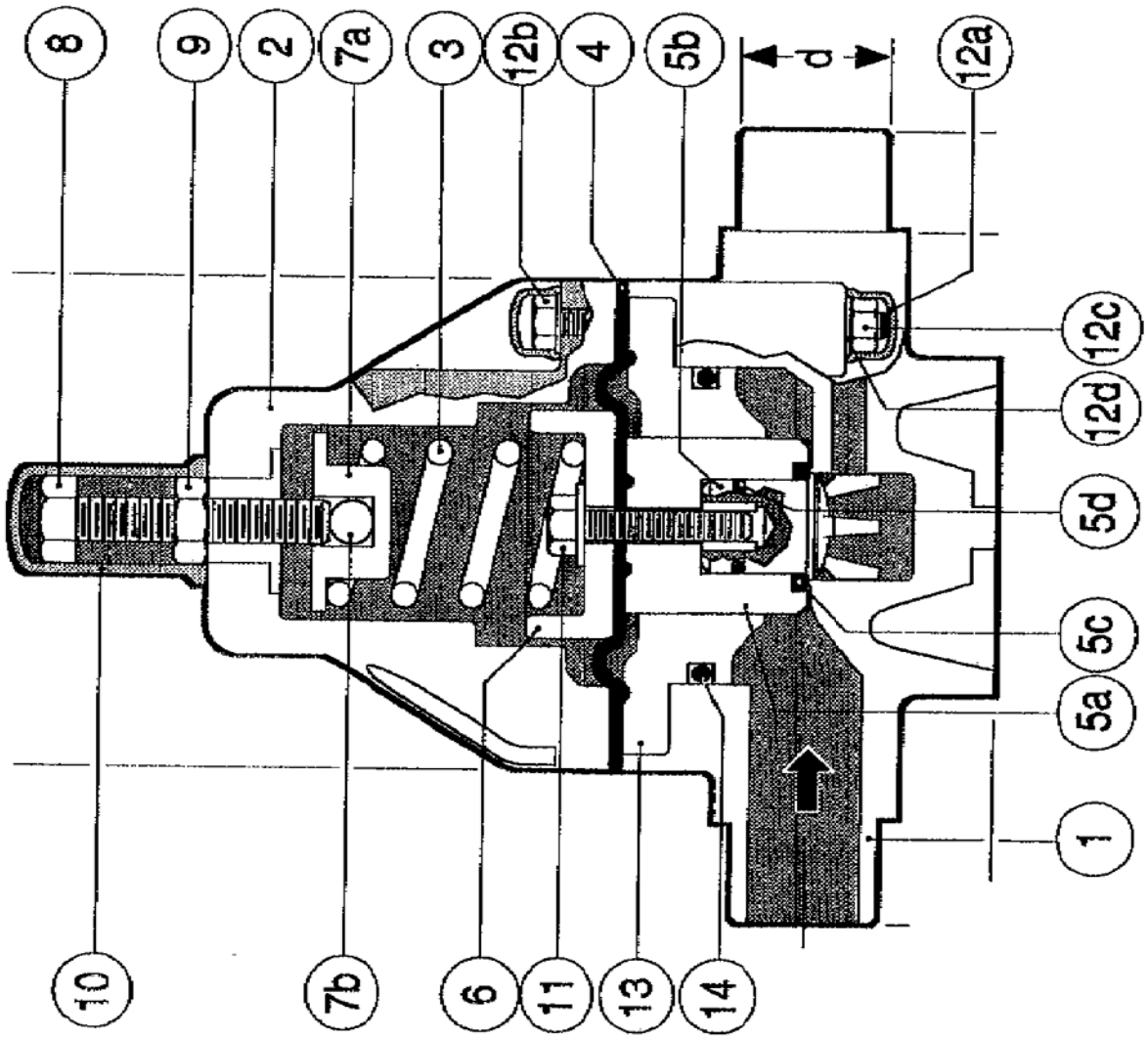
8. Remove seal (14) at intermediate flange (13).

9. Inspect all parts for wear and abrasion, replace seals, diaphragm etc. if necessary.

10. To re-assemble valve follow steps 1 through 9 in reverse order.

TROUBLESHOOTING

FAILURE		REASON	REPAIR
VALVE LEAKS AT DIAPHGRAM (4)		CLAMPING PRESSURE FOR DIAPHRAGM (4) TOO LOW.	TIGHTEN SCREWS (12)
PRESSURE RISES ABOVE SET PRESSURE	{A)	VALVE SEAT (5c) & SEALS (14) & (5d) ARE	CHECK SEALS OF PISTON (5) BODY (14) - REPLACE
	(B)	DEFECTIVE DIAPHRAGM (4) LEAKING	REPLACE.
	(C)	PISTON (5) BORE AT BODY (1) DIRTY	DISMANTLE PISTON (5) AND CLEAN BORE
VALVE CLOSED (DOES NOT OPEN)		VALVE MOUNTED IN WRONG DIRECTION.	TURN VALVE IN DIRECTION OF ARROWS
FLUIDS PENETRATE ADJUSTING SCREW (8)		DIAPHRAGM (4) DEFECTIVE.	REPLACE DIAPHRAGM (4)
LEAKING AT PLUG AT VALVE BODY		O-RING SEAL LEAKING	DISMANTLE PLUG AND REPLACE SEAL



Part	Description	Pcs
1	BODY	1
2	BONNET	1
3	RELIEF SPRING	1
4	DIAPHRAGM	1
5(a)	OUTER PISTON	1
	(PART OF ASSY)	
5(b)	INNER PISTON	1
	(PART OF ASSY)	
5(c)	SEAT	2
	(PART OF ASSY)	
5(d)	PISTON O-RING	2
	(PART OF ASSY)	
6	SPRING PLATE	1
7(a)	PRESS. PLATE	1
7(b)	BALL BEARING	1
8	ADJ. SCREW	1
9	COUNTER NUT	1
10	CAP	1
11	PISTON SCREW	1
12 (a)	BODY CAP	4/6
12 (b)	BODY BOLT	4/6
12 (c)	BODY NUT	4/6
12 (d)	BODY WASHER	4/6
13	INT. FLANGE	2
14	SEAL	2

TITLE: CHEMLINE SB PRESSURE RELIEF VALVES	SCALE		DATE	CHEMLINE PLASTICS
	DR. BY			
REFERENCE: 3/8" - 1-1/2"	CHKD. BY			DWG. NO. SB1011
	APP. BY			REV. 0

11.10 - C2-5 – CHEMLINE PRESSURE GAUGE ISOLATOR

CHEMLINE Plastics Limited

Your Pipeline To Quality Valves, Strainers, Flowmeters and Controls

55 Guardsman Road
Thornhill, Ontario
L3T 6L2
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Tel: 905-889-7890
Fax: 905-889-8553

MAINTENANCE INSTRUCTIONS
For Chemline SG Series Gauge Isolator 1/4"and 1/2"

Maintenance:

Refer to drawing on page 2 of the **SG Gauge Isolator Data Page**

1. Gauge isolators can be mounted and filled with glycerine at Chemline prior to delivery, or isolators can be mounted and filled on site.
2. Remove isolator from valve.
3. To disassemble isolator remove gauge (6) from upper chamber/bonnet (3).
4. Separate bonnet (3) from body (1).
5. Drain glycerin (or other fluid) from both chambers (1 & 3), prior to removing diaphragm (2).
6. Check teflon diaphragm (2) for wear and replace if necessary.
7. Refill upper chamber (3) and replace diaphragm (2).
8. To reassemble diaphragm follow steps 1 through 4 in reverse, to hand-tight plus ¼ turn (approx. 30 in-lb).

11.11 - C2-6 – CHEMLINE BALL VALVE

CHEMLINE Plastics Limited

Your Pipeline To Quality Valves, Strainers, Flowmeters and Controls

55 Guardsman Road
Thornhill, Ontario
L3T 6L2
Canada
Tel: 905-889-7890
Fax: 905-889-8553

MAINTENANCE & INSTALLATION INSTRUCTIONS
For Chemline Type 21 True Union Ball Valve Size 1/2"- 4"

Installation:

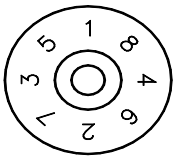
1. Make sure all surfaces are clear and free of debris prior to installing valve in pipeline. Pipeline should be empty at connection site.

2. Valve should be set to the closed position.

3. When installing valves with socket connections, ensure that only PVC solvent cement is used. Excessive use of cement can cause sticking in the valve interior, therefore use caution when applying cement, especially on vertical piping.

4. For threaded connections we recommend the use of sealing tape and, with the use of a strap wrench, to tighten no more than 2 full turns past finger-tight. Use of a pipe wrench can deform the pipe or union nut and cause damage to the valve and/or connection(s).

5. Flanged connections should be torqued evenly and in a symmetrical pattern with a torque wrench and as per the figure and chart below:



RECOMMENDED FLANGE BOLT TORQUES

VALVE SIZE	FLANGE	BOLT TORQUE	IN FT-LB	AXIAL MISALIGNMENT	PARALLELISM (INCH)
	PSI - 50	PSI - 100	PSI – 150		
1½	11	13	14	0.04	0.03
2	13	14	16	0.04	0.03
2½	13	14	16	0.04	0.03
3	18	20	22	0.04	0.03
4	20	20	22	0.04	0.04
5	22	15	29	0.04	0.04
6	25	15	32	0.04	0.04
8	25	32	40	0.06	0.04
10	25	32	40	0.06	0.04
12	29	36	43	0.06	0.04
14	32	36	43	0.06	0.04
16	36	[58-85 PSI]	58	0.06	0.04
18	36	[58-85 PSI]	-		
20	72	-	-		
24	72	-	-		

Maintenance Instructions Type 21 Ball Valve cont.

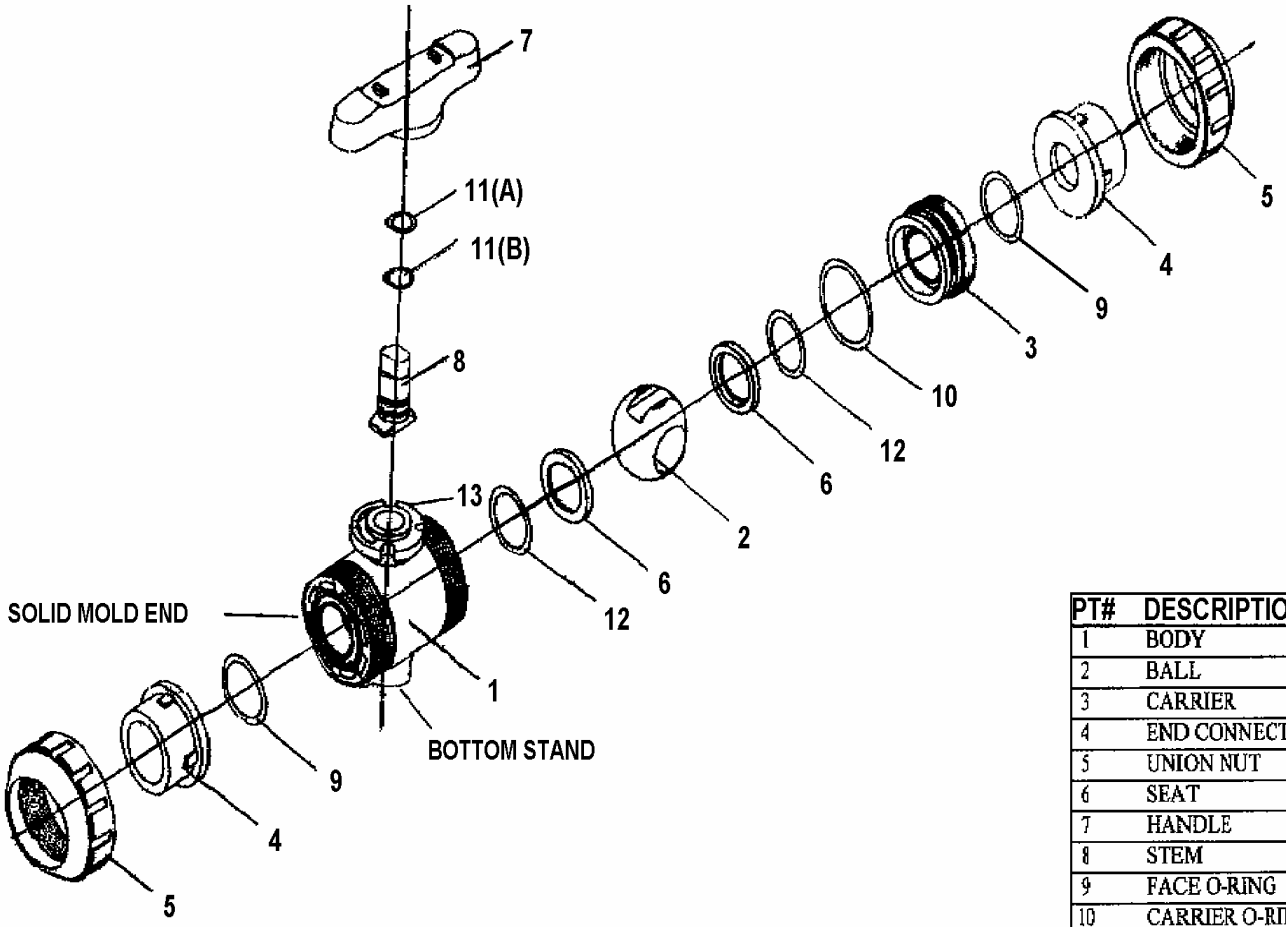
Maintenance:

Refer to **ASSEMBLY DRAWING T21V Rev. 0.** And proceed as follows:

1. Turn valve to the closed position.
2. Unscrew union nut (5) from both ends of valve.
3. Remove end connectors (4).
4. On solid mold end, remove face o-ring (9). This completely disassembles this end of valve.
5. Pull upward on handle (7) to remove.
6. On opposite end of valve, remove face o-ring (9) and use handle (7) as a spanner wrench to remove carrier (3).
7. Remove carrier o-ring (10).
8. Remove seat (6) and seat cushion (12) to expose ball (2).
9. Remove ball (2) by pushing from solid molded end of body.
10. Remove stem (6) by pushing it down into body (1).
11. Remove stem o-rings 11(A) and 11(B) from groves in stem.
12. Remove other seat (6) and seat cushion (12).
13. Inspect all parts for wear and replace as necessary.
14. Before re-assembling valve, lubricate all o-rings with Dow Corning III silicone compound or equivalent.
15. To re-assemble valve follow steps 1 through 10 in reverse order.

NOTE: If mounting actuator on mounting flange (13), make sure handle (7) is removed and stem (6) and actuator are aligned.

After replacing carrier (3), the face of the carrier should remain slightly projected from the end of the body. Make sure the ball rotates smoothly with only a touch of resistance.



PT#	DESCRIPTION	QTY	MATERIALS
1	BODY	1	PVC/PP/PVDF/CPVC
2	BALL	1	PVC/PP/PVDF/CPVC
3	CARRIER	1	CPE/EPDM/VITON/HYP.
4	END CONNECTOR	2	PVC/PP/PVDF/CPVC
5	UNION NUT	2	PVC/PP/PVDF/CPVC
6	SEAT	1	CPE/EPDM/CITON/HYP.
7	HANDLE	1	PVC/PP/PVDF/CPVC
8	STEM	1	PVC/PP/PVDF/CPVC
9	FACE O-RING	2	CPE/EPDM/VITON/HYP.
10	CARRIER O-RING	1	CPE/EPDM/VITON/HYP.
11(A)	STEM O-RING (Upper)	1	CPE/EPDM/VITON/HYP.
11(B)	STEM O-RING (Lower)	1	CPE/EPDM/VITON/HYP.
12	SEAT CUSHION	2	CPE/EPDM/VITON/HYP
13	MOUNTING FLANGE	1	PVC/PP/PVDF/CPVC

TITLE CHEMLINE TYPE 21 TRUE UNION BALL VALVE	SCALE		DATE	CHEMLINE PLASTICS	
	DR. BY				
REFERENCE SIZES 1/2" - 4"	CHKD BY			DWG. NO. T21V	REV. 0
	APP. BY				

11.12 - E1-1 – ENDRESS & HAUSER MEASURING STATION

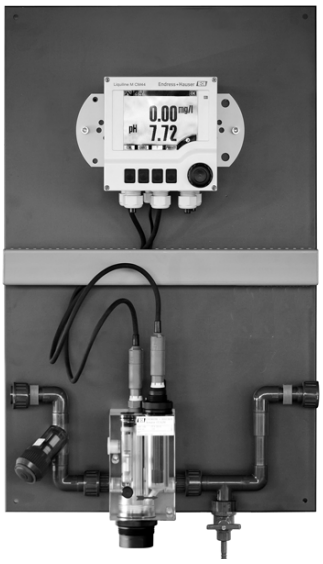
Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

Compact measuring station for disinfection (DI) CCE10 / CCE11

Station for the measurement of chlorine, total chlorine or chlorine dioxide and pH – ready for connection





Application

- Water treatment, drinking water plants, process water
- Swimming pools
- Chlorine dosing in water treatment (CCE10)
- Quality control and monitoring in distribution networks (CCE11)

Your benefits

- System ready for connection
- CCE10
  - Based on Liquisys M CCM253
  - Measurement of free chlorine, chlorine dioxide or total chlorine as well as pH and temperature
  - The allround panel for measurement and control
- CCE11
  - Based on Liquiline CM330
  - Measurement of free chlorine, pH and temperature
  - Digital sensors with Memosens technology for free chlorine and pH
  - Use of pre-calibrated sensors possible
    No complicated on-site calibration necessary
- Various connections for water pipes available
  - Metric G¾ (e.g. for Europe): Adapter for pipe connection D16 included in scope of delivery
  - Inch FNPT ½" (e.g. for North America)
- Water circuit with integrated coarse filter and sampling tap for DPD reference measurements
- Assembly with integrated flow setting and flow monitoring; proximity switch triggers alarm when minimum flow is too low (CCE10: via Liquisys; CCE11: external evaluation necessary)
- Check valve
- Easy maintenance
  - Extremely easy monitoring of flow, soiling and air bubbles thanks to transparent assembly block
  - All sensors can be calibrated in installed position

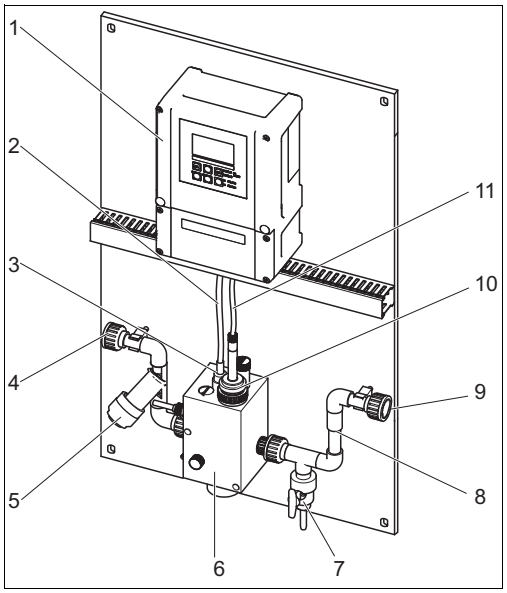
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Endress+Hauser
People for Process Automation

Function and system design

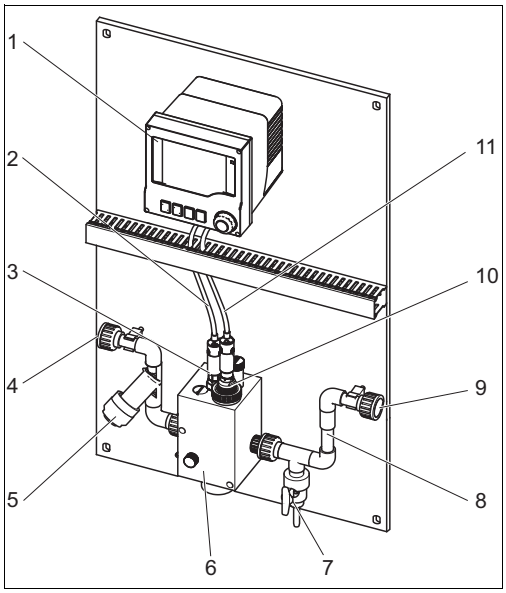
Measuring system

The measuring system is competely mounted and wired. It consists of:



CCE10

1	*Liquisys M CCM253 transmitter*
2	*Special measuring cable for pH sensors*
3	*CPS31 pH sensor*
4	*Inlet*
5	*Dirt trap*
6	*Flowfit CCA250 assembly*
7	*Sampling tap*
8	*Check valve*
9	*Outlet*
10	*CCS120/140/141/240/241 sensor (DI)*
11	*Special measuring cable for DI sensor*



CCE11

1	*Liquiline CM330 transmitter*
2	*CYK10 Memosens data cable*
3	*CPS11D pH sensor*
4	*Inlet*
5	*Dirt trap*
6	*Flowfit CCA250 assembly*
7	*Sampling tap*
8	*Check valve*
9	*Outlet*
10	*CCS142D sensor (DI)*
11	*CYK10 Memosens data cable*

Outputs

Output signal

CCE10: 0/4 to 20 mA, galvanically separated, active
CCE11: 0/4 to 20 mA, galvanically separated, passive
External power supply required!

Power supply

Supply voltage

CCE10: depending on ordered version:
100/115/230 V AC +10/-15 %, 48 to 62 Hz
24 V AC/DC +20/-15 %, 48 to 62 Hz
CCE11: 24 V DC ±20 %

Power consumption

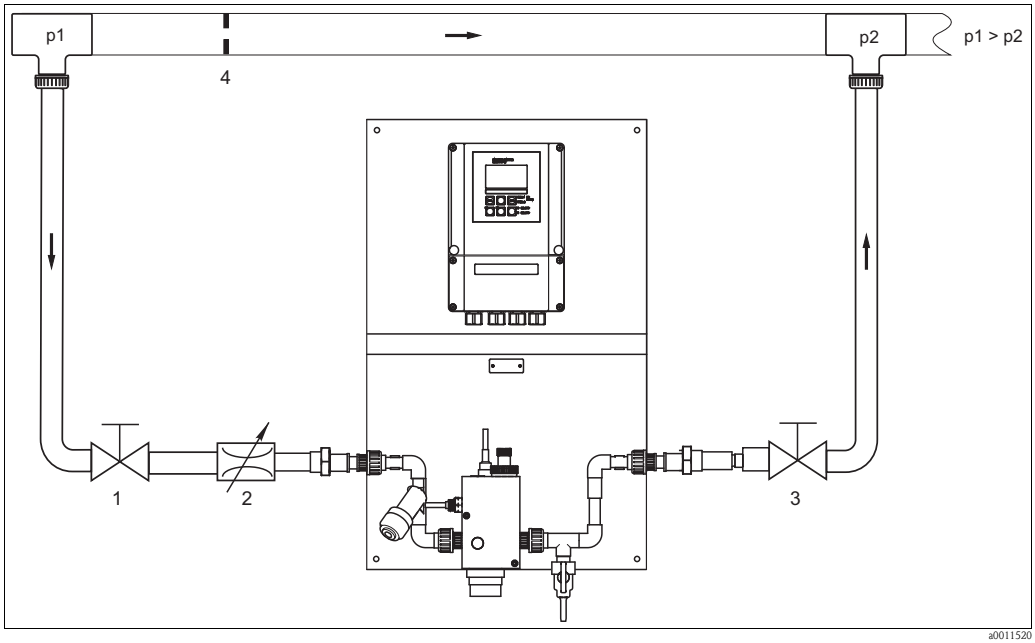
CCE10: approx. 7.5 VA
CCE11: approx. 1 W

Installation

Installation notes

Bypass operation

To achieve a flow through the bypass, pressure p1 has to be higher than pressure p2. Therefore, you have to install an orifice plate or a throttle valve in the main pipe (→ , pos. 4).

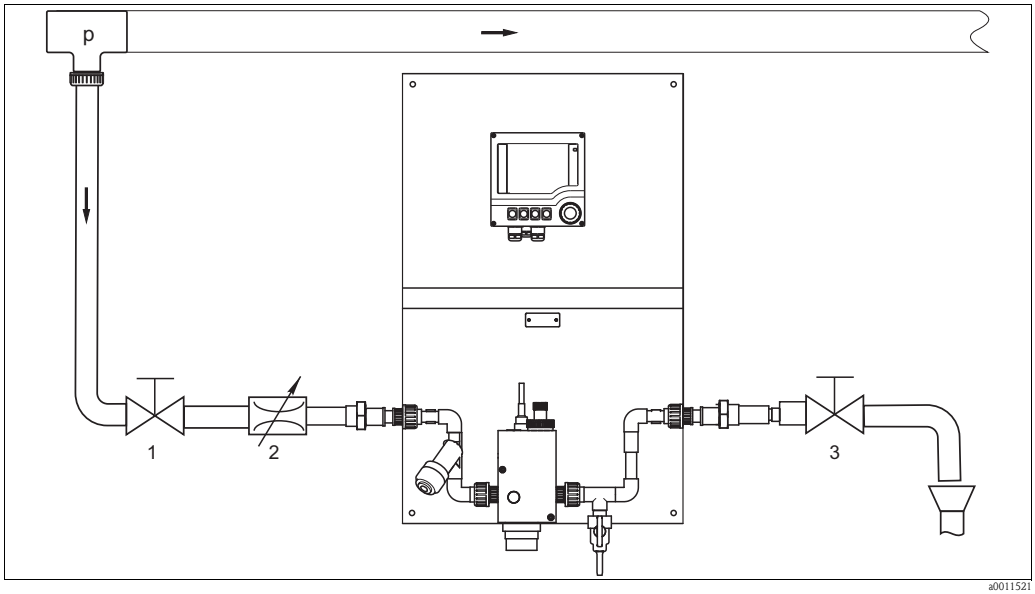


Installation example with bypass and orifice plate in the main pipe

1 Stop valve (to be provided by customer)
2 Pressure reducer (if p1 > 4 bar (58 psi)) (to be provided by customer)
3 Stop valve (to be provided by customer)
4 Orifice plate in the main pipe (to be provided by customer)

Caution!
p2 must not exceed the permissible operating pressure of the assembly of 4 bar (58 psi).

Open outlet operation



Installation example with open outlet

1 Stop valve (to be provided by customer)
2 Pressure reducer (if p > 4 bar (58 psi)) (to be provided by customer)
3 Stop valve (to be provided by customer)

Environment

Ambient temperature	0 to 50 °C (32 to 120 °F)
Storage temperature	0 to 50 °C (32 to 120 °F)

Process

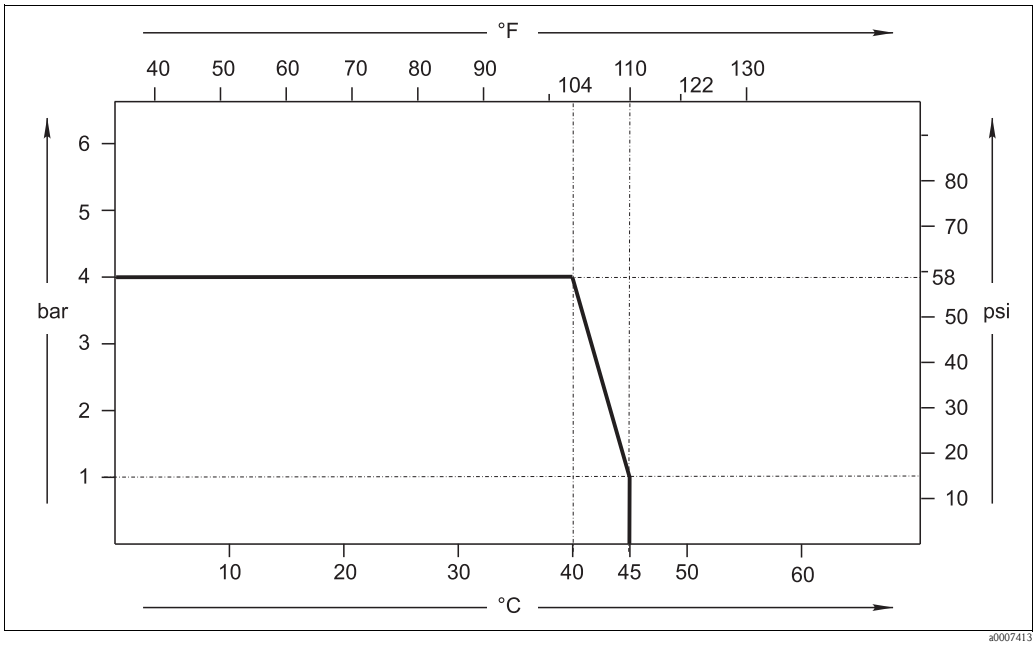
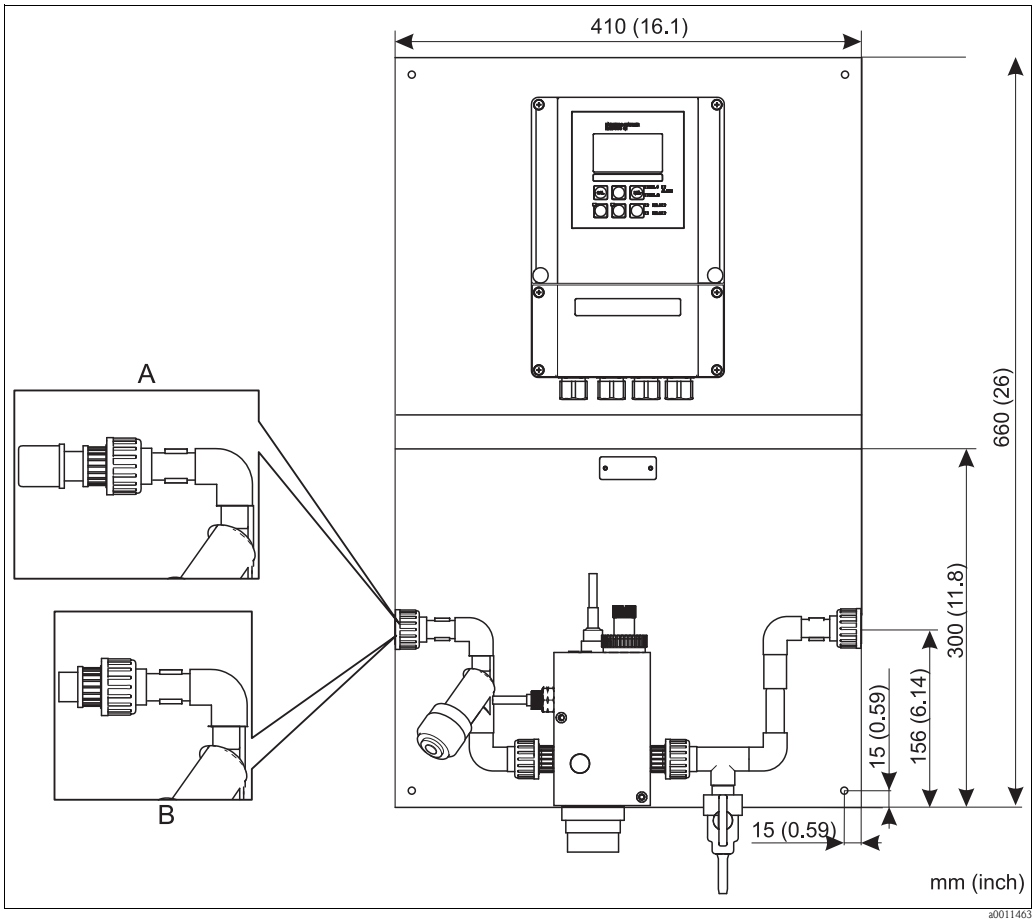
Process temperature	0 to 45 °C (32 to 110 °F), non-freezing
Process pressure	max. medium pressure: 4 bar (58 psi) at 40 °C (104 °F), see also diagram below
Temperature-pressure diagramm	

Fig. 1: Temperature-pressure diagram

Flow	optimum 30 l/h (7.9 gal/h) 30 to 120 l/h (7.9 to 31.7 gal/h), adjustable

Mechanical construction

Design, dimensions



Dimensions

A CCE1X-1 version, metric with G¾ union nut and adapter for hose D6/12
B CCE1X-2 version, inch with G1 union nut and FNPT ½" adapter

Weight

approx. 5 kg (11 lbs)

Materials

In contact with medium:

Assembly body	plexiglass (PMMA)
Built-in parts	PVC, stainless steel 1.4571 (AISI 316Ti), EPDM, Viton
Pipes	PVC-U
O-rings	EPDM
Dirt trap	
Material	PVC
Mesh size	0.5 mm (0.02")

Process connections

CCE1X-1:	PVC G¾ union nut, adapter for hose D6/12
CCE1X-2:	PVC G1 union nut , FNPT ½" adapter

Sensors

	CCE10	CCE11
Parameter, measuring range		
A1	CCS140	CCS142D-AAS80
A2	CCS141	CCS142D-GAS80
B1	CCS240	–
B2	CCS241	–
C2	CCS120	–
pH		
EP	CPS31	CPS11D

Note!
The pH sensors indicated above are included in the scope of delivery if ordered accordingly. You may also use different pH sensors such as CPS71, CPS71D (see "Accessories").

Ordering information

CCE10 product structure

Media connection							
1	PVC G¾ union nut, adapter hose ID6, OD12						
2	PVC G1 union nut, adapter FNPT ½"						
	Parameter; measuring range						
	A1	Free chlorine; 0 to 20 mg/l (CCS140)					
	A2	Free chlorine; 0 to 5 mg/l (CCS141)					
	B1	Chlorine dioxide; 0 to 20 mg/l (CCS240)					
	B2	Chlorine dioxide; 0 to 5 mg/l (CCS241)					
	C2	Total chlorine; 0 to 10 mg/l (CCS120)					
		pH measurement/ pH compensation					
		EK	without				
		EP	with				
			Power supply				
			0	230 V AC			
			1	115 V			
			2	230 V AC; CSA Gen. Purp.			
			3	115 V AC; CSA Gen. Purp.			
			5	100 V AC			
			7	24 V AC/DC; CSA Gen. Purp.			
			8	24 AC/DC			
				Output			
				0	1 x 20 mA; Cl_2 / ClO_2		
				1	2 x 20 mA; Cl_2 / ClO_2 + temp. / P(ID) / pH/ORP / Cl_2/ClO_2		
				3	PROFIBUS PA		
				4	PROFIBUS DP		
				5	1 x 20 mA; Cl_2 / ClO_2 HART		
				6	2 x 20 mA; Cl_2 / ClO_2 HART + temp. / P(ID) / pH/ORP / Cl_2/ClO_2		
						Additional contacts	
						05	not selected
						10	2 x relay; limit / P(ID) / timer
						15	4 x relay; limit / P(ID) / Chemoclean
						16	4 x relay; limit / P(ID) / timer + 3-point step controller
						20	20 mA input + 2 x relay; limit / P(ID) / timer
						25	20 mA input + 4 x relay; limit / P(ID) / Chemoclean + 3-point step controller
						26	20 mA input + 4 x relay; limit / P(ID) / timer + 3-point step controller
CCE10-							complete order code

CCE11 product structure

	Media connection				
	1	PVC G¾ union nut , adapter for hose D6/12			
	2	PVC G1 union nut , adapter FNPT ½"			
		Parameter; measuring range			
		A1	Free chlorine; 0 to 20 mg/l (CCS142D-A)		
		A2	Free chlorine; 0 to 5 mg/l (CCS142D-G)		
			pH measurement/pH compensation		
			1	without	
			2	with	
CCE11-					complete order code

Scope of delivery

The scope of delivery comprises:

- 1 measuring station, assembled with
  - transmitter
  - assembly
  - DI sensor
  - pH sensor (if selected)
  - cables
  - water pipes
- 1 accessory bag with
  - 2 hose connections D6/12 glued to union nut D16 (CCE1X-1) or 2 PVC male threads G 1 to FNPT ½" (CCE1X-2)
  - lower cap with calibration vessel for CCA250
  - dummy plugs of installation positions pH/ORP/chlorine
  - removable part of ball valve in OFF position with dummy plug F18
  - filling electrolyte and membrane cap of the DI sensor
- Operating Instructions for
  - transmitter
  - sensor
  - assembly

Accessories

Note!
In the following sections, you find the accessories available at the time of issue of this documentation.
For information on accessories that are not listed here, please contact your local service or sales representation.

Sensors

CCE10

- CCS120
  Amperometric sensor for total chlorine
  Measuring range 0.1 to 10 mg/l
  Ordering acc. to product structure, see Technical Information (TI388C/07/en)
- CCS140
  Membrane-covered amperometric sensor for free chlorine
  Measuring range 0.05 to 20 mg/l
  Ordering acc. to product structure, see Technical Information (TI058C/07/en)
- CCS141
  Membrane-covered amperometric trace sensor for free chlorine
  Measuring range 0.01 to 5 mg/l
  Ordering acc. to product structure, see Technical Information (TI058C/07/en)
- CCS240
  Membrane-covered amperometric sensor for chlorine dioxide
  Measuring range 0.05 to 20 mg/l
  Ordering acc. to product structure, see Technical Information (TI114C/07/en)
- CCS241
  Membrane-covered amperometric trace sensor for chlorine dioxide
  Measuring range 0.01 to 5 mg/l
  Ordering acc. to product structure, see Technical Information (TI114C/07/en)

- Orbisint CPS11
  pH electrode for process applications with dirt-repellent PTFE diaphragm
  Ordering acc. to product structure, see Technical Information (TI028C/07/en)

Ceratex CPS31
- pH electrode especially suited for swimming pools, with 3 ceramic diaphragms
- Ordering according to product structure, see Technical Information (TI030C/07/en)

- Ceragel CPS71
  pH electrode with double junction reference system and integrated bridge electrolyte
  Ordering acc. to product structure, see Technical Information (TI245C/07/en)

CCE11

CCS142D
- Membrane-covered amperometric sensor for free chlorine
- Memosens technology
- Measuring range 0.01 to 20 mg/l
- Ordering acc. to product structure, see Technical Information (TI419C/07/en)

- Orbisint CPS11D
  pH electrode for process applications with dirt-repellent PTFE diaphragm
  Memosens technology
  Ordering acc. to product structure, see Technical Information (TI028C/07/en)

- Ceragel CPS71D
  pH electrode with double junction reference system and integrated bridge electrolyte
  Memosens technology
  Ordering acc. to product structure, see Technical Information (TI245C/07/en)

Connection accessories

Special measuring cable with TOP68 plug-in head for CCS120
- Length: 1 m (3.28 ft)
- Order no.: 51517204

Special measuring cable with TOP68 plug-in head for CPS11/CPS31/CPS71
- Length: 1 m (3.28 ft)
- Order no.: 51513423

CYK10 Memosens data cable
- For digital sensors with Memosens technology
- Ordering according to product structure, see Technical Information (TI376C/07/en)

Calibration accessories

Free chlorine/chlorine dioxide

CCM182
- Microprocessor-controlled photometer for determining chlorine and pH value
- Measuring range for chlorine: 0.05 - 6 mg/l
- Measuring range for pH value: 6.5 - 8.4
- Order no.: CCM182-0

Cuvettes for CCM182
- 3 pieces
- Order no. 51507203

DPD tablets no. 1
- 100 pieces for free chlorine
- Order no. 50035461

DPD tablets no. 3
- 100 pieces for total chlorine
- Order no. 51502871

pH

High-quality buffer solutions of Endress+Hauser - CPY20
The secondary buffer solutions have been referenced to primary reference material of the PTB (German Federal Physico-technical Institute) and to standard reference material of NIST (National Institute of Standards and Technology) according to DIN 19266 by a DKD (German Calibration Service) accredited laboratory.

	pH value					
	A	pH 2.00 (accuracy ± 0.02 pH)				
	C	pH 4.00 (accuracy ± 0.02 pH)				
	E	pH 7.00 (accuracy ± 0.02 pH)				
	G	pH 9.00 (accuracy ± 0.02 pH)				
	I	pH 9.20 (accuracy ± 0.02 pH)				
	K	pH 10.00 (accuracy ± 0.05 pH)				
	M	pH 12.00 (accuracy ± 0.05 pH)				
		Quantity				
		01	20 x 18 ml (0.68 fl.oz) only buffer solutions pH 4.00 and 7.00			
		02	250 ml (8.45 fl.oz)			
		10	1000 ml (0.26 US gal)			
		50	5000 ml (1.32 US gal) canister for Topcal S			
			Certificates			
			A	Buffer analysis certificate		
				Version		
				1	Standard	
CPY20-						complete order code

Maintenance kits

Service kit for CCS120
- 2 membrane caps and 1 bottle of electrolyte (50 ml (1.69 fl.oz))
- Order no. 51517284

Service kit CCS14x
- For chlorine sensors CCS140/CCS141/CCS142D
- 2 replacement cartridges, filling electrolyte 50 ml, polishing sheets
- Order no. 71076921

Service kit CCS24x
- For chlorine dioxide sensors CCS240/CCS241
- 2 replacement cartridges, filling electrolyte 50 ml, polishing sheets
- Order no. 71076922

Instruments International

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4153 Reinach
Switzerland

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Fax+41 61 715 25 00
www.endress.com
info@ii.endress.com

Endress+Hauser

People for Process Automation

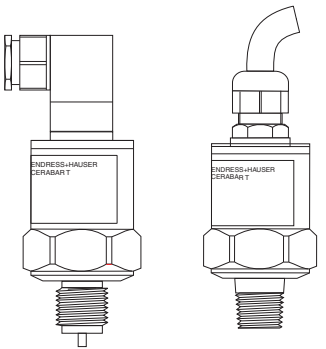
TI440C/07/en/09.09
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11.13 - E1-2 – ENDRESS & HAUSER PRESSURE TRANSMITTER

Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Operating Instructions

Cerabar T PMC131



de – Drucktransducer
en – Pressure Transducer
fr – Transducteur de pression
it – Trasduttore di pressione
es – Transmisorde presión
nl – Druk-transducer

KA00085P/00/A6/13.12
71158704

Endress+Hauser
People for Process Automation

de - Inhalt

Geräte-Identifikation	4
Abmessungen	5
Montage	6
Elektrischer Anschluss	8
Technische Daten	10

en - Contents

Device Identification	4
Dimensions	5
Mounting	6
Electrical Connection	8
Technical Data	10

fr - Sommaire

Dénomination de l'appareil	4
Dimensions	5
Montage	6
Raccordement électrique	8
Caractéristiques techniques	10

de - Sicherheitshinweise

Der Cerabar T dient der Absolut- und Relativdruckmessung in Gasen, Dämpfen, Flüssigkeiten und Stäuben. Bei unsachgemäßem Einsatz können Gefahren von ihm ausgehen. Das Gerät darf nur von qualifiziertem und autorisiertem Fachpersonal unter strenger Beachtung dieser Betriebsanleitung und der Technischen Information TI00415P, der einschlägigen Normen, gesetzlichen Vorschriften und Zertifikate eingebaut, angeschlossen, in Betrieb genommen und gewartet werden.

en - Notes on Safety

The Cerabar T is designed for measuring absolute and gauge pressure of gases, vapours, liquids and dusts. If used incorrectly it is possible that application related dangers may arise.The Cerabar T may be installed, commissioned, operated and maintained by qualified and authorised personnel only, under strict observance of these operating instructions and Technical Information TI00415P, any relevant standards, legal requirements, and, where appropriate, the certificate.

fr - Conseils de sécurité

Le Cerabar T est destiné à la mesure de pression absolue et relative dans les gaz, vapeurs, liquides et poussières. Il peut être source de danger en cas d'utilisation non conforme aux prescriptions. L'appareil ne doit être installé, raccordé, mis en service et maintenu que par un personnel qualifié et autorisé, qui tiendra compte des indications contenues dans la présente mise en service et de l' Information Technique TI00415P, des normes en vigueur et des certificats disponibles (selon l'application).

es - Indice

Identificación del equipo	4
Dimensiones	5
Montaje	7
Conexiones eléctricas	8
Datos técnicos	10

it - Indice

Identificazione (strumento)	4
Dimensioni	5
Montaggio	7
Collegamento elettrico	8
Dati tecnici	10

nl - Inhoud

Instrument-identificatie	4
Afmetingen	5
Montage	7
Elektrische aansluiting	8
Omgevingscondities	10

es - Notas sobre seguridad

Cerabar T está diseñado para medir presión absoluta y relativa en gases, vapores, liquidos y sólidos pulvurulentos. Su empleo inapropiado puede resultar peligroso. El equipo deberá ser montado, conectado, instalado y mantenido única y exclusivamente por personal cualificado y autorizado, bajo rigurosa observación de las presentes instrucciones de servicio y de la Informatión Técnica TI00415P, de las normativas y legislaciones vigentes, así como de los certificados (dependiendo de la aplicación).

it - Note sulla sicurezza

Il Cerabar T è stato progettato per la misura della pressione assoluta e relativa di gas, vapori, liquidi e polveri. Un'installazione non corretta può determinare pericolo per le persone e le cose. Lo strumento deve essere montato collegato e messo in servizio solamente da personale qualificato ed autorizzato, nel totale rispetto delle indicazioni operative qui riportate, delle prescrizioni presenti nelle informazioni tecniche TI00415P ed in accordo a tutte le norme e legislazioni vigenti e le certificazioni utilizzate.

nl - Veiligheidsinstructies

De Cerabar T is ontworpen voor het meten absoluut en overdruk van gassen, dampen, vloeistoffen en vaste stoffen. Bij niet correct gebruik kunnen gevaarlijke situaties onstaan. Het instrument mag uitsluitend door gekwalificeerd en geautoriseerd vakpersoneel geinstalleerd, aangesloten en inbedrijf genomen worden met inachtneming van dit inbedrij-fstellingsvoorschrift, het bijbehorende Technisch Informatie blad TI00415P en de betreffende normen, de wettelijke voorschriften en eventuele certificaten in acht.

de - Geräte-Identifikation

en - Device Identification

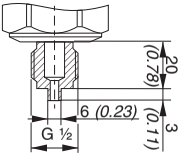
fr - Dénomination de l'appareil

es - Identificación del equipo

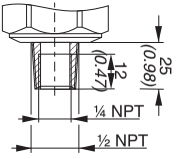
it - Identificazione dello strumento

nl - Instrument-identificatie

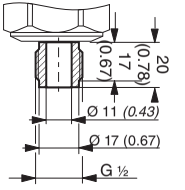
1 = G ½A, ISO 228
1.4301 (AISI 304)



2 = ½ MNPT, ¼ FNPT,
1.4301 (AISI 304)



5 = G ½A, ø11 mm, ISO228
1.4301 (AISI 304)



F = FKM Viton
S = FKM Viton, O_2

1 = ohne/without/sans/sin/senza/zonder
2 = Protokoll/Protocol/Protocole
S = German Lloyd

p

D10 = 0..100 mbar, 0...10 kPa
• • •
R4T = 0...500 psi a

de - Montage

- Die Funktion des Drucktransducers ist unabhängig von der Einbaulage.
- Zum Schutz des Gewindes und der Druckmembran darf die Schutzkappe am Gewindestutzen erst kurz vor dem Einbau entfernt werden.
- Der Drucktransducer ist nach den gleichen Richtlinien wie ein Manometer zu montieren. Wir empfehlen die Verwendung von Absperrhähnen und Wassersackrohren.
- Beim Einbau ist darauf zu achten, dass kein Tropfwasser in das Gehäuse eindringen kann.
- Einsatzgrenzen für Sauerstoff beachten (bei FKM Viton/O_2 gemäß BAM-Liste).
- Bei Anwendungen in explosionsfähiger Atmosphäre der Zone 2 (Zündschutzart Ex nA), Gehäuse vor Schlageinwirkung schützen.

en - Mounting

- The function of the transducer is independent of mounting orientation.
- To protect the thread and pressure diaphragm from damage, the protective cover on the threaded nozzle should be removed just before installation only.
- The pressure transducer is to be mounted like a manometer. The guidelines are identical. Isolating valves and water pocket pipes should be used.
- When installing, ensure that no water enters the housing.
- Note the application limits for oxygen (for FKM Viton/O_2 as per BAM list).
- In the event of applications in a Zone 2 explosive atmosphere (Ex nA explosion protection) protect the housing from impact.

fr - Montage

- Le fonctionnement du transducteur de pression est indépendant de son implantation.
- Afin de protéger le filetage et la membrane, ne retirer le capot de protection, placé sur le raccord fileté, qu'au moment du montage.
- Le transducteur de pression doit être monté conformément aux directives concernant les manomètres. Nous recommandons l'utilisation de robinets d'isolement et de siphons.
- Lors du montage, veiller à ce qu'il n'y ait pas d'infiltration d'eau dans le boîtier.
- Tenir compte des limites d'utilisation sur l'oxygène (pour FKP Viton/O_2 selon liste BAM).
- Les applications en atmosphère explosible de zone 2 (mode de protection antidéflagrant Ex nA), protéger le boîtier contre les chocs.

es - Montaje

- El funcionamiento del transmisor de presión es independiente de la orientación de montaje.
- No retirar la protección del casquillo roscado hasta el momento previo a su instalación para evitar dañar la rosca o el diafragma de presión.
- El transmisor de presión se deberá montar como un manómetro. El procedimiento es el mismo. Utilizar válvulas de corte y sifón.
- Durante la instalación asegurar que no entre agua en la caja.
- Observar los límites de utilización en oxígeno (para FKP Viton/O_2 según lista BAM).
- En las aplicaciones en atmósferas con riesgo de explosión de la zona 2 (tipo de protección contra ignición Ex nA) se debe proteger la carcasa contra el efecto de los impactos.

it - Montaggio

- Il funzionamento del trasduttore non dipende dalla posizione di montaggio.
- Per proteggere la filettatura e la membrana di pressione da eventuali danneggiamenti, eliminare il coperchio di protezione dell'ugello filettato solo immediatamente prima dell'installazione.
- Il trasduttore di pressione deve essere montato come un manometro. Utilizzare solo valvole di arresto e tubi separatori d'acqua.
- Durante l'installazione, assicurarsi che non entri acqua nella custodia.
- Osservare i limiti operativi per ossigeno (per FKM Viton/O_2 in accordo con lista BAM).
- Per l'utilizzo in ambienti a rischio di esplosione della zona 2 (Protezione antideflagrante Ex nA), proteggere le custodie contro gli urti.

nl - Montage

- Het functioneren van de Druk-transducer is onhafhankelijk van de montagepositie.
- Ter bescherming van de buitendraad en het membraan moet de beschermhuls pas vlak voor de montage verwijderd worden.
- De Druk-transducer moet identiek als een manometer gemonteerd worden. De richtlijnen t.a.v. gebruik van afsluitkranen, afstandsstukken en watersloten moeten worden aangehouden.
- Bij installatie ervoor zorgen dat er geen water in de behuizing kan komen, ook niet via de connector/wartel.
- Toepassingen in zuurstof bekijken (met FKM Viton/O_2 conform BAM lijst).
- Bescherm de behuizing tegen schokken bij toepassingen in explosiegevaarlijke atmosferen zone 2 (ontstekingsklasse Ex nA).

de - **Elektrischer Anschluss**
Stecker-Version

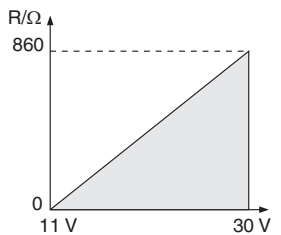
en - **Electrical Connection**
Plug version

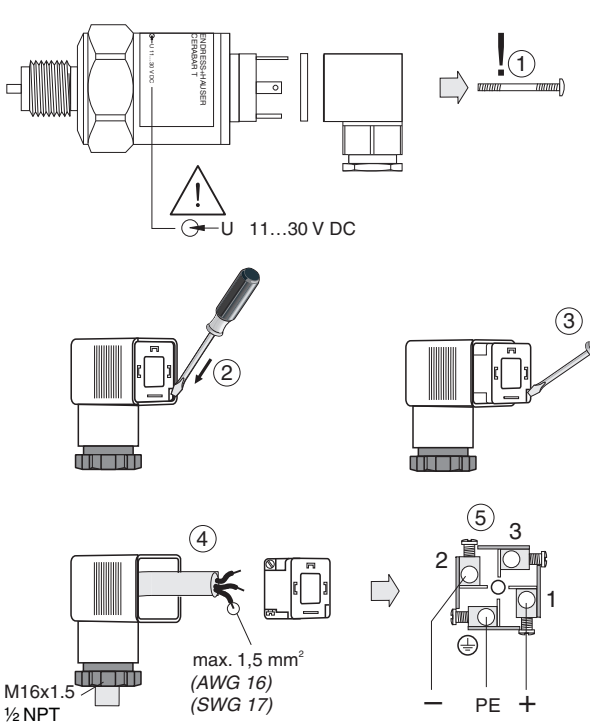
fr - **Raccordement électrique**
Version connecteur

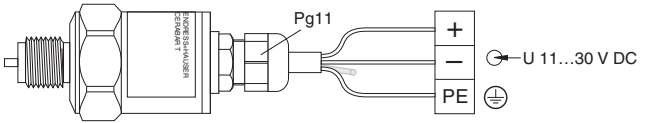
es - **Conexión eléctrica**
Con conector

it - **Collegamento elettrico**
Spina

nl - **Elektrische aansluiting**
Steker-versie

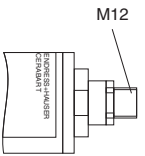






de - Referenzluft- Zuführung
Nicht verschließen! Vor Wasser schützen!

en - Reference air tube
Do not close! Protect from water!

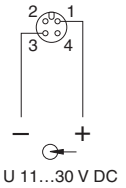


fr - Mise à l'atmosphère
Ne pas boucher! Prótéger de l'eau!

es - Tubo de compensación de presión atmosférica
No tapar! Proteger del agua!

it - Ingresso aria di riferimento
Non chiudere! Proteggere dall'acqua!

nl - Drukvereffening
Niet laten vervuilen en beschermen tegen vocht!



de + = rot; – = schwarz, PE = grün/gelb
en + = red; – = black, PE = green/yellow
fr + = rouge; – = noir, PE = vert/jaune
es + = rojo, – = negro, PE = verde/amarillo
it + = rosso, – = nero, PE = verde/giallo
nl + = rood; – = zwart, PE = groen/geel

de - Elektrischer Anschluß
Kabel-/Stecker-Version

en - Electrical Connection
Cable/plug version

fr - Raccordement électrique
Version câble/connecteur

es - Conexión eléctrica
Cable/conector

it - Collegamento elettrico
Cavo/spina

nl - Elektrische aansluiting
Kabel-/steker-versie

de - Einsatzbedingungen

- Umgebungstemperatur: –20…85 °C
- Lagerungstemperatur: –50…100 °C
- Meßstofftemperaturgrenze: max. 100 °C
- Meßstoffdruckgrenze: p_{max}
- Geräte mit CSA GP-Zulassung dürfen nur mit einer SELV oder Class 2 Spannungsversorgung betrieben werden.

en - Operating Conditions

- Ambient temperature range: –20…85°C
- Storage temperature range: –50…100°C
- Limiting temperature range: max. 100°C
- Limiting pressure range: p_{max}
- Devices with CSA GP approval may only be operated with a SELV or Class 2 power supply.

fr - Conditions d'utilisation

- Température ambiante: –20…85 °C
- Température de stockage: –50…100 °C
- Limite de température du produit: max. 100 °C
- Limite de pression du produit: p_{max}
- Les appareils avec agrément CSA GP ne doivent être utilisés qu'avec une tension d'alimentation SELV ou Class 2.

es - Condiciones de operación

- Rango de temperatura ambiental: –20…85 °C
- Rango de temperatura de almacenamiento: –50…100 °C
- Temperatura máxima de trabajo: máx. 100 °C
- Presión máx. de trabajo: p_{max}
- Los equipos con la certificación CSA GP sólo pueden trabajar con alimentación de clase 2 o SELV.

it - Condizioni operative

- Temperatura ambiente: –20…85 °C
- Temperatura per la conservazione in magazzino: –50…100 °C
- Temperatura limite del prodotto: max. 100 °C
- Pressione limite del prodotto: p_{max}
- Strumenti con approvazione CSA GP possono essere alimentati solo con unità tipo SELV o Classe 2

nl - Omgevingscondities

- Omgevingstemperatuur: –20…+85 °C
- Opslagtemperatuur: –50…100 °C
- Producttemp. : max. 100 °C
- max. procesdruk: p_{max}
- Instrumenten met een CSA GP certificaat mogen uitsluitend via een SELV of een klasse 2 voeding gevoed worden.

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KA00085P/00/A6/13.12 71158704/CCS/FM9

71158704

11.14 - E1-3 – ENDRESS & HAUSER FLOWMETER

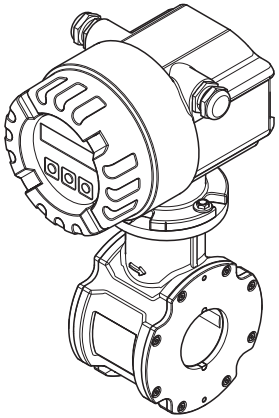
Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Brief Operating Instructions

Proline Promag 10D

Electromagnetic flow measuring system

HART



These Brief Operating Instructions are **not** intended to replace the Operating Instructions provided in the scope of supply.
Detailed information is provided in the Operating Instructions and the additional documentation on the CD-ROM supplied.

The complete device documentation consists of:
- These Brief Operating Instructions
- Depending on the device version:
  - Operating Instructions and the Description of Device Functions
  - Approvals and safety certificates
  - Special safety instructions in accordance with the approvals for the device (e.g. explosion protection, pressure equipment directive etc.)
  - Additional device-specific information

KA00036D/06/EN/13.15
71299364

Endress+Hauser

People for Process Automation

Table of contents

1 Safety instructions 3
1.1 Designated use 3
1.2 Installation, commissioning and operation 3
1.3 Operational safety 3
1.4 Safety conventions 5

2 Installation 6
2.1 Installation conditions 6
2.2 Installing the sensor 10
2.3 Installing the transmitter housing 14
2.4 Post-installation check 16

3 Wiring. 17
3.1 Connecting the various housing types 18
3.2 Connecting the remote version connecting cable 19
3.3 Potential equalization 21
3.4 Degree of protection 22
3.5 Post-connection check 22

4 Commissioning 23
4.1 Switching on the measuring device 23
4.2 Operation 24
4.3 Navigating within the function matrix 25
4.4 Device functions to be configured during commissioning 26
4.5 Troubleshooting 27

1 Safety instructions

1.1 Designated use

- The measuring device is to be used only for measuring the flow of conductive liquids in closed pipes. Most liquids can be measured as of a minimum conductivity of 50 µS/cm.
- Any use other than that described here compromises the safety of persons and the entire measuring system and is, therefore, not permitted.
- The manufacturer is not liable for damage caused by improper or non-designated use.

1.2 Installation, commissioning and operation

- The measuring device must only be installed, connected, commissioned and maintained by qualified and authorized specialists (e.g. electrical technicians) in full compliance with the instructions in these Brief Operating Instructions, the applicable norms, legal regulations and certificates (depending on the application).
- The specialists must have read and understood these Brief Operating Instructions and must follow the instructions they contain. If you are unclear on anything in these Brief Operating Instructions, you must read the Operating Instructions (on the CD-ROM). The Operating Instructions provide detailed information on the measuring device.
- The measuring device should only be installed in the pipe in a de-energized state free from outside loads or strain.
- The measuring device may only be modified if such work is expressly permitted in the Operating Instructions (on the CD-ROM).
- Repairs may only be performed if a genuine spare parts kit is available and this repair work is expressly permitted.
- If performing welding work on the piping, the welding unit may not be grounded by means of the measuring device.

1.3 Operational safety

- The measuring device is designed to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate. Relevant regulations and European standards have been observed.
- The manufacturer reserves the right to modify technical data without prior notice. Your Endress+Hauser distributor will supply you with current information and updates to these Operating Instructions.
- The information on the warning notices, nameplates and connection diagrams affixed to the device must be observed. These contain important data on the permitted operating conditions, the range of application of the device and information on the materials used.
- If the device is not used at atmospheric temperatures, compliance with the relevant marginal conditions as specified in the device documentation supplied (on CD-ROM) is mandatory.
- All parts of the device must be included in the potential equalization of the system.

- Cables, certified cable glands and certified dummy plugs must be suitable to withstand the prevailing operating conditions, such as the temperature range of the process. Housing apertures that are not used must be sealed with dummy plugs.
- The device should only be used for fluids to which all the wetted parts of the device are sufficiently resistant. With regard to special fluids, including fluids used for cleaning, Endress+Hauser will be happy to assist in clarifying the corrosion–resistant properties of wetted materials.
  However, minor changes in temperature, concentration or in the degree of contamination in the process may result in variations in corrosion resistance.
  For this reason, Endress+Hauser does not accept any responsibility with regard to the corrosion resistance of wetted materials in a specific application. The user is responsible for the choice of suitable wetted materials in the process.
- When hot fluid passes through the measuring tube, the surface temperature of the housing increases. In the case of the sensor, in particular, users should expect temperatures that can be close to the fluid temperature. If the temperature of the fluid is high, implement sufficient measures to prevent burning or scalding.
- Hazardous areas:
  Measuring devices for use in hazardous areas are labeled accordingly on the nameplate. Relevant national regulations must be observed when operating the device in hazardous areas.
- Hygienic applications:
  Measuring devices for hygienic applications have their own special labeling. Relevant national regulations must be observed when using these devices.
- Pressure devices:
  Measuring devices for use in systems that need to be monitored are labeled accordingly on the nameplate. Relevant national regulations must be observed when using these devices. The documentation on the CD–ROM for pressure devices in systems that need to be monitored is an integral part of the entire device documentation. The installation regulations, connection data and safety instructions provided in the Ex documentation must be observed.
- Endress+Hauser will be happy to assist in clarifying any questions on approvals, their application and implementation.

1.4 Safety conventions

⚠ Warning!
"Warning" indicates an action or procedure which, if not performed correctly, can result in injury or a safety hazard. Comply strictly with the instructions and proceed with care.

☝ Caution!
“Caution” indicates an action or procedure which, if not performed correctly, can result in incorrect operation or destruction of the device. Comply strictly with the instructions.

✎ Note!
"Note" indicates an action or procedure which, if not performed correctly, can have an indirect effect on operation or trigger an unexpected response on the part of the device.

2 Installation

2.1 Installation conditions

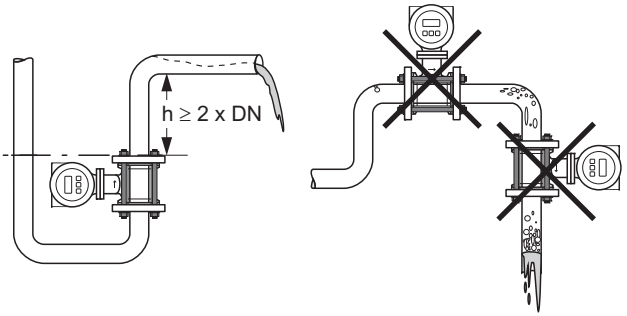
2.1.1 Dimensions

For the dimensions of the measuring device, → see the associated Technical Information on the CD-ROM.

Mounting location

The sensor should preferably be installed in an ascending pipe. Ensure the sensor is an adequate distance (≥ 2 x DN) away from the next pipe bend.

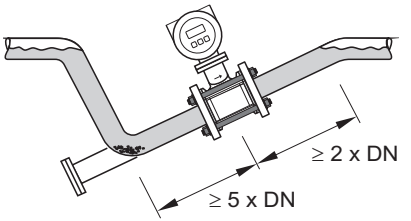
✎ Note!
Entrained air or gas bubble formation in the measuring tube can result in an increase in measuring errors. For this reason, the following mounting locations should be **avoided**:
- Highest point of a pipeline. Risk of air accumulating!
- Directly upstream from a free pipe outlet in a vertical pipeline. Risk of pipe not filling correctly!



a0010747

Partially filled pipes

Partially filled pipes with gradients necessitate a drain-type configuration.



a0010749

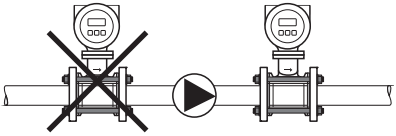
Installation in a partially filled pipe

Installation with pumps

The sensor should only be installed on the pump pressure side.

Note!
- The sensor should **never** be installed on the pump suction side in order to avoid the risk of low pressure, and thus damage to the measuring tube.
- Pulsation dampers may be needed if the sensor is installed downstream from piston pumps, piston diaphragm pumps or hose pumps.

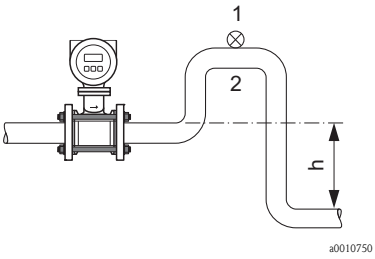
For information on the measuring tube's pressure tightness and the device's resistance to vibration and shock → see the related Technical Information on the CD-ROM.



a0010748

Down pipes

Install a siphon or a vent valve downstream of the sensor in down pipes longer than 5 meters (16 ft). This precaution is to avoid low pressure and the consequent risk of damage to the measuring tube. This measure also prevents the system losing prime, which could cause air pockets. For information on the measuring tube's pressure tightness → see the related Technical Information on the CD-ROM.

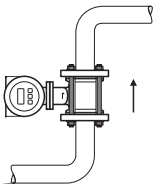


a0010750

Measures for installation in a down pipe (h > 5 m/16 ft)
1. Vent valve
2. Siphon

Orientation

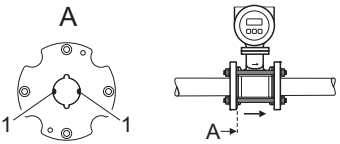
Vertical orientation



a0010709

Measures for installation in a down pipe (h > 5 m/16 ft)
Vertical orientation is generally preferred. Vertical orientation helps avoid gas and air accumulations and deposits in the measuring tube.

Horizontal orientation



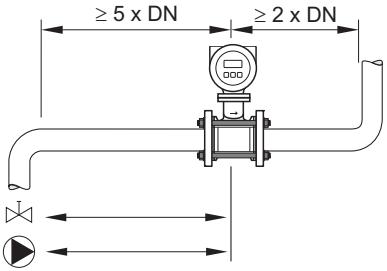
a0010710

The measuring electrode axis should be horizontal in the case of horizontal orientations. This prevents brief insulation of the two measuring electrodes by entrained air bubbles.
1 = Measuring electrodes for signal detection

Inlet and outlet run

If possible, install the sensor upstream from fittings such as valves, T-pieces, elbows, etc.

The following inlet and outlet runs must be observed in order to meet accuracy specifications:
- Inlet run ≥ 5 × DN
- Outlet run ≥ 2 × DN

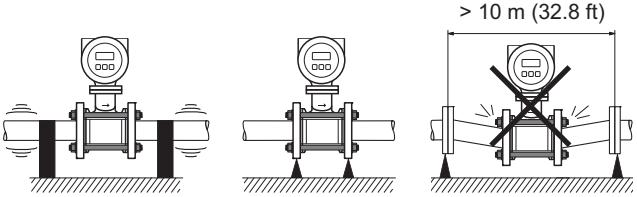


a0010751

2.1.2 Vibrations

Secure the piping and the sensor if vibration is severe.

☝.Caution!
If vibrations are too severe (>2 g/2 h per day; 10 to 100 Hz), we recommend the sensor and transmitter be mounted separately. For information on the permitted shock and vibration resistance → see the Technical Information on the CD-ROM.



a0010752-ae

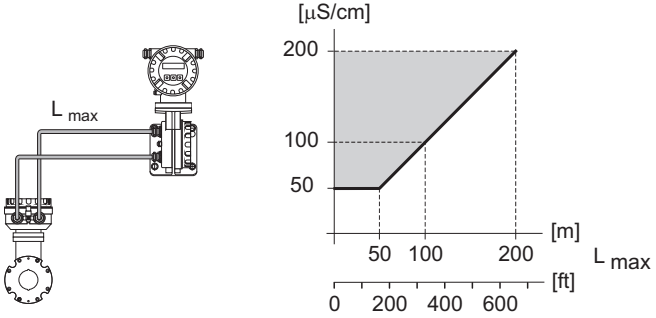
2.1.3 Length of connecting cable

Note the following when mounting the remote version:

- Fix cable run or lay in armored conduit.

  ✎. Note!
  Cable movements can falsify the measuring signal especially in the case of low fluid conductivities.

- Route the cable well clear of electrical machines and switching elements.
- If necessary, establish potential equalization between the sensor and transmitter.
- The permitted length of the connection cable L_{max} (area shaded gray in the graphic) depends on the conductivity of the fluid. A minimum conductivity of 50 µS/cm is needed for all fluids.



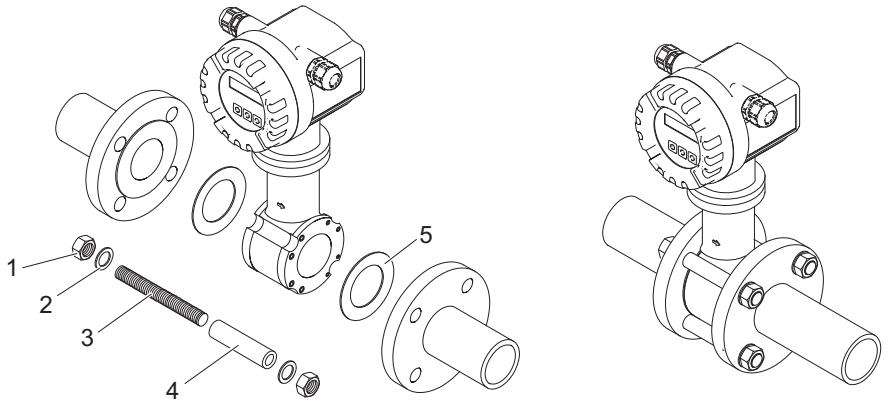
a0010754-ae

2.2 Installing the sensor

2.2.1 Mounting kit

The sensor is installed between the pipe flanges with a mounting kit. The device is centered using recesses on the sensor.

Note!
A mounting kit consisting of nuts (1), washers (2), mounting bolts (3) and seals (5) can be ordered separately. Centering sleeves (4) are provided with the device if they are required for the installation.



Seals

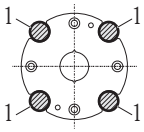
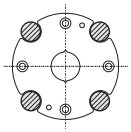
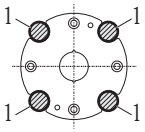
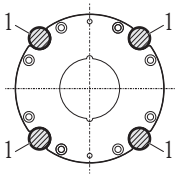
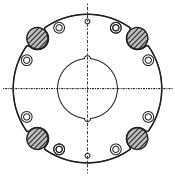
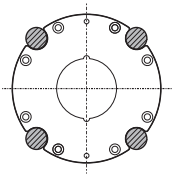
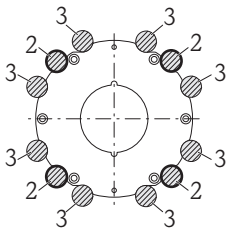
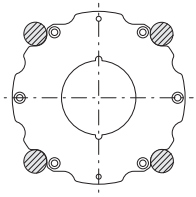
When installing the sensor, make sure that the seals used do not project into the pipe cross-section.

Caution!
Risk of short circuit!
Do not use electrically conductive sealing compounds such as graphite! An electrically conductive layer could form on the inside of the measuring tube and short-circuit the measuring signal.

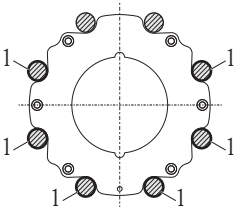
Note!
Use seals with a hardness rating of 70° Shore.

Arrangement of the mounting bolts and centering sleeves

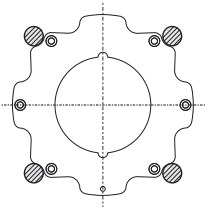
The device is centered using recesses on the sensor. The arrangement of the mounting bolts and the use of the centering sleeves supplied depend on the nominal diameter and pressure rating of the device.

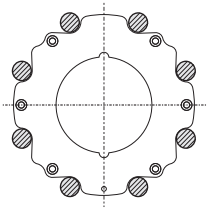
	Pressure rating	
EN (DIN)	ANSI	JIS
DN 25 to 40 (1" to 1 ½")		
 A0010896	 A0010824	 A0010896
DN 50 (2")		
 A0010897	 A0010825	 A0010825
DN 65		
 A0012170	—	 A0012171

DN 80 (3")

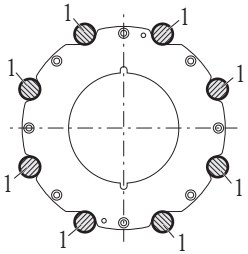


A0010898

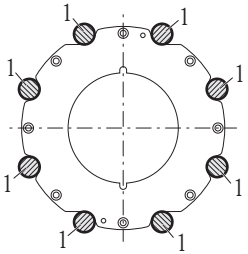

A0010827


A0010826

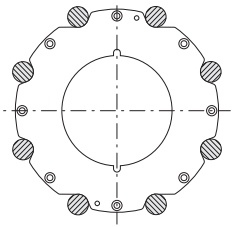
DN 100 (4")



A0012168



A0012168


A0012169

1 = Mounting bolts with centering sleeves
2 = EN (DIN) flanges: 4-hole → with centering sleeves
3 = EN (DIN) flanges: 8-hole → without centering sleeves

Tightening torques

Please note the following:
- The tightening torques listed below are for lubricated threads only.
- Always tighten the screws uniformly and in diagonally opposite sequence.
- Overtightening the screws will deform the sealing faces or damage the seals.
- The tightening torques listed below apply only to pipes not subjected to tensile stress.

The tightening torques apply to situations where an EPDM soft material flat seal (e.g. 70 Shore) is used.

Tightening torques, mounting bolts and centering sleeves for EN (DIN) PN 16

Nominal diameter [mm]	Mounting bolts [mm]	Centering sleeve length [mm]	Tightening torque [Nm] with a process flange with a	
			smooth seal face	raised face
25	4 × M12 × 145	54	19	19
40	4 × M16 × 170	68	33	33
50	4 × M16 × 185	82	41	41
65[1)]	4 × M16 × 200	92	44	44

Nominal diameter [mm]	Mounting bolts [mm]	Centering sleeve length [mm]	Tightening torque [Nm] with a process flange with a	
			smooth seal face	raised face
65[2)]	8 × M16 × 200	– [3)]	29	29
80	8 × M16 × 225	116	36	36
100	8 × M16 × 260	147	40	40

[1)] EN (DIN) flanges: 4-hole → with centering sleeves
[2)] EN (DIN) flanges: 8-hole → without centering sleeves
[3)] A centering sleeve is not required. The device is centered directly via the sensor housing.

Tightening torques, mounting bolts and centering sleeves for JIS 10 K

Nominal diameter [mm]	Mounting bolts [mm]	Centering sleeve length [mm]	Tightening torque [Nm] with a process flange with a	
			smooth seal face	raised face
25	4 × M16 × 170	54	24	24
40	4 × M16 × 170	68	32	25
50	4 × M16 × 185	– *	38	30
65	4 × M16 × 200	– *	42	42
80	8 × M16 × 225	– *	36	28
100	8 × M16 × 260	– *	39	37

* A centering sleeve is not required. The device is centered directly via the sensor housing.

Tightening torques, mounting bolts and centering sleeves for ANSI Class 150

Nominal diameter [inch]	Mounting bolts [inch]	Centering sleeve length [inch]	Tightening torque [lbf · ft] with a process flange with a	
			smooth seal face	raised face
1"	4 × UNC 1/2" × 5.70"	– *	14	7
1 ½"	4 × UNC 1/2" × 6.50"	– *	21	14
2"	4 × UNC 5/8" × 7.50"	– *	30	27
3"	4 × UNC 5/8" × 9.25"	– *	31	31
4"	8 × UNC 5/8" × 10,4"	5,79	28	28

* A centering sleeve is not required. The device is centered directly via the sensor housing.

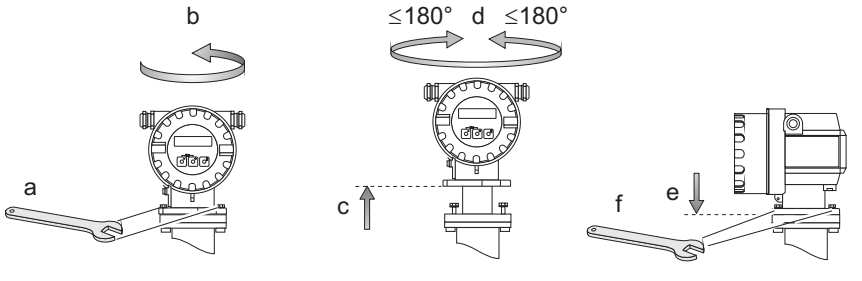
2.3 Installing the transmitter housing

2.3.1 Turning the transmitter housing

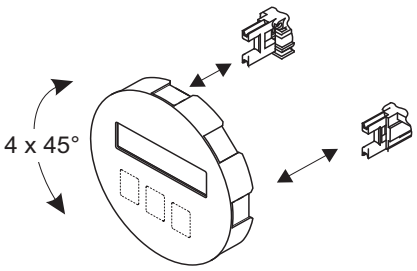
Turning the aluminum field housing

Caution!

- Raising the transmitter housing (Step c):
  Raise the transmitter housing max. 10 mm (0.39 inch) above the securing screws
- Turning the transmitter housing (Step d):
  Turn the transmitter housing max. 180° clockwise or counterclockwise



2.3.2 Turning the onsite display



a. Unscrew cover of the electronics compartment from the transmitter housing.

b. Remove the display module from the transmitter retaining rails.

c. Turn the display to the desired position (max. 4 x 45° in each direction).

d. Fit the display back onto the retaining rails.

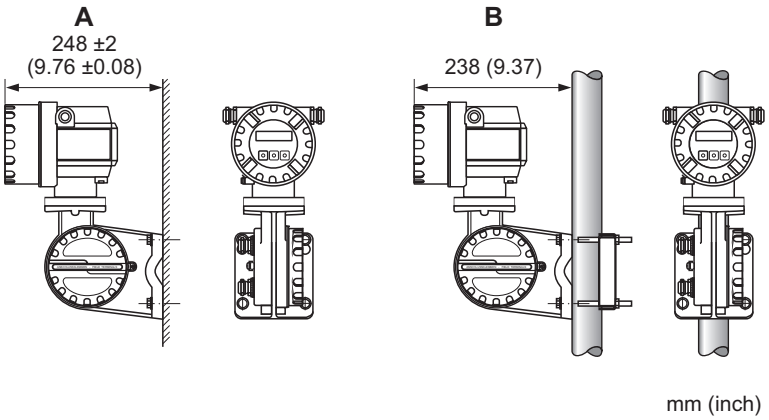
e. Screw the cover of the electronics compartment firmly back onto the transmitter housing.

2.3.3 Mounting the transmitter (remote version)

Caution!

- The ambient temperature range –20 to +60°C (–4 to +140°F) may not be exceeded at the mounting location. Avoid direct sunlight.
- If the device is mounted to a warm pipe, make sure that the housing temperature does not exceed +60 °C (+140 °F), which is the maximum permissible temperature.

The transmitter can be mounted directly on a wall (A) or a pipe (B).



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2.4 Post-installation check

- Is the measuring device damaged (visual inspection)?
- Does the device correspond to specifications at the measuring point, including process temperature and pressure, ambient temperature, minimum fluid conductivity, measuring range, etc.?
- Does the arrow on the sensor nameplate match the actual direction of flow through the pipe?
- Is the position of the measuring electrode plane correct?
- Is the position of the empty pipe detection electrode correct?
- Were all screws tightened to the specified torques when the sensor was installed?
- Were the correct seals used (type, material, installation)?
- Are the measuring point number and labeling correct (visual inspection)?
- Were the inlet and outlet runs respected?
- Is the measuring device protected against moisture and direct sunlight?
- Is the sensor adequately protected against vibration (attachment, support)?
  Acceleration up to 2 g by analogy with IEC 600 68-2-8

3 Wiring

⚠ Warning!
Risk of electric shock! Components carry dangerous voltages.
- Never mount or wire the measuring device while it is connected to the power supply.
- Before connecting the power supply, check the safety equipment.
- Route the power supply and signal cables so they are securely seated.
- Seal the cable entries and covers tight.

☝ Caution!
Risk of damaging the electronic components!
- Connect the power supply in accordance with the connection data on the nameplate.
- Connect the signal cable in accordance with the connection data in the Operating Instructions.

In addition, for the remote version:

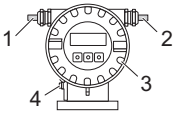
☝ Caution!
Risk of damaging the electronic components!
- Only connect sensors and transmitters with the same serial number.
- Observe the cable specifications of the connecting cable → Operating Instructions on the CD-ROM.

✎ Note!
Install the connecting cable securely to prevent movement.

3.1 Connecting the various housing types

Wire the unit using the terminal assignment diagram inside the cover.

3.1.1 Compact version

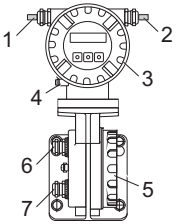


A0010755

Transmitter connection:

1 Signal cable
2 Power supply cable
3 Electronics compartment cover (connection diagram on the cover of the connection compartment)
4 Ground terminal for potential equalization

3.1.2 Remote version (transmitter)



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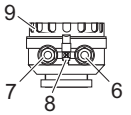
Transmitter connection:

1 Signal cable
2 Power supply cable
3 Electronics compartment cover (connection diagram on the cover of the connection compartment)
4 Ground terminal for potential equalization

Connecting the connecting cable (∅ it 19):

5 Connection compartment cover (connection diagram on the inside)
6 Coil current cable
7 Signal cable

3.1.3 Remote version (sensor)



A0010758

Transmitter connection:

9 Connection compartment cover (connection diagram on the inside)

Connecting the connecting cable (∅ it 19):

6 Coil current cable
7 Signal cable
8 Ground terminal for potential equalization

3.2 Connecting the remote version connecting cable

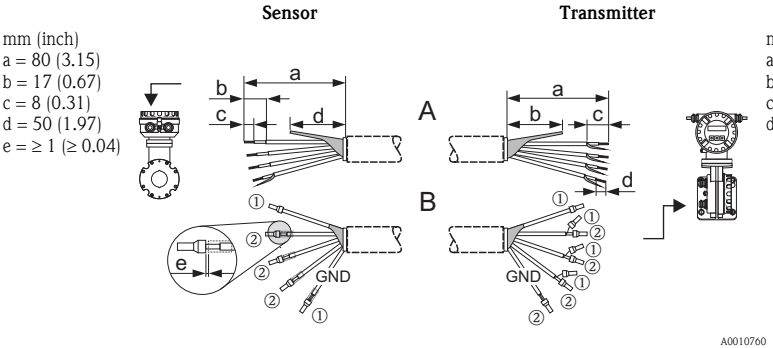
3.2.1 Connecting cable

Connecting cable termination

Terminate the signal and coil current cables as shown in the figure below (Detail A).
Fit the fine-wire cores with cable end ferrules (Detail B).

Signal cable termination

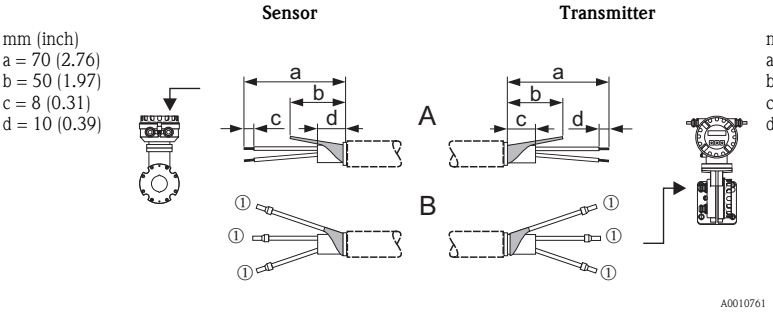
Make sure that the cable end ferrules do not touch the wire shields on the sensor side! Minimum distance = 1 mm (0.04"), exception "GND" = green cable.



① = Cable end ferrules, red, ∅ 1.0 mm (0.04"); ② = Cable end ferrules, white, ∅ 0.5 mm (0.02")

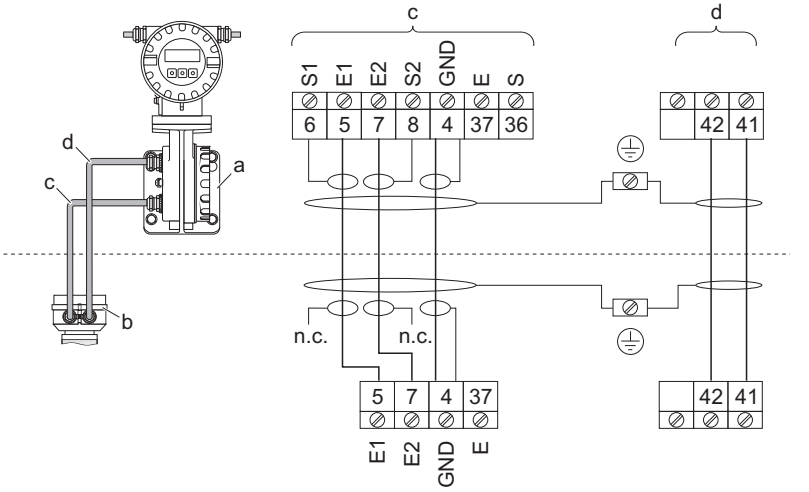
Coil current cable termination

Insulate one core of the three-core cable at the level of the core reinforcement; you only require two cores for the connection.



① = Cable end ferrules, red, ∅ 1.0 mm (0.04"); ② = Cable end ferrules, white, ∅ 0.5 mm (0.02")

3.2.2 Connecting cable connection



a Wall-mount housing connection compartment
b Sensor connection housing
c Signal cable
d Coil current cable

n.c. = not connected, isolated cable shields

Cable colors/numbers for terminals:
5/6 = brown
7/8 = white
4 = green

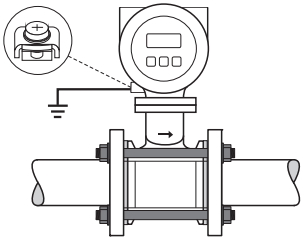
3.3 Potential equalization

Perfect measurement is only ensured when the fluid and the sensor have the same electrical potential. This is ensured by the two ground disks of the sensor.

The following should also be taken into consideration for potential equalization:
- Internal grounding concepts in the company
- Operating conditions, such as the material/grounding of the pipes, cathodic protection etc.

Standard situation
Potential equalization takes place via the ground terminal of the transmitter when using the device in the following pipes:
- Metal, grounded pipe
- Plastic pipe
- Pipe with insulating lining

✎ Note!
When installing in metal pipes, we recommend you connect the ground terminal of the transmitter housing with the piping.



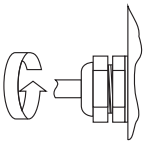
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✎ Note!
Potential equalization for other areas of application → Operating Instructions on the CD-ROM.

3.4 Degree of protection

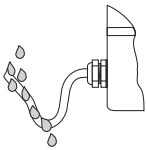
The devices meet all the requirements for IP 67.

After mounting in the field or service work, the following points have to be observed to ensure that IP 67 protection is retained:
- Install the measuring device in such a way that the cable entries do not point upwards.
- Do not remove the seal from the cable entry.
- Remove all unused cable entries and plug them with suitable/certified drain plugs.
- Use cable entries and drain plugs with a long-term operating temperature range in accordance with the temperature specified on the nameplate.



A0007549

Tighten the cable entries correctly.



A0007550

The cables must loop down before they enter the cable entries ("water trap").

3.5 Post-connection check

- Are cables or the device damaged (visual inspection)?
- Does the supply voltage match the information on the nameplate?
- Do the cables used comply with the necessary specifications?
- Do the mounted cables have adequate strain relief and are they routed securely?
- Is the cable type route completely isolated? Without loops and crossovers?
- Are all screw terminals firmly tightened?
- Have all the measures for grounding and potential equalization been correctly implemented?
- Are all cable entries installed, firmly tightened and correctly sealed?
- Cable routed as a “water trap” in loops?
- Are all the housing covers installed and securely tightened?

4 Commissioning

4.1 Switching on the measuring device

On completion of the installation (successful post-installation check), wiring (successful post-connection check) and after making the necessary hardware settings, where applicable, the permitted power supply (see nameplate) can be switched on for the measuring device.

When the power supply is switched on, the measuring device performs a number of power-up checks and device self-checks. As this procedure progresses the following messages can appear on the onsite display:

Display examples:

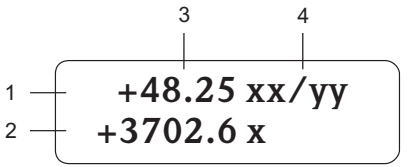
PROMAG 10 **V XX.XX.XX**	Startup message

The measuring device starts operating as soon as the startup procedure is complete. Various measured values and/or status variables appear on the display.

✎ Note!
If an error occurs during startup, this is indicated by an error message.

4.2 Operation

4.2.1 Display elements

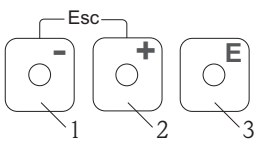


A0007557

Display lines/fields

1. Main line for primary measured values
2. Additional line for additional measured variables/status variables
3. Current measured values
4. Engineering units/time units

4.2.2 Operating elements



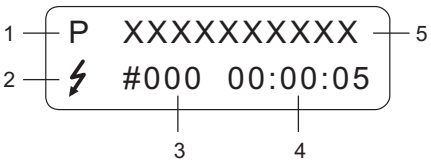
A0007559

Operating keys

1. (–) Minus key for entering, selecting
2. (+) Plus key for entering, selecting
3. Enter key for calling the function matrix, saving

When the +/– keys are pressed simultaneously (Esc):
- Exit the function matrix step-by-step:
- > 3 sec. = cancel data input and return to the measured value display

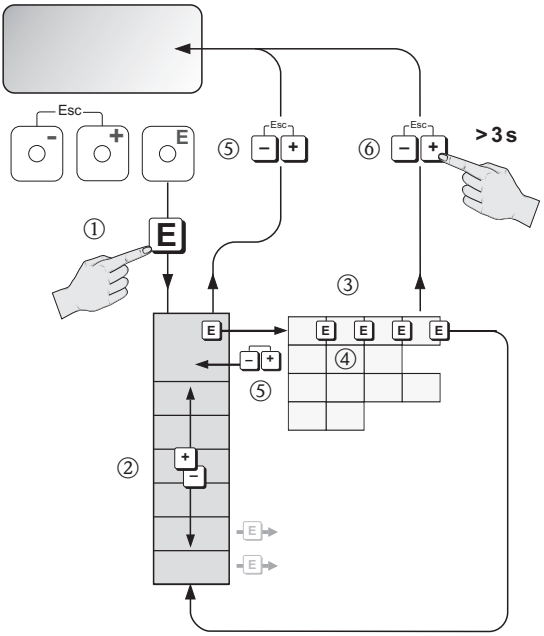
4.2.3 Displaying error messages



A0007561

1. Type of error:
   P = Process error, S = System error
2. Error message type:
   ϟ = Fault message, ! = Notice message
3. Error number
4. Duration of the last error that occurred:
   Hours: Minutes: Seconds
5. Error designation
   List of all error messages, see associated Operating Instructions on the CD-ROM

4.3 Navigating within the function matrix



1. E → Enter the function matrix (starting with measured value display)
2. ± → Select the group (e.g. OPERATION)
   E → Confirm selection
3. ± → Select function (e.g. LANGUAGE)
4. ± → Enter code **10** (only for the first time you access the function matrix)
   E → Confirm entry

   ± → Change function/selection (e.g. ENGLISH)
   E → Confirm selection
5. ± → Return to measured value display step by step
6. ± > 3 s → Return immediately to measured value display

4.4 Device functions to be configured during commissioning

Check the values and settings of the device functions **not** marked gray in the following function matrix (UNIT VOL. FLOW, UNIT VOLUME, LANGUAGE, CURRENT RANGE etc.) and adapt them to your application.

A complete description of all the device functions is provided in the Operating Instructions on the CD-ROM.

Group	Device functions					
SYSTEM UNITS	UNIT VOL. FLOW	UNIT VOLUME	FORMAT DATE/TIME			
OPERATION	LANGUAGE	ACCESS CODE	DEFINE PRIVATE CODE			
USER INTERFACE	FORMAT	CONTRAST LCD	TEST DISPLAY			
TOTALIZER	SUM	OVERFLOW	RESET TOTALIZER			
CURRENT OUTPUT	CURRENT RANGE	VALUE 20 mA	TIME CONSTANT			
PULSE/ STATUS OUTP.	OPERATING MODE	PULSE VALUE	PULSE WIDTH	OUTPUT SIGNAL		
		ASSIGN STATUS	SWITCH-ON POINT	SWITCH-OFF POINT		
COMMUNICATION	TAG NAME	TAG DESCR.	BUS ADDRESS	HART WRITE PROTECT.	MANUFACTURER ID	DEVICE ID
PROCESS PARAM.	LOW FLOW CUT OFF	EPD	EPD ADJ.			
SYSTEM PARAM.	INSTALL. DIRECTION	MEASURING MODE	POS. ZERO RET.	SYSTEM DAMP.		
SENSOR DATA	CALIBRAT. DATE	K-FACTOR	ZERO POINT	NOMINAL DIAMETER	MEASURING PERIOD	EPD ELECTRODE
SUPERVISION	FAILSAFE MODE	ALARM DELAY	SYSTEM RESET	SELF CHECKING		
SIMULAT. SYSTEM	SIM. FAILSAFE	SIM. MEASURAND	VALUE SIM. MEASURAND			
SENSOR VERSION	SERIAL NUMBER	SENSOR TYPE				
AMPLIFIER VERS.	SW REV.					

4.5 Troubleshooting

A complete description of all the error messages is provided in the Operating Instructions on the CD-ROM.

✎ Note!
The output signals (e.g. pulse, frequency) of the measuring device must correspond to the higher-order controller.

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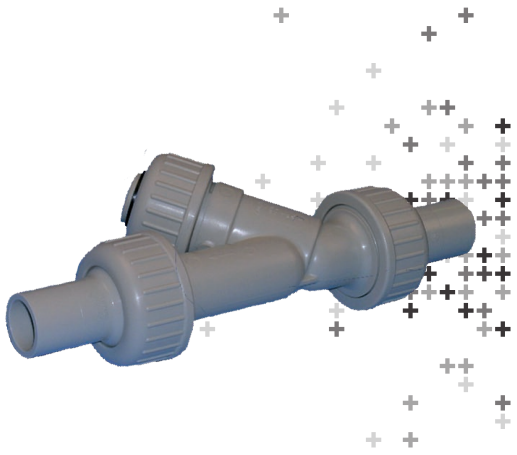
KA00036D/06/EN/13.15
71299364
FM+SGML 6.0

11.15 - G1-1 – GEORG FISCHER STRAINER

GF Piping Systems

Betriebsanleitung

Schmutzfänger Typ 305/ 306



Die technischen Daten sind unverbindlich. Sie gelten nicht als zugesicherte Eigenschaften oder als Beschaffenheits- oder Haltbarkeitsgarantien. Änderungen vorbehalten. Es gelten unsere Allgemeinen Verkaufsbedingungen.

EG-Konformitätserklärung im Sinne der EG-Druckgeräte-richtlinie (EG-RL 97/23/EG)

Der Hersteller Georg Fischer Rohrleitungssysteme AG, 8201 Schaffhausen (Schweiz) erklärt, dass es sich bei den Schmutzfängern Typ 305/306 um Produkte im Sinne der Druckgeräterichtlinie 97/23/EG handelt.

Änderungen am Schmutzfänger Typ 305/306, die Auswirkungen auf die angegebenen technischen Daten und den bestimmungsgemässen Gebrauch haben, machen diese Konformitätserklärung ungültig.

Schaffhausen, den 01.08.2012

Dirk Petry
R&D Manager
Georg Fischer Piping Systems

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Phone +41(0)52 631 30 26 / info.ps@georgfischer.com / www.gfps.com

161.484.486 / GFDO 6300_1b_2b_4b_6b (08.12) © Georg Fischer Piping Systems Ltd.

Betriebsanleitung beachten

Die Betriebsanleitung ist Teil des Produkts und ein wichtiger Baustein im Sicherheitskonzept.
- Betriebsanleitung lesen und befolgen.
- Betriebsanleitung stets am Produkt verfügbar halten.
- Betriebsanleitung an alle nachfolgenden Verwender des Produkts weitergeben.

1. Bestimmungsgemässe Verwendung

Schmutzfänger Typ 305/306 sind ausschliesslich dazu bestimmt, nach Einbau in ein Rohrleitungssystem, innerhalb der zugelassenen Druck- und Temperaturgrenzen, Verschmutzungen aus Medien zu filtern. Die gesamte Armatur und alle ihre Komponenten sind dazu bestimmt, innerhalb ihrer chemischen Beständigkeit eingesetzt zu werden.

2. Zu diesem Dokument

2.1 Mitgeltende Dokumente

- Georg Fischer Planungsgrundlagen Industrie

Diese Unterlagen sind über die Vertretung von GF Piping Systems oder unter www.piping.georgfischer.com erhältlich.

2.2 Produktvarianten

- Typ 305 und Typ 306

2.3 Sicherheits- und Warnhinweise

In dieser Anleitung werden Warnhinweise verwendet, um Sie vor Verletzungen oder vor Sachschäden zu warnen. Lesen und beachten Sie diese Warnhinweise immer.

GEFAHR	• Unmittelbar drohende Gefahr! Bei Nichtbeachtung drohen Ihnen Tod oder schwerste Verletzungen
WARNUNG	• Möglicherweise drohende Gefahr! Bei Nichtbeachtung drohen Ihnen schwere Verletzungen
VORSICHT	• Gefährliche Situation! Bei Nichtbeachtung drohen leichte Verletzungen
ACHTUNG	• Gefährliche Situation! Bei Nichtbeachtung drohen Sachschäden

3. Sicherheit und Verantwortung

Um die Sicherheit im Betrieb zu gewährleisten, ist der Betreiber für folgende Maßnahmen verantwortlich:
- Produkt nur bestimmungsgemäss verwenden, siehe bestimmungsgemässe Verwendung.
- Kein beschädigtes oder defektes Produkt verwenden. Beschädigtes Produkt sofort aussortieren.
- Sicherstellen, dass Rohrleitungssystem fachgerecht verlegt ist und regelmässig überprüft wird.
- Produkt und Zubehör nur von Personen montieren lassen, die die erforderliche Ausbildung, Kenntnis oder Erfahrung haben.
- Personal regelmässig in allen zutreffenden Fragen der örtlich geltenden Vorschriften für Arbeitssicherheit, Umweltschutz vor allem für druckführende Rohrleitungen unterweisen.

Das Personal ist für folgende Maßnahmen verantwortlich:
- Betriebsanleitung und die darin enthaltenen Hinweise kennen, verstehen und beachten.

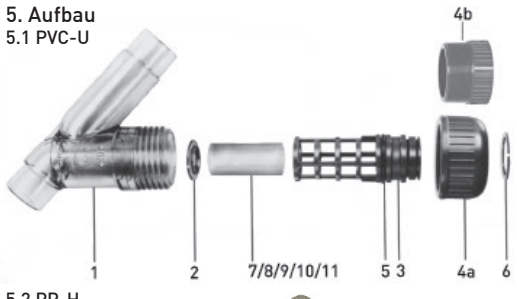
Für Schmutzfänger gelten dieselben Sicherheitsvorschriften wie für das Rohrleitungssystem, in das sie eingebaut werden.

4. Transport und Lagerung

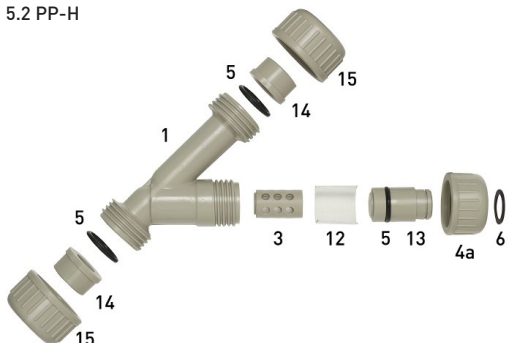
- Produkt in ungeöffneter Originalverpackung transportieren und/oder lagern.
- Produkt vor Staub, Schmutz, Feuchtigkeit sowie Wärme- und UV-Strahlung schützen.
- Sicherstellen, dass Produkt weder durch mechanische noch durch thermische Einflüsse beschädigt ist.
- Produkt vor Montage auf Transportschäden untersuchen.

5. Aufbau

5.1 PVC-U



5.2 PP-H



Pos.	Bezeichnung
1	Gehäuse
2	Abstützring
3	Siebkäfig
4a	Verschlussmutter
4b	Stopfen (nur für PVC-U, DN65 und DN80)
5	Gehäusedichtung
6	Sprengring
7	Siebrohr PVC-U (0,5 mm)
8	Siebrohr PVC-U (0,8 mm)
9	Siebrohr PVC-U (1,4 mm)
10	Siebrohr PVC-U (2,2 mm)
11	Siebrohr Edelstahl (0,5 mm)
12	Siebrohr PP-H
13	Siebkäfighalter
14	Anschlussteil PP-H
15	Anschlussmutter PP-H

6. Montage

- Gehäusedichtung **5** auf Siebkäfig **3** bzw. auf Siebkäfighalter **13** aufziehen.
- Gewünschtes Siebrohr **7/8/9/10/11/12** in Siebkäfig **3** schieben.

bei PP-H:
- Siebkäfig **3** und Siebkäfighalter **13** zusammenführen.

bei PVC-U:
- Abstützring **2** in Gehäuse **1** legen.
- Siebkäfig **3** in Gehäuse **1** einführen.

bei PVC-U, DN15 bis DN50 und PPH:
- Verschlussmutter **4a** auf Gehäuse **1** schrauben und mit Sprengring **6** sichern.

bei PVC-U, DN65 und DN80:
- Stopfen **4b** auf Gehäuse **1** befestigen.

HINWEIS
Bei Demontage des Schmutzfängers wird aus Sicherheitsgründen empfohlen, die Gehäusedichtungen auszutauschen.

7. Wartung

WARNUNG
Verletzungsgefahr durch unkontrolliertes Ausweichen des Mediums!
Wurde der Druck nicht vollständig abgebaut, kann das Medium unkontrolliert entweichen. Je nach Art des Mediums besteht Verletzungsgefahr.
- Vor dem Lösen der Verschlussmutter: Druck in der Rohrleitung vor dem Ausbau vollständig abbauen.
- Bei gesundheitsschädlichen, brennbaren oder explosiven Medien Rohrleitung vor dem Ausbau vollständig entleeren und spülen. Dabei mögliche Rückstände beachten.
- Ein sicheres Auffangen des Mediums durch entsprechende Massnahmen gewährleisten.

7.1 Siebrohr reinigen/austauschen

- Verschlussmutter **4a** öffnen bzw. Stopfen **4b** abziehen.
- Siebkäfig **3** aus Gehäuse **1** nehmen.
- Siebrohr **7/8/9/10/11/12** aus Siebkäfig **3** entnehmen.
- Siebrohr **7/8/9/10/11/12** reinigen oder ggf. durch neues Siebrohr ersetzen.
- Schmutzfänger montieren.

7.2 Gehäusedichtung austauschen

bei PVC-U, DN15 bis DN50:
- Sprengring **6** lösen und Verschlussmutter **4a** öffnen.

bei PVC-U, DN65 und DN80:
- Stopfen **4b** vom Gehäuse **1** abziehen.

bei PP-H:
- Sprengring **6** lösen und Verschlussmutter **4a** öffnen.
- Anschlussmutter **15** lösen.

- Gehäusedichtung **5** entnehmen und durch eine neue Gehäusedichtung ersetzen.
- Sicherstellen, dass Gehäusedichtung **5** korrekt sitzt und dass Dichtung und Dichtfläche frei von Verschmutzungen sind.
- Schmutzfänger montieren.

bei PVC-U, DN15 bis DN50 und PPH:
- Sicherstellen, dass Sprengring **6** gesichert ist.

8. Entsorgung

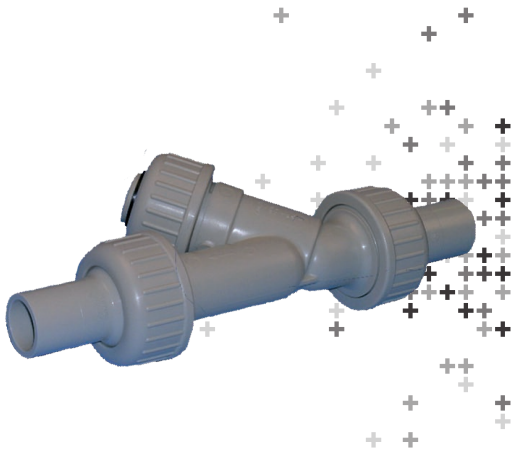
- Vor Entsorgung die einzelnen Materialien nach recycelbaren Stoffen, Normalabfall und Sonderabfall trennen.
- Bei Entsorgung oder Recycling des Produkts, der einzelnen Komponenten und der Verpackung die örtlichen gesetzlichen Bestimmungen und Verordnungen einhalten.
- Länderspezifische Vorschriften, Normen und Richtlinien beachten.

Bei Fragen bezüglich der Entsorgung des Produkts wenden Sie sich an Ihre nationale Vertretung von GF Piping Systems.

GF Piping Systems

Instruction Manual

Line strainer Type 305/ 306



The technical data are not binding. They neither constitute expressly warranted characteristics nor guaranteed properties nor a guaranteed durability. They are subject to modification. Our General Terms of Sale apply.

Declaration of conformity (CE) within the meaning of the EG directive 97/23/EG pressure device regulation

The manufacturer Georg Fischer Rohrleitungssysteme AG, 8201 Schaffhausen (Switzerland) declares that the line strainers type 305/306 are products as defined by the Pressure Equipment Directive 97/23/EC.

Changes to the line strainer that could effect the stated technical data and the intended purpose, void this manufacturer's declaration

Schaffhausen, den 01.08.2012

Dirk Petry
R&D Manager
Georg Fischer Piping Systems

Georg Fischer Piping Systems Ltd. CH-8201 Schaffhausen (Switzerland)
Phone +41(0)52 631 30 26 / info.ps@georgfischer.com / www.gfps.com

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Observe instruction manual

The instruction manual is part of the product and an important element within the safety concept.
- Read and observe instruction manual.
- Always keep instruction manual available close to the product.
- Pass on instruction manual to all subsequent users of the product.

1. Intended use

Line strainers type 305/306 are solely designed to filter the dirt out of the media after they have been installed into a pipework system. The line strainer type 305/306 is meant to be used within the entire valve's chemical resistance and all of its components and the approved pressure range.

2. Regarding this document

2.1 Related documents

- Georg Fischer planning fundamentals industry

These documents can be obtained from the GF Piping Systems representation or under www.piping.georgfischer.com.

2.2 Product types

- Type 305 and type 306

2.3 Sicherheits- und Warnhinweise

This manual contains warning instructions that shall warn against injuries or material losses. Always read and observe those warning instructions.

DANGER	• Imminent danger! Non-observance may result in major injuries or death
WARNING	• Possible danger! Non-observance may result in major injuries
CAUTION	• Dangerous situation! Non-observance may result in minor injuries
NOTICE	• Dangerous situation! Non-observance may result in material losses

3. Safety and responsibility

In order to provide safety in the plant, the operator is responsible for the following measures:
- Products may only be used for its intended purpose, see intended purpose.
- Never use a damaged or defective product. Immediately sort out damaged product.
- Make sure that the piping system has been installed professionally and serviced regularly.
- Products and equipment shall only be installed by persons who have the required training, knowledge or experience.
- Regularly train personnel in all relevant questions regarding locally applicable regulations regarding safety at work, environmental protection especially for pressurised pipes.

The personnel is responsible for the following measures:
- Know, understand and observe the instruction manual and the advices therein.

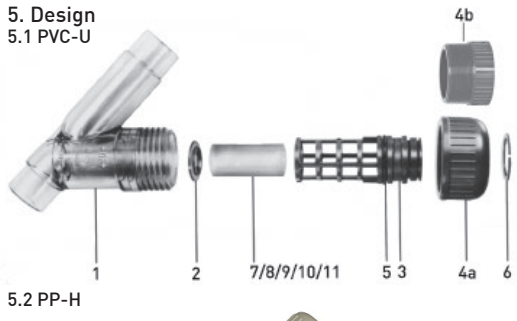
The safety instructions for the line strainer are the same as for the piping system they are installed in.

4. Transport and storage

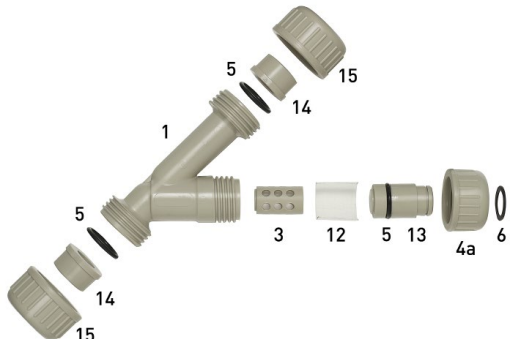
- Transport and/or store product in unopened original packaging.
- Protect product from dust, dirt, dampness as well as thermal and UV radiation.
- Make sure that the product has not been damaged neither by mechanical nor thermal influences.
- Check product for transport damages prior to the installation.

5. Design

5.1 PVC-U



5.2 PP-H



Item	Description
1	Body
2	Screen support ring
3	Screen cage
4a	Valve nut
4b	Tamping (only for PVC-U, DN65 and DN80)
5	Body seal
6	Circlip
7	Slotted casing PVC-U (0,5 mm)
8	Slotted casing PVC-U (0,8 mm)
9	Slotted casing PVC-U (1,4 mm)
10	Slotted casing PVC-U (2,2 mm)
11	Slotted casing stainless steel (0,5 mm)
12	Slotted casing PPH
13	Screen cage bracket
14	Valve end metric PP-H
15	Nut PP-H

6. Assembly

- Fit body seal **5** onto the screen cage **3** or onto the screen cage bracket **13**.
- Push designated slotted casing **7/8/9/10/11/12** into screen cage **3**.

Line strainer PP-H:
- Putting screen cage **3** and screen cage bracket **13** together.

Line strainer PVC-U:
- Place screen support ring **2** in body **1**.
- Insert screen cage **3** into body **1**.

Line strainer PVC-U, DN15 to DN50 and PPH:
- Screw valve nut **4a** onto the body **1** and secure it with a circlip **6**.

Line strainer PVC-U-U, DN65 und DN80:
- Secure tamping **4b** onto the body **1**.

NOTE
When removing the line strainer, it is recommended for safety reasons to replace the body seals.

7. Maintenance

WARNING
Risk of injury due to uncontrolled evasion of the medium!
If the pressure was not relieved completely, the medium can evade uncontrolled. Depending on the type of medium, risk of injury may exist
- Completely relieve pressure in the pipes prior to dismounting.
- Completely empty and rinse pipe prior to dismounting in connection with harmful, flammable, or explosive media. Pay attention to potential residues.
- Provide for safe collection of the medium by implementing appropriate actions.

7.1 Maintain/change screen

- Open the valve nut **4a** öffnen or remove the tamping **4b**.
- Remove screen cage **3** from body **1**.
- Remove slotted casing **7/8/9/10/11/12** from screen cage **3**.
- Clean the slotted casing **7/8/9/10/11/12** or, if necessary, replace with a new one.
- Assemble the line strainer.

7.2 Change body seal austauschen

PVC-U, DN15 to DN50:
- Loosen circlip **6** and open valve nut **4a**.

PVC-U, DN65 and DN80:
- Remove tamping **4b** from the body **1**.

PP-H:
- Loosen circlip **6** and open valve nut **4a**.
- Loosen nut **15**.

- Remove body seal **5** and replace with a new one..
- Make sure that the body seal **5** is placed correctly and that the body seal and the surrounding area are dirt-free.
- Assemble the line strainer.

PVC-U, DN15 to DN50 and PPH:
- Make sure that the circlip **6** is secured.

8. Disposal

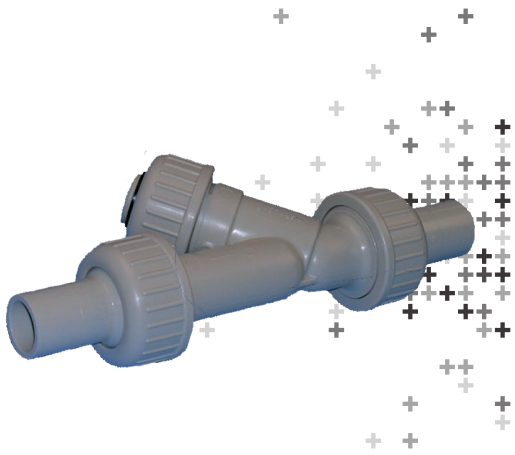
- Before disposing of the different material, separate it by recyclables, normal waste and special waste.
- Comply with local legal regulations and provisions when recycling or disposing of the product, the individual components and the packaging.
- Comply with National regulations, standards and directives.

If you have questions regarding the disposal of your product, please contact your national GF Piping Systems representative.

GF Piping Systems

Mode d'emploi

Filtre à tamis Type 305/ 306



Les données techniques sont fournies à titre indicatif. Elles ne sont pas des garanties et ne constituent pas non plus un gage de propriété intrinsèque ou de durabilité. Sous réserve de modifications. Nos conditions générales de vente s'appliquent.

Déclaration de conformité CE au sens de la directive 97/23/ CE (Directive Européenne des Equipements sous Pression)

Le fabricant Georg Fischer Rohrleitungssysteme AG, 8201 Schaffhouse (Suisse), déclare que les filtres à tamis de type 305/306 sont conformes à la directive européenne 97/23/CE sur les équipements sous pression..

Les modifications réalisées sur le filte à tamis, qui ont une influence sur les données techniques fournies et l'usage prévu, invalident la présente déclaration du fabricant.

Schaffhausen, den 01.08.2012

Dirk Petry
R&D Manager
Georg Fischer Piping Systems

Georg Fischer Piping Systems Ltd. CH-8201 Schaffhausen (Switzerland)
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Se reporter au mode d'emploi

Le mode d'emploi fait partie intégrante du produit et constitue un élément essentiel du concept de sécurité.
- Lire et respecter le mode d'emploi.
- Le mode d'emploi doit toujours être à proximité du produit.
- Transmettre le mode d'emploi à tous les utilisateurs successifs du produit.

1. Utilisation conforme

Les filtes à tamis de type 305/306 sont exclusivement destinés, après avoir été montés dans un système de tuyauterie, à filtrer les impuretés contenues dans les fluides. Les filtres à tamis sont conçus pour être utilisés dans la limite de la résistance de l'ensemble de la vanne aux produits chimiques ainsi que de tous les composants, et dans les plages de pression admissibles.

2. À propos de ce document

2.1 Documents applicables
- Principes de planification pour l'industrie Georg Fischer

Ces documents sont disponibles auprès d'un représentant de GF Piping Systems ou sur www.piping.georgfischer.com.

2.2 Variantes de produits
- Type 305 et type 306

2.3 Consignes de sécurité et avertissements

Des avertissements sont utilisés dans ce mode d'emploi afin d'avertir du risque de blessures ou de dégâts matériels. Toujours lire et respecter ces avertissements.

DANGER	• Menace de danger imminente! En cas de non-respect, vous risquez la mort ou de graves blessures
AVERTISSEMENT	• Menace de danger potentielle! En cas de non-respect, vous risquez de graves blessures
ATTENTION	• Situation dangereuse ! En cas de non-respect, vous risquez de légères blessures
ATTENTION	• Situation dangereuse ! En cas de non-respect, il existe un risque de dégâts matériels

3. Sécurité et responsabilité

Afin de garantir la sécurité du fonctionnement, l'exploitant est responsable de la mise en oeuvre des mesures suivantes:
- Utiliser le produit conformément aux dispositions uniquement, voir Utilisation conforme
- Ne pas utiliser un produit s'il est endommagé ou défectueux. Isoler immédiatement tout produit endommagé.
- S'assurer que le système de tuyauterie est posé correctement et qu'il est contrôlé régulièrement.
- Les produits et accessoires doivent uniquement être montés par des personnes qui disposent de la formation, des connaissances ou de l'expérience nécessaires.
- Informer régulièrement le personnel de toutes les questions relatives aux dispositions locales applicables en matière de sécurité du travail et de protection de l'environnement, notamment pour les canalisations sous pression.

Le personnel est responsable de la mise en oeuvre des mesures suivantes:
- Lire, comprendre et respecter le mode d'emploi ainsi que les remarques qu'il contient.

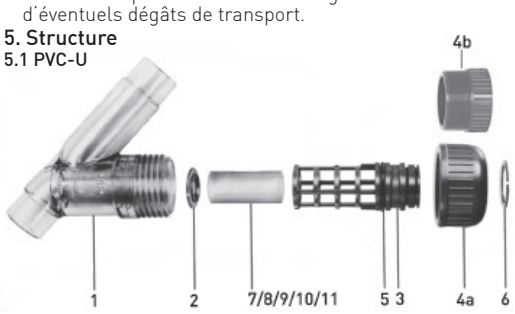
Les mêmes dispositions de sécurité s'appliquent aux filtres à tamis qu'au système de tuyauterie dans lequel ils sont intégrés.

4. Transport et stockage

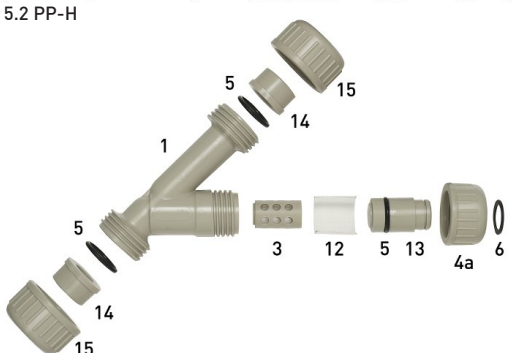
- Transporter et/ou stocker le produit dans son emballage d'origine non ouvert.
- Protéger le produit de la poussière, de la saleté, de l'humidité ainsi que des rayonnements UV et solaires.
- S'assurer que le produit n'est pas détérioré par des influences thermiques ou mécaniques.
- Contrôler le produit avant le montage afin de détecter d'éventuels dégâts de transport.

5. Structure

5.1 PVC-U



5.2 PP-H



Pos.	Désignation
1	Corps
2	Bague d'appui
3	Cage de filtre
4a	Écrou
4b	Bouchon (seulement pour PVC-U, DN65 et DN80)
5	Joint du corp
6	Circlip
7	Tamis PVC-U (0,5 mm)
8	Tamis PVC-U (0,8 mm)
9	Tamis PVC-U (1,4 mm)
10	Tamis PVC-U (2,2 mm)
11	Tamis acier inoxydable (0,5 mm)
12	Tamis PP-H
13	Support de cage
14	Pièce folle PP-H
15	Ecrou raccord PP-H

6. Montage

- Glisser le joint du corp **5** sur le cage de filtre **3** ou sur le support de cage **13**.
- Introduire le tamis souhaité **7/8/9/10/11/12** dans le cage de filtre **3**.

Filtre à tamis PP-H:
- Abouter le cage de filtre **3** et le support de cage **13**.

Filtre à tamis PVC-U:
- Placer la bague d'appui **2** dans le corps **1**.
- Insérer le cage de filtre **3** dans le corps **1**.

Filtre à tamis PPH et PVC-U, DN15 à DN50:
- Visser l'écrou **4a** sur le corps **1** et, sur les modèles DN15 à DN50, le sécuriser à l'aide d'un circlip **6**.

Filtre à tamis PVC-U, DN65 et DN80:
- Sécuriser bouchon **4b** sur le coprs **1**.

AVIS
En cas de démontage du collecteur d'impuretés, nous recommandons pour des raisons de sécurité, le remplacement des joints du corp.

7. Entretien

AVERTISSEMENT
Risque de blessure par échappement incontrôlé de l'agent!
Si la pression n'a pas été annulée complètement, l'agent peut s'échapper de manière incontrôlée.
Un risque de blessure existe selon la nature de l'agent.
- Annuler complètement la pression dans la tuyauterie avant le démontage.
- Vidanger et rincer la tuyauterie complètement avant le démontage en cas de présence d'agents nocifs pour la santé, combustibles ou explosifs. Tenir compte, ce faisant, des résidus éventuels.
- Une collecte sûre de l'agent par des mesures correspondantes doit être garantie.

7.1 Affiner/changer le tamis désiré
- Ouvrir l'écrou **4a** ou retirer le bouchon **4b**.
- Extraire le cage de filtre **3** du le corps **1**.
- Retirer le tamis **7/8/9/10/11/12** du cage du filtre.
- Nettoyer le tamis **7/8/9/10/11/12** ou le remplacer le cas échéant.
- Monter le filtre à tamis.

7.2 Changer le joint du corps

Filtre à tamis PVC-U, DN15 à DN50:
- Retirer le circlip **6** et ouvrir l'écrou **4a**.

Filtre à tamis PVC-U, DN65 et DN80:
- Retrirer le bouchon **4b**.

Filtre à tamis PP-H:
- Retirer le circlip **6** et ouvrir l'écrou **4a**.
- Retirer l'ecrou raccord **15**.

- Retirer le joint du corps **5** et le remplacer par un joint neuf.
- S'assurer que le joint du corps est bien en place et que le joint et la surface d'étanchéité sont exempts d'impuretés.
- Monter le filtre à tamis.

Filtre à tamis PPH et PVC-U, DN15 à DN50:
- S'assurer que le circlip **6** est bloqué.

8. Élimination des déchets

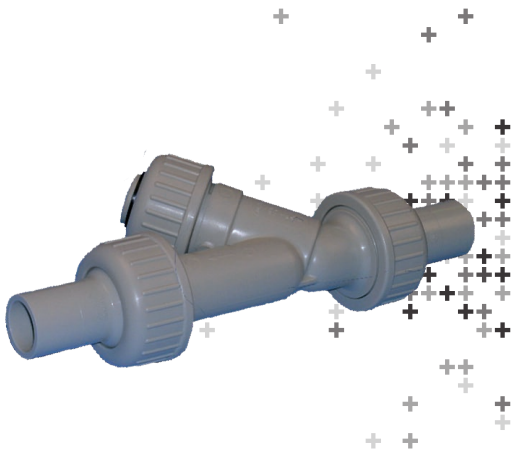
- Avant la mise au rebut, trier les différents matériaux et séparer les matériaux recyclables, les déchets normaux et les déchets spéciaux.
- En cas de mise au rebut ou de recyclage du produit, des composants individuels et de l'emballage, respecter les dispositions légales et décrets en vigueur.
- Respecter les prescriptions, normes et directives nationales spécifiques.

En cas de questions relatives à la mise au rebut du produit, adressez-vous à la représentation nationale de GF Piping Systems.

GF Piping Systems

Manual de instrucciones

Colador Tipo 305/ 306



Los datos técnicos son sin compromiso. Estos no contienen ninguna promesa de propiedades. Salvo modificaciones. Son válidas nuestras Condiciones Generales de Venta.

Declaratíon de conformidad CE en el sentido de la Directiva Equipos de presión (97/23/CE)

El fabricante Georg Fischer Rohrleitungssysteme AG, 8201 Schaffhausen (Suiza) declara que los coladors del tipo 305/306 son productos conformes a la directiva sobre equipos a presión 97/23/CE.

Toda modificación del colador que afecte a los datos técnicos indicados y al uso conforme a su destino invalidará esta declaración del fabricante.

Schaffhausen, den 01.08.2012

Dirk Petry
R&D Manager
Georg Fischer Piping Systems

Georg Fischer Piping Systems Ltd. CH-8201 Schaffhausen (Switzerland)
Phone +41(0)52 631 30 26 / info.ps@georgfischer.com / www.gfps.com

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Obsérvese el manual de instrucciones

El manual de instrucciones forma parte del producto y es un elemento importante del concepto de seguridad.
- Lea y tenga en cuenta el manual de instrucciones.
- Guarde el manual de instrucciones junto con el producto de manera que esté siempre disponible.
- Entregue el manual de instrucciones en caso de transmitir el producto a otros usuarios.

1. Uso conforme a su destino

Los coladors del tipo 305/306 han sido diseñados exclusivamente para filtrar suciedad de los medios tras ser montados en sistemas de tuberías. Los coladors están destinados al uso dentro de las resistencias químicas de la válvula completa y todos sus componentes y de los márgenes de presión admisibles.

2. Acerca de este documento

2.1 Documentación complementaria
- Fundamentos para la planificación industrial de Georg Fischer

Estos documentos están disponibles en su filial de GF Piping Systems o en www.piping.georgfischer.com

2.2 Variantes
- Tipo 305 y tipo 306

2.3 Advertencias e instrucciones de seguridad

En este manual se utilizan advertencias para avisarle de posibles lesiones o daños materiales. Lea y tenga en cuenta siempre estas advertencias.

PELIGRO	• ¡Peligro inminente! Peligro de muerte o de sufrir lesiones muy graves en caso de inobservancia
ADVERTENCIA	• ¡Posible peligro! Peligro de sufrir lesiones graves en caso de inobservancia
PRECAUCIÓN	• ¡Situación peligrosa! Peligro de sufrir lesiones leves en caso de inobservancia
ATENCIÓN	• ¡Situación peligrosa! Peligro de que se produzcan daños materiales en caso de inobservancia

3. Seguridad y responsabilidad

Para garantizar la seguridad durante el funcionamiento, el usuario es responsable de aplicar las siguientes medidas:
- Utilizar el producto exclusivamente de forma conforme a su destino.
- No utilizar ningún producto dañado o averiado. Separar de inmediato el producto dañado.
- Asegurarse de que el sistema de tuberías se instala por un profesional y se inspecciona con regularidad.
- Encomendar el montaje del producto y los accesorios únicamente a personas con la formación, los conocimientos o la experiencia necesarios.
- Informar con regularidad al personal sobre todas las cuestiones relacionadas con la normativa local vigente de seguridad laboral y protección medioambiental, especialmente en lo relativo a tuberías a presión.

El personal es responsable de aplicar las siguientes medidas:
- Conocer, comprender y tener en cuenta el manual de instrucciones y las advertencias contenidas en él.

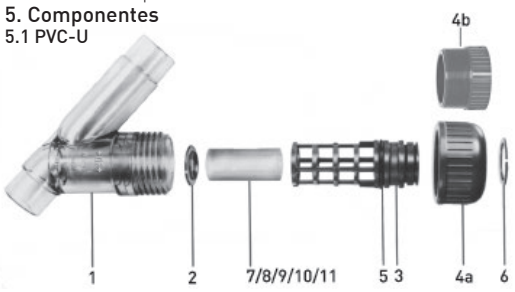
Al colador se aplican las mismas normas de seguridad que rigen para el sistema de tuberías en el que está instalado.

4. Transporte y almacenamiento

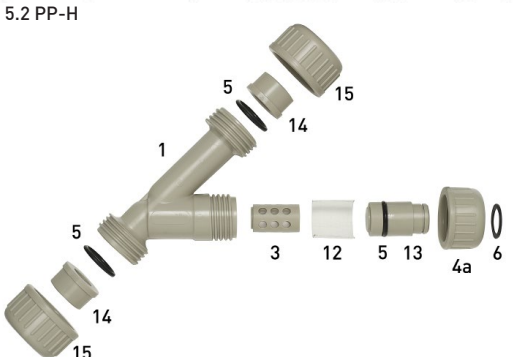
- Transporte y almacene el producto en el embalaje original cerrado.
- Proteja el producto del polvo, la suciedad, la humedad y la radiación térmica y ultravioleta.
- Asegúrese de que el producto no haya sufrido daños a consecuencia de influencias mecánicas o térmicas.
- Compruebe que el producto no ha sufrido daños durante el transporte antes de montarlo.

5. Componentes

5.1 PVC-U



5.2 PP-H



Pos.	Denominación
1	Cuerpo
2	Anillo soporte
3	Cesta filtro
4a	Tuerca ciega
4b	Enchufe (disponible sólo para für PVC-U, DN65 y DN80)
5	Junta del cuerpo
6	Anillo de sujeción
7	Tamiz PVC-U (0,5 mm)
8	Tamiz PVC-U (0,8 mm)
9	Tamiz PVC-U (1,4 mm)
10	Tamiz PVC-U (2,2 mm)
11	Tamiz acero inoxidable (0,5 mm)
12	Tamiz PP-H
13	Soporte de tamiz
14	Extremo PP-H
15	Tuerca de connexión PP-H

6. Montaje

- Extraer la junta del cuerpo **5** de la cesta filtro **3** o del soporte de tamiz **13**.
- Introducir el tamiz deseado **7/8/9/10/11/12** en la cesta filtro **3**.

Colador PP-H:
- Montar la cesta filtro **3** y el soporte de tamiz **13**.

Colador PVC-U:
- Colocar el anillo soporte **2** en la carcasa **1**.
- Introducir la cesta filtro **3** en la carcasa **1**.

Colador PVC-U, DN15 a DN50 y PPH:
- Atornillar la tuerca ciega **4a** en la carcasa **1** y en DN15 a DN50 asegurarla con un anillo de sujeción **6**.

Colador PVC-U, DN65 y DN80:
- Fijar tuerca ciega **4b** en la carcasa **1**.

AVISO
Por motivos de seguridad, al desmontar el colador es recomendable cambiar las juntas.

7. Mantenimiento

ADVERTENCIA
Peligro de lesiones por desviación incontrolada del medio!
Si no se reduce la presión completamente el medio puede salir de forma incontrolada. Según el tipo de medio puede existir peligro de lesiones.
- Disminuir la presión en la tubería antes de desmontar completamente.
- En caso de medios perjudiciales para la salud, inflamables o explosivos vaciar y lavar la tubería antes de desmontar. Además prestar atención a posibles restos.
- Garantizar una absorción segura del medio mediante medidas correspondientes.

7.1 Limpiar/sustituir el tamiz
- Abrir la tuerca ciega **4a** öffnen o despegar el enchufe **4b**.
- Extraer la cesta filtro **3** de la carcasa **1**.
- Extraer el tamiz **7/8/9/10/11/12** de la cesta filtro **3**.
- Limpiar el tamiz **7/8/9/10/11/12** o sustituirlo por uno nuevo si es necesario.
- Montaje del colador.

7.2 Sustituir la junta del cuerpo

Colador PVC-U, DN15 a DN50:
- Aflojar el anillo de sujeción **6.**
- Abrir la tuerca ciega **4a**.

Colador PVC-U, DN65 y DN80:
- Despegar el enchufe **4b** de la carcasa **1**.

Colador PP-H:
- Aflojar el anillo de sujeción **6**.
- Abrir la tuerca ciega **4a**.
- Aflojar la tuerca de connexión **15**.

- Extraer la junta del cuerpo **5** y sustituirla por una nueva.
- Cerciorarse de que la junta del cuerpo **5** está asentada correctamente y de que la junta y la superficie de obturación no presentan suciedad.
- Montaje del colador.

Colador PVC-U, DN15 a DN50 y PPH:
- Cerciorarse de que el anillo de sujeción **6** está asegurado.

8. Eliminación

- Antes de eliminar los materiales individuales estos deben separarse en residuos reciclables, residuos normales y residuos especiales.
- Al eliminar o reciclar el producto, los componentes individuales y el embalaje deben observarse las normas locales y disposiciones legales vigentes.
- Observar los reglamentos, normas y directrices específicos del país.

Si tiene dudas respecto a la eliminación del producto, diríjase a su representación nacional de GF Piping Systems.

11.16 - G1-2 – GEORG FISCHER BALL VALVE

0 Allgemeine Hinweise

0.1 Warnhinweise

In dieser Anleitung werden Warnhinweise verwendet, um Sie vor Verletzungen oder vor Sachschäden zu warnen. Lesen und beachten Sie diese Warnhinweise immer!

Warnsymbol	Bedeutung
Gefahr	Unmittelbar drohende Gefahr! Bei Nichtbeachtung drohen Ihnen Tod oder schwerste Verletzungen.
Warnung	Möglicherweise drohende Gefahr! Bei Nichtbeachtung drohen Ihnen schwere Verletzungen.
Vorsicht	Gefährliche Situation! Bei Nichtbeachtung drohen Verletzungen oder Sachschäden.

0.2 Abkürzungen

Typ 546	Kugelhahn Typ 546
MF Hebel	Abschliessbarer Multifunktionshebel
PN	Nenndrücke

0.3 Die im Text erwähnten Planungsgrundlagen erhalten Sie bei Ihrer zuständigen Verkaufsgesellschaft sowie im Internet unter www.piping.georgfischer.com/ce

0 Indications générales

0.1 Indications d'avertissement

Les présentes instructions comprennent des indications d'avertissement, qui vous mettent en garde contre les risques de blessures et de dégâts matériels. Lisez et conformez-vous toujours à ces indications d'avertissement!

Symboles d'avertissement	Signification
Danger	Danger imminent! Le non-respect vous expose à la mort ou à des blessures graves.
Avertissement	Danger éventuel! Le non-respect vous expose à des blessures graves.
Attention	Situation dangereuse! En cas de non-respect, danger de blessures ou de dégâts matériels.

0.2 Abréviations

Type 546	Robinet à bille type 546
Levier MF	Levier multifonction verrouillable
PN	Pressions nominales

0.3 Les documents d'études et de planification mentionnés dans le texte sont disponibles auprès de votre distributeur ainsi que sur le site Internet www.piping.georgfischer.com/ce.

Montage- und Betriebsanleitung
Instruction de montage et de service
Installation and Operating Instructions
Istruzioni per il montaggio e l'uso



2-Weg Kugelhahn Typ 546, handbetätigt
Robinet à bille à 2 voies type 546, à commande manuelle
2-Way Ball Valve Type 546, manual
Valvola a sfera a 2 vie tipo 546, azionamento manuale

GEORG FISCHER +GF+
Piping Systems

0 General Information

0.1 Warning notice

Warning notices are used in this manual to inform you of possible injuries or damage to property. Please read them and always abide by these warnings!

Symbol	Meaning
Danger	Imminent acute danger! Failure to comply could result in death or extremely serious injury.
Warning	Possible acute danger! Failure to comply could result in serious injury.
Caution	Dangerous situation! Failure to comply can lead to injury or damage to property.

0.2 Abbreviations

Type 546	Ball Valve Type 546
MF lever	Lockable multi-functional lever
PN	Nominal pressure

0.3 The Planning Fundamentals mentioned in this text may be obtained from your sales representative or on the internet at www.piping.georgfischer.com/ce

0 Indicazioni Generali

0.1 Avvisi di pericolo

In queste istruzioni si utilizzano avvisi di pericolo per mettervi in guardia di fronte al rischio di lesioni personali o danni materiali. Per cortesia leggete ed osservate sempre questi avvisi di pericolo!

Avviso di pericolo	Significato
Pericolo	Pericolo imminente! Nel caso di inosservanza rischio di morte o lesioni gravi.
Attenzione	Pericolo probabile! Nel caso di inosservanza rischio di lesioni gravi.
Cautela	Situazione pericolosa! Nel caso di inosservanza rischio di lesioni o danni materiali.

0.2 Abbreviazioni

Tipo 546	Valvola a sfera tipo 546
Leva MF	Leva multifunzionale chiudibile
PN	Pressioni nominali

0.3 Troverete i fondamenti per la progettazione menzionati nel testo presso la vostra società di vendita competente o al sito Internet www.piping.georgfischer.com/ce

(BR) Para obter estas instruções noutras línguas, dirija-se, por favor, à sua sociedade de vendas.
(VRC) 有关其它语种的本说明书的情况，请向您的销售公司了解。
(DK) (IS) Hvis du ønsker vejledningen på andre sprog, skal du henvende dig til din forhandler.
(E) Para obtener estas instrucciones en otros idiomas, diríjase a su distribuidor.
(GR) Για λοιπές γλώσσες στις οποίες διατίθενται οι οδηγίες αυτές, παρακαλούμε απευθυνθείτε στην εταιρεία πωλήσεων.
(ID) Untuk bahasa-bahasa lain petunjuk ini, anda dimohon untuk menghubungi perusahaan penjual.
(IND) इस निर्देश पुस्तिका की ओर भाषाऐं के लिऐ आप अपने विक्रेता से सम्पर्क करें ।
(J) その他の言語のこのマニュアルは, 最寄りの販売店までお問い合わせ下さい。
(N) Ta kontakt med salgsselskapet for å få denne veiledningen på ytterligere språk.
(NL) Voor andere taalversies van deze handleiding kunt u contact opnemen met uw verkoopfirma.
(PL) O inne jezyki niniejszej instrukcji prosze pytac w miejscu sprzedazy.
(RO) Cu privire la manualul acesta în alte limbi adresați-vă vânzătorului dvs.
(RUS) За Инструкцией на других языках обращайтесь, пожалуйста, к Вашему продавцу.
(S) Vänd dig till din återförsäljare för ytterligare språkversioner av denna anvisning.
(SGP) Keterangan dalam bahasa lain, tanyakan pada agen penjualan.

Herstellererklärung CE

Der Hersteller **Georg Fischer Rohrleitungssysteme AG, 8201 Schaffhausen (Schweiz)** erklärt, dass die **Kugelhähne des Typs 546** gemäss der harmonisierten Bauart-Norm prEN ISO 16135:2001

1. druckhaltende Ausrüstungsteile im Sinne der EG-Druckgeräterichtlinie 97/23 EG sind und solchen Anforderungen dieser Richtlinie entsprechen, die für Armaturen zutreffen,

2. den für Armaturen zutreffenden Anforderungen der Bauprodukte-Richtlinie 89/106/EG entsprechen.

Das CE-Zeichen an der Armatur zeigt diese Übereinstimmung an (nach der Druckgeräterichtlinie dürfen nur Armaturen grösser DN 25 mit CE gekennzeichnet werden).

Die Inbetriebnahme dieser Kugelhähne ist so lange untersagt, bis die Konformität der Gesamtanlage, in die die Kugelhähne eingebaut sind, mit einer der genannten EG-Richtlinien erklärt ist.

Änderungen am Kugelhahn, die Auswirkungen auf die angegebenen technischen Daten und den bestimmungsgemässen Gebrauch haben, machen diese Herstellererklärung ungültig. Zusätzliche Informationen können den «Georg Fischer Planungsgrundlagen» entnommen werden (siehe Allgemeine Hinweise Abschnitt 0.3).

Schaffhausen, den 16.10.2002

Hartmut Behlau
Geschäftsführer
Industriesysteme

Manfred Leyrer
Qualitätsmanagement-
Beauftragter

Déclaration du fabricant CE

Le fabricant **Georg Fischer Systèmes de Tuyauteries SA, 8201 Schaffhouse (Suisse)** déclare que selon la norme d'harmonisation technique prEN ISO 16135:2001, ses **robinets à bille type 546**

1. sont des pièces soumises à la pression en vertu de la Directive 97/23 CE (Equipements sous pression). Elles satisfont d'une part aux exigences de cette directive applicable à la robinetterie,
2. et d'autre part aux exigences de la Directive 89/106/CE (Produits de construction).

Le symbole CE indique cette conformité (selon la directive sur les équipements sous pression, seules les robinetteries plus grandes que DN 25 peuvent porter le symbole CE).

La mise en service des robinets à bille est interdite tant que l'installation concernée ne répond pas aux critères de conformité stipulés dans l'une des directives européennes précitées.

Les modifications effectuées sur le robinet à bille qui ont des répercussions sur les caractéristiques techniques et l'utilisation conforme entraînent la nullité de la déclaration du fabricant. Pour de plus amples informations, veuillez consulter les «bases de planification Georg Fischer» (cf. mode d'emploi, point 0.3).

Schaffhouse, le 16.10.2002

Hartmut Behlau
Directeur
des systèmes pour l'industrie

Manfred Leyrer
Mandataire pour le
management de la qualité

Manufacturer's Declaration CE

The manufacturer, **Georg Fischer Piping Systems Ltd, 8201 Schaffhausen (Switzerland),** declares, in accordance with the harmonized prEN ISO 16135:2001 standard, that the **ball valves type 546**

1. are pressure-bearing components in the sense of the EC Directive 97/23 EC concerning pressure equipment and that they meet the requirements pertaining to valves as stated in this directive,
2. correspond to the respective requirements for valves pursuant to Directive 89/106/EC concerning building products.

The CE emblem on the valve refers to this accordance (as per the directive on pressure equipment, only valves larger than DN 25 may be marked with CE).

Operation of these ball valves is prohibited until conformity of the entire system into which the ball valves have been installed is established according to one of the above mentioned EC directives.

Modifications on the ball valve which have an effect on the given technical specifications and the intended use render this manufacturer's declaration null and void. Additional information is contained in the «Georg Fischer Planning Fundamentals» (see Paragraph 0.3 under General Information).

Schaffhausen, 16.10.2002

Hartmut Behlau
Managing Director
Industrial Systems

Manfred Leyrer
Quality Management

Dichiarazione del fabbricante CE

Il fabbricante **Georg Fischer Sistemi per Tubazioni SA, 8201 Sciaffusa (Svizzera),** dichiara che **le valvole a sfera tipo 546,** in ottemperanza alla norma armonizzata sulla tipologia costruttiva prEN ISO 16135:2001

1. sono componenti di attrezzature sottoposti a pressione ai sensi della direttiva comunitaria sugli apparecchi a pressione 97/23 CEE e possiedono i requisiti previsti da tale direttiva specificamente per le valvole,
2. possiedono i requisiti previsti per le valvole a sfera dalla direttiva comunitaria sui prodotti da costruzione 89/106/CEE.

Il simbolo CE sulle valvole a sfera indica questa conformità (secondo la direttiva comunitaria sugli apparecchi a pressione possono essere contrassegnate con CE solo le valvole a sfera con dimensioni superiori a DN 25).

Non è possibile eseguire la messa in funzione di queste valvole, finché non viene attestata la conformità dell'impianto nel quale le valvole a sfera sono installate con una delle direttive comunitarie menzionate.

Eventuali modifiche eseguite sulla valvola a sfera ed eventuali alterazioni dei dati tecnici indicati e dei limiti d'uso della valvola riconducibili a tali modifiche annullano la presente dichiarazione. Per ulteriori informazioni si raccomanda la lettura dei «Fondamenti di progettazione Georg Fischer» (v. Indicazioni Generali Capitolo 0.3).

Schaffhausen, il 16.10.2002

Hartmut Behlau
Gerente dei sistemi
industriali

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GEORG FISCHER +GF+
Piping Systems

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1 Sicherheitshinweise

Für Kugelhähne gelten dieselben Sicherheitsvorschriften wie für das Rohrleitungssystem, in das sie eingebaut sind. Der Typ 546 ist ausschliesslich dazu bestimmt, nach Einbau in ein Rohrleitungssystem zugelassene Medien innerhalb der zugelassenen Druck- und Temperaturgrenzen abzusperren, durchzuleiten oder den Durchfluss zu regeln. Die maximale Betriebsdauer beträgt 25 Jahre.

Vorsicht **Bitte beachten Sie, dass der maximale Betriebsdruck der gesamten Armatur von dem maximal zulässigen Nenndruck des Anschlussteils bestimmt wird.**

Jede Person, die im Betrieb des Anwenders mit der Montage, Demontage, Inbetriebnahme, Bedienung und Instandhaltung (Inspektion, Wartung, Instandsetzung) der Armatur befasst ist, muss die komplette Bedienungsanleitung und besonders diesen Abschnitt «Sicherheitshinweise» gelesen und verstanden haben.
Dem Anwender wird empfohlen, sich dies jeweils schriftlich bestätigen zu lassen. Deshalb:
- Die Armatur nur in technisch einwandfreiem Zustand benutzen und diese Sicherheitshinweise unbedingt beachten
- Diese Dokumentation in der Nähe der Armatur aufbewahren

Es unterliegt der Verantwortung des Planers/Installateurs von Rohrleitungssystemen und des Betreibers solcher Anlagen, in die der Kugelhahn eingebaut ist, sicherzustellen, dass
- das Rohrleitungssystem fachgerecht verlegt ist und regelmässig auf seine Funktionstüchtigkeit überprüft wird
- nur fachlich qualifiziertes und autorisiertes Personal den Kugelhahn einbaut, bedient, wartet und repariert. Das Personal muss regelmässig in allen zutreffenden Fragen der örtlich geltenden Vorschriften für Arbeitssicherheit und Umweltschutz – insbesondere solche für druckführende Rohrleitungen – unterwiesen werden
- die Armatur bestimmungsgemäss nur so verwendet wird, wie in diesem Abschnitt Sicherheitshinweise beschrieben
- Einbaulagen und Orte, bei denen eine Betätigung unbeabsichtigt erfolgen kann, vermieden werden.

2 Gefahrenhinweise

Warnung **Kugelhähne nicht für Medien mit Feststoffen verwenden.**
Im Regelbetrieb ist Kavitation zu vermeiden.
Es können Schädigungen/Undichtheiten infolge Abrasion (Abrieb) auftreten.

Warnung **Ausbau des Typs 546 aus der Rohrleitung**
Wurde der Druck nicht vollständig abgebaut, kann das Medium unkontrolliert entweichen.
Je nach Art des Mediums besteht Verletzungsgefahr.
▶ Druck in der Rohrleitung vor dem Ausbau vollständig abbauen.
Bei gesundheitsschädlichen, brennbaren oder explosiven Medien muss die Rohrleitung vor dem Ausbau vollständig entleert und gespült werden (Vorsicht: mögliche Rückstände beachten)

Warnung **Durch einen Typ 546, der als Endarmatur einer unter Druck stehenden Rohrleitung verwendet wird, soll Medium abgelassen werden.**
Das Medium kann unkontrolliert austreten/herumspritzen.
Je nach Art des Mediums besteht Verletzungsgefahr.
▶ Gewährleisten Sie ein sicheres Auffangen des Mediums durch entsprechende Massnahmen (z.B. Anschluss eines Auffangbehälters)

Warnung **Der Typ 546 soll nach dem Ausbau gelagert oder zerlegt werden.**
Restmedium kann unkontrolliert austreten.
Je nach Art des Mediums besteht Verletzungsgefahr.
▶ Öffnen Sie den ausgebauten Typ 546 halb (45° Stellung) und lassen Sie den Typ 546 in senkrechter Lage leerlaufen – das Medium muss hierbei aufgefangen werden.

3 Transport und Lagerung

Der Typ 546 muss sorgfältig behandelt, transportiert und gelagert werden. Hierzu sind folgende Punkte zu beachten:
- Der Typ 546 muss in der ungeöffneten Originalverpackung transportiert und/oder gelagert werden.
- Der Typ 546 ist vor schädlichen physikalischen Einflüssen wie Licht, Staub, Wärme (Feuchtigkeit) und Strahlung zu schützen.
- Insbesondere die Anschlussteile dürfen weder durch mechanische noch durch thermische Einflüsse beschädigt werden.
- Der Typ 546 soll in geöffneter Hebelstellung (Anlieferungszustand) gelagert werden.

4 Vorbereitung des Einbaus

Unmittelbar vor der Montage ist der Kugelhahn auf Transportschäden zu untersuchen. Beschädigte Kugelhähne dürfen nicht eingebaut werden. Eine Funktionsprobe – Kugelhahn von Hand schliessen und wieder öffnen – ist durchzuführen. Kugelhähne mit erkennbarer Funktionsstörung dürfen nicht eingebaut werden.

Vorsicht **Der Kugelhahn muss stets in geöffneter Kugelstellung in das System eingebaut werden.**

Es dürfen nur Kugelhähne eingebaut werden, deren Druckklasse, Anschlussart und Anschlussabmessungen den Einsatzbedingungen entsprechen. Bei Schweiss- und Klebeverbindungen dürfen nur identische Werkstoffe miteinander verbunden werden.

5 Einbau des Typs 546

Warnung **Der Typ 546 hat gegenüber dem Typ 346 veränderte Einbaumasse, Anschlüsse und Überwurfmuttern.**
Eine Verwendung anderer Bauteile und Einbaumasse (als für Typ 546 vorgesehen) kann zu Schäden des Rohrleitungssystems führen.
▶ Einbaumasse und -bezeichnungen in den technischen Dokumentationen mit den vorliegenden Bauteilen abgleichen.

Es wird empfohlen, den Kugelhahn erst unmittelbar vor dem Einbau der Originalverpackung zu entnehmen. Kugelhahn und Rohrleitung müssen fluchten, damit die Armatur von mechanischen Beanspruchungen freigehalten wird. Zum Einbau in das Rohrleitungssystem müssen die spezifischen Verbindungsvorschriften für Klebe-, Schweiss- oder Schraubverbindungen eingehalten werden. Informationen können den Betriebs-/Klebeanleitungen der Schweissmaschinen bzw. Klebstoffhersteller entnommen werden. Die Anzugsmomente der Flanschschrauben und weitere Informationen können den **«Georg Fischer Planungsgrundlagen»** entnommen werden.
Der Einbau des Kugelhahns erfolgt gemäss Abbildungen **a – d.**
Verbinden Sie die Anschlussteile gemäss ihrem Material und ihrer Ausführung mit den Rohrenden (Schweissen, Kleben, Schrauben, Flanschen)

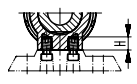
Warnung **Die Überwurfmuttern des Typs 546 sind handfest – ohne den Einsatz von Hilfswerkzeug – anzuziehen.**
Durch Einsatz von Zangen oder vergleichbaren Hilfsmitteln kann das Material der Überwurfmutter beschädigt werden. Weiter besteht die Gefahr, dass durch zu starke Anzugskräfte das Gewinde beschädigt wird.

Die Betätigung einer Armatur ruft Reaktionskräfte in der angeschlossenen Leitung hervor. Es ist deshalb erforderlich, den Kugelhahn als Festpunkt an seiner integrierten/separaten Befestigung (falls vorhanden) zu montieren oder die zugehörige Rohrleitung direkt vor und nach dem Kugelhahn mittels entsprechender Halterungen zu befestigen.

Warnung **Wenn Sie die integrierte Befestigung im Fuss des Typs 546 nutzen, beachten Sie die Angaben der max. Einschraubtiefe der Schrauben.**
Eine Nichtbeachtung kann zur Beschädigung des Kugelhahngehäuses führen. Die Druckbelastung eines beschädigten Gehäuses kann zum Bruch führen.

Max. Einschraubtiefe der Schrauben in den Kugelhahn

DN	10/15	20/25	32/40	50
Schraube	M6	M6	M8	M8
Einschraubtiefe H [mm]	12	12	15	15



Warnung In Rohrleitungssystemen, die Temperaturwechseln unterliegen, treten im Fall einer Behinderung der Wärmeausdehnung längs- bzw. Biegekräfte auf. Um die Funktionsweise der Armatur nicht zu beeinträchtigen, müssen diese Kräfte durch geeignete Festpunkte vor bzw. hinter der Armatur aufgenommen werden.

Für die Befestigung der Armatur von vorn bietet **+GF+** Ihnen eine Befestigungsplatte (30) an. Mit dieser Platte werden die Kräfte aufgenommen, die bei der Betätigung der Armatur entstehen können (z. B. Losbrechmoment). Durch Verwendung der Befestigungsplatte wird eine Übertragung der Bedienungskräfte auf das Rohrleitungssystem vermieden. Weitere Informationen finden Sie im aktuellen **+GF+** Lieferprogramm.

6 Druckprobe

Für die Druckprobe von Kugelhähnen gelten dieselben Anweisungen wie für die Rohrleitung. Detaillierte Informationen können den «Georg Fischer Planungsgrundlagen» Kapitel **Verarbeitung und Verlegung** entnommen werden. Zusätzlich gilt:
- Kontrollieren Sie, ob alle Armaturen in der erforderlichen Offen- oder Geschlossenstellung sind
- Füllen Sie das Leitungssystem und entlüften Sie sorgfältig

Vorsicht Der Prüfdruck einer Armatur **darf den Wert 1.5 x PN, (höchstens aber PN + 5 bar) nicht überschreiten.** Die Komponente mit dem niedrigsten PN bestimmt den maximal zulässigen Prüfdruck im Leitungsabschnitt.

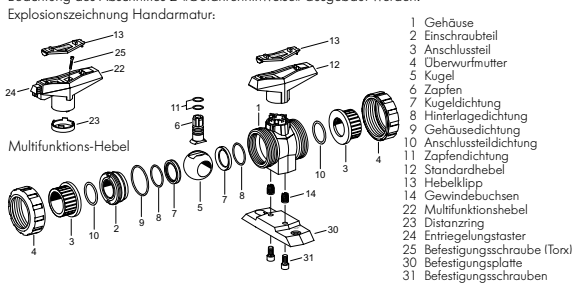
- Prüfen Sie während der Druckprobe die Armaturen und Anschlüsse auf Dichtheit. Protokollieren Sie die Ergebnisse.

7 Bestimmungsgemässe Nutzung

Wenn die Dichtheitsprüfung erfolgreich durchgeführt wurde, kann das Prüfmedium entfernt werden.
Die bestimmungsgemässe Nutzung der Anlage kann nun erfolgen.

8 Wartung – Instandhaltung

Kugelhähne benötigen im normalen Betrieb keine Wartung. Es reicht aus, periodisch zu überprüfen, ob nach aussen kein Medium austritt. Bei Leckage oder sonstigen Störungen sind unbedingt die Abschnitte 1, 2 «Sicherheitshinweise, Gefahrenhinweise» zu beachten.
Es wird empfohlen, Kugelhähne, die dauernd in der gleichen Stellung sind, 1–2 x pro Jahr zu betätigen, um ihre Funktionsfähigkeit zu überprüfen.
Bei häufigen Stellbewegungen – z.B. durch Automatisierung der Armatur oder infolge chemischen Angriffs auf das Dichtungsmaterial – kann es notwendig sein, Teile im Innern der Armatur auszutauschen. Zu diesem Zweck muss die Armatur aus dem Rohrleitungssystem unter Beachtung des Abschnittes 2 «Gefahrenhinweise» ausgebaut werden.
Explosionszeichnung Handarmatur:



1 Gehäuse
2 Einschraubteil
3 Anschlussteil
4 Überwurfmutter
5 Kugel
6 Zapfen
7 Kugeldichtung
8 Hinterlagedichtung
9 Gehäusedichtung
10 Anschlussteildichtung
11 Zapfendichtung
12 Standardhebel
13 Hebelklipp
14 Gewindebuchsen
22 Multifunktionshebel
23 Distanzring
24 Entriegelungstaster
25 Befestigungsschraube (Torx)
30 Befestigungsplatte
31 Befestigungsschrauben

Wurde der Kugelhahn durch Lösen der Überwurfmuttern (4) aus der Leitung entfernt und kann eine Restentleerung sichergestellt werden, so sind zur **Demontage** die Schritte **e – i** auszuführen:

! Bitte beachten Sie, dass das Einschraubteil (2) ein Linksgewinde hat.

Die Dichtungselemente sowie Kugel, Zapfen und Einschraubteil können ausgetauscht werden. Georg Fischer bietet zu diesem Zweck entsprechende Ersatzteilsets an.

Vorsicht Bei einem Austausch dürfen ausschliesslich die für die Armatur vorgesehenen Georg Fischer Original-Ersatzteile verwendet werden. Ersatzteile für den Typ 546 können mit den Angaben auf dem Typenschild bestellt werden.

Vorsicht **Schmiermittelauswahl**
Der Einsatz ungeeigneter Schmiermittel kann den Werkstoff des Kugelhahns oder der Dichtungen angreifen. Es dürfen keinesfalls Schmiermittel auf Mineralölbasis oder Vaseline (Petrolatum) verwendet werden.
Für lackstörungsfreie Kugelhähne sind die speziellen Herstellerhinweise zu beachten.
▶ Alle Dichtungen sind mit Fett auf Silikon- oder Polykolbasis zu schmieren.

Vorsicht **Handhabung der Dichtungen**
Alle Dichtungen (Material z.B. EPDM, FPM) sind organische Werkstoffe. Sie reagieren auf Umwelteinflüsse und müssen daher in ihrer Originalverpackung möglichst kühl, trocken und dunkel gelagert werden. Die Dichtungen sind vor dem Einbau auf mögliche Alterungsschäden wie Anrisse und Verhärtungen zu prüfen.
▶ Schadhafte Ersatzteile dürfen nicht zum Einsatz gelangen.

Bei der **Montage** der Einzelteile und Austausch der Dichtungen sind die Schritte **k – s** auszuführen:

! Der Anzug des Anschraubteils (2) muss so gewählt werden, dass die Kugel noch satt drehbar ist.

9 Montage und Betätigung des MF-Hebels

Alternativ zum Standardhebel können Sie für den Typ 546 einen verriegel- und abschliessbaren Multifunktionshebel (MF-Hebel) verwenden.
Explosionszeichnung MF-Hebel (s. kleines Bild oben)
Zur Montage des MF-Hebels sind die Schritte **t – w** auszuführen:

! Am unteren Teil des Hebelschafts befindet sich ein Distanzring (23). Kontrollieren Sie seinen korrekten Sitz im Schaft (Arretierung).

Zur Bedienung des MF-Hebels sind die Schritte **x – y** auszuführen.

x: Drücken Sie den Taster (24) zur Entriegelung in den Hebel hinein. Halten Sie den Taster in dieser Position. Der Hebel kann nun um 90° bewegt werden.

y: Der Hebel wird in der entsprechenden Position verriegelt und kann in dieser Position durch ein Schloss vor unbefugtem Zugriff gesichert werden.

1 Indications de sécurité

Les robinets à bille sont soumis aux mêmes instructions de sécurité que le système de tuyauterie dans lequel ils sont installés. Le type 546 sert exclusivement, après l'installation dans le système de tuyauterie, à arrêter, conduire ou régler le débit des fluides autorisés dans les limites de pressions et de températures autorisées. Sa durée de service maximale est de 25 ans.

Attention **Tenez compte que la pression de service max. de la vanne complète est définie par le pression nominale max. autorisée du collet.**

Toute personne responsable du montage, du démontage, de la mise en service, de l'utilisation et de la maintenance (inspection, entretien, réparation) de la vanne dans l'entreprise de l'utilisateur, devra avoir lu intégralement et compris les instructions de service et, notamment, la présente section «Indications de sécurité».
Nous conseillons à l'utilisateur de se faire remettre une confirmation écrite certifiant que cette condition a été remplie. C'est pourquoi:
- Utiliser la vanne uniquement en état technique impeccable et se conformer strictement aux présentes indications de sécurité.
- Conserver cette documentation dans le voisinage immédiat de la vanne.

Il relève de la responsabilité de l'ingénieur d'études/installateur du système de tuyauterie et de l'utilisateur des installations dans lesquelles est montée la vanne de s'assurer que:
- le système de tuyauterie a été posé de manière correcte et que le bon fonctionnement de ce dernier est soumis à des contrôles réguliers;
- seules des personnes de qualification technique appropriée et autorisées se chargent du montage, de l'utilisation, de la maintenance et de la réparation du robinet à bille. Le personnel doit être formé régulièrement sur tous les aspects des dispositions en vigueur relatives à la protection du travail et de l'environnement, notamment celles touchant aux systèmes de tuyauterie sous pression.
- la vanne soit utilisée de manière rigoureusement conforme à sa destination et conformément à la description de la présente section des indications de sécurité.
- les positions de montage et les emplacements, dans lesquels un actionnement intempestif est possible, sont évités.

2 Indications de danger

Avertissement **Ne pas utiliser les robinets à bille pour les fluides contenant des corps solides. En mode de service normal, éviter toute cavitation.**
Des dommages/fuites pourraient résulter de l'abrasion (usure).

Avertissement **Démontage du type 546 du système de tuyauterie**
Le fluide pourrait s'écouler de manière incontrôlée si la baisse de pression ne s'est pas faite intégralement. Il existe un risque de blessure selon le type de fluide.
▶ Baisser totalement la pression dans le système de tuyauterie avant le démontage du robinet à bille. En la présence de fluides toxiques, inflammables ou explosifs, vider totalement la tuyauterie et rincer cette dernière avant le démontage du robinet à bille.
(Attention: tenir compte des dépôts éventuels)

Avertissement **Un fluide doit être évacué par le biais d'un type 546, utilisé comme armature d'extrémité d'un tuyau sous pression.**
Le fluide peut s'évacuer de manière incontrôlée/par projection.
Il existe un risque de blessure selon le type de fluide.
▶ Garantissez une récupération sûre du fluide par des mesures appropriées (par exemple le raccordement d'un récipient de récupération).

Avertissement **Un type 546 doit être stocké ou démonté**
Les restes de fluides peuvent s'évacuer de manière incontrôlée.
Il existe un risque de blessure selon le type de fluide.
▶ Ouvrir le type 546 jusqu'à la moitié (position 45 °) et le laisser se vider à la position verticale – en récupérant le fluide qui s'écoule.

3 Transport et stockage

Le type 546 doit être manipulé, transporté et stocké avec précautions. Conformez-vous strictement aux points suivants:
- Transporter et/ou stocker impérativement le type 546 dans son emballage original fermé.
- Protéger le type 546 envers les influences physiques néfastes telles que la lumière, la poussière, la chaleur (l'humidité) et les rayonnements.
- Eviter notamment que les pièces de raccordement puissent s'endommager sous des effets mécaniques ou thermiques.
- S'assurer que le levier du type 546 est à la position ouverte (état à la livraison) en stockant ce demier.

4 Préparation du montage

Immédiatement avant le montage, assurez-vous par un contrôle que le robinet à bille ne souffre d'aucun dégât provoqué par le transport. Il n'est pas permis d'installer des robinets à bille endommagés. Un essai de fonctionnement – fermer manuellement et ouvrir de nouveau le robinet à bille – devra être effectué avant le montage. Il n'est pas permis d'installer des robinets à bille présentant des anomalies de fonctionnement évidentes.

Attention **L'installation du robinet à bille dans le système de tuyauterie doit impérativement se faire à la position ouverte de la bille.**

Il n'est permis d'installer que des robinets à bille dont la classe de pression, le raccordement et les dimensions de raccordement correspondent à vos conditions d'utilisation. Pour les assemblages par soudage ou par collage, il n'est permis d'assembler que des éléments en matériaux identiques.

5 Montage du type 546

Avertissement **Le type 546 possède des dimensions de montage, des collets et des écrous modifiés par rapport à ceux du type 346.**
Toute utilisation de pièces et de dimensions de montages différentes (autres que celles recommandées pour le type 546) sera susceptible de provoquer des dégâts au système de tuyauterie.
▶ Comparer impérativement les dimensions et schémas de montage fournis dans la documentation technique avec les pièces livrées.

Nous recommandons de ne sortir le robinet à bille de son emballage original que peu de temps avant l'installation. Le robinet à bille et le conduit de tuyau doivent être alignés l'un sur l'autre afin que la vanne soit mise à l'abri des sollicitations mécaniques. Lors de l'installation dans le système de tuyauterie, conformez-vous impérativement aux instructions d'assemblage afférentes aux assemblages par soudage, collage ou vissage. De plus amples informations vous seront fournies à cet effet par les instructions d'utilisation et de collage élaborées par les constructeurs et fabricants de machines de soudage et de colles. **«Les documents d'études et de planification Georg Fischer»** vous fourniront en outre des renseignements sur les couples de serrage des brides visées ainsi que bien d'autres informations.
L'installation du robinet à bille s'effectuera suivants les figures **a – d.**
Assemblez les pièces de raccordement avec les extrémités des tubes selon leur matériau et leur modèle de machine (souder, coller, visser, brider).

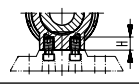
Avertissement **Les écrous du type 546 doivent être serrés à la main, sans toute utilisation d'outil quelconque.**
L'utilisation de pinces ou d'outils de secours similaires est susceptible d'endommager le matériau de l'écrou. Il en résulte en outre le risque d'endommager le filetage sous l'effet de forces de serrage excessives.

L'actionnement de la vanne provoque des forces de réaction dans la conduite raccordée. Il est donc nécessaire de monter le robinet à bille comme point fixe sur son support intégré/séparé (si un tel existe) ou de fixer le conduit de tuyau concerné par des serrages appropriés immédiatement en amont et en aval du robinet à bille.

Avertissement **Tenez compte des indications sur la profondeur max. de vissage des vis dans le cas où vous utiliseriez la fixation intégrée au pied du type 546.**
Le non-respect de cette recommandation est susceptible d'entraîner des dégâts sur le boîtier du robinet à bille. La contrainte de pression sur un boîtier endommagé pourra provoquer sa rupture.

Profondeur de vissage maximale des vis dans le robinet à bille

DN	10/15	20/25	32/40	50
Vis	M6	M6	M8	M8
Prof. de vissage H [mm]	12	12	15	15



Avertissement En cas d'empêchement de la dilatation thermique, des forces d'allongement thermique linéaire et de flexion apparaîtront dans les systèmes de tuyauterie soumis à des fluctuations de températures. Pour ne pas perturber le fonctionnement du robinet à bille, ces forces devront être absorbées par des points fixes appropriés en amont et en aval de la vanne.

+GF+ propose une plaque de fixation (30) pour fixer la vanne par l'avant. Grâce à cette plaque, les forces, éventuellement générées par l'actionnement du robinet à bille (par exemple le couple initial de décollement), sont absorbées. Par l'utilisation de la plaque de fixation, vous empêcherez la transmission des forces d'actionnement sur le système de tuyauterie. Vous trouverez de plus amples informations dans le programme de livraison actuel **+GF+**.

6 Epreuve statique

Les essais statiques des robinets à bille sont régis par les mêmes instructions que les systèmes de tuyauterie. «Les documents d'études et de planification Georg Fischer» chapitre mise en œuvre et installation, vous fourniront des renseignements plus détaillés. En outre:
- Vérifier que toutes les vannes sont bien aux positions ouvert ou fermé nécessaires
- Remplir le système de tuyauterie et désaérer ce dernier soigneusement

Attention La pression d'essai de la vanne **ne doit en aucun cas dépasser la valeur 1,5 x PN (max. PN + 5 bar)**. Le composant présentant la plus faible valeur PN détermine la pression d'essai maximale autorisée dans le segment de conduit.

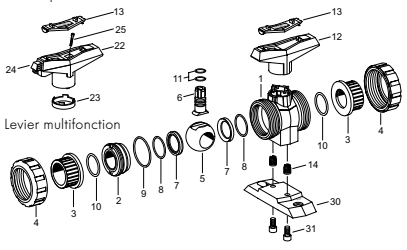
- Pendant l'essai statique, contrôler l'étanchéité des vannes et des raccords. Consigner tous les résultats par écrit.

7 Utilisation conforme à la destination

Le fluide utilisé pour l'essai statique peut être évacué une fois que le contrôle d'étanchéité s'est effectué avec succès.
Il est maintenant possible de passer à l'utilisation de la vanne conformément à sa destination.

8 Entretien – maintenance

Les robinets à bille ne nécessitent aucune mesure de maintenance en mode de service normal. Il suffit de contrôler périodiquement qu'il n'existe pas de fuite de fluide vers l'extérieur. En cas de fuites ou d'anomalies quelconques, conformez-vous impérativement aux chapitres 1, 2 «Indications de sécurité», «Indications de danger».
Nous vous recommandons d'actionner 1–2 fois par an les robinets à bille qui restent en permanence à la même position, ceci afin de contrôler leur bon fonctionnement.
En cas de mouvements de réglage fréquents, par exemple en raison de l'automatisation de la vanne ou à la suite d'agressions chimiques sur le matériau d'étanchéité, il pourrait devenir nécessaire de remplacer des composants à l'intérieur de la vanne. Dans ce cas, il faudra démonter la vanne du système de tuyauterie en vous conformant aux indications de la section 2 «Indications de danger».
Vue explosée des robinetteries manuelles



1 Boîtier
2 Pièce filetée
3 Collet
4 Écrou
5 Bille
6 Pivot
7 Joint de bille
8 Joint sous-jacent
9 Joint du corps
10 Joint frontal
11 Joint de pivot
12 Levier standard
13 Bride de levier
14 Douille filetée
22 Levier multifonction
23 Anneau d'écartement
24 Bouton de déverrouillage
25 Vis de fixation (Torx)
30 Plaque de fixation
31 Vis de fixation

Si le robinet à bille a été démonté du conduit par desserrage de l'écrou (4) et si vous pouvez garantir un vidage total, exécutez pour le **démontage** les étapes **e – i**:

! Notez bien que la pièce filetée (2) possède un filetage à gauche!

Il est possible de remplacer les éléments d'étanchéité ainsi que la bille, le pivot et la pièce filetée. Georg Fischer vous propose à cet effet des kits de pièces de rechange appropriés.

Attention Utiliser exclusivement des pièces de rechange originales Georg Fischer conçues pour la vanne utilisée. Les pièces de rechange pour le type 546 pourront être commandées grâce aux indications figurant sur la plaque signalétique du robinet à bille.

Attention **Choix du lubrifiant**
L'utilisation de lubrifiants inappropriés est susceptible d'agresser le matériau du robinet à bille ou des joints. Il n'est en aucun cas permis d'utiliser des lubrifiants à base d'huile minérale ou de vaseline (pétrolatum).
Conformez-vous aux instructions spécifiques du fabricant afin d'obtenir des robinets à bille sans problèmes de fuite.
▶ Les joints doivent être enduits de graisse à base de silicone/ Polycol.

Attention **Manipulation des joints**
Tous les joints (par exemple de matériaux EPDM, FPM) sont des matières organiques. Ils réagissent donc aux influences ambiantes; c'est pourquoi ils doivent être stockés dans leurs emballages respectifs à un endroit frais, sec et à l'abri de la lumière. Avant le montage, contrôler que les joints ne présentent pas de dégâts de vieillissement tels que les fissures et les durcissements.
▶ Il n'est pas permis d'utiliser des pièces de rechange endommagées.

Exécuter les étapes **k – s** lors du **montage** des pièces de rechange/du remplacement des joints:

! Le serrage de la pièce filetée (2) doit être choisi de manière à ce que la bille puisse encore tourner librement.

9 Montage et actionnement du levier multifonction

Au lieu du levier standard, vous pouvez pour le type 546 utiliser un levier multifonction (levier MF) condamnable et verrouillable.
Vue explosée du levier multifonction (cf. petite image en haut)
Accomplissez les étapes de travail **t – w** pour le montage du levier multifonction:

! Un anneau d'écartement (23) est monté sur la partie inférieure de la tige du levier. Contrôlez que cet anneau est correctement monté (arrêtoir).

Accomplissez les étapes **x – y** pour l'utilisation du levier multifonction:

x: Appuyez sur le bouton (24) dans le levier pour déverrouiller ce dernier. Maintenez le bouton à cette position. Il est maintenant possible de tourner le levier de 90°.

y: Verrouillez le levier à la position souhaitée; vous pouvez alors l'y condamner au moyen d'un cadenas pour empêcher toute manipulation intempestive.

1 Safety information

The same safety guidelines apply for ball valves as for the piping system into which they are built. The 546 valve is intended exclusively for shutting off and conducting allowed media within the allowable pressure and temperature range or for controlling flow in the piping systems into which it has been installed. The maximum service life is 25 years.

Caution **Please note that the max. working pressure of the complete valve is defined by the max. allowed nominal pressure of the valve end.**

Anyone involved with the mounting, dismounting, operation, handling and maintenance (inspection, service and repair) of the valve at the plant where it is installed must have read and understood the complete instruction manual, in particular this paragraph pertaining to safety information.
We recommend having this confirmed in writing. Furthermore:
- Use only perfectly functioning valves and always observe these safety guidelines.
- This documentation must be kept readily available in the vicinity of the valve.

It is the responsibility of the piping systems engineer/installer and the operator of such systems into which the ball valve has been installed to warrant that
- the piping system has been installed correctly by professionals and its functionality is checked periodically,
- only qualified and authorized personnel mounts, operates, services and repairs the ball valve. Employees must be instructed on a regular basis in all aspects of work safety and environmental protection as indicated by the applicable local regulations – especially those pertaining to pressure-bearing piping,
- the valve is used only according to the specifications for which it has been intended, as indicated in this paragraph on safety,
- installation positions and locations in which manipulations can occur unintentionally must be avoided.

2 Hazardous situations

Warning **Do not use ball valves for media containing solids.**
Avoid cavitation in control operation.
This could lead to damages/leakage due to abrasion.

Warning **Removing the 546 valve from the pipeline**
If the pressure has not been released completely, the medium can exit uncontrollably.
Depending on the type of medium, injury may occur.
▶ Before dismounting, release all pressure from the piping system.
For hazardous, flammable or explosive media, the piping system must be completely emptied and rinsed before the valve may be dismounted (Attention: there could still be residue).

Warning **Medium needs to be tapped from a 546 valve, which is used as an end valve in a pressure-bearing piping system.**
The medium can exit/splash uncontrollably.
Depending on the type of medium, injury may occur.
▶ Make certain that the medium is caught safely with the appropriate measures (e.g. connecting a vessel to collect the exiting medium).

Warning **The 546 valve is to be stored or dismantled after removal from pipe.**
Residual media can exit uncontrollably.
Depending on the type of medium, injury may occur.
▶ Open the dismounted valve type 546 halfway (45° position) and let it drain in a vertical position – catch the medium in an appropriate vessel.

3 Transport and storage

The ball valve type 546 must be handled, transported and stored with care. Please note the following:
- The 546 valve should be transported and/or stored in its original, unopened packaging.
- The 546 valve must be protected from harmful physical influences, such as light, dust, heat (humidity) and UV radiation.
- The connecting parts of the ball valve in particular must not be damaged by mechanical or thermal influences.
- The 546 valve should be stored with the lever in the opened position (as it was supplied).

4 Prior to installation

To begin with, the ball valve should be inspected for transport damages. Damaged valves must not be installed. A function test – close the ball valve by hand and open it again – should be done. Ball valves which do not function properly must not be installed.

Caution **The ball valve must always be built into the system in the opened position.**

Only ball valves whose pressure rating, type of connection and dimensions correspond to the operating conditions should be installed. For fusion and cemented connections, only join identical materials with one another.

5 Installation of the type 546

Warning **The installation dimensions, connections and union nuts of the type 546 valve have been modified from the type 346.**
The use of components and installation dimensions other than those prescribed for the type 546 can cause damage to the piping system.
▶ Compare the installation dimensions and specifications in the technical documentation with those of the components at hand.

We recommend only removing the ball valve from its original packaging immediately before installation. The ball valve and the pipe must be aligned so that the valve is kept free of mechanical stress. The specific jointing instructions for solvent cementing, fusion and screw connection methods must be adhered to when installing the valve into the piping system. More information can be found in the operating manuals of the fusion machines or the cementing instructions of the adhesive manufacturer. The tightening torque of the flange screws and other useful information can be found in the **«Georg Fischer Planning Fundamentals»**.
Install the ball valve according to the illustrations **a – d.**
Join the connecting parts with the pipe ends according to their materials and types (fusion, cementing, screwing, flanges).

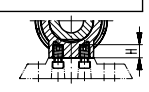
Warning **The union nuts of the type 546 should be hand-tightened – without the use of additional tools.**
If other tools, such as pliers, are used, the material of the union nuts could be damaged. Additionally, if they are tightened too strongly, it is possible for the thread to become damaged.

Operation of a valve causes reactive forces in the pipe to which it is connected. It is therefore necessary to mount the ball valve as a fixed point with its integrated/separate fastener (if available) or to reinforce the corresponding piping directly before and after the ball valve with suitable supports.

Warning **If you use the integrated fastening system in the base of the type 546, please take note of the max. insertion depth of the screws.**
Failure to comply can lead to damage of the ball valve housing. The pressure load on a damaged housing could cause breakage.

Max. insertion depth of the screws in the ball valve

DN	10/15	20/25	32/40	50
Screw	M6	M6	M8	M8
Insertion depth H [mm]	12	12	15	15



Warning In piping systems with temperature fluctuations, bending and longitudinal forces can occur if heat expansion is hindered. So as not to impair the functioning of the valve, these forces must be absorbed by implementing suitable fixed points in front of or behind the valve.

For front fastening, **+GF+** has a mounting plate (30) on offer. When this plate is used, forces which can occur during valve operation are absorbed (e.g. initial break-away torque); the operating forces are thus prevented from being transferred over to the piping system. For more information, please see the valid **+GF+** product range.

6 Pressure test

Ball valve pressure testing is subject to the same regulations as apply to the piping system. Detailed information can be found in the «Georg Fischer Planning Fundamentals,» in the chapter on **Handling and Installation**. Also applicable:
- Check that all valves are in the required open or closed position
- Fill the piping system and deaerate carefully

Caution The test pressure on a valve must **not exceed the value 1.5 x PN, (maximum PN + 5 bar).** The components with the lowest PN determine the maximum allowable test pressure in the piping section.

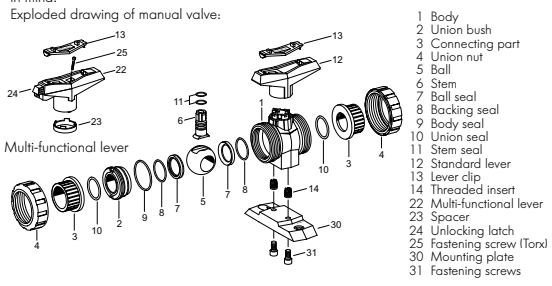
- Check the valves and connections for leaks during the pressure test. Document your results.

7 Intended use

When the leak test has been completed successfully, remove the test medium.
The system can now be used as intended.

8 Service – Maintenance

Ball valves require no maintenance under normal operating conditions. Periodic inspection to make sure that no medium is leaking is sufficient. Should leakage or other malfunctions occur, follow the instructions given under paragraphs 1, 2 «Safety information, Hazardous situations». We recommend a function test for ball valves which are kept permanently in the same position 1–2 x a year to check serviceability.
For frequent control operations – valve automation, or due to chemical attack on the sealing material – it may become necessary to replace parts inside the valve. For this purpose, the valve must be removed from the piping system, keeping paragraph 2 «Hazardous situations» in mind.
Exploded drawing of manual valve:



1 Body
2 Union bush
3 Connecting part
4 Union nut
5 Ball
6 Stem
7 Ball seal
8 Backing seal
9 Body seal
10 Union seal
11 Stem seal
12 Standard lever
13 Lever clip
14 Threaded insert
22 Multi-functional lever
23 Spacer
24 Unlocking latch
25 Fastening screw (Torx)
30 Mounting plate
31 Fastening screws

When the ball valve has been removed from the pipe by loosening the union nut (4) and preparations have been made for drainage, **disassemble** the valve by following steps **e – i**:

! Please note that the union bush (2) has left-handed thread.

The sealing elements, as well as the ball, stem and union bush can be replaced.
Georg Fischer has the respective spare parts kits on offer.

Caution Only original Georg Fischer spare parts designed specifically for this valve may be used for replacement purposes. Orders for spare parts for the 546 ball valve should include all the details given on the type plate.

Caution **Lubricants**
Using the wrong lubricants can damage the material of the ball valve or seals. Never use petroleum-based greases or Vaseline (Petrolatum).
For silicon-free ball valves, please consult the special manufacturer's instructions.
▶ All the seals must be lubricated with a silicon or polyglycol based grease.

Caution **Seals**
All the seals (made of e.g. EPDM, FPM) are organic materials which react to environmental influences. They must therefore be kept in their original packaging, and stored cool, dry and dark. The seals should be checked for damages from aging, such as fissures and hardening, before mounting.
▶ Do not use defective spare parts.

To **assemble** the components and replace seals, follow the steps **k – s**:

! Tighten the union bush (2) so that the ball moves snugly.

9 Mounting and using the MF lever

As an alternative to the standard lever, you can install a lockable multi-functional (MF) lever for the type 546.
Exploded drawing for MF lever (see small drawing above)
To mount the MF lever, follow the steps **t – w**:

! There is a spacer (23) at the bottom of the lever shaft. Make sure it is positioned correctly in the shaft (catch).

To work the MF lever, follow the steps **x – y**.

x: Press the unlocking latch (24) into the lever. Hold the latch in this position and the lever can be moved 90°.

y: The lever will lock in the respective position and can be secured in this position with a lock, protecting it from unauthorized access.

1 Avvertenze di sicurezza

Per le valvole a sfera valgono le medesime norme di sicurezza del sistema di tubazione in cui sono installati. Il tipo 546 è previsto unicamente allo scopo di bloccare, dopo l'installazione in un sistema di tubazioni, le sostanze ammesse all'interno dei limiti di pressione e temperatura ammessi, far fluire o regolare il flusso. La durata di funzionamento massima è di 25 anni.

Cautela **Tenere conto che la pressione di servizio max. della valvola completa è definita dalla pressione nominale max. ammesa dell'attacco.**

Ogni persona che nell'azienda dell'utente si occupa di montaggio, smontaggio, messa in funzione, uso e manutenzione (ispezione, manutenzione, riparazione) della rubinetteria, deve aver letto e compreso tutte le istruzioni per l'uso e in particolare questo capitolo «Avvertenze di sicurezza». All'utente si consiglia di farsi confermare ciò per iscritto. Per questa ragione:
- utilizzare il rubinetto solo in condizioni tecniche ineccepibili e osservare assolutamente queste avvertenze di sicurezza
- conservare questa documentazione in prossimità del rubinetto

Il progettista/l'installatore dei sistemi di tubazione e l'operatore degli impianti dove è installata la valvola a sfera devono accertare che
- il sistema di tubazione venga posato a regola d'arte e il suo funzion

11.17 - G2 – GRUNDFOS PUMP

CR, CRI, CRN

Installation and operating instructions



be
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innovate

GRUNDFOS

GB: EC declaration of conformity

We, Grundfos, declare under our sole responsibility that the products CR, CRI and CRN, to which this declaration relates, are in conformity with these Council directives on the approximation of the laws of the EC member states:

— Machinery Directive (2006/42/EC).
Standard used: EN 809:1998, A1:2009.
— EMC Directive (2004/108/EC).
— Ecodesign Directive (2009/125/EC).
Electric motors:
Commission Regulation No 640/2009.
Applies only to three-phase Grundfos motors marked IE2 or IE3.
See motor nameplate.
Standard used: EN 60034-30:2009.
— Ecodesign Directive (2009/125/EC).
Water pumps:
Commission Regulation No 547/2012.
Applies only to water pumps marked with the minimum efficiency index MEI. See pump nameplate.

This EC declaration of conformity is only valid when published as part of the Grundfos installation and operating instructions (publication number 97688538 1112).

CN: EC 产品合格声明书

我们格兰富在我们的全权责任下声明，产品 CR, CRI 和 CRN，即该合格证所指之产品，符合欧共体使其成员国法律趋于一致的以下欧共理事会指令：

— 机械设备指令 (2006/42/EC)。
所用标准：EN 809:1998, A1:2009。
— 电磁兼容性指令 (2004/108/EC)。
— 生态化设计指令 (2009/125/EC)。
电动机：
欧委会规定第 640/2009 号。
只适用于带有 IE2 或 IE3 标志的格兰富三相电机。参见电机铭牌。
所用标准：EN 60034-30:2009。
— 生态化设计指令 (2009/125/EC)。
水泵：
欧委会规定第 547/2012 号。
仅适用于标有最低效率指标 （MEI）的水泵。见泵铭牌。

本EC合格性声明仅在作为格兰富安装与操作指导手册 （出版号97688538 1112）的一部分时有效。

Bjerringbro, 1th November 2012



Svend Aage Kaae
Technical Director
Grundfos Holding A/S
Poul Due Jensens Vej 7
8850 Bjerringbro, Denmark

Person authorised to compile technical file and empowered to sign the EC declaration of conformity.

Original installation and operating instructions.

CONTENTS

		Page
1.	**Symbols used in this document**	**3**
2.	**Handling**	**3**
3.	**Type designation**	**4**
3.1	Type key for CR, CRI, CRN 1s, 1, 3, 5, 10, 15 and 20	4
3.2	Type key for CR, CRN 32, 45, 64, 90, 120 and 150	4
4.	**Applications**	**4**
5.	**Technical data**	**4**
5.1	Ambient temperature and altitude	4
5.2	Liquid temperature	5
5.3	Maximum permissible operating pressure and liquid temperature for the shaft seal	5
5.4	Minimum inlet pressure	5
5.5	Maximum inlet pressure	6
5.6	Minimum flow rate	6
5.7	Electrical data	6
5.8	Frequency of starts and stops	6
5.9	Dimensions and weights	6
5.10	Sound pressure level	6
6.	**Installation**	**6**
6.1	Foundation	7
6.2	Vibration dampening	7
6.3	Outdoor installation	8
6.4	Hot surfaces	8
6.5	Torques	8
6.6	Flange forces and torques	8
7.	**Electrical connection**	**9**
7.1	Cable entry/screwed connection	9
7.2	Three-phase connection	9
7.3	Single-phase connection	10
7.4	Terminal box position	10
7.5	Frequency converter operation	10
8.	**Start-up**	**10**
8.1	Shaft seal run-in	11
9.	**Maintenance**	**11**
10.	**Frost protection**	**11**
11.	**Service**	**11**
11.1	Service kits and manuals	11
12.	**Fault finding**	**12**
13.	**Disposal**	**12**



Warning

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

1. Symbols used in this document



Warning

If these safety instructions are not observed, it may result in personal injury.



Warning

If these instructions are not observed, it may lead to electric shock with consequent risk of serious personal injury or death.

Caution ***If these safety instructions are not observed, it may result in malfunction or damage to the equipment.***

Note ***Notes or instructions that make the job easier and ensure safe operation.***

2. Handling

When lifting the entire pump with motor, follow these instructions:

- Pump with motor sizes 0.37 - 7.5 kW:
  Lift the pump in the motor flange by means of straps or the like.
- Pump with motor sizes 11-75 kW:
  Lift the pump by means of the motor eyebolts.

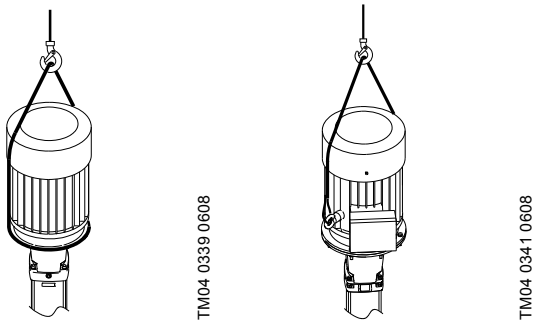


Fig. 1 Correct lifting of a CR pump

In the case of CR, CRI and CRN pumps with other motor makes than those mentioned above, we recommend that you lift the pump by means of straps in the motor flange.

3. Type designation

3.1 Type key for CR, CRI, CRN 1s, 1, 3, 5, 10, 15 and 20

Example	CR	3-	10	X-	X-	X-	X-	XXXX
Type range: CR, CRI, CRN								
Nominal flow rate in m^3/h								
Number of impellers								
Code for pump version								
Code for pipework connection								
Code for materials								
Code for rubber pump parts								
Code for shaft seal								

3.2 Type key for CR, CRN 32, 45, 64, 90, 120 and 150

Example	CR	32-	2	1-	X-	X-	X-	X-	XXXX
Pump range: CR, CRN									
Nominal flow rate in m^3/h									
Number of stages									
Number of impellers with reduced diameter									
Code for pump version									
Code for pipework connection									
Code for materials									
Code for rubber pump parts									
Code for shaft seal									

4. Applications

Grundfos multistage in-line centrifugal pumps, types CR, CRI and CRN, are designed for a wide range of applications.

CR, CRI, CRN

CR, CRI CRN pumps are suitable for liquid transfer, circulation and pressure boosting of cold or hot clean liquids.

CRN

Use CRN pumps in systems where all parts in contact with the liquid are made of high-grade stainless steel.

Pumped liquids

Thin, clean, non-flammable liquids, not containing solid particles or fibres. The liquid must not attack the pump materials chemically.

When pumping liquids with a density and/or viscosity higher than that of water, use motors with correspondingly higher outputs, if required.

5. Technical data

5.1 Ambient temperature and altitude

Motor power [kW]	Motor make	Motor efficiency class	Maximum ambient temperature [°C]	Maximum altitude above sea level [m]
0.37 - 0.55	Grundfos MG	-	+40	1000
0.75 - 22	Grundfos MG	IE3	+60	3500
30 - 75	Siemens	IE3	+55	2750

If the ambient temperature exceeds the above temperature values or the pump is installed at an altitude exceeding the above altitude values, the motor must not be fully loaded due to the risk of overheating. Overheating may result from excessive ambient temperatures or the low density and consequently low cooling effect of the air.

In such cases, it may be necessary to use a motor with a higher rated output.

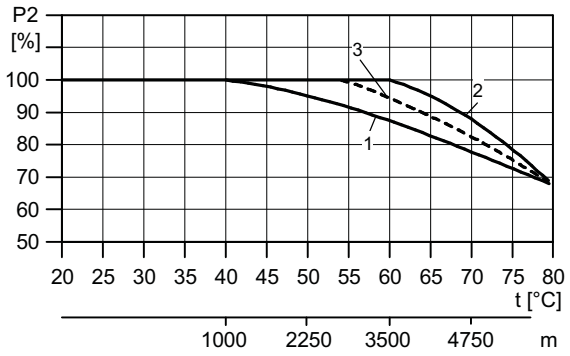


Fig. 2 Motor output depends on temperature/altitude

Pos.	Motor power [kW]	Motor make
1	0.37 - 0.55	MG
	0.37 - 22	MGE
2	0.75 - 22	MG
3	30 - 75	Siemens

Example

Figure 2 shows that the load of an IE3 motor at an ambient temperature of 70 °C must not be loaded more than 89 % of the rated output. If the pump is installed 4750 metres above sea level, the motor must not be loaded more than 89 % of the rated output.

In cases where both the maximum temperature and the maximum altitude are exceeded, the derating factors must be multiplied (0.89 x 0.89 = 0.79).

Note

For motor bearing maintenance at ambient temperatures above 40 °C, see section 9. Maintenance.

5.2 Liquid temperature

The table on page 15 states the relationship between liquid temperature range and maximum permissible operating pressure.

Note ***The maximum permissible operating pressure and liquid temperature ranges apply to the pump only.***

5.3 Maximum permissible operating pressure and liquid temperature for the shaft seal

Note ***The diagram below applies to clean water and water containing anti-freeze liquids.***

CR, CRI, CRN 1s to 20 and CR, CRN 32 to 150

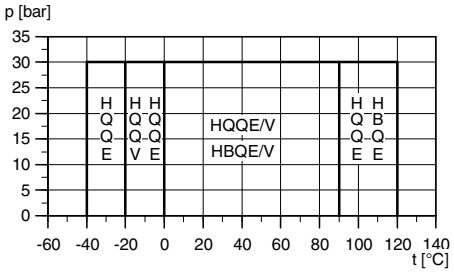


Fig. 3 Maximum permissible operating pressure and liquid temperature

Standard shaft seal	Motor [kW]	Max. temperature range [°C]
HQQE	0.37 - 45	-40 °C to +120 °C
HBQE	55 - 75	0 °C to +120 °C
HQQV	0.37 - 45	-20 °C to +90 °C
HBQV	55 - 75	0 °C to +90 °C

CRI and CRN pumps using a type H shaft seal with EPDM rubber parts, HxxE, can be cleaned in place (CIP) with liquids up to 150 °C for maximum 15 minutes.

Note ***The pumping of liquids above +120 °C may result in periodical noise and reduced pump life.***

CR, CRI, CRN pumps are not suitable for the pumping of liquids above 120 °C for long periods.

5.4 Minimum inlet pressure

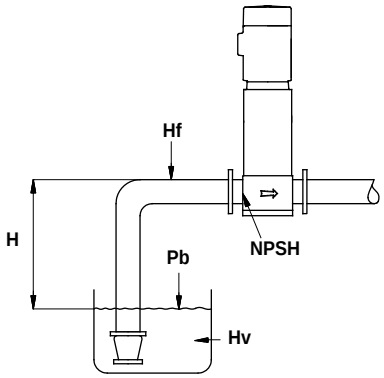


Fig. 4 Schematic view of open system with a CR pump

The maximum suction lift "H" in metres head can be calculated as follows:

$H = p_b \times 10.2 - NPSH - H_f - H_v - H_s$

p_b = Barometric pressure in bar.
(Barometric pressure can be set to 1 bar.)
In closed systems, p_b indicates the system pressure in bar.

NPSH = Net Positive Suction Head in metres head (to be read from the NPSH curve on page 13 at the highest flow the pump will be delivering).

H_f = Friction loss in suction pipe in metres head at the highest flow the pump will be delivering.

H_v = Vapour pressure in metres head, see fig. E on page 18.
t_m = liquid temperature.

H_s = Safety margin = minimum 0.5 metres head.

If the calculated "H" is positive, the pump can operate at a suction lift of maximum "H" metres head.

If the calculated "H" is negative, an inlet pressure of minimum "H" metres head is required. There must be a pressure equal to the calculated "H" during operation.

Example

p_b = 1 bar.
Pump type: CR 15, 50 Hz.
Flow rate: 15 m^3/h.
NPSH (from page 13): 1.1 metres head.
H_f = 3.0 metres head.
Liquid temperature: +60 °C.
H_v (from fig. E, page 18): 2.1 metres head.

$H = p_b \times 10.2 - NPSH - H_f - H_v - H_s$ [metres head].

$H = 1 \times 10.2 - 1.1 - 3.0 - 2.1 - 0.5 =$ 3.5 metres head.

This means that the pump can operate at a suction lift of maximum 3.5 metres head.

Pressure calculated in bar: 3.5 x 0.0981 = 0.343 bar.
Pressure calculated in kPa: 3.5 x 9.81 = 34.3 kPa.

5.5 Maximum inlet pressure

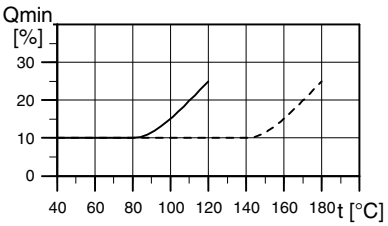
The table on page 16 states the maximum permissible inlet pressure. However, the actual inlet pressure + maximum pump pressure (at no flow) must always be lower than the values stated in fig. A, page 15.

The pumps are pressure-tested at a pressure of 1.5 times the values stated in fig. B, page 16.

5.6 Minimum flow rate

Due to the risk of overheating, do not use the pump at flows below the minimum flow rate.
The curves below show the minimum flow rate as a percentage of the nominal flow rate in relation to the liquid temperature.

- - - - = air-cooled top.



TM01 2816 2302

Fig. 5 Minimum flow rate

Caution ***The pump must not run against a closed discharge valve.***

5.7 Electrical data

See motor nameplate.

5.8 Frequency of starts and stops

Motor size [kW]	Maximum number of starts per hour
≤ 3	200
4-30	100
37-55	75
75	50

5.9 Dimensions and weights

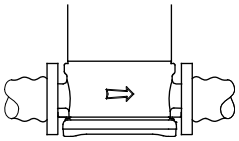
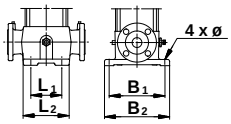
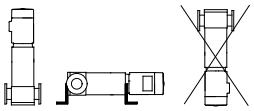
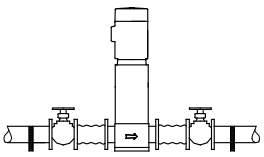
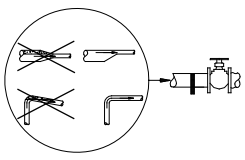
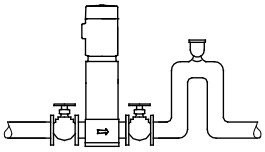
Dimensions: See fig. C, page 17.
Weights: See label on the packing.

5.10 Sound pressure level

See fig. D, page 18.

6. Installation

The pump must be secured to a horizontal, plane and solid foundation by bolts through the holes in the base plate.
When installing the pump, follow the procedure below in order to avoid damaging the pump.

Step	Action
1  TM02 0013 3800	Arrows on the pump base show the direction of flow of liquid through the pump.
2  TM00 2256 3393	This information is stated on page 17: • port-to-port lengths • dimensions of the base • pipework connections • diameter and position of foundation bolts.
3  TM01 1241 4097	The pump can be installed vertically or horizontally (CR, CRN 120 and 150, 75 kW, only vertically). However, the motor must neither fall below the horizontal plane nor be installed upside down. Ensure that an adequate supply of cool air reaches the motor cooling fan. Motors above 4 kW must be supported.
4  TM02 0116 3800	To minimize possible noise from the pump, we advise you to fit expansion joints on either side of the pump. The foundation/installation must be carried out as described in section *6.1*. Fit isolating valves on either side of the pump to avoid draining the syestem if the pump needs to be removed for cleaning, repair or replacement. Always protect the pump against backflow by means of a non-return valve (foot valve).
5  TM02 0114 3800	Install the pipes so that air locks do not occur, especially on the suction side of the pump.
6  TM02 0115 3800	Fit a vacuum valve close to the pump if the installation has one of these characteristics: • The discharge pipe slopes downwards away from the pump. • There is a risk of siphon effect. • Protection against backflow of unclean liquids is needed.

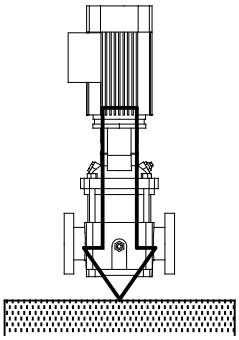
6.1 Foundation

Note

The foundation/installation must be carried out in accordance with the following instructions. Non-compliance may result in functional faults which will damage the pump components.

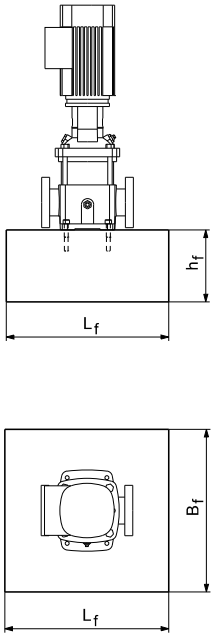
Grundfos recommends to install the pump on a concrete foundation which is heavy enough to provide permanent and rigid support to the entire pump. The foundation must be capable of absorbing any vibration, normal strain or shock. The concrete foundation must have an absolutely level and even surface.

Place the pump on the foundation, and fasten it. The base plate must be supported on the whole area. See fig. 6.



TM04 0342 0608

Fig. 6 Correct installation



TM04 0343 0608

Fig. 7 Foundation

The recommended length and width are shown in fig. 7. Note that the length and width of the foundation for pumps with motor size ≤ 30 kW must be 200 mm larger than the base plate.

For pumps with motor size ≥ 37 kW, the length and width must always be 1.5 x 1.5 (L_f x W_f) metres.

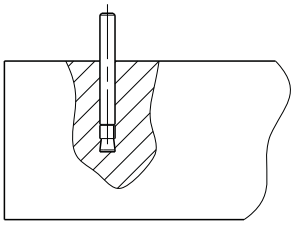
The mass of the foundation must be at least 1.5 times the total mass of the pump. The minimum height of the foundation (h_f) can then be calculated:

$$h_f = \frac{m_{pump} \times 1.5}{L_f \times B_f \times \delta_{concrete}}$$

The density (δ) of concrete is usually taken as 2,200 kg/m^3.

In installations where noise-less operation is particularly important, a foundation with a mass up to 5 times that of the pump is recommended.

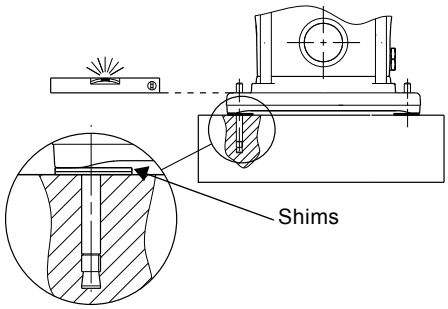
The foundation must be provided with bolts for fixing the base plate. See fig. 8.



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Fig. 8 Bolt in foundation

When the foundation bolts are in position, the pump can be placed on the foundation. The base plate can now be aligned using shims, if necessary, so that it is completely horizontal. See fig. 9.



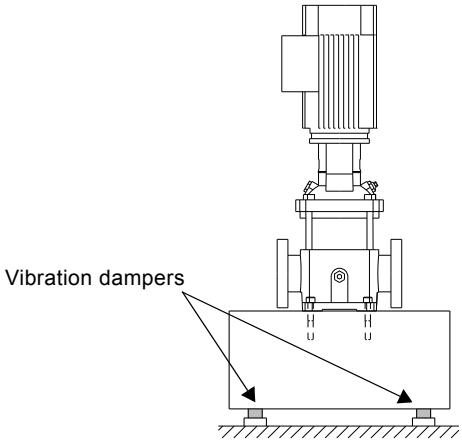
TM04 0362 0608

Fig. 9 Alignment with shims

6.2 Vibration dampening

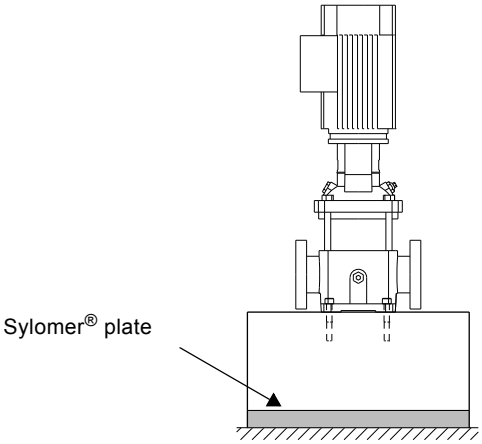
If vibration dampers are used, they must be installed under the foundation. Pumps with motor size ≤ 30 kW can use vibration dampers as shown in fig. 10.

For pumps with motor sizes ≥ 37 kW, use a Sylomer® plate as shown in fig. 11.



TM04 1691 1008

Fig. 10 Pump on vibration dampers



TM04 1692 1008

Fig. 11 Pump on Sylomer® plate

6.3 Outdoor installation

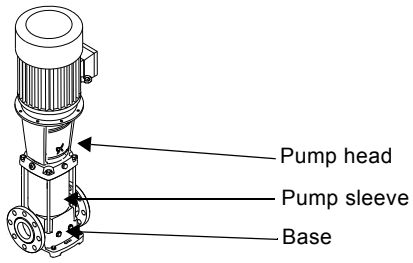
When installed outdoors, it is recommended to provide the motor with a rain cover. We also recommend to open one of the drain holes in the motor flange.

6.4 Hot surfaces

Warning

When pumping hot liquids, care should be taken to ensure that persons cannot accidentally come into contact with hot surfaces.

Figure 12 shows which pump parts get as hot as the pumped liquid.



TM04 0361 0608

Fig. 12 Hot surfaces on a CR, CRI, CRN pump

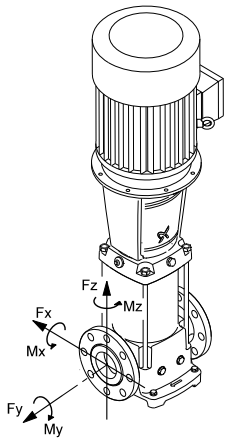
6.5 Torques

The table shows the recommended torques for bolts in base and flanges.

CR, CRI, CRN	Base [Nm]	Flange [Nm]
1s to 5	40	50-60
10 to 20	50	60-70
32 to 150	70	70-80

6.6 Flange forces and torques

If not all loads reach the maximum permissible value stated in the tables below, one of these value may exceed the normal limit. Contact Grundfos for further information.



TM04 0346 0608

Fig. 13 Flange forces and torques

Y-direction: Direction of chamber stack

Z-direction: 90 ° from inlet/outlet

X-direction: Inlet/outlet

Forces

Flange, DN [mm]	CR, CRI, CRN	Force, Y-direction [N]	Force, Z-direction [N]	Force, X-direction [N]
25/32	1s to 5	760	1170	780
40	10	1000	1250	1100
50	15 and 20	1350	1650	1500
65	32	1700	2075	1875
80	45	2050	2500	2250
100	64 and 90	2700	3350	3000
125/150	120 and 150	2700	3350	3000

Torques

Flange, DN [mm]	CR, CRI, CRN	Torque, Y-direction [Nm]	Torque, Z-direction [Nm]	Torque, X-direction [Nm]
25/32	1s to 5	820	970	1220
40	10	900	1050	1300
50	15 and 20	1000	1150	1400
65	32	1075	1225	1500
80	45	1150	1300	1600
100	64 and 90	1250	1450	1750
125/150	120 and 150	1250	1450	1750

7. Electrical connection

The electrical connection should be carried out by an authorised electrician in accordance with local regulations.

Warning

Before removing the terminal box cover and before removing/dismantling the pump, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

The pump must be connected to a main switch.

Caution ***The user is to consider whether it is necessary to install an emergency stop switch.***

The operating voltage and frequency are marked on the motor nameplate. Make sure that the motor is suitable for the power supply on which it will be used and the motor terminal connection is correct. You will find a wiring diagram in the terminal box.

7.1 Cable entry/screwed connection

All motors are supplied without screwed cable entries. The table below shows the numbers and sizes of cable entry holes of the terminal box (standard EN 50262).

Motor [kW]	Number and size of cable entries	Description
0.25 - 0.55	2 x M20 x 1.5	The holes have precast threads and are closed with knock-out cable entries
0.75 - 3.0	2 x M20	The holes are closed with knock-out cable entries
4.0 - 7.5	4 x M25	The holes are closed with knock-out cable entries
11 - 22	2 x M20 4 x M40	The holes are closed with knock-out cable entries
30 - 45	2 x M50 x 1.5	Blanking plug
55 - 75	2 x M63 x 1.5	Blanking plug

7.2 Three-phase connection

	Mains supply [V]		
	Delta connection		Star connection
50 Hz	220-240	/	380-415
	380-415	/	660-690
60 Hz	220-277	/	380-480 1)
	380-480	/	660-690

1) 60 Hz motors, 0.37 - 1.1 kW: 220-277/380-440 V.

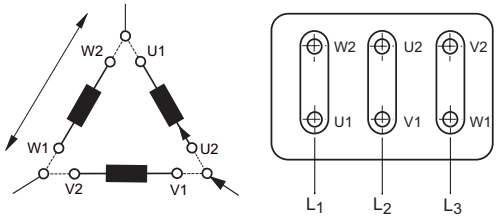


Fig. 14 Delta connection

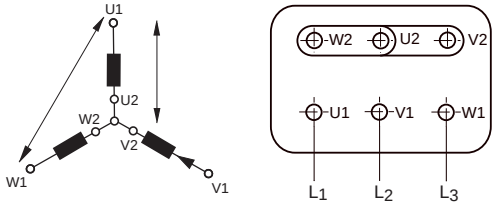


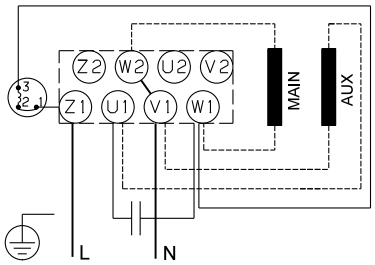
Fig. 15 Star connection

If the motor is provided with PTC sensors or PTO contacts, the connection must be in accordance with the wiring diagram in the terminal box.

Three-phase motors must be connected to a motor-protective circuit breaker.

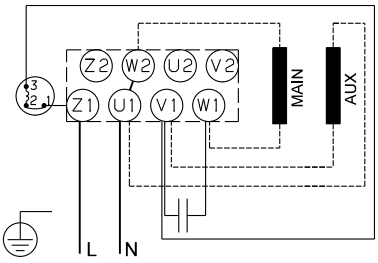
7.3 Single-phase connection

	Mains supply [V]		
	"Low voltage"		"High voltage"
50 Hz	220-230	/	240



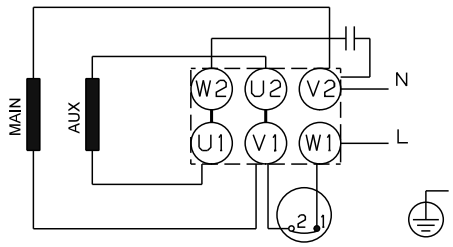
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Fig. 16 Connection, "low voltage", 0.37 - 0.75 kW



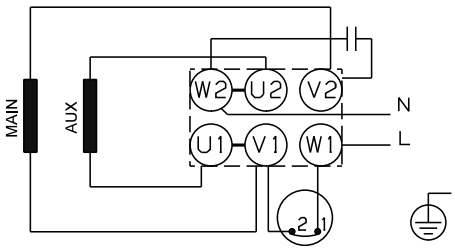
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Fig. 17 Connection, "high voltage", 0.37 - 0.75 kW



TM04 0345 0608

Fig. 18 Connection, "low voltage", 1.1 - 2.2 kW



TM04 0344 0608

Fig. 19 Connection, "high voltage", 1.1 - 2.2 kW

Single-phase Grundfos motors incorporate a thermal switch and require no additional motor protection.

7.4 Terminal box position

The terminal box can be turned to four positions, in 90 ° steps. Follow this procedure:

1. If necessary, remove the coupling guards. Do not remove the coupling.
2. Remove the bolts securing the motor to the pump.
3. Turn the motor to the required position.
4. Replace and tighten the bolts.
5. Replace the coupling guards.

Carry out the electrical connection as shown in the diagram inside the terminal box cover.

7.5 Frequency converter operation

Motors supplied by Grundfos

All three-phase motors supplied by Grundfos can be connected to a frequency converter. The frequency converter must be set to variable torque.

Depending on the frequency converter type, this may cause increased acoustic noise from the motor. Furthermore, it may cause the motor to be exposed to detrimental voltage peaks.

Caution

Grundfos motors, types MG 71 and MG 80, for supply voltages up to and including 440 V without phase insulation (see motor nameplate), must be protected against voltage peaks above 650 V (peak value) between the supply terminals.

We recommend to protect all other motors against voltage peaks higher than 1200 V by 2000 V/µsec.

The above disturbances, i.e. both increased acoustic noise and detrimental voltage peaks, can be eliminated by fitting an LC filter between the frequency converter and the motor.

For further information, please contact the frequency converter or motor supplier.

Other motor makes than those supplied by Grundfos

Please contact Grundfos or the motor manufacturer.

8. Start-up

Caution

Do not start the pump until it has been filled with liquid and vented. If the pump runs dry, the pump bearings and the shaft seal may be damaged.

Warning

Pay attention to the direction of the vent hole and take care to ensure that the escaping water does not cause injury to persons or damage to the motor or other components.
In hot-water installations, pay special attention to the risk of injury caused by scalding hot water.

Follow the instructions on page 28.

CR, CRI, CRN 1s to 5

For these pumps, we advise you to open the bypass valve during start-up, see fig. 20 for bypass valve location. The bypass valve connects the suction and discharge sides of the pump, thus making the filling procedure easier. Close the bypass valve again when the operation is stable.

When pumping liquids containing air, we advise you to leave the bypass valve open if the operating pressure is lower than 6 bar.

Close the bypass valve if the operating pressure constantly exceeds 6 bar. Otherwise the material at the opening will be worn because of the high liquid velocity.

8.1 Shaft seal run-in

The seal faces are lubricated by the pumped liquid, meaning that there may be a certain amount of leakage from the shaft seal.

When the pump is started up for the first time, or when a new shaft seal is installed, a certain run-in period is required before the leakage is reduced to an acceptable level. The time required for this depends on the operating conditions, i.e. every time the operating conditions change, a new run-in period will be started.

Under normal conditions, the leaking liquid will evaporate. As a result, no leakage will be detected.

However, liquids such as kerosene will not evaporate.
The leakage may therefore be seen as a shaft seal failure.

9. Maintenance



Warning

Before starting work on the pump, make sure that all power supplies to the pump have been switched off and that they cannot be accidentally switched on.

Pump bearings and shaft seal are maintenance-free.

Motor bearings

Motors not fitted with grease nipples are maintenance-free.

Motors fitted with grease nipples should be lubricated with a high-temperature, lithium-based grease. See the instructions on the fan cover.

In the case of seasonal operation (motor is idle for more than 6 months of the year), we recommend you to grease the motor when the pump is taken out of operation.

Depending on the ambient temperature, the motor bearings must be replaced or lubricated according to the table below. The table applies to 2-pole motors. The number of operating hours stated for bearing replacement are guidelines only.

Motor size [kW]	Bearing replacement interval [operating hours]				
	40 °C	45 °C	50 °C	55 °C	60 °C
0.37 - 0.75	18000	-	-	-	-
1.1 - 7.5	20000	15500	12500	10000	7500

Motor size [kW]	Lubrication interval [operating hours]				
	40 °C	45 °C	50 °C	55 °C	60 °C
11 - 18.5	4500	3400	2500	1700	1100
22	4000	3100	2300	1500	1000
30 - 55	4000	3000	2000	1500	-
75	2000	1500	1000	500	-

Intervals for 4-pole motors are twice as long as those for 2-pole motors.

If the ambient temperature is lower than 40 °C, bearings must be replaced/lubricated at the intervals mentioned under 40 °C.

10. Frost protection

Pumps which are not being used during periods of frost should be drained to avoid damage.

Drain the pump by loosening the vent screw in the pump head and by removing the drain plug from the base.



Warning

Pay attention to the direction of the vent hole and take care to ensure that the escaping water does not cause injury to persons or damage to the motor or other components.
In hot-water installations, pay special attention to the risk of injury caused by scalding hot water.

Do not tighten the vent screw and replace the drain plug until the pump is to be used again.

CR, CRI, CRN 1s to 5

Before replacing the drain plug in the base, screw the bypass valve out against the stop. See fig. 20.

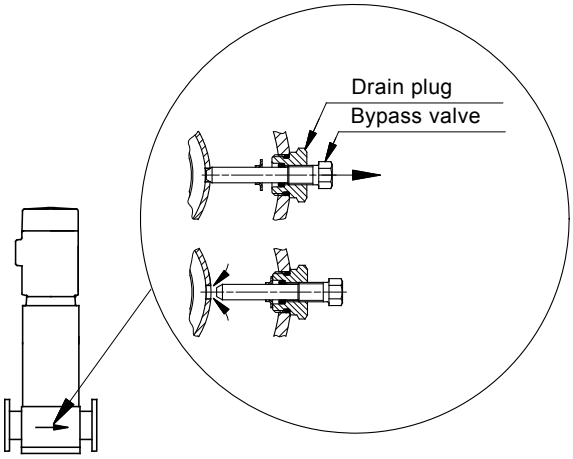


Fig. 20 Location of drain plug and bypass valve

Fit the drain plug by tightening the large union nut followed by the bypass valve.

11. Service

It is advisable to repair pumps with motors of 7.5 kW and up at pump site. Necessary lifting equipment must be available.

Note

If a pump has been used for a liquid which is toxic or injurious to health, the pump will be classified as contaminated.

If Grundfos is requested to service the pump, Grundfos must be contacted with details about the pumped liquid, etc. *before* the pump is returned for service. Otherwise Grundfos can refuse to accept the pump for service.

Possible costs of returning the pump are to be paid by the customer.

However, any application for service (no matter to whom it may be made) must include details about the pumped liquid if the pump has been used for liquids which are toxic or injurious to health.

11.1 Service kits and manuals

Service kits and manuals for CR, CRI and CRN, see www.grundfos.com (WebCAPS), WinCAPS or Service Kit Catalogue.

12. Fault finding



Warning

Before removing the terminal box cover and before removing/dismantling the pump, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

Fault	Cause	Remedy
1. Motor does not run when started.	a) Supply failure.	Connect the power supply.
	b) Fuses are blown.	Replace fuses.
	c) Motor-protective circuit breaker has tripped out.	Reactivate the motor-protective circuit breaker.
	d) Thermal protection has tripped out.	Reactivate the thermal protection.
	e) Main contacts in motor-protective circuit breaker are not making contact or the coil is faulty.	Replace contacts or magnetic coil.
	f) Control circuit is defective.	Repair the control circuit.
	g) Motor is defective.	Replace the motor.
2. Motor-protective circuit breaker trips out immediately when supply is switched on.	a) One fuse/automatic circuit breaker is blown.	Replace the fuse/cut in the circuit breaker.
	b) Contacts in motor-protective circuit breaker are faulty.	Replace motor-protective circuit breaker contacts.
	c) Cable connection is loose or faulty.	Fasten or replace the cable connection.
	d) Motor winding is defective.	Replace the motor.
	e) Pump mechanically blocked.	Remove the mechanical blocking of the pump.
	f) Motor-protective circuit breaker setting is too low.	Set the motor-protective circuit breaker correctly.
3. Motor-protective circuit breaker trips out occasionally.	a) Motor-protective circuit breaker setting is too low.	Set the motor-protective circuit breaker correctly.
	b) Low voltage at peak times.	Check the power supply.
4. Motor-protective circuit breaker has not tripped out but the pump does not run.	a) Check 1 a), b), d), e) and f).	
5. Pump performance not constant.	a) Pump inlet pressure is too low (cavitation).	Check the suction conditions.
	b) Suction pipe/pump partly blocked by impurities.	Clean the suction pipe/pump.
	c) Pump draws in air.	Check the suction conditions.
6. Pump runs but gives no water.	a) Suction pipe/pump blocked by impurities.	Clean the suction pipe/pump.
	b) Foot or non-return valve blocked in closed position.	Repair the foot or non-return valve.
	c) Leakage in suction pipe.	Repair the suction pipe.
	d) Air in suction pipe or pump.	Check the suction conditions.
	e) Motor runs in the wrong direction of rotation.	Change the direction of rotation of the motor.
7. Pump runs backwards when switched off.	a) Leakage in suction pipe.	Repair the suction pipe.
	b) Foot or non-return valve defective.	Repair the foot or non-return valve.
8. Leakage in shaft seal.	a) Shaft seal is defective.	Replace the shaft seal.
9. Noise.	a) Cavitation.	Check the suction conditions.
	b) Pump does not rotate freely (frictional resistance) because of incorrect pump shaft position.	Adjust the pump shaft. Follow the procedure in fig. F, G or H at the end of these instructions.
	c) Frequency converter operation.	See section *7.5 Frequency converter operation*.

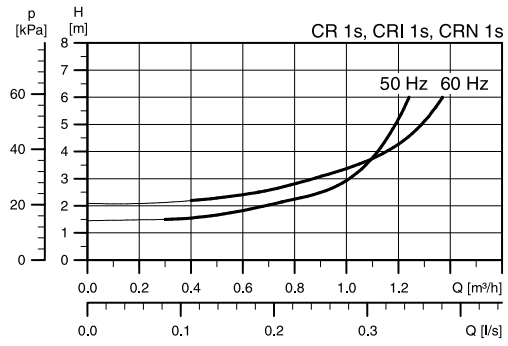
13. Disposal

This product or parts of it must be disposed of in an environmentally sound way:

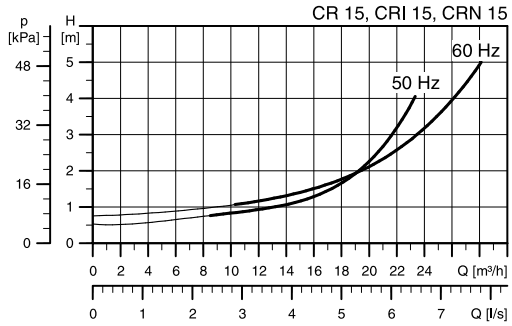
1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

Subject to alterations.

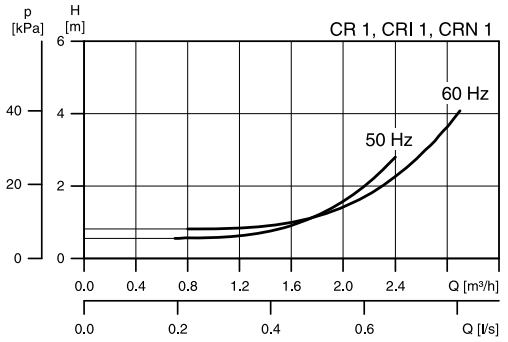
NPSH



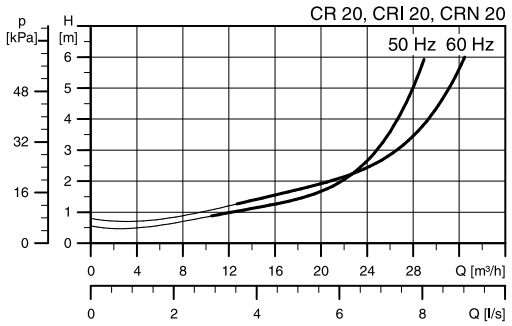
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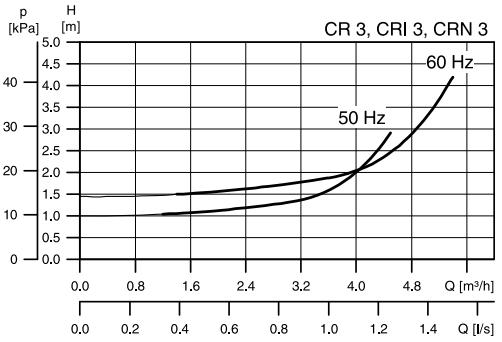
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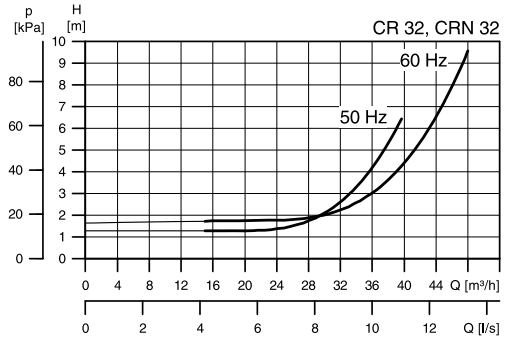
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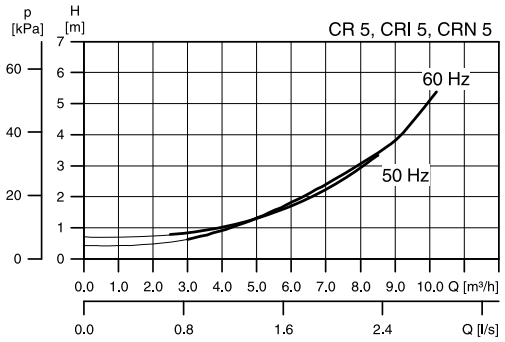
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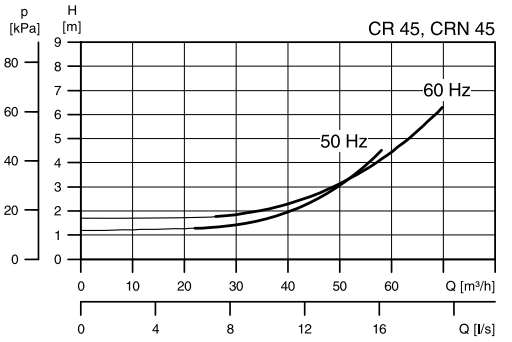
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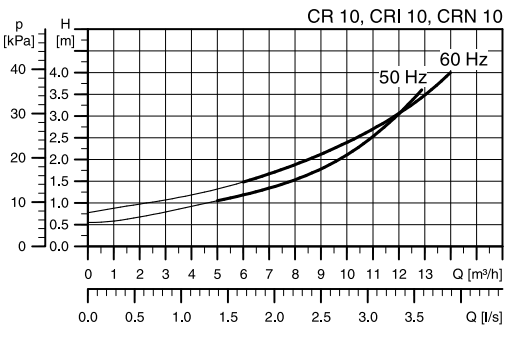
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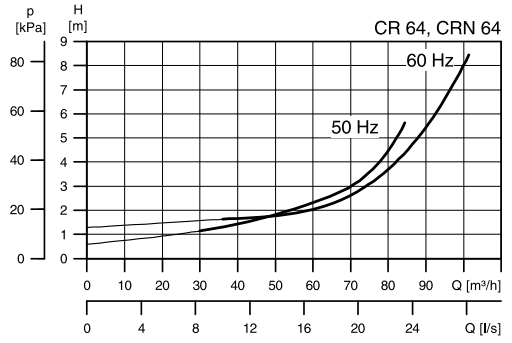
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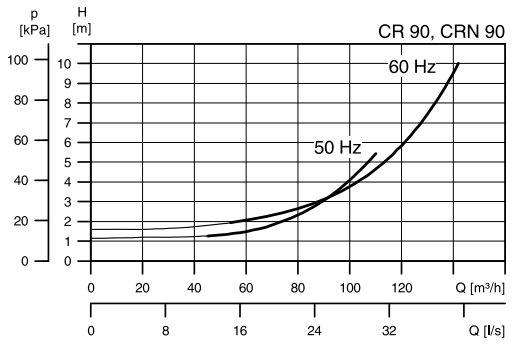
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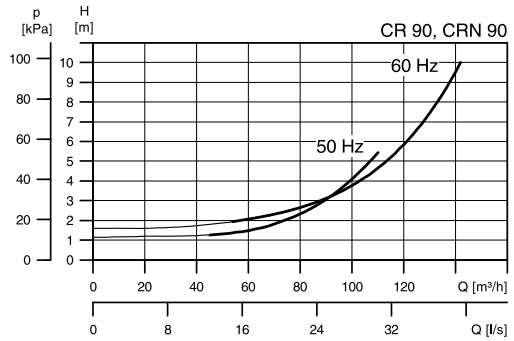
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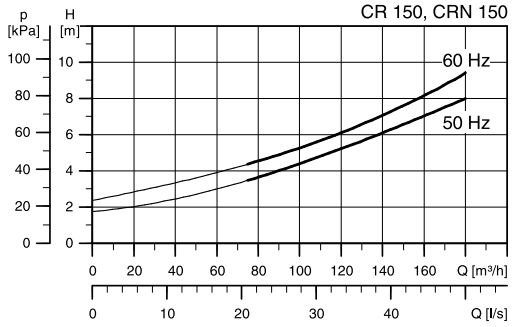
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TM01 1937 0899



TM03 8764 2507



TM03 8765 2507

Fig. A

Maximum permissible operating pressure / liquid temperature range

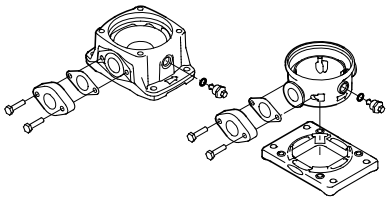
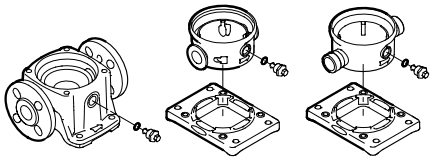
			Oval		PJE - CLAMP - CA - UNION DIN - FGJ	
						
			Operating pressure	**Liquid temperature range**	**Operating pressure**	**Liquid temperature range**
	CR, CRI, CRN 1s		16 bar	-20 °C to +120 °C	25 bar	-20 °C to +120 °C
	CR, CRI, CRN 1		16 bar	-20 °C to +120 °C	25 bar	-20 °C to +120 °C
	CR, CRI, CRN 3		16 bar	-20 °C to +120 °C	25 bar	-20 °C to +120 °C
	CR, CRI, CRN 5		16 bar	-20 °C to +120 °C	25 bar	-20 °C to +120 °C
	CR, CRI 10-1	→ 10-16	16 bar	-20 °C to +120 °C	16 bar	-20 °C to +120 °C
	CR, CRI 10-17	→ 10-22	-	-	25 bar	-20 °C to +120 °C
	CRN 10		-	-	25 bar	-20 °C to +120 °C
	CR, CRI 15-1	→ 15-7	10 bar	-20 °C to +120 °C	-	-
	CR, CRI 15-1	→ 15-10	-	-	16 bar	-20 °C to +120 °C
	CR, CRI 15-12	→ 15-17	-	-	25 bar	-20 °C to +120 °C
	CRN 15		-	-	25 bar	-20 °C to +120 °C
	CR, CRI 20-1	→ 20-7	10 bar	-20 °C to +120 °C	-	-
	CR, CRI 20-1	→ 20-10	-	-	16 bar	-20 °C to +120 °C
50 Hz	CR, CRI 20-12	→ 20-17	-	-	25 bar	-20 °C to +120 °C
	CRN 20		-	-	25 bar	-20 °C to +120 °C
	CR, CRN 32-1-1	→ 32-7	-	-	16 bar	-30 °C to +120 °C
	CR, CRN 32-8-2	→ 32-14	-	-	30 bar	-30 °C to +120 °C
	CR, CRN 45-1-1	→ 45-5	-	-	16 bar	-30 °C to +120 °C
	CR, CRN 45-6-2	→ 45-11	-	-	30 bar	-30 °C to +120 °C
	CR, CRN 45-12-2	→ 45-13-2	-	-	33 bar	-30 °C to +120 °C
	CR, CRN 64-1-1	→ 64-5	-	-	16 bar	-30 °C to +120 °C
	CR, CRN 64-6-2	→ 64-8-1	-	-	30 bar	-30 °C to +120 °C
	CR, CRN 90-1-1	→ 90-4	-	-	16 bar	-30 °C to +120 °C
	CR, CRN 90-5-2	→ 90-6	-	-	30 bar	-30 °C to +120 °C
	CR, CRN 120		-	-	30 bar	-30 °C to +120 °C
	CR, CRN 150		-	-	30 bar	-30 °C to +120 °C
	CR, CRI, CRN 1s		16 bar	-20 °C to +120 °C	25 bar	-20 °C to +120 °C
	CR, CRI, CRN 1		16 bar	-20 °C to +120 °C	25 bar	-20 °C to +120 °C
	CR, CRI, CRN 3		16 bar	-20 °C to +120 °C	25 bar	-20 °C to +120 °C
	CR, CRI, CRN 5		16 bar	-20 °C to +120 °C	25 bar	-20 °C to +120 °C
	CR, CRI 10-1	→ 10-10	16 bar	-20 °C to +120 °C	16 bar	-20 °C to +120 °C
	CR, CRI 10-12	→ 10-17	-	-	25 bar	-20 °C to +120 °C
	CRN 10		16 bar	-20 °C to +120 °C	25 bar	-20 °C to +120 °C
	CR, CRI 15-1	→ 15-5	10 bar	-20 °C to +120 °C	-	-
	CR, CRI 15-1	→ 15-8	-	-	16 bar	-20 °C to +120 °C
	CR, CRI 15-9	→ 15-12	-	-	25 bar	-20 °C to +120 °C
	CRN 15		10 bar	-20 °C to +120 °C	25 bar	-20 °C to +120 °C
	CR, CRI 20-1	→ 20-5	10 bar	-20 °C to +120 °C	-	-
60 Hz	CR, CRI 20-1	→ 20-7	-	-	16 bar	-20 °C to +120 °C
	CR, CRI 20-8	→ 20-10	-	-	25 bar	-20 °C to +120 °C
	CRN 20		10 bar	-20 °C to +120 °C	25 bar	-20 °C to +120 °C
	CR, CRN 32-1-1	→ 32-5	-	-	16 bar	-30 °C to +120 °C
	CR, CRN 32-6-2	→ 32-10-2	-	-	30 bar	-30 °C to +120 °C
	CR, CRN 45-1-1	→ 45-4	-	-	16 bar	-30 °C to +120 °C
	CR, CRN 45-5-2	→ 45-7	-	-	30 bar	-30 °C to +120 °C
	CR, CRN 64-1-1	→ 64-3	-	-	16 bar	-30 °C to +120 °C
	CR, CRN 64-4-2	→ 64-5-2	-	-	30 bar	-30 °C to +120 °C
	CR, CRN 90-1-1	→ 90-3	-	-	16 bar	-30 °C to +120 °C
	CR, CRN 90-4-2		-	-	30 bar	-30 °C to +120 °C
	CR, CRN 120		-	-	30 bar	-30 °C to +120 °C
	CR, CRN 150		-	-	30 bar	-30 °C to +120 °C

Fig. B

Maximum inlet pressure for CR, CRI and CRN

50 Hz		60 Hz	
CR, CRI, CRN 1s			
CR, CRI, CRN 1s-2 → CR, CRI, CRN 1s-36	10 bar	CR, CRI, CRN 1s-2 → CR, CRI, CRN 1s-27	10 bar
CR, CRI, CRN 1			
CR, CRI, CRN 1-2 → CR, CRI, CRN 1-36	10 bar	CR, CRI, CRN 1-2 → CR, CRI, CRN 1-25 CR, CRI, CRN 1-27	10 bar 15 bar
CR, CRI, CRN 3			
CR, CRI, CRN 3-2 → CR, CRI, CRN 3-29 CR, CRI, CRN 3-31 → CR, CRI, CRN 3-36	10 bar 15 bar	CR, CRI, CRN 3-2 → CR, CRI, CRN 3-15 CR, CRI, CRN 3-17 → CR, CRI, CRN 3-25	10 bar 15 bar
CR, CRI, CRN 5			
CR, CRI, CRN 5-2 → CR, CRI, CRN 5-16 CR, CRI, CRN 5-18 → CR, CRI, CRN 5-36	10 bar 15 bar	CR, CRI, CRN 5-2 → CR, CRI, CRN 5-9 CR, CRI, CRN 5-10 → CR, CRI, CRN 5-24	10 bar 15 bar
CR, CRI, CRN 10			
CR, CRI, CRN 10-1 → CR, CRI, CRN 10-6 CR, CRI, CRN 10-7 → CR, CRI, CRN 10-22	8 bar 10 bar	CR, CRI, CRN 10-1 → CR, CRI, CRN 10-5 CR, CRI, CRN 10-6 → CR, CRI, CRN 10-17	8 bar 10 bar
CR, CRI, CRN 15			
CR, CRI, CRN 15-1 → CR, CRI, CRN 15-3 CR, CRI, CRN 15-4 → CR, CRI, CRN 15-17	8 bar 10 bar	CR, CRI, CRN 15-1 → CR, CRI, CRN 15-2 CR, CRI, CRN 15-3 → CR, CRI, CRN 15-12	8 bar 10 bar
CR, CRI, CRN 20			
CR, CRI, CRN 20-1 → CR, CRI, CRN 20-3 CR, CRI, CRN 20-4 → CR, CRI, CRN 20-17	8 bar 10 bar	CR, CRI, CRN 20-1 CR, CRI, CRN 20-2 → CR, CRI, CRN 20-10	8 bar 10 bar
CR, CRN 32			
CR, CRN 32-1-1 → CR, CRN 32-4 CR, CRN 32-5-2 → CR, CRN 32-10 CR, CRN 32-11-2 → CR, CRN 32-14	4 bar 10 bar 15 bar	CR, CRN 32-1-1 → CR, CRN 32-2 CR, CRN 32-3-2 → CR, CRN 32-6 CR, CRN 32-7-2 → CR, CRN 32-10-2	4 bar 10 bar 15 bar
CR, CRN 45			
CR, CRN 45-1-1 → CR, CRN 45-2 CR, CRN 45-3-2 → CR, CRN 45-5 CR, CRN 45-6-2 → CR, CRN 45-13-2	4 bar 10 bar 15 bar	CR, CRN 45-1-1 → CR, CRN 45-1 CR, CRN 45-2-2 → CR, CRN 45-3 CR, CRN 45-4-2 → CR, CRN 45-7	4 bar 10 bar 15 bar
CR, CRN 64			
CR, CRN 64-1-1 → CR, CRN 64-2-2 CR, CRN 64-2-1 → CR, CRN 64-4-2 CR, CRN 64-4-1 → CR, CRN 64-8-1	4 bar 10 bar 15 bar	CR, CRN 64-1-1 CR, CRN 64-1 → CR, CRN 64-2-1 CR, CRN 64-2 → CR, CRN 64-5-2	4 bar 10 bar 15 bar
CR, CRN 90			
CR, CRN 90-1-1 → CR, CRN 90-1 CR, CRN 90-2-2 → CR, CRN 90-3-2 CR, CRN 90-3 → CR, CRN 90-6	4 bar 10 bar 15 bar	CR, CRN 90-1-1 → CR, CRN 90-2-2 CR, CRN 90-2-1 → CR, CRN 90-4-2	10 bar 15 bar
CR, CRN 120			
CR, CRN 120-1 → CR, CRN 120-2-1 CR, CRN 120-2 → CR, CRN 120-5-1 CR, CRN 120-6-1 → CR, CRN 120-7	10 bar 15 bar 20 bar	CR, CRN 120-1 CR, CRN 120-2-2 → CR, CRN 120-3 CR, CRN 120-4-1 → CR, CRN 120-5-2	10 bar 15 bar 20 bar
CR, CRN 150			
CR, CRN 150-1-1 → CR, CRN 150-1 CR, CRN 150-2-1 → CR, CRN 150-4-1 CR, CRN 150-5-2 → CR, CRN 150-6	10 bar 15 bar 20 bar	CR, CRN 150-1-1 CR, CRN 150-1 → CR, CRN 150-2 CR, CRN 150-3-2 → CR, CRN 150-4-2	10 bar 15 bar 20 bar

Fig. C

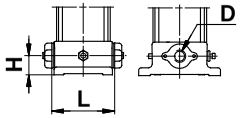
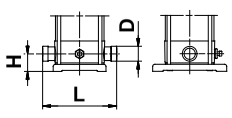
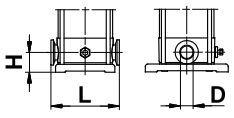
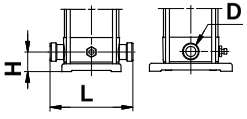
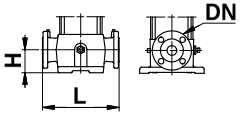
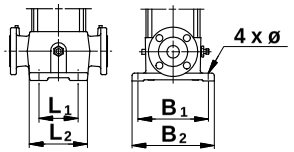
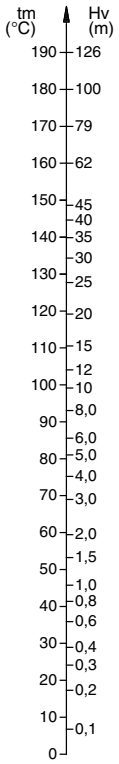
Pump Type	Oval			PJE			CLAMP - FlexiClamp			UNION			DIN - FGJ							
	 TM00 2251 3393			 TM00 2252 3393			 TM00 2253 3393			 TM00 2254 3393			 TM00 2255 3393			 TM00 2256 3393				
	L [mm]	H [mm]	D [Rp]	L [mm]	H [mm]	D [mm]	L [mm]	H [mm]	D [mm]	L [mm]	H [mm]	D [G]	L [mm]	H [mm]	DN	L_1 [mm]	L_2 [mm]	B_1 [mm]	B_2 [mm]	Ø [mm]
CR 1s	160	50	1	-	-	-	-	-	-	-	-	-	250	75	25/32	100	145	180	220	13
CRI, CRN 1s	-	-	-	210	50	42.2	162	50	30	228	50	2	250	75	25/32	100	150	180	220	13
CR 1	160	50	1	-	-	-	-	-	-	-	-	-	250	75	25/32	100	145	180	220	13
CRI, CRN 1	-	-	-	210	50	42.2	162	50	30	228	50	2	250	75	25/32	100	150	180	220	13
CR 3	160	50	1	-	-	-	-	-	-	-	-	-	250	75	25/32	100	145	180	220	13
CRI, CRN 3	-	-	-	210	50	42.2	162	50	30	228	50	2	250	75	25/32	100	150	180	220	13
CR 5	160	50	1¼	-	-	-	-	-	-	-	-	-	250	75	25/32	100	145	180	220	13
CRI, CRN 5	-	-	-	210	50	42.2	162	50	30	228	50	2	250	75	25/32	100	150	180	220	13
CR 10	200	80	1½	-	-	-	-	-	-	-	-	-	280	80	40	130	178	215	256	13.5
CRI, CRN 10	-	-	-	261	80	60.1	202	80	50	-	-	-	280	80	40	130	200	215	248	13
CR 15	200	80	2	-	-	-	-	-	-	-	-	-	300	90	50	130	176	215	256	13.5
CRI, CRN 15	-	-	-	261	90	60.1	202	90	50	-	-	-	300	90	50	130	200	215	248	13
CR 20	200	80	2	-	-	-	-	-	-	-	-	-	300	90	50	130	176	215	256	13.5
CRI, CRN 20	-	-	-	261	90	60.1	202	90	50	-	-	-	300	90	50	130	200	215	248	13
CR 32	-	-	-	-	-	-	-	-	-	-	-	-	320	105	65	170	223	240	298	14
CRN 32	-	-	-	-	-	-	-	-	-	-	-	-	320	105	65	170	226	240	298	14
CR 45	-	-	-	-	-	-	-	-	-	-	-	-	365	140	80	190	248	266	331	14
CRN 45	-	-	-	-	-	-	-	-	-	-	-	-	365	140	80	190	251	266	331	14
CR 64	-	-	-	-	-	-	-	-	-	-	-	-	365	140	100	190	248	266	331	14
CRN 64	-	-	-	-	-	-	-	-	-	-	-	-	365	140	100	190	251	266	331	14
CR 90	-	-	-	-	-	-	-	-	-	-	-	-	380	140	100	199	261	280	348	14
CRN 90	-	-	-	-	-	-	-	-	-	-	-	-	380	140	100	199	261	280	348	14
CR 120	-	-	-	-	-	-	-	-	-	-	-	-	380	180	125	275	344	380	472	18
CRN 120	-	-	-	-	-	-	-	-	-	-	-	-	380	180	125	275	344	380	472	18
CR 150	-	-	-	-	-	-	-	-	-	-	-	-	380	180	125	275	344	380	472	18
CRN 150	-	-	-	-	-	-	-	-	-	-	-	-	380	180	125	275	344	380	472	18

Fig. D

Airborne noise emitted by pumps with motors fitted by Grundfos

Motor [kW]	50 Hz	60 Hz
	$\bar{L}_{pA}$ [dB(A)]	$\bar{L}_{pA}$ [dB(A)]
0.37	50	55
0.55	50	53
0.75	50	54
1.1	52	57
1.5	54	59
2.2	54	59
3.0	55	60
4.0	62	66
5.5	60	65
7.5	60	65
11	60	65
15	60	65
18.5	60	65
22	66	70
30	71	75
37	71	75
45	71	75
55	71	75
75	73	77

Fig. E

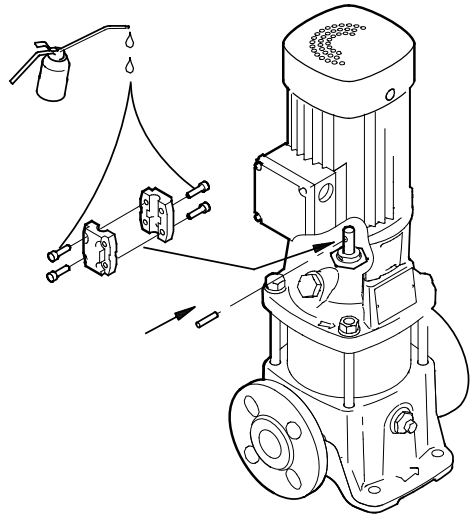


TM02 7445 3503

CR, CRI, CRN 1s, 1, 3 and 5

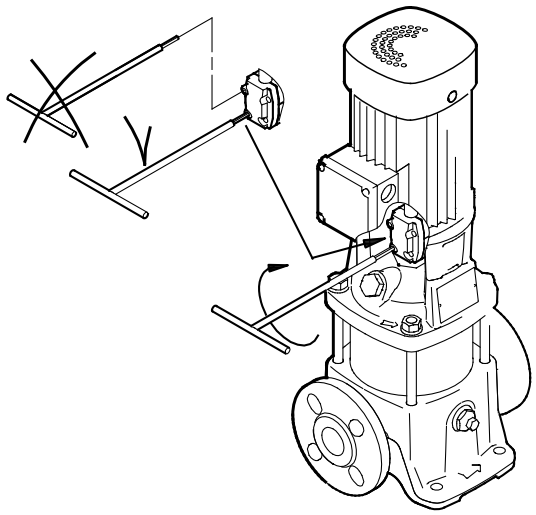
Fig. F

A



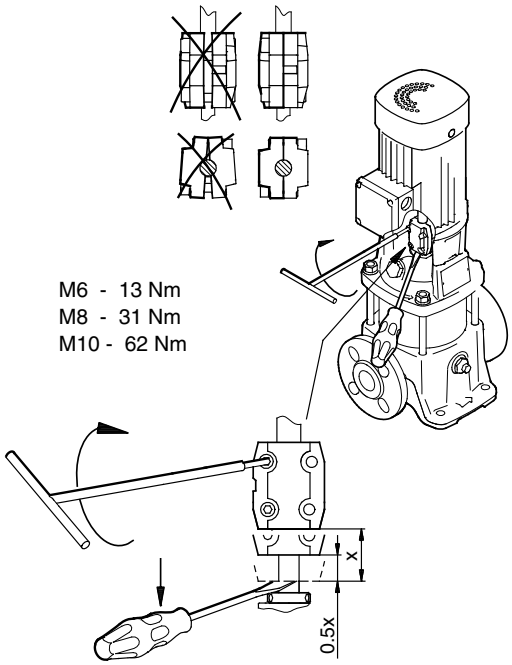
TM02 0459 4600

B



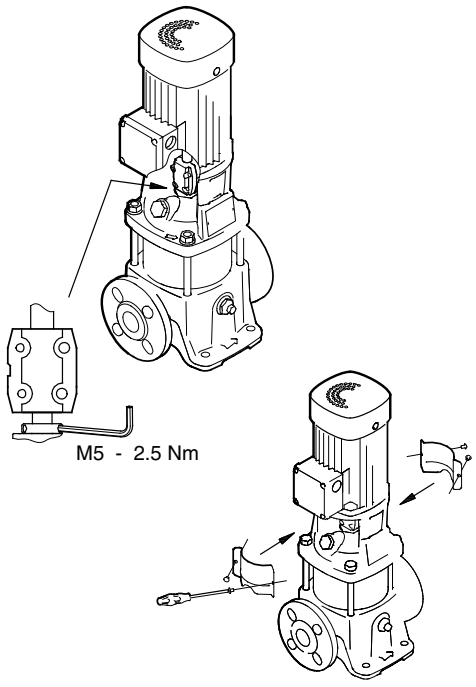
TM02 0460 4600

C



TM02 1051 0501

D

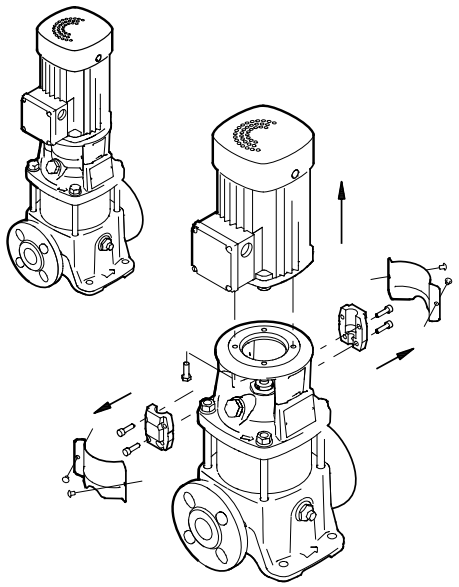


TM02 1052 0501

CR, CRI, CRN 10, 15 and 20

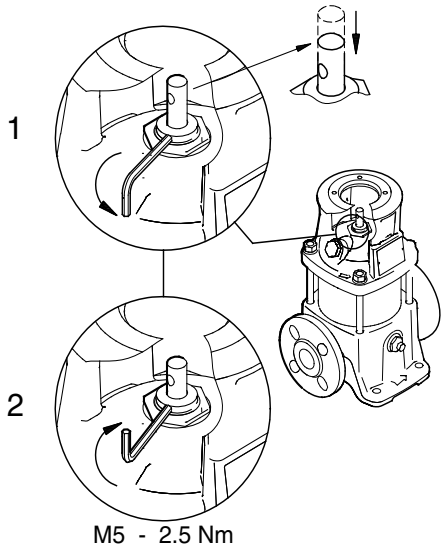
Fig. G

A



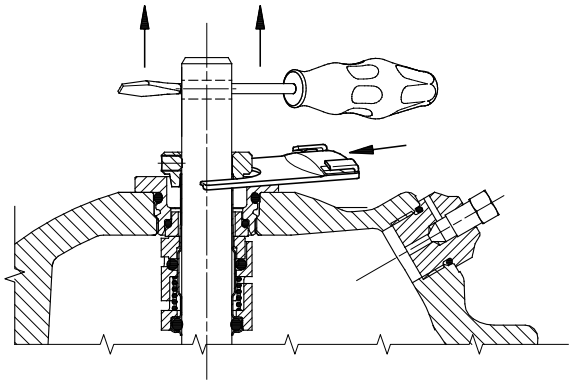
TM02 1045 0501

B



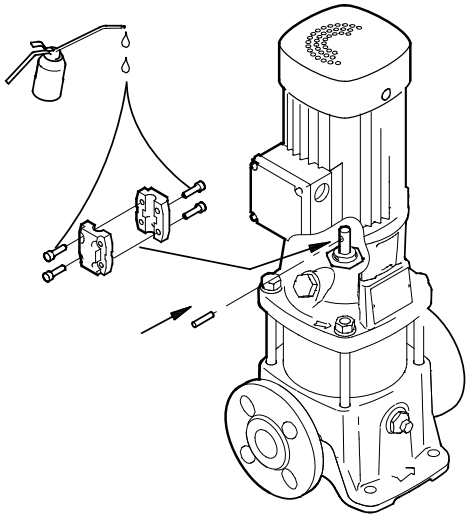
TM02 8500 0304

C



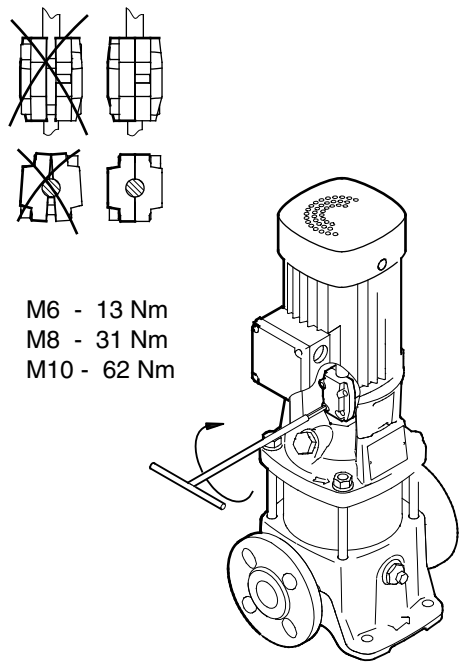
TM02 7923 4403

D



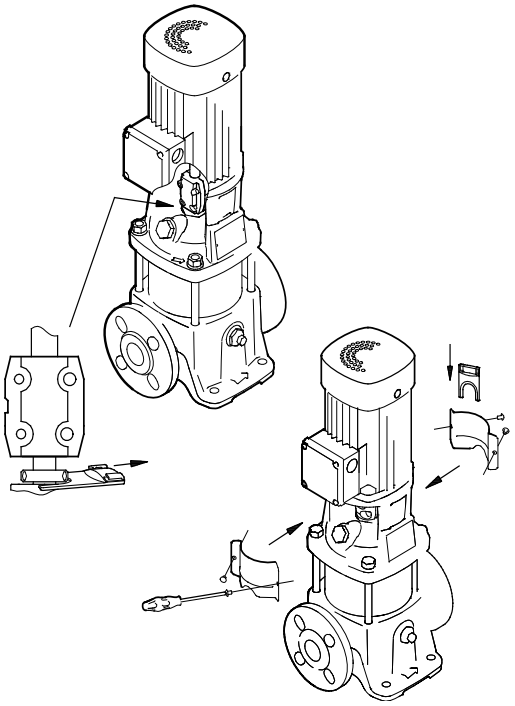
TM02 0459 4600

E



TM02 8542 0404

F

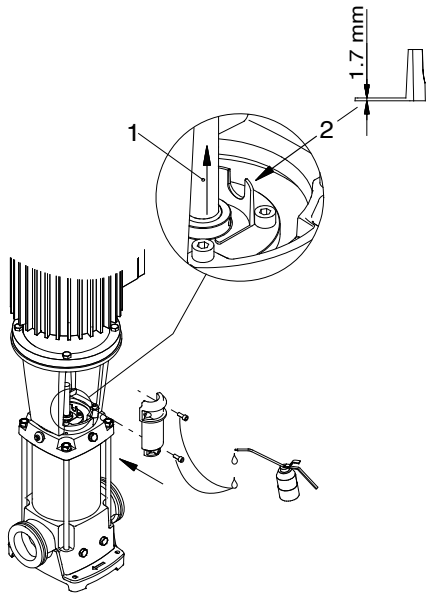


TM02 8515 0304

CR, CRN 32, 45, 64, 90

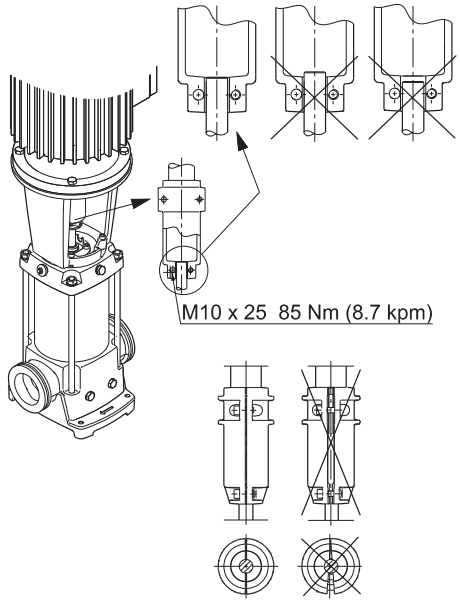
Fig. H

A



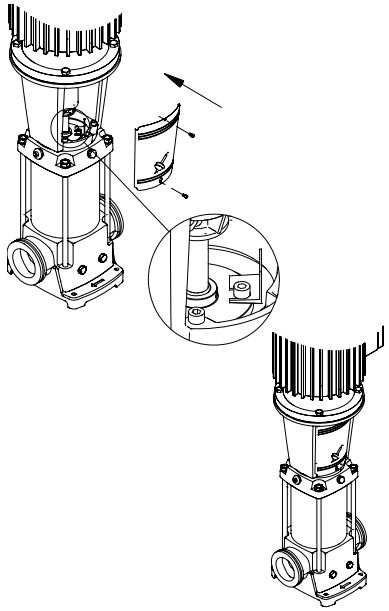
TM01 2144 3600

B



TM01 9878 4409

C

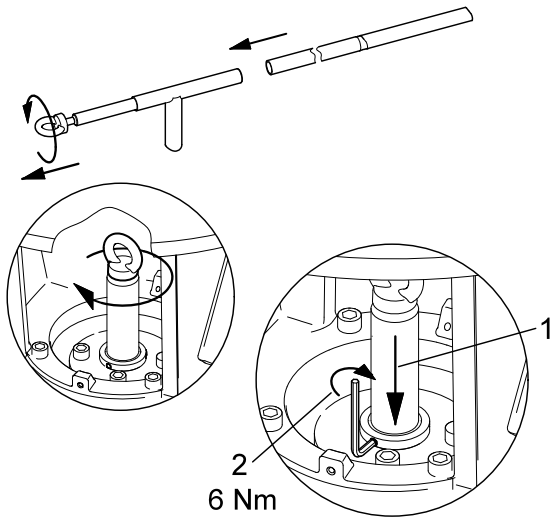


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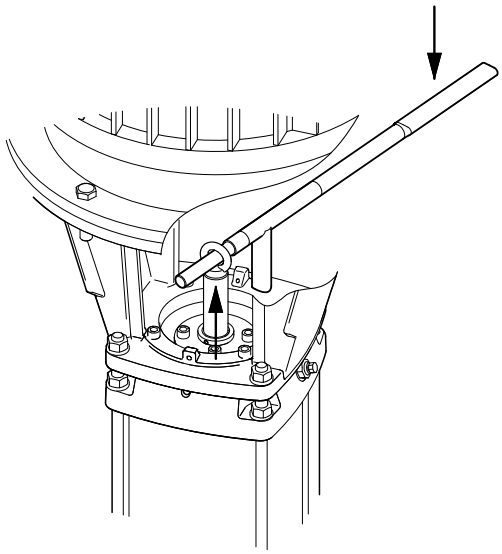
Fig. I

A



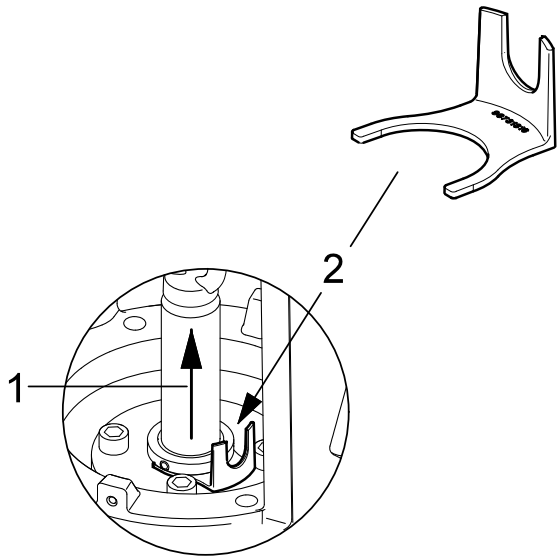
TM03 8903 2707

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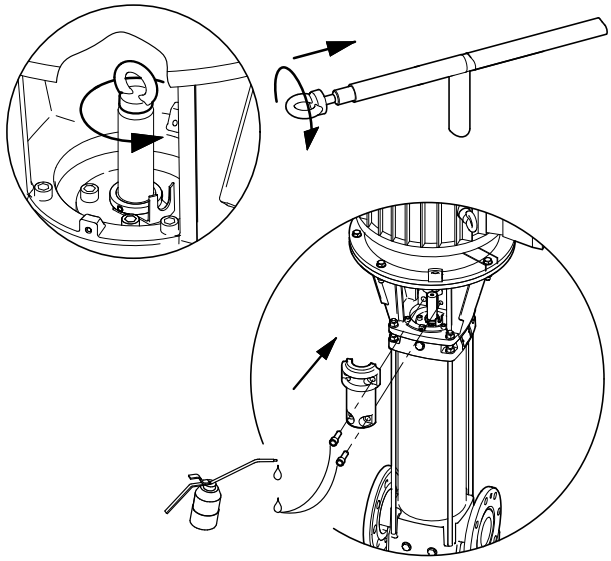
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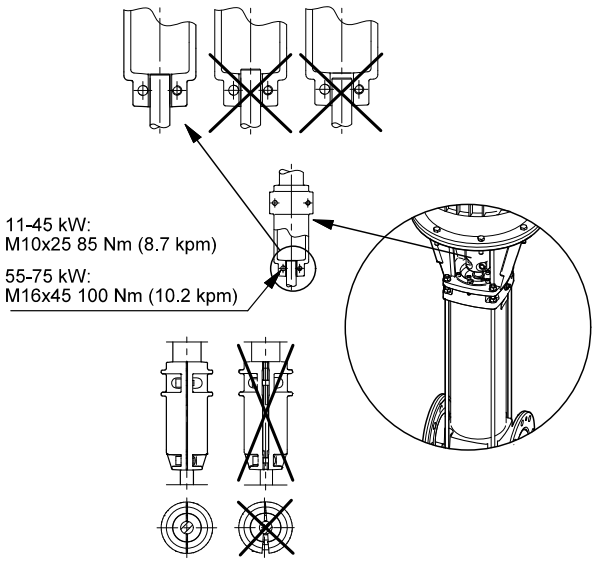
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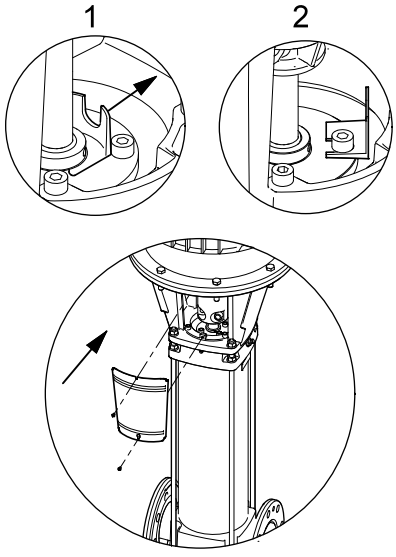
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E



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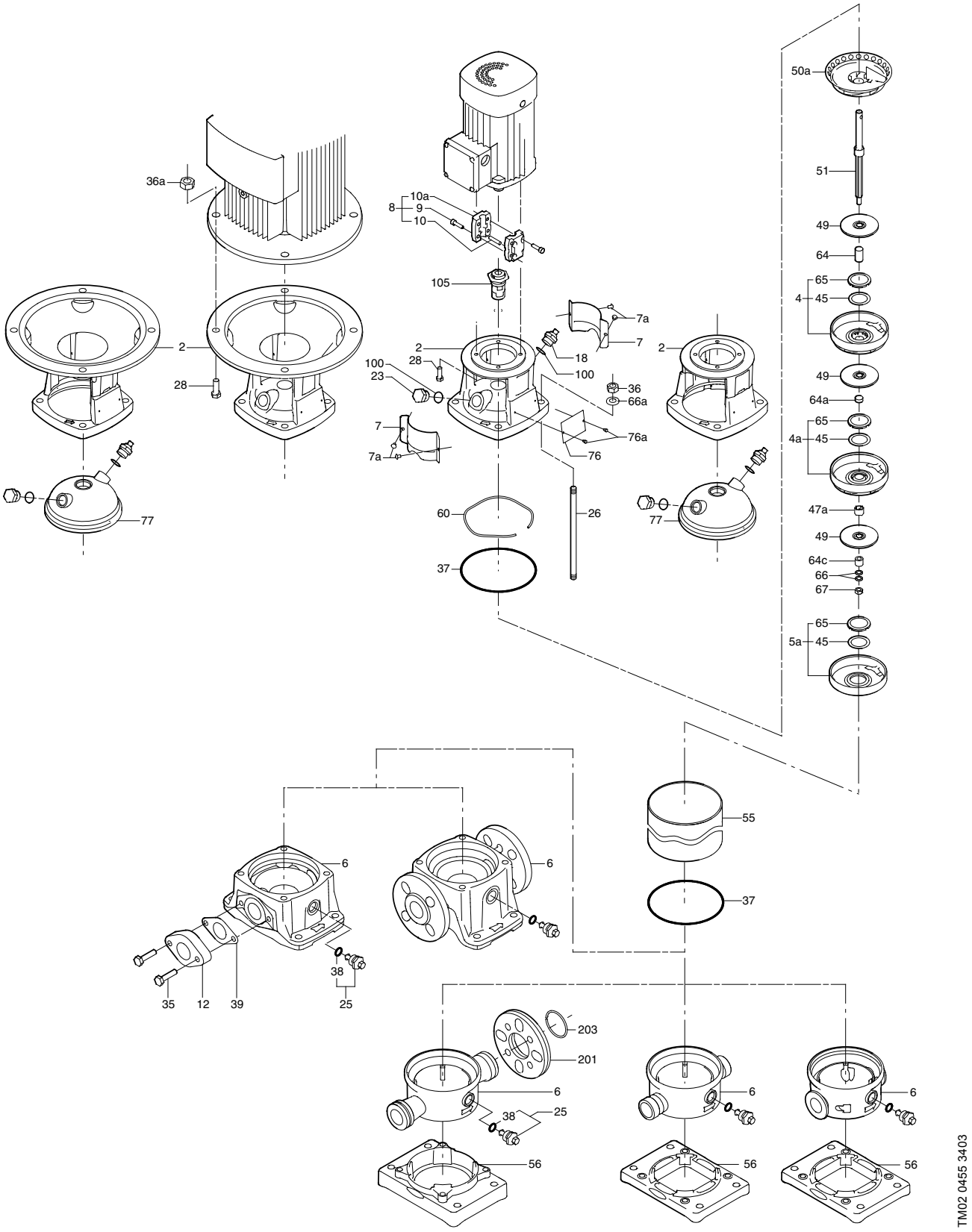
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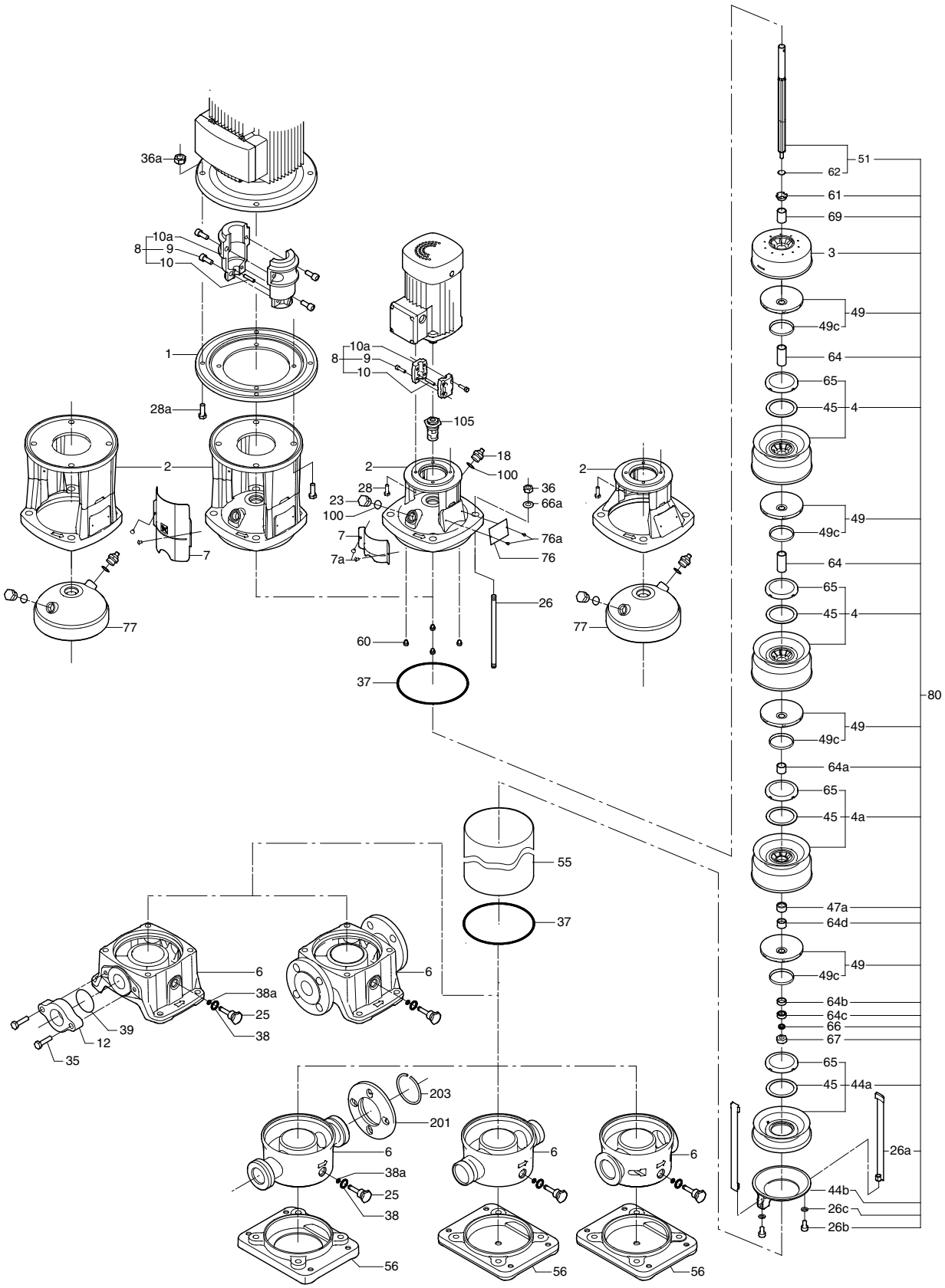


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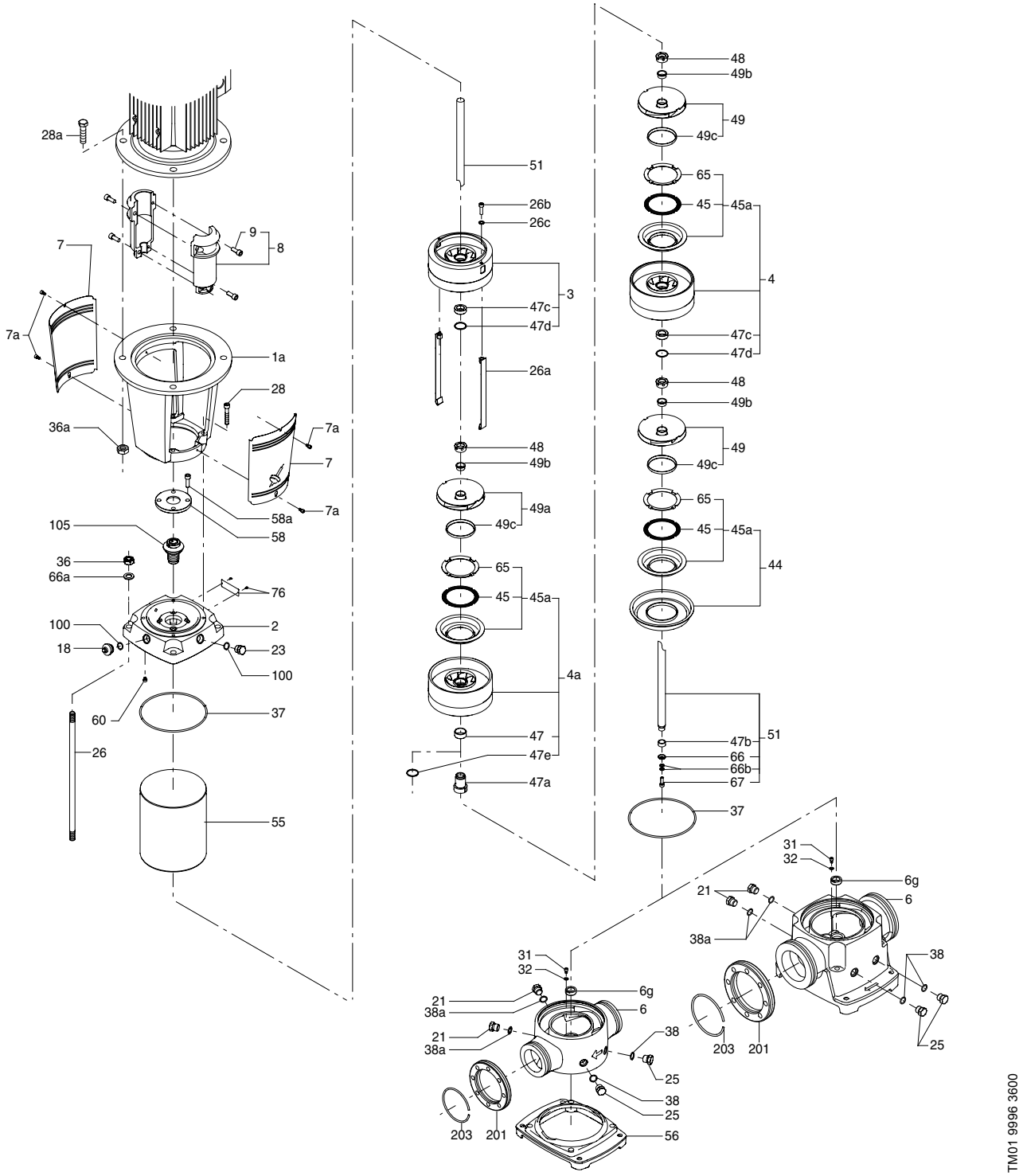
Pos.	Designation	
	(GB)	(ZH)
1	Adapter flange	接头法兰
1a	Motor stool	电机座
2	Pump head	泵头
3	Chamber, top	腔体，顶部
3a	Chamber without neck ring	无耐磨环的腔体
4	Chamber complete	完整腔体
4a	Chamber with bearing ring	有耐磨环的腔体
5a	Chamber complete	完整腔体
6	Base	基架
6a	Stop pin	止动销
6d	Guide plate for base	基架导板
6g	Bearing ring	轴承环
7	Coupling guard	联轴器护罩
7a	Screw	螺丝
8	Coupling complete	联轴器成品
9	Screw	螺丝
10	Shaft pin	轴销
18	Air vent screw	排气螺丝
19	Pipe plug	管塞
21	Plug	塞
23	Plug	塞
25	Drain plug	放水螺塞
26	Staybolt	定位螺栓
26a	Strap	拉紧板条
26b	Screw	螺丝
26c	Washer	垫圈
28	Screw	螺丝
28a	Screw	螺丝
31	Screw	螺丝
32a	Washer	垫圈
35	Screw	螺丝
36	Nut	螺母
36a	Nut	螺母
37	O-ring/gasket	O型圈/垫圈
38	O-ring	O型圈
38a	O-ring	O型圈
44	Inlet part complete	进口部分
45	Neck ring	颈环
45a	Neck ring complete	颈环成品
47	Bearing ring	轴承环
47a	Bearing with driver	带驱动器的轴承
47b	Bearing ring, rotating	轴承动环
47c	Bush	衬套
47d	Retaining ring	挡圈
47e	Retaining ring	挡圈
48	Split cone nut	花键圆锥螺母
49	Impeller	叶轮
49a	Impeller	叶轮
49b	Split cone	花键圆锥
49c	Wear ring	耐磨环
51	Pump shaft	泵轴
55	Sleeve	外套
56	Base plate	基板
56a	Base plate	基板
56c	Screw	螺丝
56d	Washer	垫圈
57	O-ring	O型圈
58	Seal carrier	密封载体
58a	Screw	螺丝
60	Spring	弹簧
61	Seal driver	密封驱动
62	Stop ring	止动环
64	Spacing pipe	隔管
64a	Spacing pipe	隔管
64c	Clamp, splined	花键夹
64d	Spacing pipe	隔管
65	Neck ring retainer	颈环挡圈
66	Washer	垫圈
66a	Washer	垫圈
66b	Lock washer	锁紧垫圈
67	Nut/screw	螺母/螺丝
69	Spacing pipe	隔管
76	Nameplate set	铭牌套件
100	O-ring	O型圈
105	Shaft seal	轴封
201	Flange	法兰
203	Retaining ring	挡圈

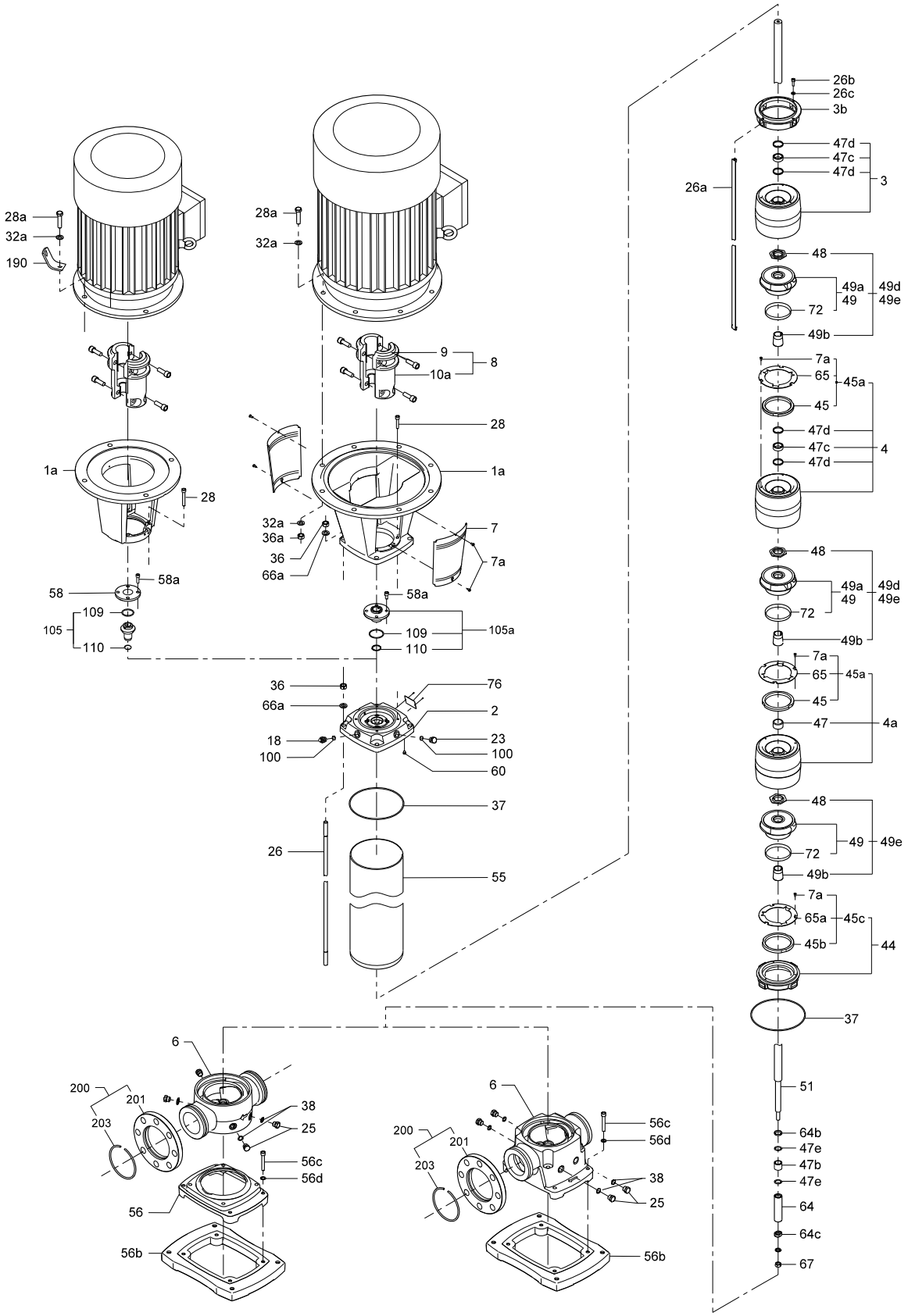
CR, CRI, CRN 1s, 1, 3 and 5




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10a
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28
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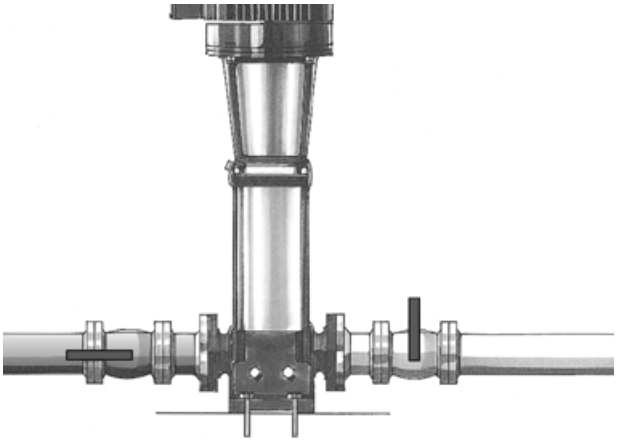


TM03 6001 4106

Appendix

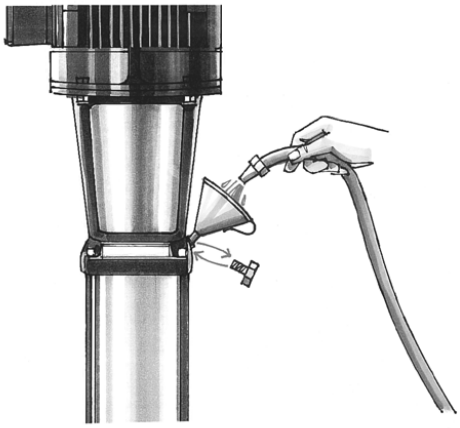
Start-up

1



TM01 1403 4497

2



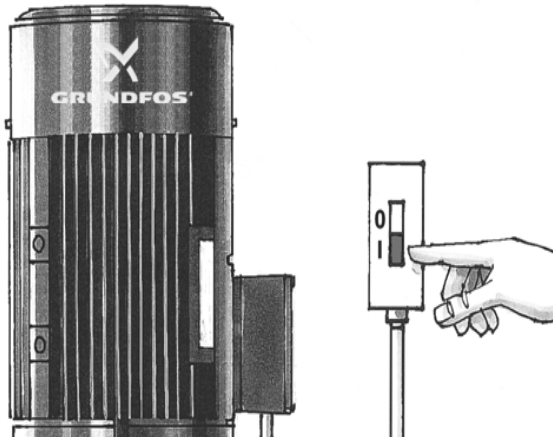
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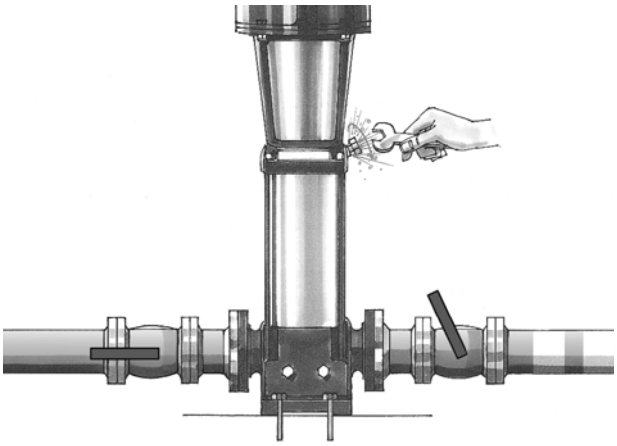
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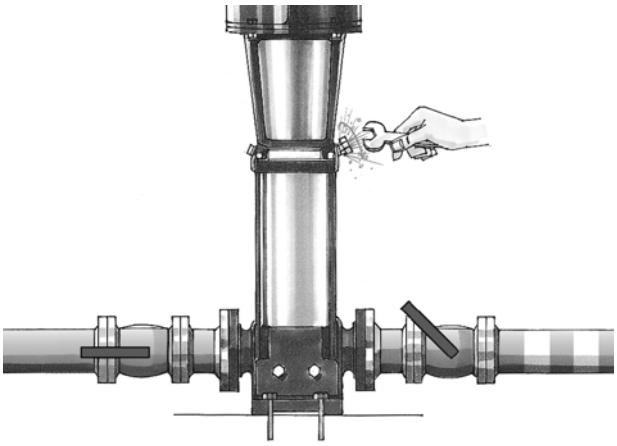
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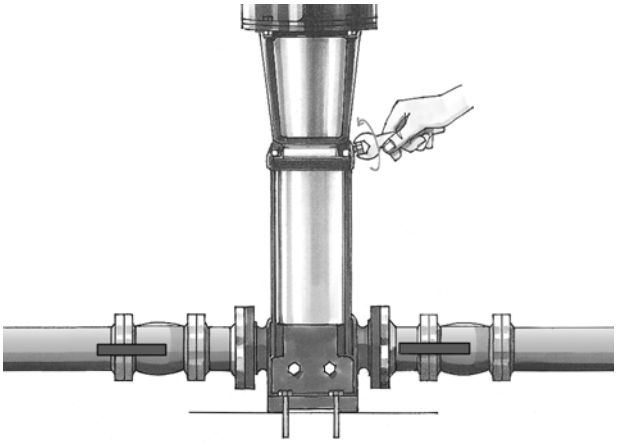
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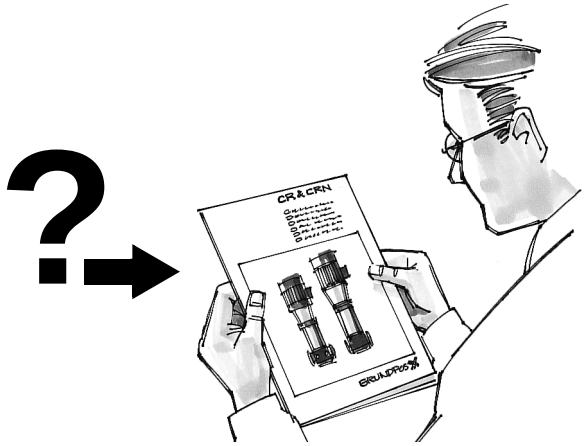
TM01 1408 4497

7



TM01 1409 4497

8



TM01 9988 3600

Quickguide

Start-up

1 Close the isolating valve on the discharge side of the pump and open the isolating valve on the suction side.	**2** Remove the priming plug from the pump head and slowly fill the pump with liquid. Replace the priming plug and tighten securely.
3 See the correct direction of rotation of the pump on the motor fan cover.	**4** Start the pump and check the direction of rotation.
5 Vent the pump by means of the vent valve in the pump head. At the same time, open the discharge isolating valve a little.	**6** Continue to vent the pump. At the same time, open the discharge isolating valve a little more.
7 Close the vent valve when a steady stream of liquid runs out of it. Completely open the discharge isolating valve.	**8** For further information, see page 10.

启动

1 关闭水泵排出侧的隔离阀，打开吸入侧的隔离阀。	**2** 从泵头拆去引水塞并缓慢加注水泵。装好引水塞并安全拧紧。
3 在电机风扇盖上察看水泵正确的转动方向。	**4** 启动水泵，检查转动方向。
5 通过位于泵头内的除气阀对泵除气。与此同时，稍稍打开排出侧隔离阀。	**6** 水泵继续除气。与此同时，再稍大些打开排出侧隔离阀。
7 在看到液体持续平稳地从除气阀流出后关闭此阀。 完全打开排出侧隔离阀。	**8** 进一步信息请见第22页。

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Addresses Revised 21.05.2014

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97688538 1112
ECM: 1104018

11.18 - I1 – INTEMPCO TEMPERATURE TRANSMITTER

7. Specifications

@Vnom : 24 VDC, Tambient = 25°C
Span nom. : RTD (Pt100) = 100°C

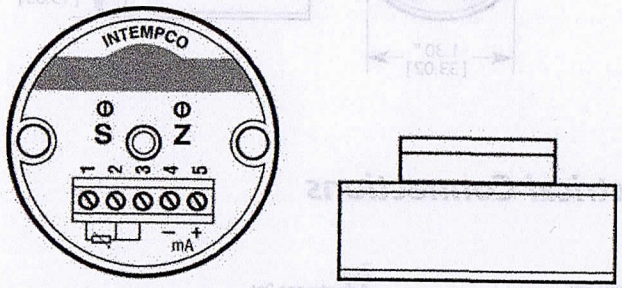
Output :	4-20mA two wire
Power Supply :	9-36 VDC, polarity protected
Supply Voltage Effect :	±0.02 % / V
Open Circuit Detection :	Up scale, greater than 23mA, limited to 40mA.
Load Capability :	Rmax.=(Vsupply - 9V) / 20mA
Zero Drift :	±0.05% / °C
Span Drift :	±0.05% / °C
Ambient Operating Temperature :	-40 to +70 °C (-40 to +158°F)
Storage Temperature :	-40 to +100 °C (-40 to +212°F)
Zero and Span Adjustment :	20 turn potentiometer ± 25% for zero and span
Input :	RTD Pt-100 (α=0.00385)
Linearity to Temperature :	±0.1% or better
Sensor Lead 3-wire Compensation:	0.01 °C/Ohm, 500 Ohm max.
Excitation Current :	0.8 mA

8. Notes

intempco
2511, Guenette Montreal (Quebec) Canada H4R 2E9
Tel.: [514] 337-7471 **Fax : [514] 337-7475**
www.intempco.com

RT810-EN-M-15062004

INTEMPCO's RT810
Temperature Transmitter



INSTRUCTION MANUAL

1. Description

The RT810 transmitters feature linearized output to temperature for RTD's. It is factory calibrated and designed for highest performance and lowest cost. The wide temperature range and stocked availability make RT810 an excellent choice for temperature signal transmission. A linearized output for RTD's is a unique performance feature of these transmitters.

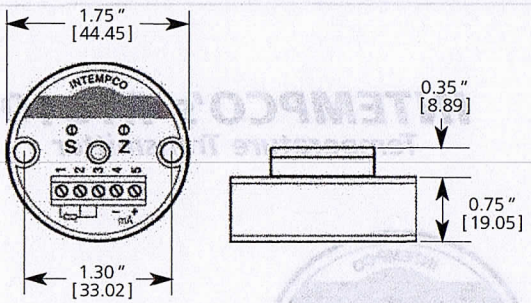
2. Note

Prior to unpacking and installation, please read the operating instructions and follow them carefully. These units are to be used, serviced, and repaired only by individuals who are familiar with the operating instructions and the applicable regulations for operational safety and accident prevention.

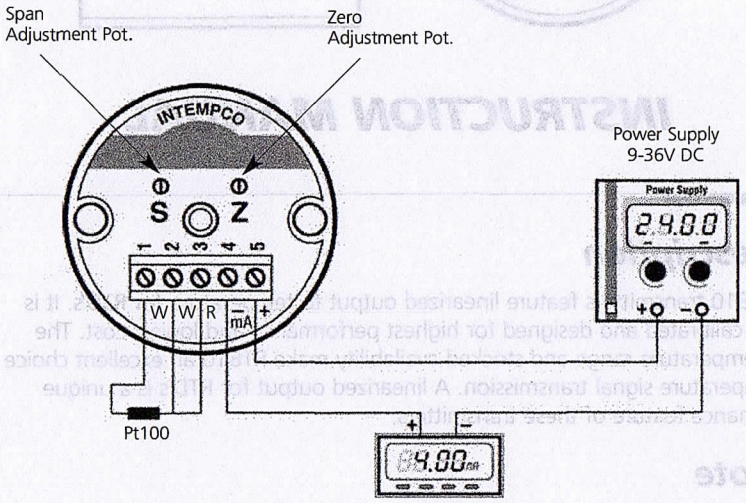
3. Control of Units

The units are calibrated and checked before shipment and shipped in good conditions. If you detect a visible defect on the unit, we recommend that you carefully check the packing material. In the event of a defect, please immediately notify the mail service/freight forwarder, as they are responsible for shipping damage.

4. Dimensions



5. Electrical Connections



The diagram above represents the connection method to provide the 4-20 mA with a current loop output. In most cases, the RT810 would take the form of a 3 wire output probe assembly. The output loop, the indicator and the transmitter are powered by a 9 to 36 VDC power supply. The indicator could be replaced by a controller, a data logger, etc.

Note : **Transmitters are protected against reverse connections, incorrect connections of the output wires result in a near zero current flow in the loop.**

6. Calibration Instructions

The RT810 comes factory calibrated. If you need to re-calibrate the unit, you will require the following equipment :

- 9-36 VDC Power Supply with a milliamp indicator or a loop-powered calibrator.
- A temperature bath.
- A standard reference temperature sensor.
- Test leads.

2 Point Calibration, Min. & Max. (Example : 0-100 °C range)

1. Connect the RT810 as per the wiring diagram. (5)
2. Set the temperature bath to the minimum range of the RT810 transmitter, Ex.: 0 °C = 4.00 mA
3. With the temperature standard, verify the bath temperature and, if required, calculate the corresponding current output for the RT810.
4. Immerse the RT810 probe in the temperature bath. Make sure the output stabilizes. With ZERO pot. adjust current output to 4.00mA or the corresponding current output.
5. Set the temperature bath to maximum range of the RT810 transmitter, Ex.: 100 °C = 20.00 mA
6. With the temperature standard, verify the bath temperature and, if required, calculate the corresponding current output for the RT810.
7. Immerse the RT810 probe in the temperature bath. Make sure the output stabilizes. With the SPAN pot. adjust current output to 20.00 mA or the corresponding current output.
8. Repeat steps 2 to 7 until required accuracy is reached. This step is necessary because of the small interaction between Zero and Span.

Single Point Calibration (Example : 0-100 °C range)

In some cases, a single point calibration is sufficient especially when a process is at a fixed set point.

1. With a temperature standard, verify the correct process temperature and compare it to the RT810 reading.
2. If the temperature reading is below the mid-point of the RT810 range, use the ZERO pot. to obtain the correct reading.
3. If the temperature reading is above the mid-point of the RT810 range, use the SPAN pot. to obtain the correct reading.

11.19 - P1 – PRIMARY FLUID CALIBRATION COLUMN

ACCUDRAW® PVC Calibration Instructions

Note: ***Before starting either of the calibration procedures below, ensure that the pump is primed and void of any trapped air.***

Using the USGPH scale: (scale is based on **time**, in one (1) minute volume discharge)

1. Fill the calibration to the top "0" mark on the USGPH scale.
2. Close isolation valve (#2) from supply tank, open isolation valve (#1) below cylinder and start the pump.
3. Use a stopwatch to measure the time of one (1) minute (60 seconds) and record the volume dispensed by the metering pump, using the draw down scale.
4. Adjust the pump volume control higher or lower to meet with your desired output.
5. Repeat above steps 1 through 4, until the desired output is met.
6. Divide the measured USGPH number by 60 to determine the **USGPM volume**, if required.

If you wish to shorten the time of dispensing for calibration by one half (1/2) or one quarter (1/4), you must multiply the measured volume by the same number used to divide the time by.

e.g. 10 USGPH in 1 minute equals
5 USGPH X 2 in 30 seconds or
2.5 USGPH X 4 in 15 seconds

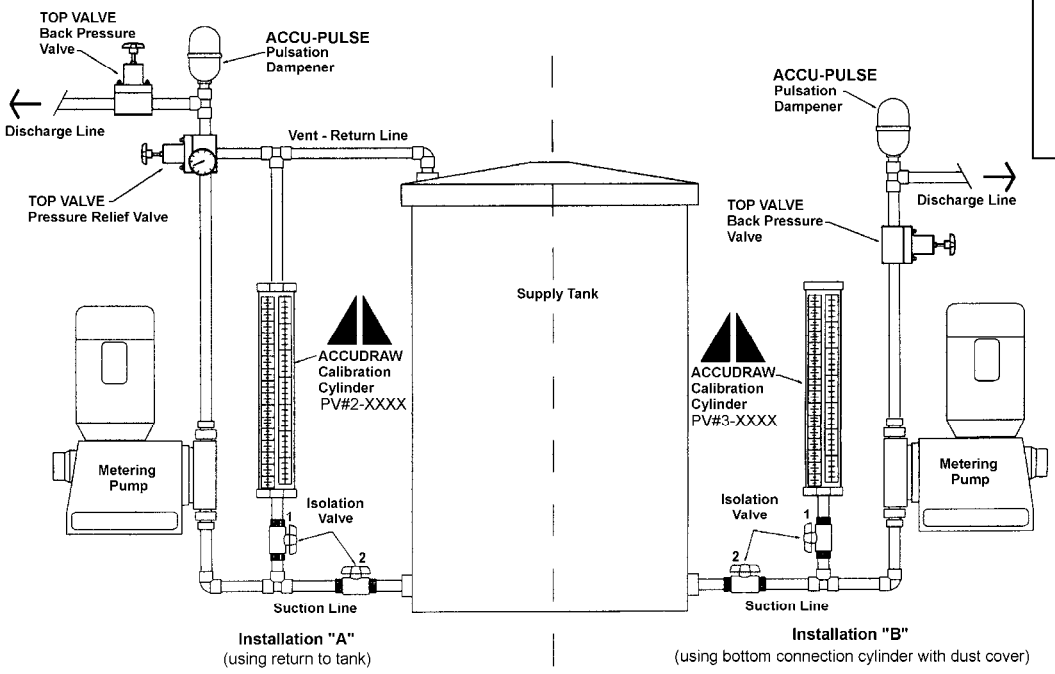
Using the ml scale: (scale is based on **volume** pumped, over any given time)

1. Fill the calibration cylinder to the top "0" mark on the ml scale.
2. Close isolation valve (#2) from supply tank, open isolation valve (#1) below cylinder and start the pump.
3. Use a stopwatch to measure the time it takes to pump down a given volume (ml) in 60 seconds.
4. Multiply the volume by 60 to determine the **ml per hour** volume, if required.
5. Adjust the pump volume control higher or lower to meet with your desired output.
6. Repeat above steps 1 through 5, until the desired output is met.

If you wish to shorten the time of dispensing for calibration by one half (1/2) or one quarter (1/4), you must multiply the volume by the same number used to divide the time by to determine ml per minute or hour.

e.g. 100 ml in 60 seconds equals
50 ml X 2 in 30 seconds or
25 ml X 4 in 15 seconds

Typical Installations ("A" and "B")



Conversion Factors
1ml = 1 cc
1000 ml – 1 liter
ml/sec x 60 = ml/min
1 US gal/min x 0.063 = liters/sec
1 US gal = 3.786 liters

Caution:
Do not use as a Pressure Vessel.

PRIMARY FLUID SYSTEMS INC.

Call Toll Free 1-800-776-6580
Tel: (905) 333-8743 Fax: (905) 333-8746

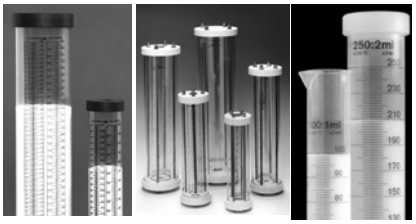
E-Mail: primary@ primaryfluid.com
www.primaryfluid.com

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Metering Pump Accessories Save $$$$

Prevent unsafe and inefficient systems by design.

ACCUDRAW Calibration Cylinders



PVC **Glass** **Poly**

- *PVC, glass, polypropylene*
- *translucent, chemical resistant*
- *coloured graduations and lettering*
- *threaded or socket connections*
- *standard sizes 100 ml to 20,000 ml*

Custom built in other sizes and materials.

TOP VALVE Back Pressure/Pressure Relief



- *long life diaphragm*
- *range of 0 – 150 PSIG*
- *air release, optional gauge port*
- *PVC, CPVC, PVDF, Teflon, polypropylene, stainless, Alloy 20 and Hastelloy C*
- *7 sizes ¼" – 2" NPT*
- *colour coded handles indicate size*

Designed to enhance the <u>accuracy</u> and <u>safety</u> of your metering pumps.

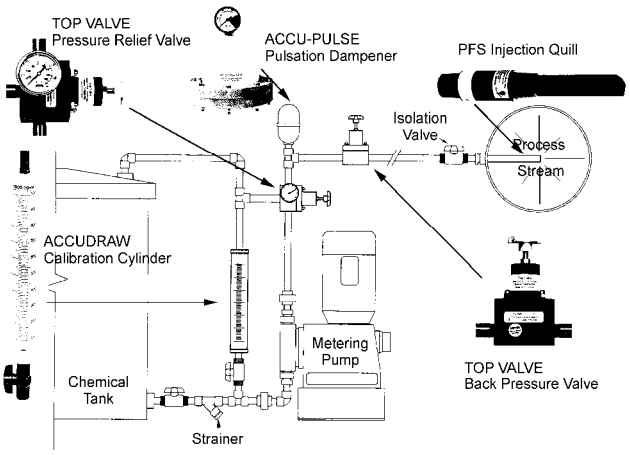
ACCU-PULSE Pulsation Dampeners



Designed to remove pulsating flows from positive displacement pumps.

- *increase system efficiency and pump life*
- *decrease maintenance and costs*
- *protect pipes, meters, valves and instrumentation from pulsation and vibration*
- *ensure meter accuracy, longevity and repeatability*
- *prevent foaming and splashing*
- *extensive range of materials and sizes*
- *lightweight, compact design*

Typical Metering Pump System



AutoCad drawings available from our web site.
Visit www.primaryfluid.com

PFS Injection Quills

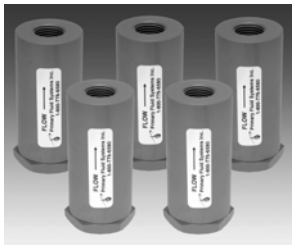


Designed to inject chemical into the center stream of process.

- *provides for a more homogenous mix in the pipeline*
- *built-in checks to prevent back siphoning*
- *2 sizes 6" and 8" length*
- *PVC, CPVC, PVDF, polypropylene, stainless and Hastelloy C*
- *pressure to 3000 PSIG*
- *temperature to 260°C (500°F)*

Custom built in other sizes and materials.

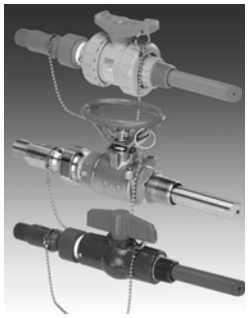
Accu-Vent



Designed to automatically vent gases and vapours.

- *vents gases and vapors released from Sodium Hypochlorite, Sulfuric Acid & Hydrogen Peroxide*
- *CPVC (Corzan) and Viton corrosion resistant wetted materials of construction*
- *specially designed float material automatically vents built up gases on system start up and under working pressure*
- *standard 1/2" or 3/4" NPT threaded connections or optional socket weld*
- *available in other materials*

PFS Corporation Stops



Designed to inject chemical into the center stream of process.

- *isolation valve allows for ease of maintenance*
- *available in 6 materials of construction*
- *wetted components have comparable or greater chemical resistance than quill construction material*
- *standard and custom lengths available*
- *connection in NPT, metric or flanged*

Custom built in other sizes & materials.

Call Toll Free 1-800-776-6580
Tel: (905) 333-8743 Fax: (905) 333-8746

11.20 - P2 – PROMINENT DOSING PUMP

Operating instructions

Solenoid Metering Pump
gamma/ X, GMXa

EN



Please carefully read these operating instructions before use. · Do not discard.
The operator shall be liable for any damage caused by installation or operating errors.
The latest version of the operating instructions are available on our homepage.

Part no. 984586 **Original Operating Instructions (2006/42/EC)** BA G 049 03/16 EN

Supplementary information



Fig. 1: Please read!

Read the following supplementary information in its entirety! Should you already know this information, you will benefit more from referring to the operating instructions.

The following are highlighted separately in the document:

- Enumerated lists

⟶ Instructions

⇨ Outcome of the instructions

↳ *'State the identity code and serial number' on page 2*: Links to points in this chapter

- refer to ... : References to points in this document or another document

[Keys]

'Menu level 1 ➔ Menu level 2 ➔ Menu level ...': Menu paths

'Software interface text'

Information

This provides important information relating to the correct operation of the unit or is intended to make your work easier.

Safety Information

Safety information is identified by pictograms - see "Safety Chapter".

State the identity code and serial number

Please state the identity code and serial number, which you can find on the nameplate or in the menu under *'Setting / Menu ➔ Information'* when you contact us or order spare parts. This enables the unit type and material versions to be clearly identified.

Table of contents

1 Identity code 5

2 About this pump 7

3 Safety chapter 8

4 Storage, Transport and Unpacking 13

5 Overview of Equipment and Control Elements 14

5.1 Overview of Equipment 14

5.2 Control Elements 15

5.2.1 Control Elements 15

5.2.2 Key Functions 18

6 Functional Description 19

6.1 Liquid End 19

6.2 Drive unit 19

6.3 Capacity 21

6.4 Self-Bleeding 21

6.5 Operating Modes 21

6.6 Functions 22

6.7 Relay (Options) 22

6.8 LED Displays 23

6.9 Hierarchy of Operating Modes, Functions and Fault Statuses 23

7 Assembly 24

8 Installation, hydraulic 26

8.1 Installing hose lines 27

8.1.1 Installation of Metering Pumps Without Bleed Valve 27

8.1.2 Installation of Metering Pumps With Bleed Valve 30

8.1.3 Installation of Metering Pumps With Self-bleeding (SEK Type) 30

8.2 Basic installation notes 31

9 Installation, Electrical 33

9.1 Supply voltage connector - mains voltage 34

9.2 Description of the Terminals 34

9.2.1 "External control" Terminal 34

9.2.2 "Level switch" terminal 35

9.2.3 "Dosing monitor" terminal 36

9.2.4 "Diaphragm rupture indicator" terminal 36

9.2.5 Relay 37

10 Basic Set-up Principles 41

10.1 Basic Principles for Setting up the Control 41

10.2 Checking adjustable variables 43

10.3 Changing to set up mode 43

11 Set Up / *'Menu'* 44

11.1 *'Information'* 44

11.2 *'Settings'* 44

11.2.1 *'Operating Mode'* 44

11.2.2 *'Automatic'* 49

11.2.3 *'Stroke length'* 49

11.2.4 Metering 50

11.2.5 Concentration 54

11.2.6 Calibrate 60

11.2.7 System 62

11.2.8 Inputs/Outputs 62

11.2.9 Bleed 66

11.2.10 *'Priming Time'* ... 67
11.2.11 *'Time'* ... 67
11.2.12 *'Date'* ... 67
11.3 Timer ... 68
11.3.1 Timer Activation ... 68
11.3.2 Setting the Timer ... 68
11.3.3 Clear All ... 70
11.3.4 Example ... 70
11.4 *'Service'* ... 70
11.4.1 *'Access Protect.'* ... 70
11.4.2 *'Password '* ... 71
11.4.3 *'Clear Counter'* ... 71
11.4.4 *'Diaphragm Replacement'* ... 72
11.4.5 *'Display'* ... 72
11.4.6 *'Reset to Factory Settings'* ... 72
11.5 *'Language'* ... 72
12 Operation ... **73**
12.1 Manual operation ... 73
13 Maintenance ... **75**
14 Repairs ... **77**
14.1 Cleaning Valves ... 78
14.2 Replacing the Diaphragm ... 79
14.3 Cleaning the Diaphragm Rupture Indicator ... 80
15 Troubleshooting ... **82**
15.1 Faults Without a Fault Message ... 82
15.2 Fault Messages ... 83
15.3 Warning Messages ... 84
15.4 All Other Faults ... 84
16 Decommissioning ... **85**
17 Technical Data ... **87**
17.1 Performance Data ... 87
17.2 Accuracy ... 88
17.2.1 Standard Liquid End ... 88
17.2.2 Self-Bleeding Liquid End ... 88
17.3 Viscosity ... 88
17.4 Material specifications ... 89
17.5 Electrical Data ... 89
17.6 Temperatures ... 90
17.7 Climate ... 90
17.8 Degree of Protection and Safety Requirements ... 90
17.9 Compatibility ... 90
17.10 Shipping Weight ... 91
17.11 Sound pressure level ... 91
18 Exploded Drawings and Ordering Information ... **92**
18.1 Exploded drawings ... 92
18.2 Ordering Information ... 124
19 Dimensional Drawings ... **125**
20 Diagrams for Setting the Capacity ... **134**
21 EC Declaration of Conformity for Machinery ... **137**
22 Operating/Set-up Overview of the gamma/ X ... **138**
23 Operating Menu of gamma/ X, Entire Unit ... **140**
24 Continuous Displays and Secondary Displays ... **144**
25 Index ... **146**

1 Identity code

Product range gamma/ X												
GMXa	Type											
	- - - -	Performance data and type - see nameplate										
		Dosing head material										
		PP	Polypropylene									
		NP	Clear acrylic									
		PV	PVDF									
		TT	PTFE + carbon									
		SS	Stainless steel									
			Seal material									
			B	FPM								
			E	EPDM								
			T	PTFE								
				Dosing head design								
				0	Without bleed valve, without valve spring							
				1	Without bleed valve, with valve spring							
				2	With bleed valve, without valve spring							
				3	With bleed valve, with valve spring							
				4	Without bleed valve, with valve spring for more high-viscosity media							
				9	Self-bleeding with bypass (SEK)							
					Hydraulic connector							
					0	Standard connection in line with technical data						
					5	Connector for 12/6 hose, suction side standard						
					9	Connector for 10/4 hose, discharge side only, suction side standard						
						Diaphragm rupture indicator						
						0	Without diaphragm rupture indicator					
						1	With diaphragm rupture indicator, optical sensor					
							Design					
							0	Hous. RAL5003 / Hood RAL2003				
							M	modified				
								Logo				
								0	with ProMinent logo			
									Electrical connection			
									U	Universal control 100-230 V ±10%, 50/60 Hz		
										Cable and plug		
										A	2 m European	
										B	2 m Swiss	
										C	2 m Australian	
										D	2 m USA / 115 V	
										E	2 m Great Britain	

| Product range gamma/ X | | |

2 About this pump

About this pump

Pumps in the ProMinent gamma/ X product range are microprocessor-controlled solenoid metering pumps with the following characteristics:

- Simple adjustment of the capacity directly in l/h
- Available material combinations: PP, PVDF, clear acrylic, PTFE and stainless steel
- Special dosing head designs for gaseous and high-viscosity media
- Illuminated LC display and 3-LED display for operating, warning and error messages, visible from all sides
- Factor with external contact control 99:1 ... 1:99
- Batch operation with max. 99,999 strokes/start pulse
- Input of concentration for simple adjustment with volume-proportional metering tasks
- Stroke rate adjustment in 1 stroke/hour increments from 0 ... 12,000 strokes/h
- Electronic stroke length adjustment, continuous from 0 ... 100% (recommended 30 ... 100%)
- Connector for 2-stage level switch
- External control via 0/4-20 mA standard signal with adjustable assignment of signal value to stroke rate
- Optional 4-20 mA output for remote transmission of stroke length and stroke rate
- Universal power supply unit 100 V - 230 V, 50/60 Hz
- Optional 230 V relay module, can also be retrofitted easily and securely
- Optional 24 V combined relay, can also be retrofitted easily and securely

The hydraulic parts of the gamma/ X are identical to those of the Beta® (not with types 0220, 0424 and 0245).

3 Safety chapter

Identification of safety notes

The following signal words are used in these operating instructions to denote different severities of danger:

Signal word	Meaning
WARNING	Denotes a possibly dangerous situation. If this is disregarded, you are in a life-threatening situation and this can result in serious injuries.
CAUTION	Denotes a possibly dangerous situation. If this is disregarded, it could result in slight or minor injuries or material damage.

Warning signs denoting different types of danger

The following warning signs are used in these operating instructions to denote different types of danger:

Warning signs	Type of danger
	Warning – automatic start-up.
	Warning – high-voltage.
	Warning – danger zone.

Intended Use

- Only use the pump to meter liquid feed chemicals.
- Only use the pump after it has been correctly installed and started up in accordance with the technical data and specifications contained in the operating instructions.
- Observe the general limitations with regard to viscosity limits, chemical resistance and density - see also ProMinent resistance list in the Product Catalogue or at www.prominent.com!
- All other uses or modifications are prohibited.
- The pump is not intended for the metering of gaseous media and solids.
- The pump is not intended for the metering of flammable media without implementing suitable protective measures.
- The pump is not intended for the metering of explosive media.
- The pump is not intended for operation in areas at risk from explosion.
- The pump is not intended for exterior applications without the implementation of suitable protective measures.
- The pump should only be operated by trained and authorised personnel, see the following "Qualifications" table.
- You are obliged to observe the information contained in the operating instructions at the different phases of the unit's service life.

Safety Information



WARNING!

Warning about personal and material damage

The pump can start to pump, as soon as it is connected to the mains voltage.

– Install an emergency cut-off switch in the pump power supply line or integrate the pump in the emergency cut-off management of the system.



WARNING!

Warning of personal injury and material damage

The pump can start pumping as soon as it has cooled down after the error *'temperature'*.

– Take this into account with the pump and your installation.



WARNING!

Danger of electric shock

A mains voltage may exist inside the pump housing.

– If the pump housing has been damaged, you must disconnect it from the mains immediately. It may only be returned to service after an authorised repair.



WARNING!

Warning of dangerous or unknown feed chemical

Should a dangerous or unknown feed chemical be used: It may escape from the hydraulic components when working on the pump.

– Take appropriate protective measures before working on the pump (e.g. safety glasses, safety gloves, ...). Observe the safety data sheet for the feed chemical.
– Drain and flush the liquid end before working on the pump.



WARNING!

Fire danger

When pumping inflammable media the operator must take suitable safety precautions.



WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.



CAUTION!

Warning of feed chemical spraying around

Feed chemical can spray out of the hydraulic components if they are manipulated or opened due to pressure in the liquid end and adjacent parts of the system.

– Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
– Depressurise the system before commencing any work on hydraulic parts.



CAUTION!

Warning of feed chemical spraying around

The metering pump can generate a multiple of its rated pressure. Hydraulic parts can rupture if a discharge line is blocked.

– Correctly install a relief valve in the discharge line downstream of the metering pump.



CAUTION!

Warning of feed chemical spraying around

An unsuitable feed chemical can damage the wetted parts of the pump.

– Take into account the resistance of the wetted materials when selecting the feed chemical - see the ProMinent Product Catalogue or visit our homepage.



CAUTION!

Danger of injury to personnel and material damage

The use of untested third party components can result in injury to personnel and material damage.

– Only fit parts to metering pumps that have been tested and recommended by ProMinent.



CAUTION!

Danger from incorrectly operated or inadequately maintained pumps

Danger can arise from a poorly accessible pump due to incorrect operation and poor maintenance.

– Ensure that the pump is accessible at all times.
– Adhere to the maintenance intervals.



CAUTION!

Danger from incorrect dosing

The metering behaviour of the pump changes if a different liquid end size is fitted.

– Reprogram the pump in the *'Menu / Information ➔ Settings ➔ System ➔ Change head type'* menu.



CAUTION!

Warning against illegal operation

Observe the regulations that apply where the device is installed.

Isolating protective equipment

- Covers for the slots for relays and optional modules - see the chapter entitled "Overview of Equipment and Control Elements"

Customers should only remove the cover for the slots for relays and optional modules and/or a relay or optional module in line with the supplementary instructions for the relays and optional modules.

Customer should only remove the dosing head in accordance with the "Repair" chapter.

Only the ProMinent Service department is authorised to open the housing and the hood (housing the control elements).

Information in the event of an emergency

In an emergency, either disconnect the mains plug, press *[Start/Stop]* or press the Emergency Stop switch installed on the customer's side or disconnect the pump from the mains/power supply in line with the Emergency Stop management guidelines for your system.

If feed chemical escapes, additionally ensure that the pump's hydraulic environment is at atmospheric pressure. Adhere to the material safety data sheet for the feed chemical.

Qualification of personnel

Task	Qualification
Storage, transport, unpacking	Instructed person
Assembly	Technical personnel, service
Planning the hydraulic installation	Qualified personnel who have a thorough knowledge of metering pumps
Hydraulic installation	Technical personnel, service
Installation, electrical	Electrical technician
Operation	Instructed person
Maintenance, repair	Technical personnel, service
Decommissioning, disposal	Technical personnel, service
Troubleshooting	Technical personnel, electrical technician, instructed person, service

Explanation of the table:

Qualified personnel

A qualified employee is deemed to be a person who is able to assess the tasks assigned to him and recognise possible dangers based on his/her technical training, knowledge and experience, as well as knowledge of pertinent regulations.

Note:

A qualification of equal validity to a technical qualification can also be gained by several years of employment in the relevant field of work.

Electrical technician

An electrical technician is able to complete work on electrical systems and recognise and avoid possible dangers independently based on his/her technical training and experience, as well as knowledge of pertinent standards and regulations.

The electrical technician should be specifically trained for the working environment in which he is employed and know the relevant standards and regulations.

An electrical technician must comply with the provisions of the applicable statutory directives on accident prevention.

Instructed person

An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him/her and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.

Service

The Service department refers to service technicians, who have received proven training and have been authorised by ProMinent to work on the system.

Sound pressure level

Sound pressure level LpA < 70 dB according to EN ISO 20361

at maximum stroke length, maximum stroke rate, maximum back pressure (water)

4 Storage, Transport and Unpacking

Safety Information



WARNING!

Only return metering pumps for repair in a cleaned state and with a flushed liquid end - refer to "Decommissioning!

Only return metering pumps with a completed Decontamination Declaration form. The Decontamination Declaration constitutes an integral part of an inspection / repair order. A unit can only be inspected or repaired when a Declaration of Decontamination Form is submitted that has been completed correctly and in full by an authorised and qualified person on behalf of the pump operator.

The "Decontamination Declaration Form" can be found on our homepage.



CAUTION!

Danger of material damage

The device can be damaged by incorrect or improper storage or transportation!

- The unit should only be stored or transported in a well packaged state - preferably in its original packaging.
- The packaged unit should also only be stored or transported in accordance with the stipulated storage conditions.
- The packaged unit should be protected from moisture and the ingress of chemicals.

Ambient conditions

Ambient conditions - refer to "Technical Data" chapter.

Scope of delivery

Compare the delivery note with the scope of delivery:

- Metering pump with mains cable
- Connector kit for hose/pipe connection (optional)
- Product-specific operating instructions with EC Declaration of Conformity
- Optional accessories

5 Overview of Equipment and Control Elements

5.1 Overview of Equipment

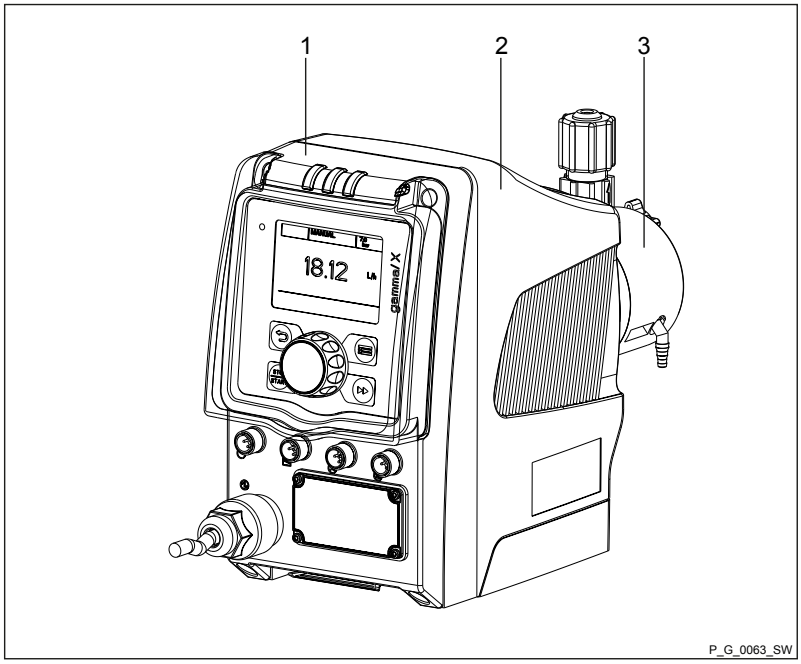


Fig. 2: Overview of equipment, complete

1 Control unit
2 Drive unit
3 Liquid end

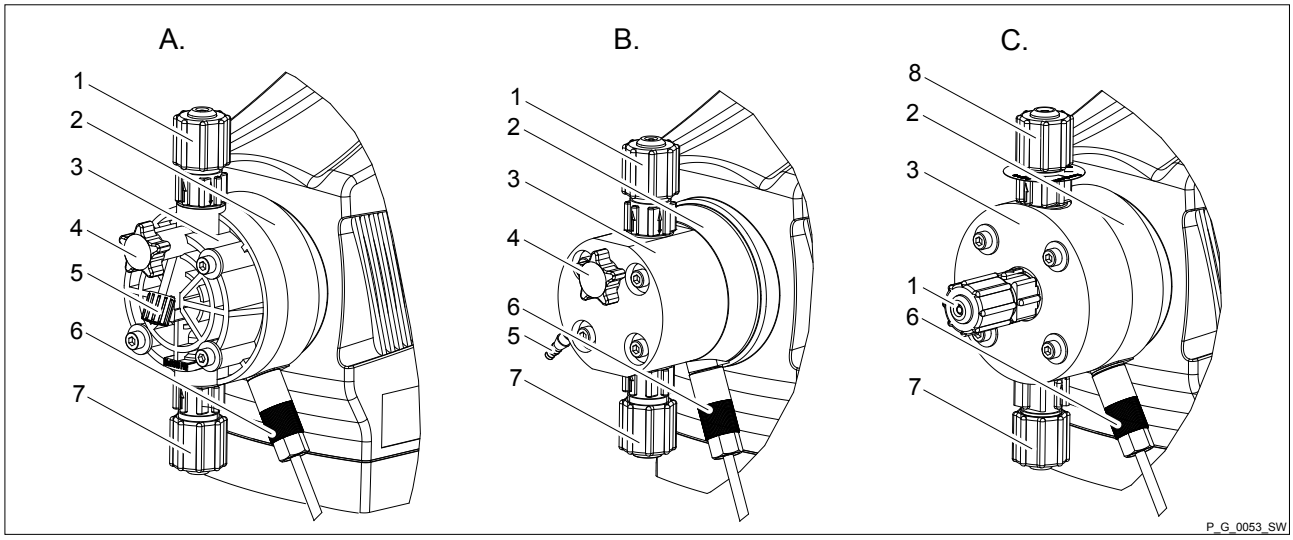


Fig. 3: A. Liquid end with PV bleed valve; B. Liquid end with NP bleed valve; C. Self-bleeding liquid end (SEK)

1 Discharge valve
2 Backplate
3 Dosing head
4 Bleed valve
5 Bypass hose sleeve
6 Diaphragm rupture indicator (optional)
7 Suction valve
8 Bleed valve, self-bleeding

5.2 Control Elements

Control elements, overview

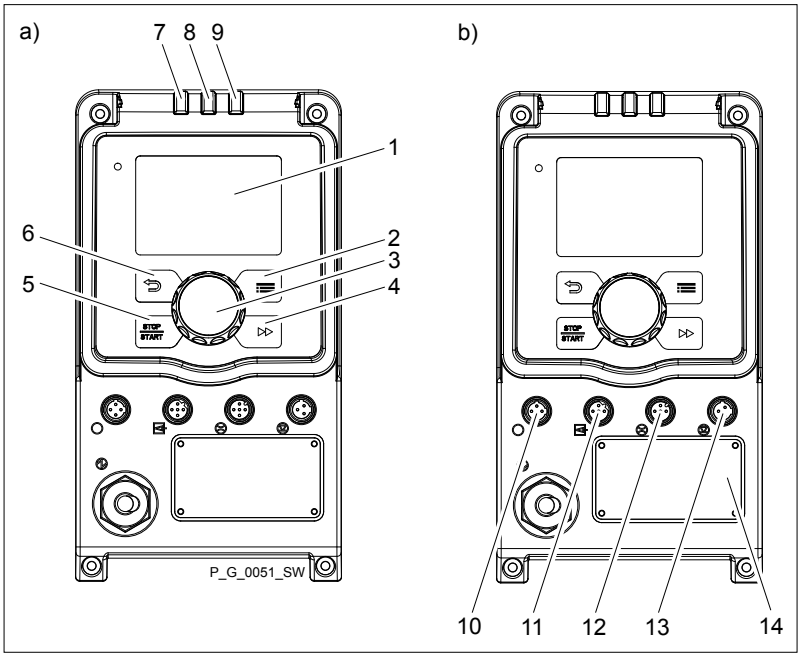


Fig. 4

1 LCD screen
2 *[Menu]* key
3 Clickwheel
4 *[Priming]* key
5 *[STOP/START]* key
6 *[Back]* key
7 Fault indicator (red)
8 Warning indicator (yellow)
9 Operating indicator (green)
10 "Diaphragm rupture indicator" terminal
11 "External control" terminal
12 "Dosing monitor" terminal
13 "Level switch" terminal
14 Slot for relay and optional modules

5.2.1 Control Elements

Use this overview to familiarise yourself with the keys and the other control elements on the pump!

Pressure display, identifier and fault displays on the LCD screen

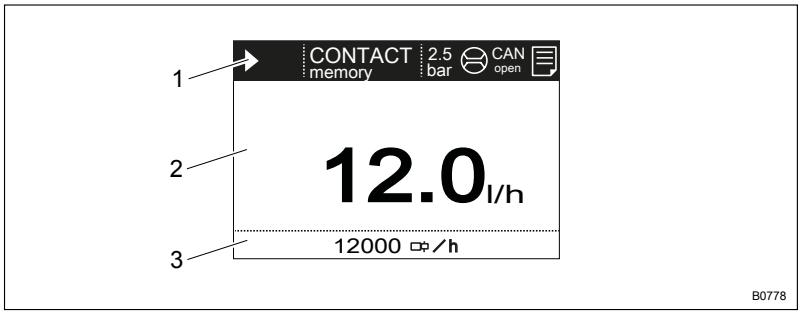


Fig. 5: Construction of continuous display

1 Status bar
2 Continuous display, central area
3 Secondary display

Refer to the chapter entitled "Main Displays and Secondary Displays" in the Appendix for the different main displays and secondary displays.

The LCD screen supports the operation and adjustment of the pump by providing different information and identifiers:

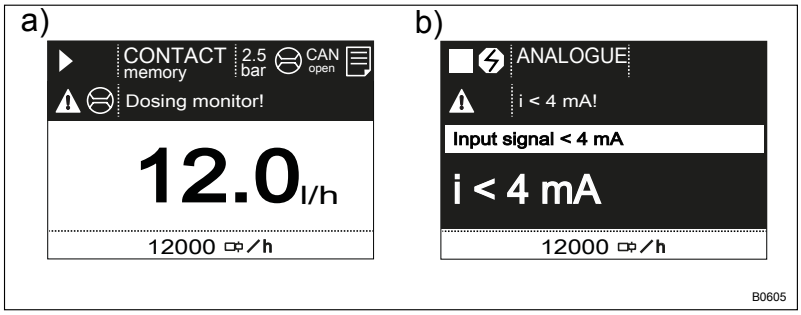


Fig. 6: a) Continuous display with warning message; b) Continuous display with fault message. Explanation of the symbols in the following tables.

The above Figure, Part a) shows that:

- The pump is in operation
- Is in *'Contact'* operating mode with "memory" stroke memory.
- The average system pressure is 2.5 bar
- A dosing monitor is connected
- A CAN module is being used
- A log entry has been made
- A warning message for the *'dosing monitor'* is pending
- The capacity of 12.0 l/h has been set
- The stroke rate is 12,000 strokes / h

Pressure display

Display	Meaning
2.5 bar	Displays the average system pressure

Identifier and error displays:

Identifier	Meaning
	The pump is working or waiting for a starting signal.
	The pump was manually stopped using the [STOP/START] key.
	The pump was remotely stopped (Pause) - via the "External" terminal.
	The pump was stopped by an error.
	Only with cyclical batch metering: the pump waits for the next cycle.
	Only with *'Access. protect'*: the pump software is locked.
'AUX'	The pump is currently pumping at auxiliary capacity and/or auxiliary frequency.
'memory'	Only in *'CONTACT'* and *'BATCH'* operating modes: The auxiliary function "Stroke memory" has been set.
	The pump is in *'ANALOGUE'* operating mode. The *'Curve ➔ linear'* type of processing is set.
	The pump is in *'ANALOGUE'* operating mode. The *'Curve ➔ Upper side band'* type of processing is set.
	*'Metering ➔ Discharge stroke ➔ optimum'* metering profile has been set.
	*'Metering ➔ Discharge stroke ➔ fast'* metering profile has been set.
	*'Metering ➔ Discharge stroke ➔ sine mode'* metering profile has been set.
	*'Metering ➔ Discharge stroke ➔ continuous'* metering profile has been set.
	*'Metering ➔ Discharge stroke ➔ DFMa'* metering profile has been set.
	*'Metering ➔ Discharge stroke ➔ normal'* metering profile has been set.
	*'Metering ➔ Discharge stroke ➔ HV1'* metering profile has been set.

Identifier	Meaning
	*'Metering* ➔ *Discharge stroke* ➔ *HV2'* metering profile has been set.
	*'Metering* ➔ *Discharge stroke* ➔ *HV3'* metering profile has been set.
	A dosing monitor "Flow Control" is connected.
	A diaphragm rupture indicator is connected.
	The pump is in the *'Menu'* (Set up).



Further explanations can be found in the "Troubleshooting" chapter.



The pump only shows the metering volume and the capacity in the calibrated state in l or l/h or in gal or gal/h.

5.2.2 Key Functions

Key	Application	In the continuous displays	In the menu
[Back]	press	-	Move back to the previous menu point (or a continuous display) - without saving
Press *[STOP/ START]*	press	Stop pump,	Stop pump,
		Start pump	Start pump
[Menu]	press	Move to the menu	Move back to a continuous display
[Priming]	press	Priming	Priming
[Clickwheel]	press	Start batch (only in *'Batch'* operating mode) Acknowledge errors	Move to next menu option (or a continuous display) Confirm entry and save
[Clickwheel]	turn	Switch between the continuous displays	Change figure or change selection



Refer to the "Set-up Basics" chapter to adjust figures

6 Functional Description

6.1 Liquid End

The dosing process is performed as follows: The diaphragm is pressed into the dosing head; the pressure in the dosing head closes the suction valve and the feed chemical flows through the discharge valve out of the dosing head. The diaphragm is now drawn out of the dosing head; the discharge valve closes due to the negative pressure in the dosing head and fresh feed chemical flows through the suction valve into the dosing head. One cycle is completed.

6.2 Drive unit

The diaphragm is driven by an electromagnet, controlled by an electronic control.

Drive technology

The drive technology on the gamma/ X enables the timed progress of the flow to be precisely matched to the requirements of the particular application.

This ensures that the user can set the optimum **discharge stroke** for his application, as required:

Pos.*	Discharge stroke	Application
A.	*'optimum'*	For maximum accuracy when metering and the very best results with internal pressure measurement and special functions.
B.	*'fast'*	For as fast a discharge stroke as possible - the duration of the discharge stroke is dependent on the stroke rate.
C.	*'Sine mode'*	For a long, sine-shaped discharge stroke - the duration of the discharge stroke is dependent on the stroke rate.
D.	*'continuous'*	For a continuous discharge stroke e.g. for bottling processes. The duration of the discharge stroke is dependent on the stroke rate.
E.	*'DFMa'*	For optimum operation with a flow meter DulcoFlow® DFMa.

* see following drawing.

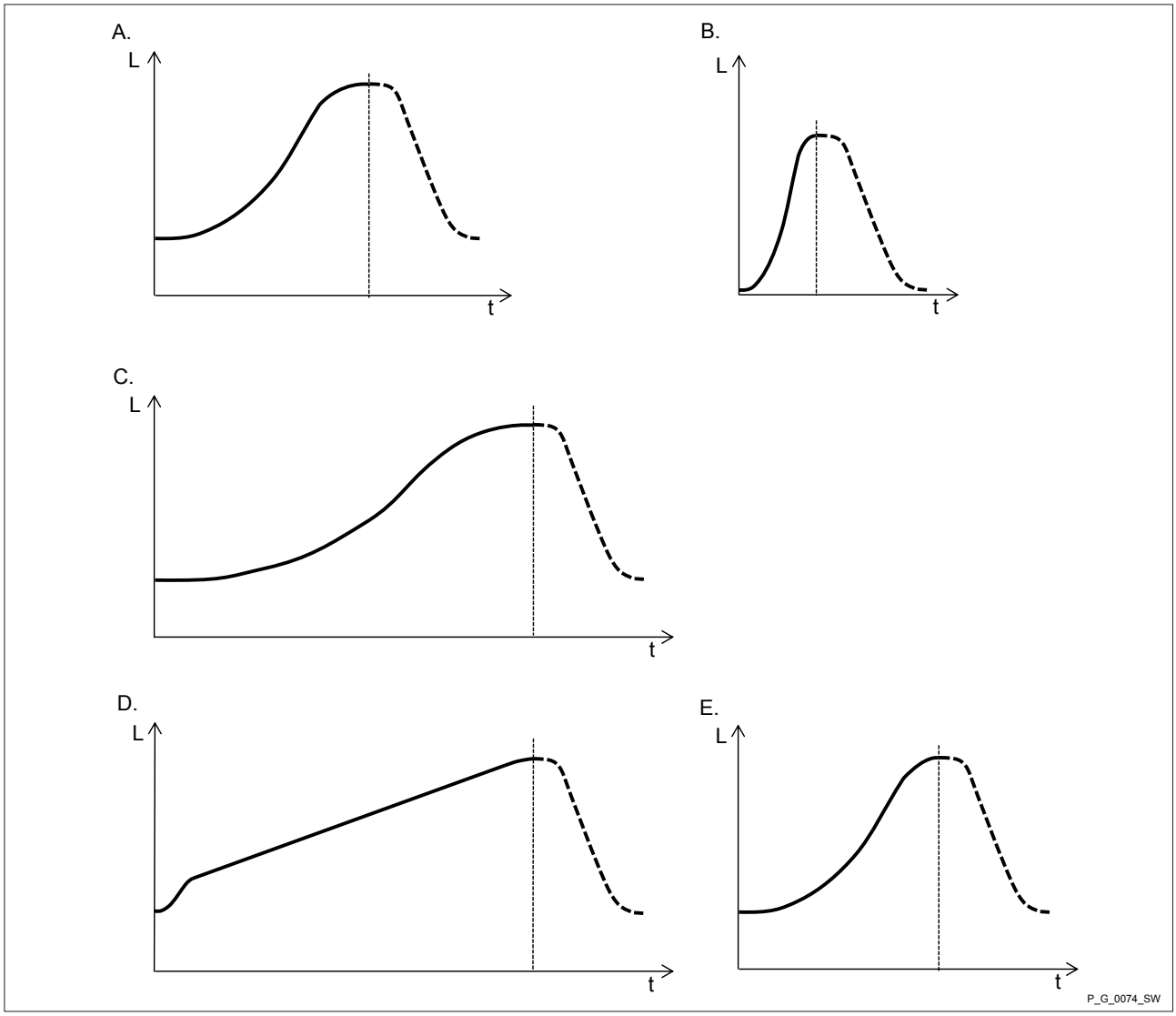


Fig. 7: Discharge stroke metering profiles with stroke L and time t (suction stroke shown as a dotted line)

It is possible to selectively also slow the **suction stroke** with all these metering profiles for the discharge stroke - see . In this way, it is possible to prevent the main cause of inaccurate metering with high viscosity feed chemicals, namely the incomplete filling of the liquid end. With gaseous feed chemicals, the slow suction stroke prevents cavitation and consequently increases dosing precision.

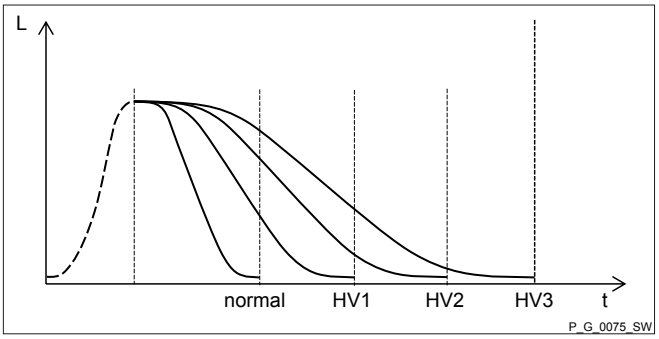


Fig. 8: Suction stroke metering profiles with stroke L and time t

Normal	Normal suction stroke
HV1	Suction stroke for viscous feed chemical
HV2	Suction stroke for average viscosity feed chemical
HV3	Suction stroke for high-viscosity feed chemical

Oscillations in the back pressure in the metering line, which could lead to undesirable variations in the metering volume, are automatically compensated for by the power end/drive. This results in **dosing precision**, which otherwise could only be achieved with complex control circuits.

6.3 Capacity

The capacity set regulates the pump even in *'Automatic'* mode (not with SEK dosing heads).

By contrast, in conventional mode, the stroke length and stroke rate determine the capacity. The stroke length can be adjusted between 0 and 100% via the continuous display or the menu. A metering volume of between 30 to 100% is reproduced as being technically sensible (SEK type: 50 - 100%)! The stroke rate can be set via the menu (not in "Analogue" operating mode) within a range of 0 - 12,000 strokes/h.

6.4 Self-Bleeding

Self-bleeding liquid ends (SEK types) are capable of independent priming when a discharge line is connected and diverting existent air pockets via a bypass. During operation they are also capable of conveying away gases which are produced, independently of the operating pressure in the system. It is also possible to dose precisely in a depressurised state due to the integral back pressure valve.

6.5 Operating Modes

Operating modes are selected via the "Operating modes" menu.

Refer to the "Hierarchy of Operating Modes, Functions and Fault Statuses" for the order of the various operating modes, functions and fault statuses.

"Manual" operating mode

'Manual' operating mode permits you to operate the pump manually.

"Contact" operating mode

This operating mode provides the option of controlling the pump externally by means of potential-free contacts (e.g. by means of a contact water meter). The "Pulse Control" option enables you to preselect the number of strokes (a scaling or transfer factor of 0.01 to 99.99) in the *'Settings'* menu.

"Batch" operating mode

This operating mode provides the option of working with large transfer factors (up to 99,999). Metering can be triggered either by pressing the *[Clickwheel]* or by a pulse received via the "External control" terminal or through a contact or a semiconductor switching element. It is possible to pre-select a metering volume (batch) or a number of strokes using the *[Clickwheel]* in the *'Settings'* menu.

"Analogue" operating mode

The capacity and/or stroke rate is controlled via an analogue current signal via the "External control" socket. The processing of the current signal can be preselected via the control unit.

6.6 Functions

Refer to the "Hierarchy of Operating Modes, Functions and Fault Statuses" for the order of the various operating modes, functions and fault statuses.

The following functions can be selected using the *'Settings'* menu:

"Calibrate" function

The pump can also be operated in a calibrated state in all operating modes if it is to meter extremely precisely. This can be useful with very viscous feed chemicals but less so with feed chemicals with a similar consistency to water. Calibration is retained over the entire stroke rate range and over a stroke length range from 0 - 100%.

"Auxiliary capacity" / "Auxiliary frequency" function

This facilitates the switch-over to a fixed adjustable capacity / stroke rate in the *'menu'* via the "External control" terminal.

"Bleed " function

This permits simple bleeding - without the need for an additional bleed valve. The pump works at maximum stroke rate based on the selected signal in order to transport gas bubbles out of the liquid end.

The following functions are available as standard:

"Flow" function

It monitors the flow after every single stroke, if a dosing monitor is connected and if *'Fast'* is set under *'Settings* ➔ *Metering* ➔ *Discharge stroke'* or *'DFMa'* (for the DulcoFlow®). The number of defective strokes, after which the pump is switched off, can be set in the *'Settings'* menu.

"Level switch" function

Information about the liquid level in the dosing tank is reported to the pump. A two-stage level switch has to be fitted for this purpose, which is connected to the "Level switch" terminal.

"Pause" function

The pump can be remotely stopped via the "External Control" terminal.

"Stop" function

The pump can be stopped without disconnecting it from the mains/power supply by pressing the STOP/START *[STOP/START]* key.

"Priming" function

Priming can be triggered by pressing ⏩ *[Priming]*.

6.7 Relay (Options)

The pump has several connecting options available:

"Fault indicating relay" option

The relay can close a connected power circuit (e.g. for an alarm horn) in the event of warnings or fault messages (e.g. *'Warning level'*).

The relay can be retrofitted through the slot in the front of the pump - refer to the installation instructions for "Retrofitting relays".

"Fault indicating and pacing relay" option

This combined relay can generate a contact with each stroke via its pacing relay in addition to functioning as a fault indicating relay.

The relay can be retrofitted through the slot in the front of the pump.

"Automatic bleed" option

The "Automatic bleed" option is used for controlled bleeding of the liquid end, if the pump has the "Automatic bleed" option. This option can be retrofitted through the slot in the front of the pump and conversion of the dosing head.

There are two versions:

- Version with only 1 relay – to control the electric bleed valve in the dosing head.
- Version with only 2 relays – one relay to control the electric bleed valve in the dosing head and one relay free for other uses.

"mA output" option

The current output I signal indicates the pump's actual calculated metering volume. The relay can be retrofitted through the slot in the front of the pump.

The option also always includes a fault indicating relay or a pacing relay.

6.8 LED Displays

Fault indicator (red)

LED display	Colour	lit	briefly goes out	flashes
Fault indicator	red	A fault message is pending	-	undefined operating status
Warning indicator	yellow	A warning message is pending	-	-
Operating indicator	green	The pump is ready for operation	At each stroke	Stroke rate below 30 strokes / min

6.9 Hierarchy of Operating Modes, Functions and Fault Statuses

The different operating modes, functions and fault statuses have a different effect on whether and how the pump reacts.

The following list shows the order:

1. - Stop
2. - Priming
3. - Error, Pause, Level
4. - Auxiliary capacity / Auxiliary frequency
5. - Manual, Analogue, Contact, Batch

Comments:

re 1 - "Stop" stops everything.

re 2 - "Priming" can take place in any mode of the pump (providing it is functioning).

re 3 - "Error", "Pause" and "Level" stop everything apart from "Priming".

re 4 - The "Auxiliary capacity" and/or "Auxiliary frequency" always has priority over the capacity / stroke rate specified by an operating mode listed under 5.

7 Assembly

Please refer to the online version of the operating instructions on our website for the right dimensional drawings for the pump and mounting plate.

Compare the dimensions on the dimensional drawing with those of the pump and/or mounting plate.

CAUTION!

Danger from incorrectly operated or inadequately maintained pumps

Danger can arise from a poorly accessible pump due to incorrect operation and poor maintenance.

– Ensure that the pump is accessible at all times.
– Adhere to the maintenance intervals.

Capacity too low

The liquid end valves can be disturbed by vibrations.

– *Secure the metering pump so that no vibrations can occur.*

Capacity too low

If the valves of the liquid end are not vertical, they cannot close correctly.

– *Ensure that the suction and discharge valves are upright (with self-bleeding liquid ends: the bleed valve).*

Several metering pumps can be arranged closely together as required.

1. To remove the mounting plate, press down the black flap below the front of the pump a little and press the mounting plate backwards.
2. Assemble the mounting plate on a **level** and load-bearing base surface (with a minimum of 2 bolts and 2 washers!).

   You can also assemble the mounting plate on a **vertical**, level and load-bearing base surface (using 3 bolts and 3 washers!). You then need to rotate the liquid end (vertical valve position!)

   You can also assemble the mounting plate on a **wall bracket** (accessories). 3 alignments are possible.
3. Lock the foot of the metering pump into the mounting plate – see further information Fig. 9.

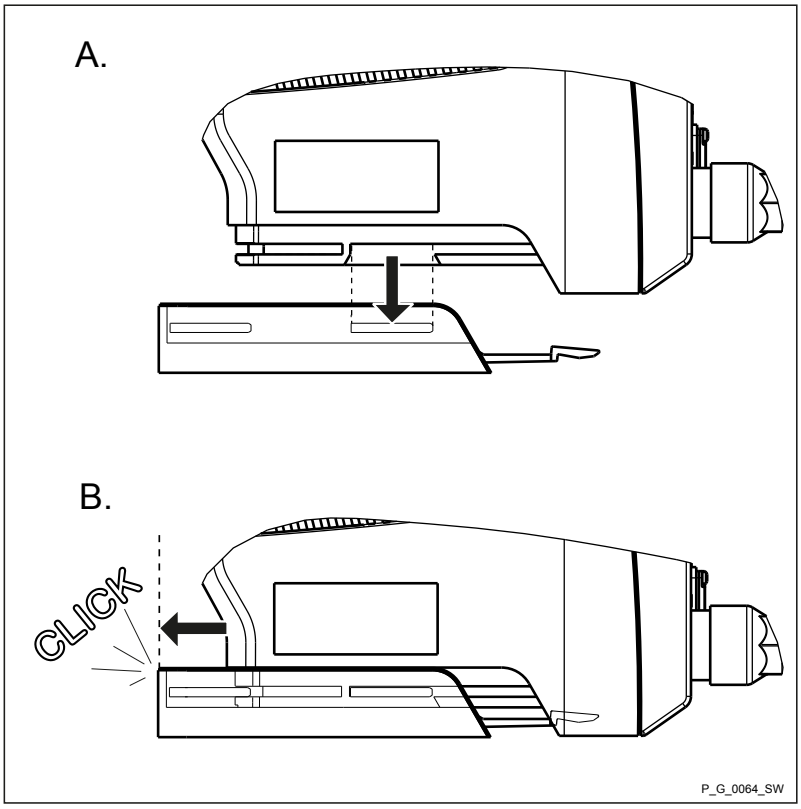


Fig. 9

Suggested bolts and washers for fixing the assembly foot

Bolt	Type	Size	Washer
	DELTA-PT bolt	50 (WN5412/5452)	A5.3 (DIN 125)
	PT bolt	50 (WN1441/1411 KA/B)	-
	Flat-head bolt	M5 (DIN EN ISO 7045)	A5.3 (DIN 125)
	Allen bolt/	M5 (DIN EN ISO 4762)	A5.3 (DIN 125)

8 Installation, hydraulic

Safety Information



CAUTION!

Warning of feed chemical spraying around

An unsuitable feed chemical can damage the wetted parts of the pump.

– Take into account the resistance of the wetted materials when selecting the feed chemical - see the ProMinent Product Catalogue or visit our homepage.



CAUTION!

Warning of feed chemical spraying around

Pumps which are not fully installed hydraulically can eject feed chemicals from the outlet openings of the discharge valves as soon as they are connected to the mains.

– The pump must first be hydraulically installed and then electrically.
– In the event that you have failed to do so, press the *[STOP/START]* button or press the emergency-stop switch.



CAUTION!

Warning of feed chemical spraying around

Feed chemical can spray out of the hydraulic components if they are manipulated or opened due to pressure in the liquid end and adjacent parts of the system.

– Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
– Depressurise the system before commencing any work on hydraulic parts.



CAUTION!

Danger from rupturing hydraulic components

Peak loads during the dosing stroke can cause the maximum permissible operating pressure of the system and pump to be exceeded.

– The discharge lines are to be properly designed.



CAUTION!

Danger of injury to personnel and material damage

The use of untested third party components can result in injury to personnel and material damage.

– Only fit parts to metering pumps that have been tested and recommended by ProMinent.

8.1 Installing hose lines

8.1.1 Installation of Metering Pumps Without Bleed Valve

Safety Information



CAUTION!

Warning of feed chemical spraying around

The pipes can loosen or rupture if they are not installed correctly.

- Route all hose lines so they are free from mechanical stresses and kinks.
- Only use original hoses with the specified hose dimensions and wall thicknesses.
- Only use clamp rings and hose nozzles that are intended for the hose diameter in question to ensure the long service life of the connections.



CAUTION!

Danger from rupturing hydraulic components

Hydraulic components can rupture if the maximum permissible operating pressure is exceeded.

- Always adhere to the maximum permissible operating pressure of all hydraulic components - please refer to the product-specific operating instructions and system documentation.
- Never allow the metering pump to run against a closed shut-off device.
- Install a relief valve.



CAUTION!

Hazardous feed chemicals can escape

Hazardous or extremely aggressive feed chemicals can leak out when using conventional bleeding procedures with metering pumps.

- Install a bleed line with return line into the storage tank.



CAUTION!

Hazardous feed chemicals can escape

Hazardous or extremely aggressive feed chemicals can leak out in the event that the metering pump is removed from the installation.

- Install a shut-off valve on the metering pump's pressure and discharge sides.



CAUTION!

Uncontrolled flow of feed chemical

Feed chemicals can leak through a stopped metering pump if there is back pressure.

- Use an injection valve or a vacuum breaker.

CAUTION!

Uncontrolled flow of feed chemical

Feed chemicals can leak through the metering pump in an uncontrolled manner in the event of excessive priming pressure.

– Do not exceed the maximum permissible priming pressure for the metering pump.

Align the pipes so that the metering pump and the liquid end can be removed from the side if necessary.

Installing hose lines - PP, NP, PV, TT designs

1. Cut off the ends of the hoses at right angles.
2. Pull the union nut (2) and clamp ring (3) over the hose (1) - see figure Fig. 10.
3. Push the hose end (1) up to the stop over the nozzle (4) and widen, if necessary.

Ensure that the O-ring and flat seal (5) is properly fitted to the valve (6).

Never re-use used PTFE seals. An installation sealed in this way is not watertight.

This type of seal is permanently distorted when subjected to pressure.

In order to enable it to be distinguished from the EPDM flat seal, the FPM flat seal PV design has a dot.

4. Place the hose (1) with the nozzle (4) onto the valve (6).
5. Clamp the hose connector: Tighten the union nut (2) while simultaneously pressing on the hose (1).
6. Re-tighten the hose connector: Pull on the hose (1) briefly, which is fastened to the dosing head and then tighten the union nut (2) once more.

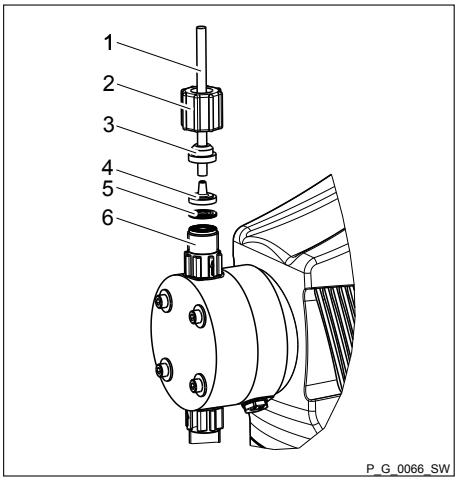


Fig. 10: PP, NP, PV and TT designs

1 Hose
2 Union nut
3 Clamp ring
4 Nozzle
5 O-ring or flat seal
6 Valve

Installing stainless steel pipe - SS design

1. Pull the union nut (2) and clamp rings (3, 4) over the pipe (1) with approx. 10 mm overhang - see Fig. 11.
2. Insert the pipe (1) up to the stop in the valve (5).
3. Tighten the union nut (2).

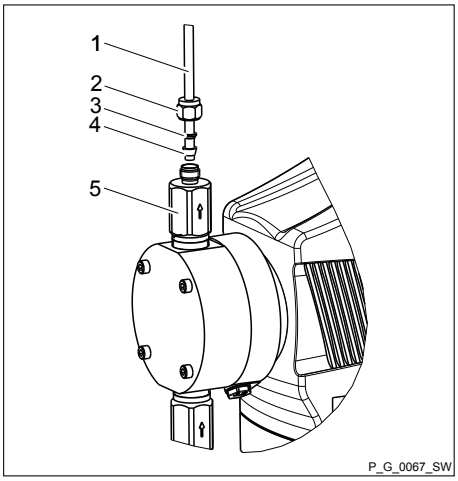


Fig. 11: SS design

1 Pipe
2 Union nut
3 Rear clamp ring
4 Front clamp ring
5 Valve

Installing hose lines - SS design

CAUTION!

Warning of feed chemical spraying around

Connections can come loose in the event that hose lines are installed incorrectly on stainless steel valves.

- Only use PE or PTFE hose lines.
- In addition, insert a stainless steel support insert into the hose line.

8.1.2 Installation of Metering Pumps With Bleed Valve

Safety Information

CAUTION!

– All the installation and safety notes for metering pumps without bleed valves also apply.

Installation of the return line

A return line is also connected in addition to the suction and discharge line.

1. Attach the hose line to the return hose nozzle or to the liquid end bleed valve. PVC hose, soft, 6x4 mm is recommended.
2. Feed the free end of the return line back to the storage tank.
3. Shorten the return line so that it is not immersed in the feed chemical in the storage tank.

8.1.3 Installation of Metering Pumps With Self-bleeding (SEK Type)

Safety Information

CAUTION!

– All of the installation and safety notes for metering pumps without self-bleeding also apply.
– Do not exceed the maximum values for priming lift, priming pressure and viscosity of the feed chemical.
– Do not allow the suction side line cross-section to exceed the line cross-section on the suction valve.

Information about priming pressure

– *Make sure that the priming pressure on the suction end is at least equal to the return line pressure.*
– *Back pressure in the return line restricts the bleeding function.*
– *In contrast, it is possible to operate the pump with back pressure in the return line and atmospheric pressure on the suction side.*

Installation of the return line

A return line is also connected in addition to the suction and discharge line.

– *The return line is connected to the vertical valve on the upper side of the liquid end. It is factory-labelled with a red sleeve - see ‘Installation of the return line’ on page 30.*
– *The discharge line is connected to the horizontal valve.*

1. Attach the hose line to the return hose nozzle or to the liquid end bleed valve. PVC hose, soft, 6x4 mm is recommended.
2. Feed the free end of the return line back to the storage tank.
3. SEK only: Insert the return line into the anti-kink device on the bleed valve and screw it in place until the anti-kink device engages.

The anti-kink device prevents the return line from kinking, avoiding the risk of self-bleeding failure.

4. Shorten the return line so that it is not immersed in the feed chemical in the storage tank.

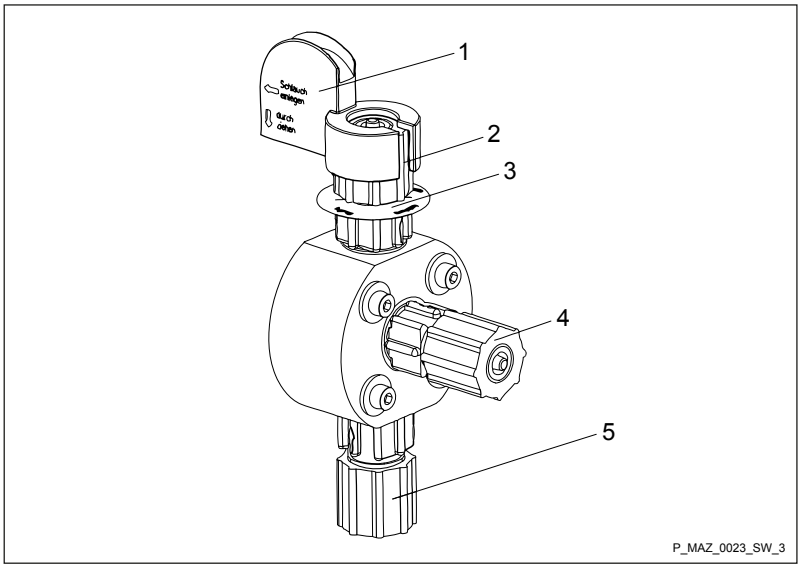


Fig. 12: SEK liquid end

1 Anti-kink device
2 Bleed valve for the return line into the storage tank, 6/4 mm
3 Red sleeve
4 Discharge valve for discharge line to the injection point, 6/4 - 12/9 mm
5 Suction valve for suction line in the storage tank, 6/4 - 12/9 mm

8.2 Basic installation notes

Safety notes

CAUTION!
Danger resulting from rupturing hydraulic components
Hydraulic components can rupture if the maximum permissible operating pressure is exceeded.

– Never allow the metering pump to run against a closed shut-off device.
– With metering pumps without integral relief valve: Install a relief valve in the discharge line.

CAUTION!
Hazardous feed chemicals can escape
With hazardous feed chemicals: Hazardous feed chemical can leak out when using conventional bleeding procedures with metering pumps.

– Install a bleed line with a return into the storage tank.

Shorten the return line so that it does not dip into the feed chemical in the storage tank.

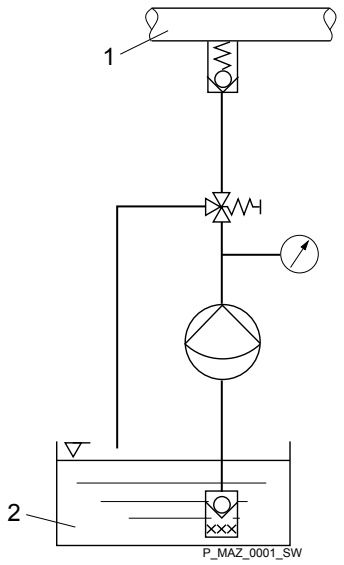


Fig. 13: Standard installation

1 Main line
2 Storage tank

Legend for hydraulic diagram

Symbol	Explanation	Symbol	Explanation
	Metering pump		Foot valve with filter meshes
	Injection valve		Level switch
	Multifunctional valve		Manometer

9 Installation, Electrical



WARNING!
Danger of electric shock
A mains voltage may exist inside the device.

– Before any work, disconnect the device's mains cable from the mains.



WARNING!
Risk of electric shock
This pump is supplied with a grounding conductor and a grounding-type attachment plug.

– To reduce the risk of electric shock, ensure that it is connected only to a proper grounding-type receptacle.



WARNING!
Risk of electric shock
In the event of an electrical accident, the pump must be quickly disconnected from the mains.

– Install an emergency cut-off switch in the pump power supply line or
– Integrate the pump in the emergency cut-off management of the system and inform personnel of the isolating option.



WARNING!
Danger of electric shock
Incompletely installed electrical options can allow moisture into the inside of the housing.

– Fit appropriate modules into the slot on the front of the pump or use the original blank cover to seal it in a leak-tight manner.



WARNING!
Danger of electric shock
A mains voltage may exist inside the pump housing.

– If the pump housing has been damaged, you must disconnect it from the mains immediately. It may only be returned to service after an authorised repair.



CAUTION!
Material damage possible due to power surges
Should the pump be connected to the mains power supply in parallel to inductive consumers (such as solenoid valves, motors), inductive power surges can damage the controller when it is switched off.

– Provide the pump with its own contacts and supply with voltage via a contactor relay or relay.

Install the pump in line with best working practice and in accordance with the operating instructions and applicable regulations.

9.1 Supply voltage connector - mains voltage

WARNING!

Unexpected startup is possible

As soon as the pump is connected to the mains, the pump may start pumping and consequently feed chemical may escape.

– Prevent dangerous feed chemicals from escaping.
– If you have not successfully prevented this, immediately press the *[STOP/START]* key or disconnect the pump from mains, e.g. via an emergency cu-off switch.

CAUTION!

If the pump is integrated into a system: Design the system so that potential hazardous situations are avoided by pumps starting up automatically subsequent to unintended power interruptions.

Connect the pump to the mains/power supply using the mains cable.

9.2 Description of the Terminals

9.2.1 "External control" Terminal

The "external control" terminal is a 5-pole panel terminal. It is compatible with 2- and 4-pole cables.

Only use a 5-pole cable with the "Auxiliary capacity" / "Auxiliary frequency" and "mA-input" functions.

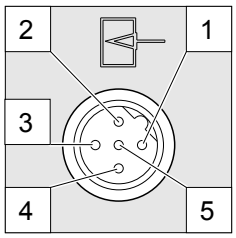


Fig. 14: Pump assignment

Electrical interface for pin 1 "Pause" - pin 2 "External contact" - pin 5 "Auxiliary capacity / Auxiliary frequency"

Data	Value	Unit
Voltage with open contacts	5	V
Input resistance	10	kΩ
Max. pulse frequency	25	pulse/s
Min. pulse duration	20	ms

Control via:

- potential-free contact (load: 0.5 mA at 5 V) or
- Semiconductor switch (residual voltage < 0.7 V)

Electrical interface for pin 3 "mA input" (with identity code characteristic "Control version": 2 and 3)[1]

Data	Value	Unit
Input apparent ohmic resistance, approx.	120	Ω

[1] The metering pump makes its first metering stroke at approx. 0.4 mA (4.4 mA) and reaches maximum frequency at approx. 19.6 mA.

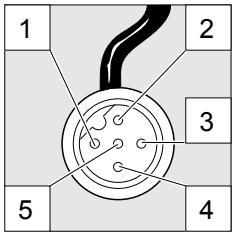


Fig. 15: Cable assignment

Pin	Function	5-wire cable	2-wire cable
1	Pause	brown	bridged at pin 4
2	External contact	white	brown
3	mA input*	blue	-
4	Earth / GND	black	white
5	Auxiliary capacity / Auxiliary frequency	grey	-

* with identity code characteristic "Control version": 3

Refer to the functional description for the hierarchy of functions and operating modes.

"Pause" function

The pump does not work if:

- the cable is connected and pin 1 and pin 4 are open.

The pump works if:

- the cable is connected and pin 1 and pin 4 are connected.
- no cable is connected.

"External contact" operating mode

The pump performs one or more strokes if:

- Pin 2 and pin 4 are connected to each other for at least 20 ms. At the same time, pin 1 and pin 4 must also be connected to each other.

"Analogue" operating mode

The pump capacity and/or stroke rate can be controlled by a current signal. The current signal is connected between pin 3 and pin 4.

In addition, pin 1 and pin 4 must also be connected.

"Auxiliary capacity" / "Auxiliary frequency" operating mode

The pump works at a pre-set capacity / stroke rate if:

- Pin 5 and pin 4 are connected to each other. At the same time, pin 1 and pin 4 must also be connected to each other. The auxiliary capacity / auxiliary frequency is factory-preset to maximum capacity / stroke rate.

9.2.2 "Level switch" terminal

There is a connecting option for a 2-stage level switch with pre-warning and limit stop.

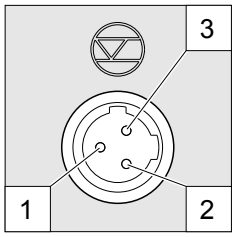


Fig. 16: Pump assignment

Electrical interface

Data	Value	Unit
Voltage with open contacts	5	V
Input resistance	10	kΩ

Control via:

- potential-free contact (load: 0.5 mA at 5 V) or
- Semiconductor switch (residual voltage < 0.7 V)

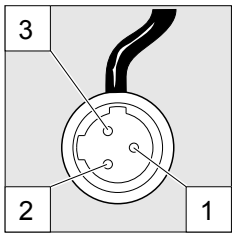


Fig. 17: Cable assignment

Pin	Function	3-wire cable
1	Earth / GND	black
2	Minimum pre-warning	blue
3	Minimum limit stop	brown

9.2.3 "Dosing monitor" terminal

There is a connection option for a dosing monitor.

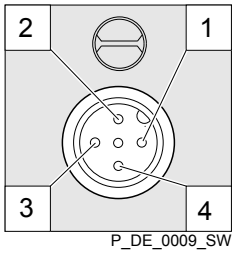


Fig. 18: Pump assignment

Electrical interface

Data	Value	Unit
Voltage with open contacts	5	V
Input resistance	10	kΩ

Control via:

- potential-free contact (load: 0.5 mA at 5 V) or

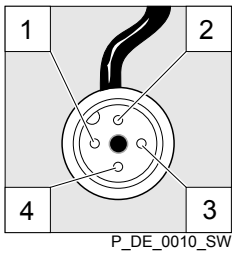


Fig. 19: Cable assignment

Pin	Function	4-wire cable
1	Power supply (5 V)	brown
2	Coding	white
3	Feedback	blue
4	Earth / GND	black

9.2.4 "Diaphragm rupture indicator" terminal

There is an option to connect a diaphragm rupture indicator.

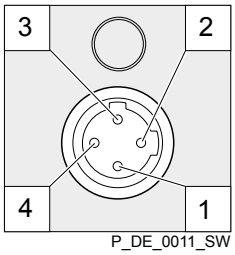


Fig. 20: Pump assignment

Electrical interface

Specification	Value
Supply voltage, approx.:	+5 V, loadable with 20 mA (current limit 150 mA)
Power consumption:	min. 10 mA, max. 20 mA (sensor presence detection)
Sensor signal:	potential-free contact (load: 0.5 mA at +5 V) or Semiconductor switch (residual voltage < 0.3 V)

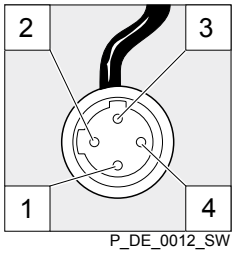


Fig. 21: Cable assignment

Pin	Function	4-wire cable
1	Power supply (5 V)	brown
2	not assigned	white
3	Sensor signal	blue
4	Earth / GND	black

9.2.5 Relay

9.2.5.1 Relay functions

gamma/ X GMXa

Identity code	Description	Type	Maximum voltage	Maximum current	Behaviour of relay type when retrofitting, as standard
0	no relay	-	-	-	-
1	Fault indicating relay	NC changeover contact	230 V	8 A	X
4	fault indicating relay + Pacing relay	N/O N/O	24 V 24 V	100 mA 100 mA	X X
C	fault indicating relay + 4-20 mA output	N/O	24 V	100 mA	X

Relay type switches in the event of...

Relay type*	Level Warning	Level low	Dosing monitor Error	Calibrated stroke length Error	Processor Error
Fault indicating relay:	X	X	X	X	X
Warning relay:	X	-	-	X	-

* Can be reprogrammed in the *'Relay'* menu.

9.2.5.2 "Fault indicating relay" output (identity code 1)

A fault indicating relay can be ordered as an option - refer to ordering information in the appendix. It is used to emit a signal when there is a fault with the pump and for the "Liquid level low, 1st stage" warning message and "Liquid level low, 2nd stage" fault message.

The fault indicating relay can be retrofitted and is operational once attached to the relay board - refer to "Retrofitting Relays" supplementary operating instructions.

The behaviour is factory-programmed. If another switching function is required, the pump can be reprogrammed in the *'Relay'* menu.

The relay can be retrofitted and operates once it is plugged into the relay board.

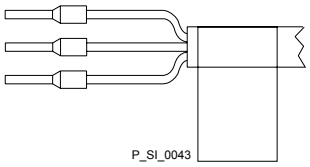


Fig. 22: Cable assignment

Electrical interface

Data	Value	Unit
Maximum contact load at 230 V and 50/60 Hz:	8	A
Minimum mechanical lifespan:	200,000	switching operations

Identity code 1

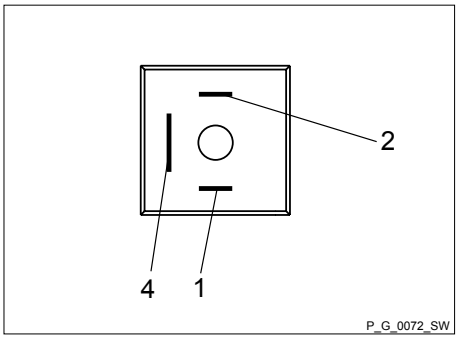


Fig. 23: Pump assignment

To pin	VDE cable	Contact	CSA cable
1	white	NO (normally open)	white
2	green	NC (normally closed)	red
4	brown	C (common)	black

9.2.5.3 Output for Other Relays (Identity code 4)

A fault indicating and a pacing relay can optionally be ordered - refer to ordering information in the appendix. The pacing output is electrically-isolated by means of an optocoupler with a semiconductor switch. The second switch is a relay (also electrically isolated).

The behaviour is factory-programmed. If another switching function is required, the pump can be reprogrammed in the *'Relay'* menu.

The fault indicating/pacing relay can be retrofitted and is operational once attached to the relay board - refer to "Retrofitting Relays" supplementary operating instructions.

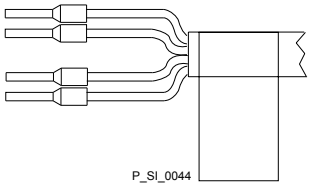


Fig. 24: Cable assignment

Electrical interface

for fault indicating relay output:

Data	Value	Unit
Maximum contact load at 24 V and 50/60 Hz:	2	A
Minimum mechanical lifespan:	20,000,000	switching operations

for semiconductor switch pacing relay:

Data	Value	Unit
Max. residual voltage at $I_{off\ max}$ = 1 µA	0.4	V
Maximum current	100	mA
Maximum voltage	24	VDC
Pacing pulse duration, approx.	100	ms

Identity code 4

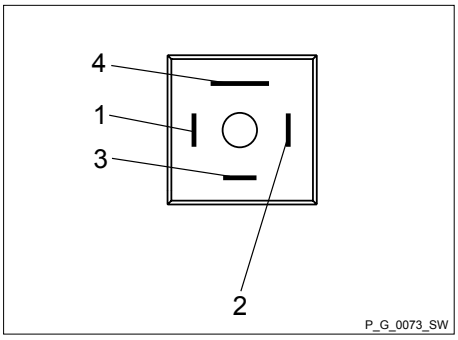


Fig. 25: Pump assignment

To pin	VDE cable	Contact	Relay
1	yellow	NO (normally open)	other relay
4	green	C (common)	other relay
3	white	NO (normally open)	Pacing relay
2	brown	C (common)	Pacing relay

9.2.5.4 Output "Current output plus relay" (identity code C)

A relay combined with a current output can optionally be ordered. The relay either switches off the pump as a fault indicating relay in the event of a fault on the pump and with "Liquid level low 1st stage" warning message and "Liquid level low 2nd stage" fault messages or is used as a pacing relay.

The behaviour is factory-programmed. If another switching function is required, the pump can be reprogrammed in the *'Relay'* menu.

In the *'ANALOG OUTPUT'* menu, the variable to be signalled by the current output can be selected.

The current output plus relay can be retrofitted and operates once it is plugged into the board.

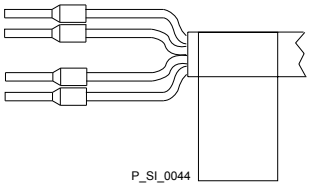


Fig. 26: Cable assignment

Electrical interface

for current output

Data	Value	Unit
Open circuit voltage:	8	V
Current range:	4 ... 20	mA
Ripple, max.:	80	µA pp
Ripple, max.:	250	Ω

for semiconductor switch ("relay"):

Data	Value	Unit
Max. residual voltage at $I_{off\ max}$ = 1 µA	0.4	V
Maximum current	100	mA
Maximum voltage	24	VDC
Pacing pulse duration, approx.	100	ms

Identity code c

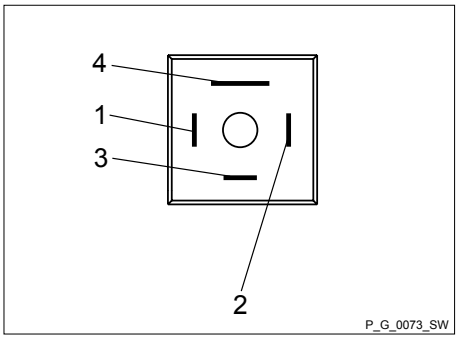


Fig. 27: Pump assignment

To pin	VDE cable	Contact	Relay
1	yellow	"+"	Current output
4	green	"-"	Current output
3	white	NC (normally closed) or NO (normally open)	Relay
2	brown	C (common)	Relay

10 Basic Set-up Principles

- *Please also refer to all the overviews covering "Operating/set-up overview" and "Operating menu for gamma/ X, complete" in the appendix and the chapters "Overview of Equipment and Control Elements" and "Control Elements".*
- *The pump leaves the menu and returns to a continuous display if [Menu] is pressed or no key is pressed for 60 seconds.*

10.1 Basic Principles for Setting up the Control



Fig. 28: Please read

Fig. 29 shows using the "Language" example how to set up something - in turn:

- Following the displays
- The path derived from this
- The path as presented in the operating instructions

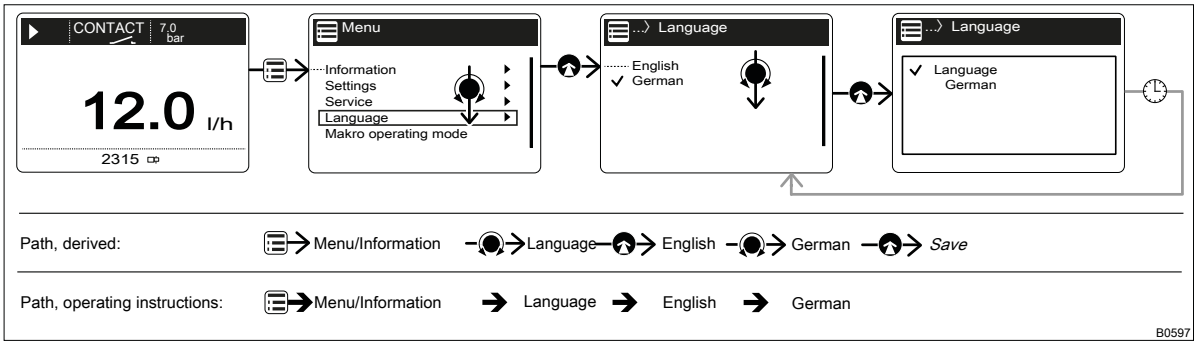


Fig. 29: "Setting up the language": As an example of set-up and path displays

Legend:

Symbol	Explanation
	Press *[Menu]*
	Turn the *[Clickwheel]*
	Press the *[Clickwheel]*

"Setting up the language" in detail

1. To access the *'Menu'*: press *[Menu]*.
   ⇨ The cursor points to *'Information'*.
2. To switch from *'Information'* to *'Language'*: turn the *[Clickwheel]*.
3. To return to the *'Language'* menu: press the *[Clickwheel]*.
   ⇨ The cursor points to a language.
4. To switch to *'Deutsch'*: turn the *[Clickwheel]*.
5. To save: press the *[Clickwheel]*.
   ⇨ The software shows a display by way of confirmation.
   After 2 seconds, it returns to the higher-level *'Menu'*.

6. To complete the setting: press [Menu].

   Alternatively: wait 15 seconds or exit the *'Menu'* via [Menu] or via *'End'*.

Confirming an entry

Briefly press the *[Clickwheel]*.

⇨ The software switches to the next menu point or back to the menu and saves the entry.

Quitting a menu option without confirming it

Press [Back].

⇨ The software switches to the next menu point or back to the menu without saving anything.

Returning to a continuous display

Press [Menu].

⇨ The software cancels the entry and switches to a continuous display without saving anything.

Changing adjustable variables

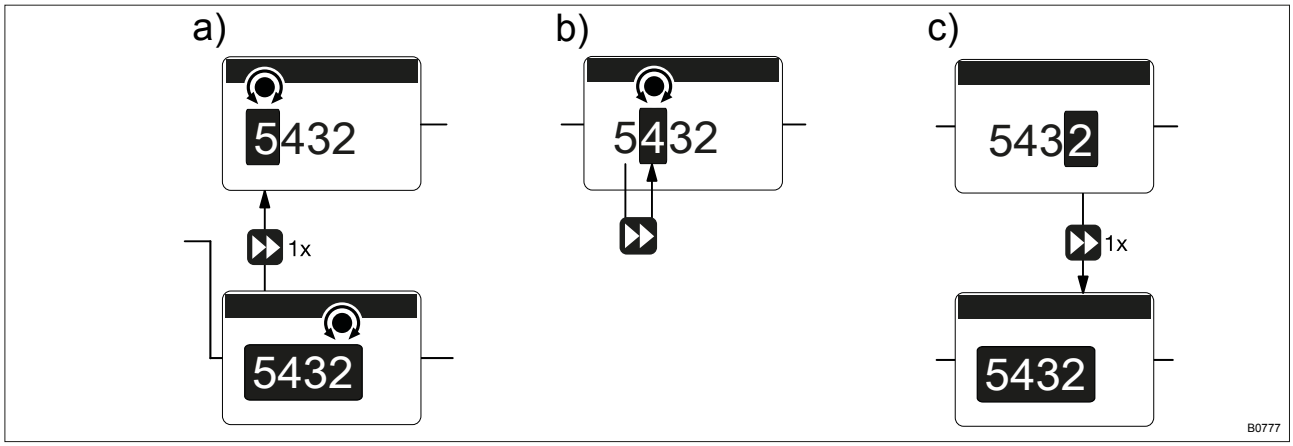


Fig. 30: a) Changing from one figure to its initial figures; b) Changing the figure; c) Returning from the last figure to the (complete) figure (to correct a wrong figure, for example0.

Changing a (complete) number

Turn the *[Clickwheel]*.

⇨ The value of the figure highlighted is increased or lowered.

Changing figures

1. To adjust the value of a figure, press [Priming].

   ⇨ The first figure is highlighted - see Figure above, point a)

2. To adjust the value of a figure, turn the *[Clickwheel]*.

3. To move to the next figure, press *[Priming]* - see Fig. above, point b).

4. To run through the figures again, if necessary (possibly because of an incorrect figure), when you get to the last figure press ⏭ *[Priming]* again - see Fig. above, point c).

   ⇨ Now you can start from the beginning again.

Confirming adjustable variables

Press the *[Clickwheel]* 1x.

⇨ The software saves the entry.

10.2 Checking adjustable variables

Continuous displays

Before you adjust the pump, you can check the actual settings of the adjustable variables:

Simply turn the *[Clickwheel]* if the pump is showing a continuous display.

⇨ Each time the *[Clickwheel]* engages when you turn it, you will see a different continuous display.



The number of continuous displays depends on the identity code, the selected operating mode and the connected additional devices, see overview "Continuous displays" in the appendix.

Secondary displays

The lowest line of a continuous display shows different information (which cannot be adjusted in the secondary display) - see overview "Continuous displays and secondary displays" in the appendix.

You can access secondary displays via any continuous display as follows:

1. Press the *[Clickwheel]* for 3 seconds.

   ⇨ A frame appears around the secondary display.

2. Providing there is a frame, you will see a different secondary display each time the *[Clickwheel]* engages when turned.

   When you reach the secondary display you wish, leave the *[Clickwheel]* and wait briefly.

10.3 Changing to set up mode

In a continuous display, if you press ☰ *'Menu'*, the pump changes to set-up mode - in the *'Menu'*. For more information refer to the following chapter entitled "Set-up / menu".

If under *'Access protect.'* only the *'Menu'* or *'All'* has been set (top left lock symbol), then after pressing the *[Clickwheel]*, first enter the *'Password'*.

11 Set Up / *'Menu'*



- *Please also refer to all overviews covering "Operating/ set up overview" and "Operating menu for gamma/ X, complete" in the appendix and in the chapters "Overview of Equipment and Control Elements".*
- *The pump leaves the menu and returns to a continuous display if [Menu] is pressed or no key is pressed for 60 seconds.*

The *'Menu'* is sub-divided as follows:

1 - *'Information'*

2 - *'Settings'*

3 - *'Timer'*

4 - *'Service'*

5 - *'Language'*

11.1 *'Information'*

→ *'Menu / Information → ...'*

The *'Information'* provides information on your pump and certain parameters and counters. The number and type can depend on the pump settings.

11.2 *'Settings'*

→ *'Menu / Information → Settings → ...'*

The *'Settings'* menu generally includes these setting menus:

1 - *'Operating mode'*

2 - *'Automatic'*

3 - *'Stroke length'*

4 - *'Metering'*

5 - *'Concentration'*

6 - *'Calibration'*

7 - *'System'*

8 - *'Inputs/outputs'*

9 - *'Bleed valve'*

10 - *'Priming time'*

11 - *'Time'*

12 - *'Date'*

11.2.1 *'Operating Mode'*

→ *'Menu / Information → Settings → Operating mode → ...'*

11.2.1.1 *'Manual'*

➔ *'Menu / Information ➔ Settings ➔ Operating mode ➔ Manual'*

'Manual' operating mode permits you to operate the pump manually.

The capacity and/or stroke rate and stroke length can be set in the continuous displays in this operating mode.

11.2.1.2 *'Contact'*

➔ *'Menu / Information ➔ Settings ➔ Operating mode ➔ Contact ➔ ...'*

'Contact' operating mode allows you to trigger individual strokes or a stroke series.

You can trigger the strokes via a pulse sent via the "External control" terminal.

The purpose of this operating mode is to convert the incoming pulses into strokes with a step-down (fractions) or small step-up.

CAUTION!
The pump maintains the stroke rate when changing over from *'Manual'* operating mode to *'Contact'* operating mode.

The maximum stroke rate can be set in 'Contact' operating mode. It should normally be set to 12,000 strokes/hour.

Memory - Pulses not yet processed

You can also activate the *'Memory'* function extension ("memory" identifier). When *'Memory'* is activated, the pump adds up the remaining strokes, which could not be processed, up to the maximum capacity of the stroke memory of 4,200,000,000 strokes. If this maximum capacity is exceeded, the pump goes into fault mode.

CAUTION!
– Only with *'Memory'* - *'off'* : If you press *[STOP/START]* or empty the contact memory (*'Menu / Information ➔ Service ➔ Clear counters'*) or the "Pause" function is activated, the *'Memory'* is cleared.

Factor

The number of strokes per pulse depends on the factor which you can input. By using a factor you can multiply incoming pulses by a factor between 1.01 and 99.99 or reduce them by a factor of 0.01 to 0.99:

```
Number of strokes executed = factor x number of
incoming pulses
```

Table of examples

	Factor	Pulse (sequence)	Number of strokes (sequence)
Step-up*			
	1	1	1
	2	1	2
	25	1	25
	99.99	1	99.99
	1.50	1	1.50 (1 / 2)
	1.25	1	1.25 (1 / 1 / 1 / 2)
Step-down**			
	1	1	1
	0.50	2	1
	0.10	10	1
	0.01	100	1
	0.25	4	1
	0.40	2.5 (3 / 2)	(1 / 1)
	0.75	1.33 (2 / 1 / 1)	(1 / 1 / 1)

*** Explanation of the conversion ratio**

With a factor of 1	... 1 stroke is executed per 1 pulse.
With a factor of 2	... 2 strokes are executed per 1 pulse
With a factor of 25	... 25 strokes are executed per 1 pulse

**** Explanation of step-down**

With a factor of 1	... 1 stroke is executed per 1 pulse.
With a factor of 0.5	...1 stroke is executed after 2 pulses.
With a factor of 0.1	...1 stroke is executed after 10 pulses.
With a factor of 0.75	...1 stroke is executed once after 2 pulses, then 1 stroke is executed twice after 1 pulse, and then again 1 stroke after 2 pulses etc.

If a remainder is obtained when dividing by the factor, then the unit adds the remainders together. As soon as this sum reaches or exceeds "1", the pump executes an additional stroke. Therefore on average during the metering operation, the resultant number of strokes precisely matches the factor.

Contact water meter

Using "Pulse Control" you can ideally adapt the pump to the relevant process, for example in conjunction with contact water meters.

11.2.1.3 *'Batch'*

'Menu / Information ➔ Settings ➔ Operating mode ➔ Batch ➔ ...'

The *'Batch'* operating mode enables you to pre-select large metering volumes.

You can only select whole numbers but no fractions as the number of strokes (figures 1 to 99,999).

You can trigger the strokes using the *[Clickwheel]* if you have already switched to the *'Push'* continuous display. You can also trigger them via a pulse via the "External control" terminal.

The stroke rate can be set in 'Batch' operating mode. It should normally be set to 12,000 strokes/hour.

Memory - remaining strokes not yet processed

You can also activate the *'Memory'* function extension ("memory" identifier). When *'Memory'* is activated, the pump adds up the remaining strokes, which could not be processed, up to the maximum capacity of the stroke memory of 4,200,000,000 strokes. If this maximum capacity is exceeded, the pump goes into fault mode.

CAUTION!

– The pump maintains its stroke rate when changing over from *'Manual'* operating mode to *'Batch'* operating mode.
– If you press *[STOP/START]* or the "Pause" function is activated, the *'Memory'* is cleared.

In operation, the batch size can be changed more easily by using the "Batch size" continuous display.

11.2.1.4 *'Analogue'* (Option)

'Menu / Information ➔ Settings ➔ Operating mode ➔ Analogue ➔ ...'

The secondary display "Signal current" indicates the incoming current.

You can select 5 types of current signal processing:

- *'0 - 20 mA'*
- *'4 - 20 mA'*
- *'Linear curve '*
- *'Lower side band'*
- *'Upper side band'*

'0 - 20 mA'

At 0 mA the pump is stationary –

At 20 mA the pump works at maximum stroke rate.

'4 - 20 mA'

At 4 mA the pump is stationary –

At 20 mA the pump works at maximum stroke rate.

With current signals of less than 3.8 mA, an error message appears and the pump stops (e.g. if a cable has broken).

'Linear curve'

The symbol "Linear curve" appears on the LCD screen. You can enter any pump stroke rate behaviour proportional to the current signal. For this purpose, enter any two points P1 (I1, F1) and P2 (I2, F2) (F1 is the stroke rate at which the pump is to operate at current I1, F2 is the stroke rate at which the pump is to operate at current I2...); this defines a straight line and thus the behaviour is specified:

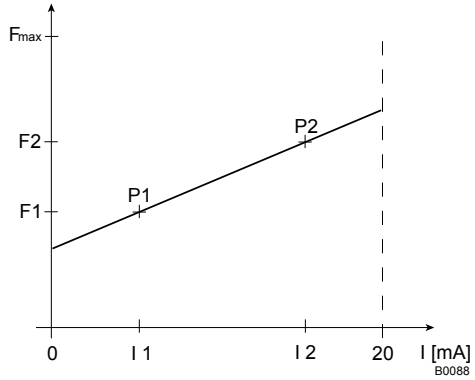


Fig. 31: Frequency-current diagram for "Linear curve"

Plot a diagram similar to the one above – with values for (I1, F1) and (I2, F2) – so that you can set the pump as desired!

The smallest processable difference between I1 and I2 is 4 mA (|I1-I2| ≥4 mA).

Error processing

In the *'Error message'* menu item, you can activate an error process for these types of processing.

'Lower side band'

Using this type of processing, you can control a metering pump using the current signal as shown in the diagram below.

However, you can also control two metering pumps for different feed chemicals via a current signal (e.g. one acid pump and one alkali pump using the signal of a pH sensor). To do this, connect the pumps electrically in series.

Error processing

In the *'Error message'* menu item, you can activate an error process for these types of processing.

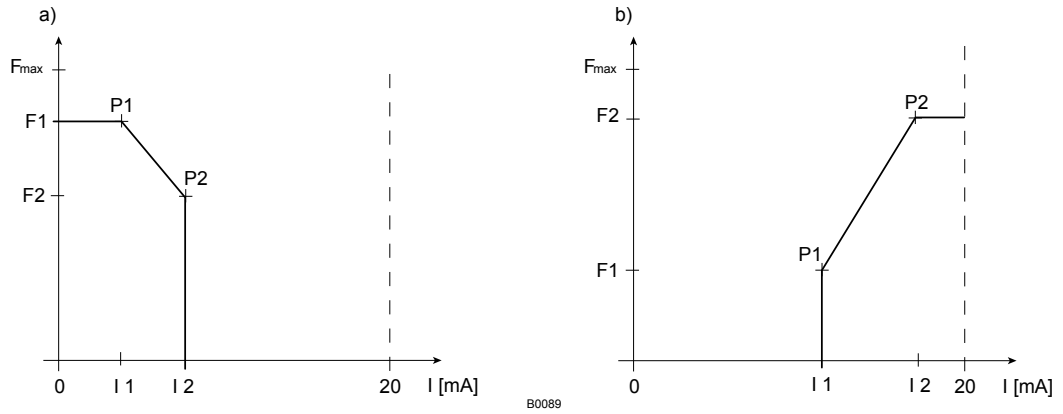


Fig. 32: Frequency-current diagram for a) Lower side band, b) Upper side band

'Upper side band'

Using this processing type, you can control a metering pump using the current signal as shown in the diagram above.

Everything functions according to the type of the processing *'Lower side band'*.

11.2.2 *'Automatic'*

☰➔ *'Menu / Information ➔ Settings ➔ Automatic ➔ ...'*

In the *'Automatic'* menu, you can set whether the unit is to meter automatically or conventionally.

With *'Automatic' - 'on'*, you set direct values, such as capacity, metering volume or dosing time, instead of stroke length and stroke rate. Other selection points then appear in the operating menu - refer to the chapter "Operating Menu for gamma/ X, complete" (in the appendix) for the selection points highlighted with a "*1".

In *'Automatic' - 'on'* metering mode, the gamma/ X specifies the stroke length and the stroke rate according to the conditions determined in order to meter the set capacity.

'Automatic' - 'on' and 'Automatic' - 'off' metering modes are completely independent of each other. That is to say that 'Automatic' - 'off' metering mode does not carry over settings from 'Automatic' - 'on'.

11.2.3 *'Stroke length'*

☰➔ *'Menu / Information ➔ Settings ➔ Stroke length ➔ ...'*

The menu does not appear with *'Automatic' 'on'*!

In the *'Stroke length'* menu, you can enter the stroke length manually.

In operation, the stroke length can be changed more easily by using the "Stroke length" continuous display:

- *Turn the [Clickwheel] to return to the "Stroke length" continuous display.*
- *Press the [Clickwheel] and then turn it to set the stroke length.*
- *Press the [Clickwheel] to save the stroke length.*

11.2.4 Metering

☰ ➔ *'Menu / Information ➔ Settings ➔ Metering ➔ ...'*

11.2.4.1 *'Discharge Stroke'*

☰ ➔ *'Menu / Information ➔ Settings ➔ Metering ➔ Discharge stroke ➔ ...'*

In the *'Settings'* - *'Discharge stroke'* sub-menu, you can precisely match the pump metering flow over time against the requirements of the particular application.

This ensures that the user can set the optimum **discharge stroke** for his application, as required:

Pos.*	Discharge stroke	Application
A.	*'optimum'*	For maximum accuracy when metering and the very best results with internal pressure measurement and special functions.
B.	*'fast'*	For as fast a discharge stroke as possible - the duration of the discharge stroke is dependent on the stroke rate.
C.	*'Sine mode'*	For a long, sine-shaped discharge stroke - the duration of the discharge stroke is dependent on the stroke rate.
D.	*'continuous'*	For a continuous discharge stroke e.g. for bottling processes. The duration of the discharge stroke is dependent on the stroke rate.
E.	*'DFMa'*	For optimum operation with a flow meter DulcoFlow® DFMa.

* see following drawing.

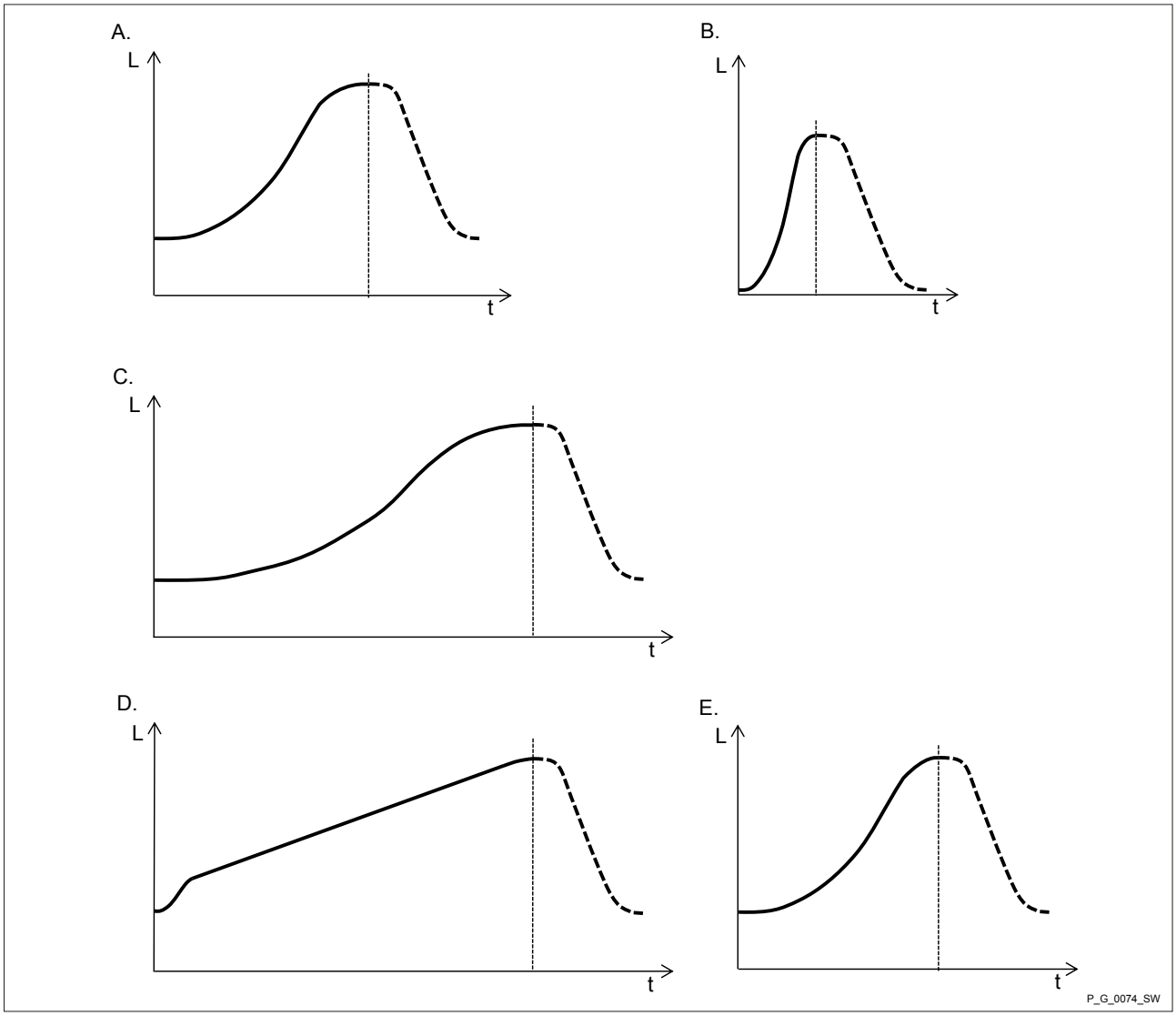


Fig. 33: Discharge stroke metering profiles with stroke L and time t (suction stroke shown as a dotted line)

11.2.4.2 *'Suction Stroke'*

☰ ➔ *'Menu / Information ➔ Settings ➔ Metering ➔ Suction stroke ➔ ...'*

It is possible to selectively also slow the **suction stroke** with all these metering profiles for the discharge stroke - see . In this way, it is possible to prevent the main cause of inaccurate metering with high viscosity feed chemicals, namely the incomplete filling of the liquid end. With gaseous feed chemicals, the slow suction stroke prevents cavitation and consequently increases dosing precision.

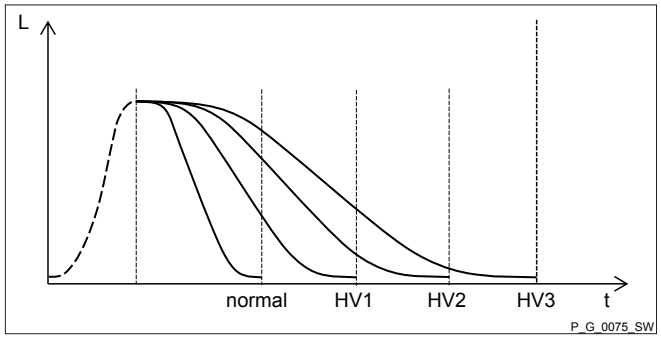


Fig. 34: Suction stroke metering profiles with stroke L and time t

Normal Normal suction stroke
HV1 Suction stroke for viscous feed chemical
HV2 Suction stroke for average viscosity feed chemical
HV3 Suction stroke for high-viscosity feed chemical

– *Slowing down the suction stroke leads to a lower stroke rate and thus to a lower capacity.*

'Suction stroke' setting	Maximum stroke rate Strokes/min
Normal	200
HV1	160
HV2	120
HV3	80

11.2.4.3 *'Pressure Stage'*

➔ *'Menu / Information ➔ Settings ➔ Metering ➔ Pressure stage ➔ ...'*

You can use the programmable function *'Pressure stage'* to reduce the nominal pressure of the pump, thereby minimising the risk of lines rupturing.

The switch-off pressure of the permanently active overpressure monitoring falls at the same time as the pressure stage - see .

Nominal pressures depending on the size of the liquid ends and the pressure stages

Pressure stage /	4	7	10	16	20	25
Size of liquid end						
1602	X	X	X	X	-	-
2002	X	X	X	-	X	-
1604	X	X	X	X	-	-
2504	X	X	X	-	-	X

Pressure stage /	4	7	10	16	20	25
Size of liquid end						
1009	X	X	X	-	-	-
0708	X	X	-	-	-	-
0715	X	X	-	-	-	-
0414	X	-	-	-	-	-
0424	X	-	-	-	-	-

Pressure stage	Switch-off pressure*
2	2.8
4	5.2
7	8.5
10	12.5
16	19
20	23
25	28

* above which the unit is switched off for the medium-term in the event of excess pressure

11.2.4.4 *'Monitoring'*

→ *'Menu / Information* → *Settings* → *Metering* → *Monitoring* → *...'*

11.2.4.4.1 *'Air lock'*

→ *'Menu / Information* → *Settings* → *Metering* → *Monitoring* → *Air lock* → *...'*

Should a message and the "Air lock" symbol appear, this may mean that there is gas in the liquid end (if *'Warning'* or *'Error'* was set in the *'Air lock'* sub-menu).

11.2.4.5 Compensation

Using the *'Compensation'* programmable function, you can minimise the influence of back pressure oscillations and thus achieve a high dosing precision.

With difficult hydraulic conditions, it can be better to switch off the 'Compensation' function.

11.2.5 Concentration

→ *'Menu / Information → Settings → Concentration → ...'*

The desired mass concentration of feed chemical that will subsequently be required in the dissolving medium (e.g. the main flow) can be entered directly in the "Concentration" continuous display.

The principle of entering the concentration:

1. Select the operating mode.
2. Set the data for the feed chemical and dissolving medium in the *'Set up'*- *'Concentration'* menu.
3. Set the desired concentration in the "Concentration" continuous display.

- *The "Concentration" continuous display only appears, if:*
  - *the pump is calibrated.*
  - *the 'Concentration' menu was run through in the operating mode used.*
  - *and 'Concentration control' was switched to 'active' - in the operating mode being used.*
- *The "Concentration" continuous display switches to the display mode "%" at concentrations above 999.99 ppm.*
- *When changing between operating modes, the pump saves the settings for each operating mode - providing it is connected to supply voltage.*
- *If the pump is to display the concentration as a volume concentration, enter "1.00" kg/l for the density of the feed chemical.*

11.2.5.1 *'Manual'* operating mode (settings for the *'Concentration'* function)

→ *'Menu / Information → Settings → Concentration → Concentration control → Flow of main medium → ...'*

The "Concentration input" in *'Manual'* operating mode is intended for metering a substance into pipework containing a medium flowing at a constant rate (*'main flow'*) in such a way that it has a specific mass concentration in the flow.

CAUTION!

Danger of too high concentrations

The metering pump can continue to meter if the flow falls or stops entirely.

- Take system-based precautions to prevent the metering pump from continuing to meter in these circumstances.

The prerequisites are that:

- the flowing medium has the same density as water (1 kg/l ≙ g/cm³)
- the mass concentration of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid: 35 %)

- the density of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid: 1.26 kg/l ≙ g/cm³)
- The measurement unit for the liquid volume is set in the *'System* ➔ *Volume unit'* menu.

Procedure

CAUTION!
The precision of the concentration is strongly dependent on:
– the precision of the metering pump calibration.
– the precision of the inputs.

1. Calibrate the metering pump if it is not yet calibrated - see chapter *'Settings'*- *'Calibration'* chapter.
2. Check whether the metering pump is set to *'Automatic'* - *'on'* metering mode.
3. Select *'Manual'* - *'Operating mode'* (possible settings from other operating modes remain saved.).
4. Select *'Concentration'* in the *'Set up'* menu.
5. Actively set *'active'* in the *'Concentration control'* menu item and press the *[Clickwheel]*.
6. Set the *'Main medium flow'* (in the pipework) and then press the *[Clickwheel]*.
7. Set the *'Feed chemical mass concentration'* and press the *[Clickwheel]*.
8. Set the (mass) *'Feed chemical density'* and press the *[Clickwheel]*.
   ⇨ The *'Concentration'* menu appears.
9. Press *[Menu]*.
   ⇨ A continuous display appears.
10. Press the *[Clickwheel]* to go to the "Concentration" continuous display (ppm or %).
11. Enter the required mass concentration of the feed chemical in the main flow by pressing and turning the *[Clickwheel]*.

Possible values of adjustable variables

Adjustable variable	Lower value	Upper value	Increment
Flow in m³/h	0000.1	9999.9	0000.1
Mass concentration in %	000.01	100.00	000.01
Mass density in kg/l	0.50	2.00	0.01

11.2.5.2 *'Contact'* operating mode (settings on the *'Concentration'* function)

'Menu / Information ➔ Settings ➔ Concentration ➔ Concentration control ➔ Contact gap ➔ ...'

The "Concentration input" in *'CONTACT'* operating mode is intended for metering a substance into pipework containing a medium flowing at a variable rate in such a way that it has a specific mass concentration in the flow.

CAUTION!
Danger of too high concentrations
The metering pump can continue to meter if the flow falls or stops entirely.

– Take system-based precautions to prevent the metering pump from continuing to meter in these circumstances.

The prerequisites are that:

- the flowing medium has the same density as water (1 kg/l ≙ g/cm³)
- the mass concentration of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid: 35 %)
- the density of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid: 1.26 kg/l ≙ g/cm³)
- a contact water meter is hydraulically installed and connected to the external input of the metering pump.
- The measurement unit for the liquid volume is set in the *'System* ➔ *Volume unit'* menu.

Procedure

CAUTION!
The precision of the concentration is strongly dependent on:

– the precision of the metering pump calibration.
– the precision of the inputs.

1. Calibrate the metering pump if it is not yet calibrated - see chapter *'Settings'*- *'Calibration'* chapter.
2. Check whether the metering pump is set to *'Automatic'* - *'on'* metering mode.
3. Select *'Contact'* - *'Operating mode'* and simply confirm the associated menu items with the *[Clickwheel]* (possible settings from other operating modes remain saved.)
4. Select *'Concentration'* in the *'Set up'* menu.
5. Actively set *'active'* in the *'Concentration control'* menu item and press the *[Clickwheel]*.
6. Set the *'Contact gap'* and press the *[Clickwheel]*.
7. Set the (mass) *'Feed chemical concentration'* and press the *[Clickwheel]*.
8. Set the (mass) *'Feed chemical density'* and press the *[Clickwheel]*.

   ⇨ The *'Concentration'* menu appears.
9. Press *[Menu]*.

   ⇨ A continuous display appears.
10. Press the *[Clickwheel]* to go to the "Concentration" continuous display (ppm or %).

11. You can enter the desired mass concentration using the *[Clickwheel]*.

Possible values of adjustable variables

Adjustable variable	Lower value	Upper value	Increment
Contact gap in l/contact	000.10	999.99	000.01
Mass concentration in %	000.01	100.00	000.01
Mass density in kg/l	0.50	2.00	0.01

11.2.5.3 *'Batch'* operating mode (settings for the *'Concentration'* function)

➔ *'Menu / Information* ➔ *Settings* ➔ *Concentration* ➔ *Concentration control* ➔ *Volume of main medium* ➔ *...'*

The "Concentration input" in *'Batch'* operating mode, is intended for metering a substance into the medium in a storage tank so that it then has a defined mass concentration in the storage tank (when batching a solution – do not forget to stir!).

The prerequisites are that:

- the medium in the storage tank has the same mass density as water (1 kg/l ≙ g/cm³)
- the mass concentration of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid: 35 %)
- the density of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid: 1.26 kg/l ≙ g/cm³)
- The measurement unit for the liquid volume is set in the *'System* ➔ *Volume unit'* menu.

Procedure

CAUTION!
The precision of the concentration is strongly dependent on:
– the precision of the metering pump calibration.
– the precision of the inputs.

1. Calibrate the metering pump if it is not yet calibrated - see *'Set up'* - *'Calibration'* chapter.
2. Check whether the metering pump is set to *'Automatic'* - *'on'* metering mode.
3. Select *'Batch'* - *'Operating mode'* and simply confirm the associated menu items with the *[Clickwheel]* (possible settings from other operating modes remain saved.)
4. Select *'Concentration'* in the *'Set up'* menu.
5. Actively set *'active'* in the *'Concentration control'* menu item and press the *[Clickwheel]*.
6. Set the *'Main medium volume'* of the medium in the storage tank and press the *[Clickwheel]*.
7. Set the (mass) *'Feed chemical concentration'* and press the *[Clickwheel]*.
8. Set the (mass) *'Feed chemical density'* and press the *[Clickwheel]*.
   ⇨ The *'Concentration'* menu appears.

9. Press *[Menu]*.

   ⇨ A continuous display appears.

10. Press the *[Clickwheel]* to go to the "Concentration" continuous display (ppm or %).

11. You can enter the desired mass concentration using the *[Clickwheel]*.

Possible values of adjustable variables

Adjustable variable	Lower value	Upper value	Increment
Volume in l	0000.1	9999.9	0000.1
Mass concentration in %	000.01	100.00	000.01
Mass density in kg/l	0.50	2.00	0.01

11.2.5.4 *'Analogue'* operating mode (settings on the *'Concentration'* function)

'Menu / Information ➔ *Settings* ➔ *Concentration* ➔ *Concentration control* ➔ *Max. flow of main medium* ➔ *...'*

The "Concentration input" in *'Analogue'* operating mode is intended for metering a substance into pipework containing a medium flowing at a variable rate in such a way that it has a specific mass concentration in the flow.

CAUTION!
Danger of too high concentrations
The metering pump can continue to meter if the flow falls or stops.
– Take system-based precautions to prevent the metering pump from continuing to meter in these circumstances.

CAUTION!
Risk of incorrect concentrations
– After adjusting, check whether the concentration at various flows corresponds to the required result.

The prerequisites are that:

- the flowing medium has the same density as water (1 kg/l ≙ g/cm³)
- the mass concentration of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid: 35 %)
- the density of the feed chemical is known - see the feed chemical safety data sheet (e.g. with 35% sulphuric acid: 1.26 kg/l ≙ g/cm³)
- a flow meter with analogue output is hydraulically installed and connected to the external input of the metering pump.
- The measurement unit for the liquid volume is set in the *'System* ➔ *Volume unit'* menu.

Procedure

CAUTION!
The precision of the concentration is strongly dependent on:
– the precision of the metering pump calibration.
– the precision of the inputs.

1. Calibrate the metering pump if it is not yet calibrated - see chapter *'Settings'*- *'Calibration'* chapter.
2. Check whether the metering pump is set to *'Automatic'* - *'on'* metering mode.
3. Select *'Analogue'* operating mode and confirm with the *[Clickwheel]*.
4. Set *'0...20 mA'* or *'4..20 mA'* in the *'Select analogue'* menu item and press the *[Clickwheel]*.
5. Select *'Concentration'* in the *'Set up'* menu.
6. Actively set *'active'* in the *'Concentration control'* menu item and press the *[Clickwheel]*.
7. Set the *'Max. main medium flow'* (in the pipework) and press the *[Clickwheel]*. (It is then assigned to the current value of 20 mA).
8. Set the (mass) *'Feed chemical concentration'* and press the *[Clickwheel]*.
9. Set the (mass) *'Feed chemical density'* and press the *[Clickwheel]*.
   ⇨ The *'Concentration'* menu appears.
10. Press *[Menu]*.
    ⇨ A continuous display appears.
11. Press the *[Clickwheel]* to go to the "Concentration" continuous display (ppm or %).

12. You can enter the desired mass concentration using the *[Clickwheel]*.

CAUTION!
- Note the decimal point.
- The mass concentration is affected by changes in the stroke rate and the stroke length.
- The pump limits the upper value of the mass concentration, because otherwise the incremental jumps when adjusting would be unacceptably large. Adjust the stroke length as necessary - do not set it under 30%.

The least significant figures of the value in the continuous display cannot be changed at will using the [Arrow keys], rather only in incremental jumps resulting from the input data.

As necessary, change the stroke length and adjust the concentration; in doing so the pump compensates via the stroke rate.

Possible values of adjustable variables

Adjustable variable	Lower value	Upper value	Increment
Max. flow in m^3/h	0000.1	9999.9	0000.1
Mass concentration in %	000.01	100.00	000.01
Mass density in kg/l	0.50	2.00	0.01

11.2.6 Calibrate

➔ *'Menu / Information ➔ Settings ➔ Calibration ➔ ...'*

Accuracy of calibration 1

Normally the pump does not have to be calibrated.

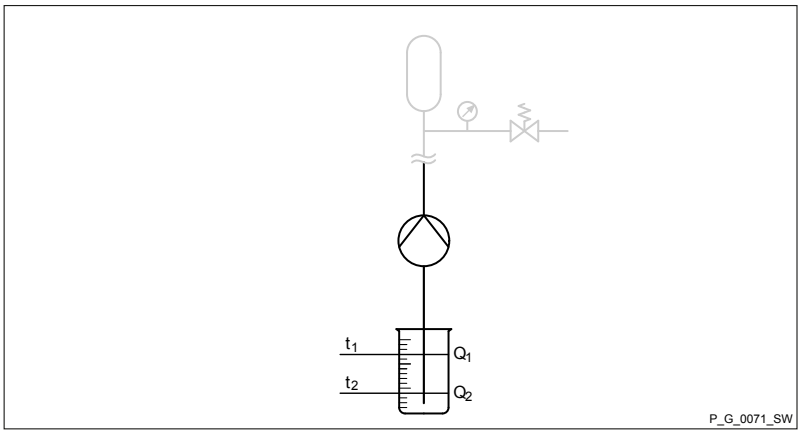
The pump can be calibrated if viscous feed chemicals are used or extremely high accuracy is required.

Accuracy of calibration 2

Calibration will not be accurate if these conditions are not adhered to:

- *do not allow the stroke length to fall below 30%.*
- *The pump should perform a minimum of 200 strokes for calibration.*

WARNING!
If the feed chemical is dangerous, take appropriate safety precautions when performing the following calibration instructions. Observe the safety data sheet for the feed chemical!



Preparation

1. Use the *[Clickwheel]* to scroll through the continuous display to check whether litres or gallons have been selected.
2. If the incorrect volume unit has been selected, correct it in the *'Menu / Information* ➔ *Settings* ➔ *System* ➔ *Volume unit'* menu.
3. Check whether the capacity of stroke rate in the continuous display is not too low for calibration.
4. Lead the suction hose into a measuring cylinder containing the feed chemical – make sure that the discharge hose is installed in a permanent manner (operating pressure, ...!).
5. Prime the feed chemical (press ⏩ *[Priming]*) if the suction hose is empty.

Calibration process

1. Record the level in the measuring cylinder.
2. Select the *'Menu / Information* ➔ *Settings* ➔ *Calibrate'* ' menu and press the *[Clickwheel]*.
   ⇨ The *'Start calibration'* (PUSH) menu point appears.
3. To start calibration, press the *[Clickwheel]*.
   ⇨ The *'Calibrate ...'* menu item appears, the pump starts to pump and indicates the number of strokes.
4. After a reasonable number of strokes (a minimum of 200), use the *[Clickwheel]* to stop the pump.
   ⇨ The *'Calibration ended'* menu point appears. It demands the calibration volume to be entered.
5. Determine the required metering volume (difference between initial volume - remaining volume in the measuring cylinder).
6. Use the *[Clickwheel]* to enter this volume in the *'Calibration ended'* menu items and close.
   ⇨ The pumps switches to the *'Calibration result'* menu item - the pump is calibrated.
7. Press the *[Clickwheel]*.
   ⇨ The pump returns to the *'Menu / Information* ➔ *Settings'* menu.

11.2.7 System

'Menu / Information ➔ Settings ➔ System ➔ ...'

The *'System'* menu splits into the following sub-menus:

1 - *'Dosing head'*

2 - *'Volume unit'*

3 - *'Pressure unit'*

11.2.7.1 *'Dosing head '*

'Menu / Information ➔ Settings ➔ System ➔ Dosing head ➔ ...'

CAUTION!

– Should a different liquid end size be fitted, then the pump must be reprogrammed in the *'Dosing head'* sub-menu.

– Reprogram the pump to *'No dosing head'* for demonstration purposes or if operating without feed chemical.

If 'SEK' has been selected as the type of head, the pressure is not displayed and the 'Automatic' menu is hidden. Only 'fast' can be selected for the 'Discharge stroke' and 'normal' for the 'Suction stroke'.

11.2.7.2 Volume unit

'Menu / Information ➔ Settings ➔ System ➔ Volume unit ➔ ...'

You can select another unit for the volume in the *'Volume unit'* sub-menu.

11.2.7.3 Pressure unit

'Menu / Information ➔ Settings ➔ System ➔ Pressure unit ➔ ...'

In the *'Pressure unit'* sub-menu, you can select another unit for the pressure.

11.2.8 Inputs/Outputs

'Menu / Information ➔ Settings ➔ Inputs/Outputs ➔ ...'

The *'Inputs/Output'* menu splits into the following sub-menus:

1 - *'Auxiliary Capacity' / 'Auxiliary Frequency'*

2 - *'Relay1'* (optional)

3 - *'Relay2'* (optional)

4 - *'mA output'* (optional)

5 - *'Diaphragm rupture'* (only if connected)

6 - *'Flow control'* (only if connected)

7 - *'Pause input'* (Option)

8 - *'Level warning'*

9 - *'Level error'*

11.2.8.1 *'Auxiliary Capacity' / 'Auxiliary Frequency'*

☰ ➔ *'Menu / Information ➔ Settings ➔ Inputs/Outputs ➔ Auxiliary capacity / Auxiliary frequency ➔ ...'*

The programmable function *'Auxiliary capacity' / 'Auxiliary frequency'* permits the switch-over to an additional capacity / stroke rate that can be fixed in the *'Auxiliary capacity' / 'Auxiliary frequency'* menu.

It can be activated via the "External control" terminal. If *'Auxiliary capacity' / 'Auxiliary frequency'* is being used, then the identifier "AUX" appears on the LCD screen.

Refer to the "Hierarchy of Operating Modes, Functions and Fault Statuses" for the order of the various operating modes, functions and fault statuses.

11.2.8.2 *'Relay1 (Optional)'*

☰ ➔ *'Menu / Information ➔ Settings ➔ Inputs/outputs ➔ Relay1 ➔ ...'*

The setting options for the 'Relay' function only exist if a relay is fitted.

gamma/ X, GMXa

Relay, physical and pre-set to ...

Identity code specification	Relay, physical	Pre-set to ...
1	1 x changeover contact 230 V – 8 A	Fault indicating relay, N/C
4	2 x N/O 24 V – 100 mA	Fault indicating relay, N/C, and pacing relay
C	1 x N/O 24 V – 100 mA, + 4...20 mA output	Fault indicating relay, N/C

Relay type

You can reprogram the relays to these types:

Menu setting	Effect
Inactive	The relay is inactive.
Error	The relay switches in the event of a fault message (red LED*).
Warning	The relay switches in the event of a warning message (yellow LED*).
Warning + error	The relay switches in the event of a warning message (yellow LED*) or a fault message (red LED*).
Pump active	The relay switches as soon as the pump is in standby and not in a state like *'Pause'* .
Metering / Batch	The relay changes its state as soon as a batch has been processed.
Stroke rate**	The relay switches at every stroke.
Option	The relay has the option of the module plugged in (e.g. the bleed module).
Bleed	The relay switches upon the internal signal *'Air lock'*.

* see the "Troubleshooting" chapter

** only use *'Relay 2'* for this relay type (semiconductor relay).

Relay polarity

You can set here how a relay is to switch.

Menu setting	Effect
normally-closed (NC)	The relay is closed in normal mode and opens with a triggering event.
normally-open (NO)	The relay is open in normal mode and opens with a triggering event.

11.2.8.3 *'Relay2 (Optional)'*

☰ ➔ *'Menu / Information ➔ Settings ➔ Inputs/outputs ➔ Relay2 ➔ ...'*

Relay cycle quantity

Here you can set the metering volume for which the pacing relay is to switch once.

For more information on *'Relay2'* - see ↳ *Chapter 11.2.8 'Inputs/Outputs' on page 62*.

11.2.8.4 *'mA Output (Optional)'*

☰ ➔ *'Menu / Information ➔ Settings ➔ Inputs/outputs ➔ mA output ➔ ...'*

Here you can set which current range is to be used at the mA output.

You can then set whether the current stroke rate (strokes / hour) is to be signalled at the mA output or the capacity (litres / hour) and the corresponding value for 20 mA.

11.2.8.5 *'Diaphragm Rupture'*

☰➔ *'Menu / Information ➔ Settings ➔ Inputs/outputs ➔ Diaphragm rupture ➔ ...'*

The setting options for the 'Diaphragm rupture' function only exist if a diaphragm rupture indicator is electrically installed. The symbol for diaphragm appears }.

In the *'Diaphragm rupture'* sub-menu you can select whether the pump generates a warning message or a fault message in the event of a diaphragm rupture.

11.2.8.6 *'Flow Control'*

☰➔ *'Menu / Information ➔ Settings ➔ Inputs/outputs ➔ Flow control ➔ ...'*

The setting options for the 'Flow control' function only exists if a flow control has been electrically installed. The symbol for flow control appears: ⊜.

A metering monitor, such as a Flow Control (also DulcoFlow®), can register the individual pressure impacts of the pump and feed it back to the pump.

The pump switches to fault mode if this feedback is missing in a sequence, as set under *'Error tolerance'*.

It is possible to switch the function on and off under *'Activation'* .

It is possible to set whether the function is to be deactivated with auxiliary frequency under *'if Auxiliary'*.

11.2.8.7 *'Pause Input'*

☰➔ *'Settings ➔ Inputs/outputs ➔ Pause ➔ ...'*

In the *'Pause'* menu you can select whether the pump switches to *'Pause'* with a "normally-open (NO)" or "normally-closed (NC) input contact signal.

11.2.8.8 *'Level Warning'*

☰➔ *'Settings ➔ Inputs/outputs ➔ Level warning ➔ ...'*

In the *'Level warning'* menu, you can select whether the pump switches to *'Level warning'* with a "normally-open (NO)" or "normally-closed (NC)" input contact signal.

11.2.8.9 *'Level Error'*

☰➔ *'Settings ➔ Inputs/outputs ➔ Level error ➔ ...'*

In the *'Level error'* menu, you can select whether the pump switches to *'Level error'* with a "normally-open (NO)" or "normally-closed (NC)" input contact signal.

11.2.9 Bleed

➔ *'Menu / Information* ➔ *Settings* ➔ *Bleed* ➔ *...'*

The *'Bleed'* function is used for controlled bleeding of the liquid end.

The software solution is always in the pump control. The pump presses the gas bubbles out of the liquid end at maximum stroke rate during bleeding.

If the pump has "Automatic bleed" via the "relay identity code option (retro-fittable), the pump can be bled via a bleed relay.

There are 2 hardware options for automatically bleeding the discharge side:

- via ProMinent's bleed module in the liquid end.
- via a customer implemented bleed facility in the discharge line.

The *'Bleed'* function can be triggered in 4 ways:

1 - Not (*'Off'*).

2 - *'Periodically'* by an internal signal - defined by *'Cycle'* and *'Duration'*.

3 - By the *'Air lock'* internal signal

4 - If one of the two signals occurs (*'Both'*).

Detailed explanation:

1 - If *'Off'* has been selected in the menu, this function is deactivated.

2 - If *'Periodically'* was selected in the menu, then the control unit periodically triggers the bleed procedure with an adjustable *'cycle'* (10 ... 1440 min = 24 h) and an adjustable *'duration'* (5 ... 300 s = 5 min).

Bleeding is always triggered at the start of a period. A bleed process is also started by the *[STOP/START]* key or by connecting the pump to mains voltage.

3 - If *'Air lock'* has been selected in the menu, the *'Air lock'* internal signal triggers the bleed procedure.

If the signal appears again within 8 minutes of the bleed procedure being carried out, the control unit repeats the bleed procedure up to a maximum of 3 times. However if the signal still appears, then an error message is generated, which has to be acknowledged via the *[dial]*.

In the event of an *'Air lock'* the option of a direct error or warning message disappears for the *'Air lock'* signal. The corresponding menu branch in the *'Settings'* menu is also hidden. The signal is only available for the *'Bleed'* function.

4 - If *'Both'* has been selected in the menu, then each trigger can trigger a bleed process.

Sequence of the bleed procedure (automatic):

1. The pump control stops the normal metering operation - the "Stop Pause" symbol appears on the LCD screen.
2. Only with bleed relay: After 1 s, the pump control opens the bleed valve on the liquid end (via the bleed relay and the solenoid valve).
3. 1 s later, the pump starts to run at its maximum possible stroke rate (as during priming) - the "Air lock" symbol appears on the LCD screen instead of the "Stop Pause" symbol.
4. The pump operates in this way for the total set time.

5. Once the set time has elapsed, the pump stops – the "Stop Pause" symbol appears on the LCD screen again.
6. Only with bleed relay: After 1 s the pump control closes the liquid end bleed valve.
7. After 1 s the "Stop Pause" symbol disappears and the pump recommences normal operation.

If the pump was in the "Stop" state at the time of triggering (*[STOP/START]*, Pause, Error), the start of the bleed procedure is delayed - until this state has been cleared.

If the pump switched to "Stop" state during the bleed procedure, the pump control jumps immediately to phases 5 and 6 - see above. This definitely cancels the bleed procedure. As soon as the "Stop" state is cleared, the bleed procedure starts from the beginning.

11.2.10 *'Priming Time'*

→ *'Menu / Information → Settings → Priming time → ...'*

In the *'Priming time'* menu, you can select how long the metering pump is to prime once *[Priming]* has been pressed.

In operation, the stroke length can be changed more easily using the "Priming time" display:

- *Press [Priming] - the pump starts to prime.*
- *Turn the [Clickwheel] to set the priming time.*
- *Press the [Clickwheel] to save the priming time.*

11.2.11 *'Time'*

→ *'Menu / Information → Settings → Time → ...'*

In the *'Time'* menu you can set the time.

1. Use the dial to adjust a figure.
2. Use *[Priming]* to move to the next figure.

Under *'Auto. Summer time'* you can select whether you wish to change over to *'Summer time'*.

You can also input when the pump is to change to and from *'Summer time'*.

11.2.12 *'Date'*

→ *'Menu / Information → Settings → Date → ...'*

You can set the date in the *'Date'* menu.

11.3 Timer

☰ ➔ *'Menu / Information ➔ Timer ➔ ...'*

11.3.1 Timer Activation

☰ ➔ *'Menu / Information ➔ Timer ➔ Activation ➔ ...'*

To activate the timer, set *'Activation'* to *'active'*.

11.3.2 Setting the Timer

☰ ➔ *'Menu / Information ➔ Timer ➔ Setting the timer ➔ ...'*

A program set up in "Automatic" - "on" metering mode will not function in "Automatic" - "off" metering mode and vice versa.

You can create commands (program lines) for a timer program in the *'Set timer'* menu.

You can create up to 32 commands (program lines).

You can then use the administration functions to manage the commands - ↳ *Chapter 11.3.2 'Setting the Timer' on page 68*.

Use the *'Clear all'* function to clear all commands (the program).

Create the command as follows:

1 - Create a command (program line)

2 - Select the triggering event and time

3 - Selecting the Action and Value

4 - Check the command

5 - Create the next command if necessary

11.3.2.1 Administration Functions for Commands

The following administration functions are available to manage the commands (program lines):

- *'New'*
- *'Display'* (only if commands entered)
- *'Change'* (only if commands entered)
- *'Clear'* (only if commands entered)

Use *'New'* to create a new command.

11.3.2.2 *'Init'* Initial Conditions

Use *'Init'* to specify initial conditions at the start of the program - see ↳ *Chapter 11.3.2.4 'Selecting the action and value' on page 69*.

11.3.2.3 Selecting the *'Time Event'* and Time

You can select a time event (cycle) and a time as well:

Time event	Time
'Hourly'	hourly at the x minute
'Daily (Mon-Sun)'	daily at the time mm.ss, Monday to Sunday
'Weekdays1 (Mo-Fr)'	daily at the time mm.ss, Monday to Friday
'Weekdays1 (Mo-Sa)'	daily at the time mm.ss, Monday to Saturday
'Weekend (Sa+Su)'	daily at the time mm.ss, Saturday and Sunday
'Weekly'	weekly at the time mm.ss on the day dd.
'Monthly'	weekly at the time mm.ss on the x. day of the month



CAUTION!
If you wish to use automatic summer time adjustment (*'Settings'* - *'Time'*) avoid any triggering events between 02:00 a.m. and 03:00 a.m.

11.3.2.4 Selecting the action and value

You can select an action and also a value:

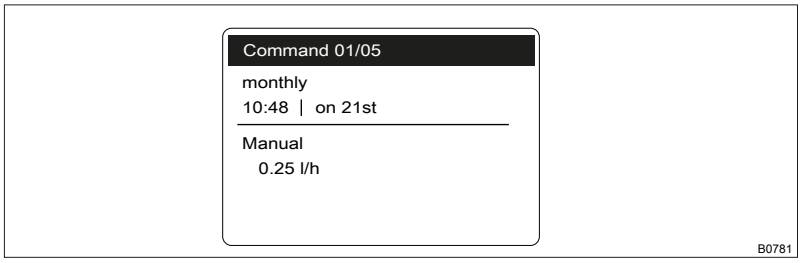
Action	Value
Manual	Litre/h *1
	Strokes/h *2
	Stroke length * 2
Stop	--
Frequency	Litre/h *1
	Strokes/h *2
Relay 1	open
	closed
Relay 2	open
	closed

*1: only available in *'Automatic'* operating mode - see Chapter *'Settings'* - *'Automatic'*

*2: only available, if metering is done the traditional/conventional way.

11.3.2.5 Checking the Finished Command

The pump displays the finished command (program line) as soon as you have finished programming the command:



11.3.3 Clear All

➔ *'Menu / Information* ➔ *Timer* ➔ *Clear all* ➔ *...'*

Use the *'Clear all'* menu to clear all commands (the program).

11.3.4 Example

Example of "Weekday metering"

The pump is to meter 2 litres every half an hour every weekday (Mon-Fri) between 8:00 and 11:00:

Command	Time event	Time of day	Action	Capacity	Comment
01	workdays 1 (Mo-Fr)	08:30	Manual	12,000 l/h	//Meter with 12,000 l/h//
02	workdays 1 (Mo-Fr)	08:40	Stop		//Stop//
03	workdays 1 (Mo-Fr)	09:30	Manual	12,000 l/h	//Meter with 12,000 l/h//
04	workdays 1 (Mo-Fr)	09:40	Stop		//Stop//
05	workdays 1 (Mo-Fr)	10:30	Manual	12,000 l/h	//Meter with 12,000 l/h//
06	workdays 1 (Mo-Fr)	10:40	Stop		//Stop//

Explanation: At a capacity of 12 l/h, the pump has to work for 10 minutes to meter 2 litres.

11.4 *'Service'*

➔ *'Menu / Information* ➔ *Service* ➔ *...'*

11.4.1 *'Access Protect.'*

➔ *'Menu / Information* ➔ *Service* ➔ *Access protect.* ➔ *...'*

You can lock parts of the setting options here.

The following locking options are available:

Selection	Point ①	Point ②
'none'	-	-
' Lock menu'	X	-
'Lock all'	X	X

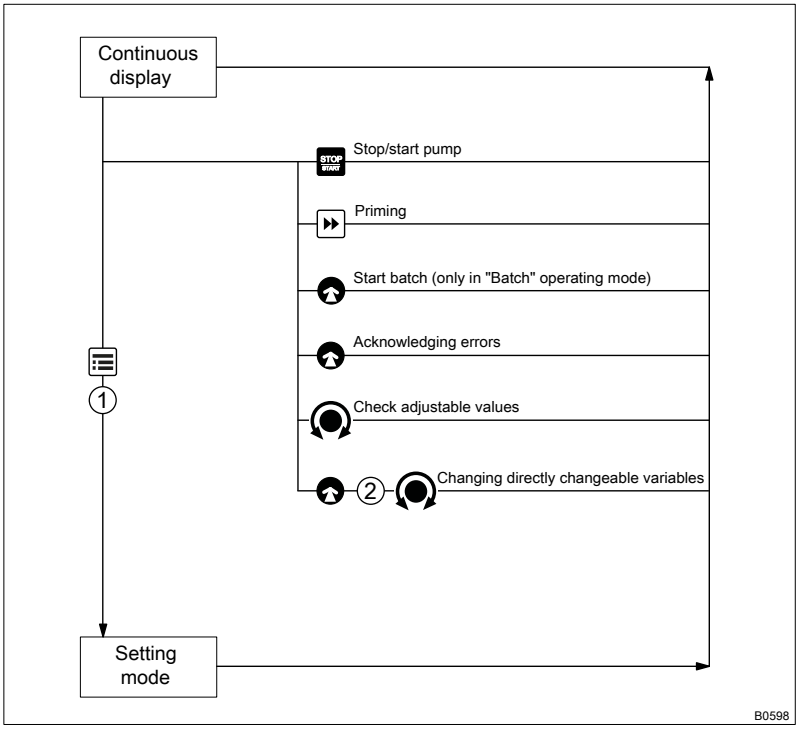


Fig. 35

If you have set a *'Password'* - see below, then the identifier will appear after 1 minute in the top left and the specified areas will be locked, if no key has been pressed in the meantime.

Both locks use the same *'Password'*.

11.4.2 *'Password '*

➔ *'Menu / Information ➔ Service ➔ Password ➔ ...'*

You can enter a password of your choice in the *'Change password'* menu.

11.4.3 *'Clear Counter'*

➔ *'Menu / Information ➔ Timer ➔ Clear counter ➔ ...'*

You can reset the counter to "0" in the *'Clear counter'* menu:

- *'Stroke counter'* (total number of strokes)
- *'Volume counter'* (total litres)
- *'Contact memory'*
- *'All'*

To clear: exit the menu by briefly pressing the *[Clickwheel]*.

The values have increased since commissioning of the pump, the last calibration or the last deletion.

11.4.4 *'Diaphragm Replacement'*

☰ ➔ *'Menu / Information* ➔ *Service* ➔ *Diaphragm replacement* ➔ *...'*

You can move the slide rod into the "replacement position" here with *'To replacement position'* to enable the diaphragm to be replaced more easily.

11.4.5 *'Display'*

☰ ➔ *'Menu / Information* ➔ *Service* ➔ *Display* ➔ *...'*

You can set the *'Contrast'* and the *'Brightness'* of the LCD screen here.

11.4.6 *'Reset to Factory Settings'*

☰ ➔ *'Menu / Information* ➔ *Service* ➔ *Reset to factory settings* ➔ *...'*

You can reset the pump to its factory settings here with *'Yes'*

11.5 *'Language'*

☰ ➔ *'Menu / Information* ➔ *Language* ➔ *...'*

In the *'Language'* menu, you can select the desired operating language.

12 Operation

WARNING!
Fire hazard with flammable media
Only with combustible media: These may start to burn when combined with oxygen.

– During filling and draining of the liquid end, an expert must ensure that feed chemical does not come into contact with oxygen.

This chapter describes all the operating options in a continuous display (several symbols and the pressure display appear at the top in the black bar) for the trained person at the pump.

– *Please also refer to the "Operating/Setting Overview" and "Continuous Displays and Secondary Displays" overviews at the end of the operating instructions and also the "Overview of Equipment and Control Elements" chapter.*

12.1 Manual operation

Stop/start pump

Stop the pump: Press *[STOP/START]*.

Start the pump: Press *[STOP/START]* again.

Priming

Press *[Priming]*.

Turn the *[Clickwheel]* to extend of shorten the priming time during priming.

Starting a batch

In *'Batch'* operating mode: Press the *[Clickwheel]* in the *'Push'* continuous display.

Acknowledging errors

Press the *[Clickwheel]* to acknowledge error messages that require acknowledgement.

Checking adjustable variables

In a continuous display: Another continuous display will appear each time the *[Clickwheel]* engages when turned. (The number depends on the configuration).

Changing directly changeable variables

Changing a variable in the relevant continuous display:

1. Press the *[Clickwheel]*.
   ⇨ The variable can be changed (highlighted).
2. Turn the *[Clickwheel]*.
   ⇨ The variable is changed.
3. Press the *[Clickwheel]*.
   ⇨ The variable is saved (the highlighting disappears).

If the "lock" - "lock all" has been set - see *'Set Up Overview of the gamma/ X' on page 74*, first enter the *'Password'* after pressing the *[Clickwheel]*.

List of directly changeable variables:

- Capacity
- Stroke rate
- Stroke length
- Factor
- Contact volume
- Batch dosing time
- Concentration

Set Up Overview of the gamma/ X

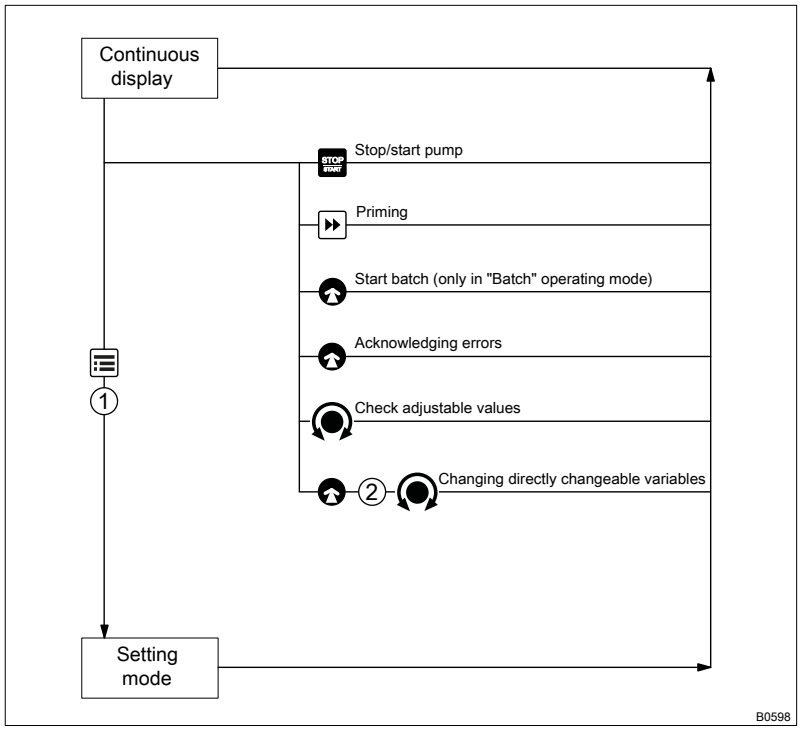


Fig. 36: Control options using keys and locking options

Press *[Clickwheel]*
Turn *[Clickwheel]*
① "Lock menu"
② "Lock all"

13 Maintenance

WARNING!
It is mandatory that you read the safety information and specifications in the "Storage, Transport and Unpacking" chapter prior to shipping the pump.

WARNING!
Fire hazard with flammable media
Only with combustible media: These may start to burn when combined with oxygen.

– During filling and draining of the liquid end, an expert must ensure that feed chemical does not come into contact with oxygen.

CAUTION!
Warning of feed chemical spraying around
Feed chemical can spray out of the hydraulic components if they are manipulated or opened due to pressure in the liquid end and adjacent parts of the system.

– Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
– Depressurise the system before commencing any work on hydraulic parts.

Third party spare parts for the pumps may lead to problems when pumping.

– *Use only original spare parts.*
– *Use the correct spare parts kits. In the event of doubt, refer to the exploded views and ordering information in the appendix.*

Standard liquid ends:

Interval	Maintenance work	Personnel
Quarterly*	■ Check the metering diaphragm for damage** - refer to "Repair". ■ Check that the hydraulic lines are fixed firmly to the liquid end. ■ Check that the suction valve and discharge valve are fitted tightly. ■ Check that the entire liquid end is leak-tight - particularly around the leakage hole - refer to Fig. 37. ■ Check that the flow is correct: Press ⏩ *[Priming]* to allow the pump to prime briefly. ■ Check that the electrical connections are intact. ■ Check the integrity of the housing. ■ Check that the dosing head screws are tight.	Technical personnel

* Under normal loading (approx. 30% of continuous operation)

Under heavy loading (e.g. continuous operation): Shorter intervals.

** Check the diaphragm frequently with feed chemicals that put particular pressure on the diaphragm, e.g. those containing abrasive additives.

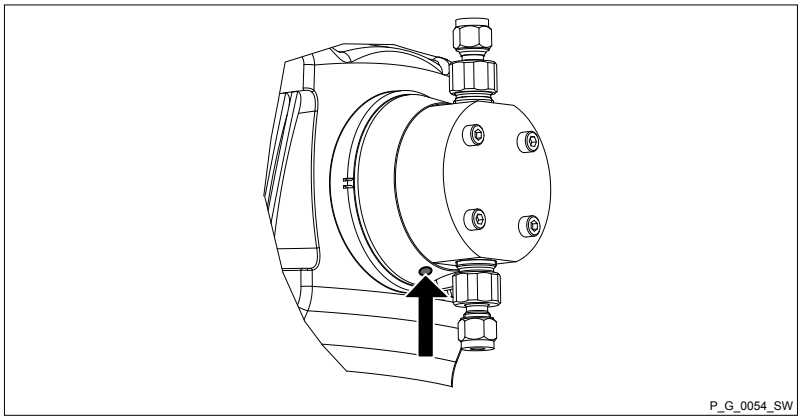


Fig. 37: Leakage hole

Liquid ends with bleed valve:

Interval	Maintenance work
Quarterly*	In addition: ■ Check that the bypass line is fixed firmly to the liquid end. ■ Check that the bleed valve is tight. ■ Check the discharge and bypass line for kinks. ■ Check that the bleed valve is operating correctly.

* Under normal loading (approx. 30% of continuous operation).

Under heavy loading (e.g. continuous operation): Shorter intervals.

Tightening torque

Data	Value	Unit
Tightening torque for screws:	4.5 ... 5.0	Nm

14 Repairs

Safety information



WARNING!

Danger of electric shock

Unauthorised repairs inside the pump can result in an electric shock.

For this reason, only allow a ProMinent branch or representative to perform repair inside the pump, in particular the following:

- Replacement of damaged mains connection lines
- Replacement of fuses
- Replacement of electronic control



WARNING!

It is mandatory that you read the safety information and specifications in the "Storage, Transport and Unpacking" chapter prior to shipping the pump.



WARNING!

Contact with the feed chemical

Parts that come into contact with the feed chemical are exposed and touched during repair work.

- Protect yourself against the feed chemical in case it is hazardous. Read the safety data sheet on the feed chemical.



CAUTION!

Warning of feed chemical spraying around

Feed chemical can spray out of the hydraulic components if they are manipulated or opened due to pressure in the liquid end and adjacent parts of the system.

- Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
- Depressurise the system before commencing any work on hydraulic parts.



WARNING!

Fire hazard with flammable media

Only with combustible media: These may start to burn when combined with oxygen.

- During filling and draining of the liquid end, an expert must ensure that feed chemical does not come into contact with oxygen.

14.1 Cleaning Valves



Warning of faulty operation

Refer to the exploded drawings in the appendix when working on the unit.

14.2 Replacing the Diaphragm

- If necessary take protective measures.
- Adhere to the material safety data sheet for the feed chemical.
- Prevent the escape of feed chemical.
- Ensure that the system is at atmospheric pressure.

1. Empty the liquid end (turn the liquid end upside down and allow the feed chemical to run out; flush out with a suitable medium; flush the liquid end thoroughly when using hazardous feed chemicals!)
2. Set up ☰ ➔ *'Service ➔ Diaphragm replacement ➔ To replacement position'*

   ⇨ The pump moves the diaphragm away from the backplate.

> *Now leave the pump connected to the mains/ power supply so that this state is maintained.*

3. Unscrew the hydraulic connectors on the discharge and suction side.
4. With types with coarse/fine bleed valve: Firstly remove the coarse/ fine bleed valve (grip), then lift off the cover of the liquid end with a screw driver.

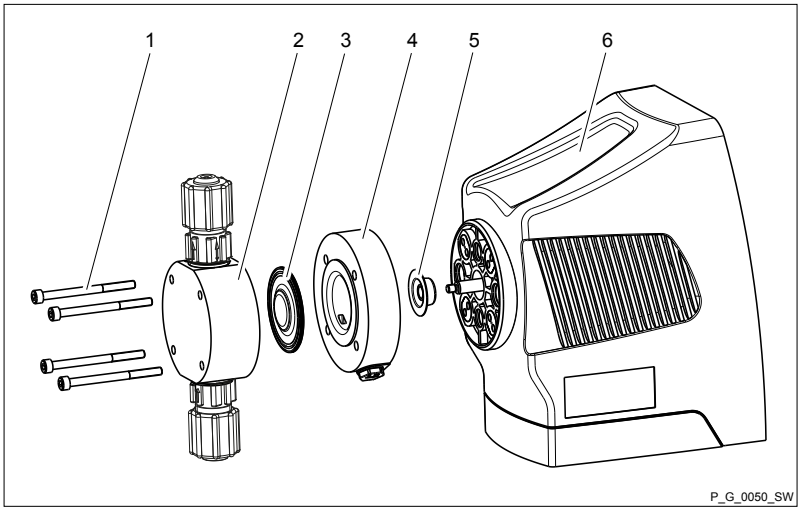


Fig. 38: Partially exploded view of liquid end

1 Screws
2 Dosing head
3 Diaphragm
4 Backplate
5 Safety diaphragm
6 Pump housing

5. Remove the screws (1).
6. Remove the dosing head (2) plus screws (1) from the pump - see figure
7. Loosen the diaphragm (3) from the drive axle with a gentle backwards turn in an anticlockwise direction.
8. Unscrew the diaphragm (3) completely from the drive axle.
9. Remove the backplate (4) from the pump housing (6).
10. Check the condition of the safety diaphragm (5) and replace if necessary.
11. Push the safety diaphragm (5) onto the drive axle only until it lies flush with the pump housing (6) and no further!

12. Tentatively screw the new diaphragm (3) onto the drive axle up to the stop - ensure that this is successful, otherwise the pump will subsequently not meter correctly!
13. Unscrew the diaphragm (3) again.
14. Place the backplate (4) on the pump housing (6).

CAUTION!
- Make sure that the leakage hole points downwards when the pump is subsequently fitted - see figure in the "Maintenance" chapter!
- Place the backplate (4) immediately into the correct position on the pump housing (6)! Do not twist the backplate on the pump housing to prevent the safety diaphragm (5) becoming warped!

15. Place the diaphragm (3) into the backplate (4).

CAUTION!
- Do not over-tighten the diaphragm (3) in the following step!
- Ensure that the backplate (4) remains in its position so that the safety diaphragm does not become warped!

16. Hold the backplate (4) firmly and screw the diaphragm (3) in a clockwise direction until it is sitting tightly.
17. Place the dosing head (2) with the screws (1) onto the diaphragm (3) and the backplate (4) - ensure that the suction connector points downwards when the pump is in its subsequent fitting position.
18. Set up ☰ ➔ *'Service* ➔ *Diaphragm replacement* ➔ *Back'*

    ⇨ The pump moves the diaphragm back to the backplate.
19. Gently tighten the screws (1) and then tighten them diagonally. See below for the tightening torque.
20. With types with coarse/fine bleed valve: Allow the cover of the liquid end to rest in the dosing head, then press the grip of the bleed valve into the coarse/fine bleed valve.

Check the tightening torque of the screws after 24 hours of operation!

Tightening torque

Data	Value	Unit
Tightening torque for screws:	4.5 ... 5.0	Nm

14.3 Cleaning the Diaphragm Rupture Indicator

WARNING!

Warning of unnoticed escaping of feed chemical

After the diaphragm rupture indicator has been triggered, any residue of feed chemical residues can interfere with it.

- After the diaphragm rupture indicator has been triggered, clean and test it.

1. First replace the liquid end diaphragm - see above!
2. Unscrew the diaphragm rupture indicator using an SW 14 open-ended spanner.
3. Clean the diaphragm rupture indicator with suitable liquid - if possible using water (polysulphone material).
4. Test the connected diaphragm rupture indicator: fully immerse the tapered section at the front in water.
   ⇨ The continuous display indicates a diaphragm rupture.
5. Thoroughly dry the diaphragm rupture indicator.
   ⇨ The continuous display no longer indicates a diaphragm rupture.
6. Screw the clean and dry diaphragm rupture indicator into the hole until hand-tight and liquid-tight - without using tools!

15 Troubleshooting

Safety information



WARNING!

Warning of dangerous or unknown feed chemical

Should a dangerous or unknown feed chemical be used: It may escape from the hydraulic components when working on the pump.

- Take appropriate protective measures before working on the pump (e.g. safety glasses, safety gloves, ...). Observe the safety data sheet for the feed chemical.
- Drain and flush the liquid end before working on the pump.



CAUTION!

Warning of feed chemical spraying around

Feed chemical can spray out of the hydraulic components if they are manipulated or opened due to pressure in the liquid end and adjacent parts of the system.

- Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
- Depressurise the system before commencing any work on hydraulic parts.



WARNING!

Fire hazard with flammable media

Only with combustible media: These may start to burn when combined with oxygen.

- During filling and draining of the liquid end, an expert must ensure that feed chemical does not come into contact with oxygen.

15.1 Faults Without a Fault Message

Faults without a fault message

Fault description	Cause	Remedy	Personnel
Pump does not prime in spite of full stroke motion and bleeding.	Minor crystalline deposits on the ball seat due to the valves drying out.	Take the suction hose out of the storage tank and thoroughly flush out the liquid end.	Technical personnel
	Serious crystalline deposits on the ball seat due to the valves drying out.	Dismantle the valves and clean them - refer to the "Repair" chapter.	Technical personnel
Fluid is escaping from the backplate.	The screws in the dosing head are too loose.	Tighten the screws in the dosing head crosswise - refer to the "Repair" chapter for the tightening torque.	Instructed personnel
	The diaphragm is not leaktight.	Replace the diaphragm - refer to the "Repair" chapter. If a diaphragm rupture has been indicated, clean the diaphragm rupture indicator - refer to the "Repair" chapter.	Technical personnel
Green LED display (operating indicator) does not light up.	The wrong mains voltage or no mains voltage is connected.	The specified mains voltage as per the voltage specification can be found on the nameplate.	Electrician

15.2 Fault Messages

In the event of a fault:

- The red LED display lights up.
- A message and a symbol then appear on the LCD screen.
- The pump stops.

Fault description	Cause	Remedy	Personnel
The identifier appears followed by the message *'Level error!'*	The fluid level in the storage tank has reached "Liquid level low 2nd stage".	Fill the storage tank.	Technical personnel
The *'Storage tank overflow'* message appears.	The stroke memory has overflowed.	Remedy the cause (such as too low a factor, too high a contact frequency ...), then: Press the *[Clickwheel]* (think of the consequences for the process!).	Technical personnel
The identifier I < 4 mA appears followed by the message *'Input signal < 4 mA'*.	The pump is in *'Analogue'* operating mode, a fault behaviour has been programmed in the *'Analogue'* menu and the control current has fallen below 4 mA.	Clear the cause of the low control current or switch the programming of the fault behaviour to *'off'* - see chapter "Set Up"-"Settings"-"Operating mode"-"Analogue".	Technical personnel
The identifier I > 20 mA appears followed by the message *'Input signal > 20 mA'*.	The pump is in *'Analogue'* operating mode, a fault behaviour has been programmed in the *'Analogue'* menu and the control current has risen above 20 mA.	Clear the cause of the high control current or switch the programming of the fault behaviour to *'off'* - see chapter "Set Up"-"Settings"-"Operating mode"-"Analogue".	Technical personnel
The identifier I < Imin appears followed by the message *'Control signal < Imin'*.	The pump is in *'Analogue'* operating mode-"xx side band", a fault behaviour has been programmed in the *'Analogue'* menu and the control current has fallen below 4 mA.	Clear the cause of the low control current or switch the programming of the fault behaviour to *'off'* - see chapter "Set Up"-"Settings"-"Operating mode"-"Analogue".	Technical personnel
The identifier I > Imax appears followed by the message *'Control signal > Imax'*.	The pump is in *'Analogue'* operating mode-"xx side band", a fault behaviour has been programmed in the *'Analogue'* menu and the control current has risen above 20 mA.	Clear the cause of the high control current or switch the programming of the fault behaviour to *'off'* - see chapter "Set Up"-"Settings"-"Operating mode"-"Analogue".	Technical personnel
The identifier appears followed by the message *'Defective stroke metering'*.	The dosing monitor reported more defective strokes than was set in the *'Inputs/Outputs'* menu.	Press the *[Clickwheel]*. Investigate and clear the cause.	
The identifier appears followed by the message *'Diaphragm rupture'*.	The diaphragm is broken.	Replace the diaphragm and clean the diaphragm rupture indicator, refer to the "Repair" chapter.	Technical personnel
The identifier P+ appears followed by the message *'Overload '*.	The pump has detected too high a back pressure.	Rectify the cause.	Technical personnel
The identifier "Temperature" appears followed by the message *'Temperature'* and the pump remains idle.	The ambient temperature is too high.	Lower the ambient temperature. The pump starts up automatically.	Technical personnel
	The temperature is too high.	Rectify the cause. The pump starts up automatically.	Technical personnel
The identifier appears followed by the message *'Air in dosing head'*.	Gas bubbles in the liquid end (leaks, gaseous medium, cavitation).	Bleed the liquid end and rectify the cause. Seal the system or slow the suction stroke.	Technical personnel

Fault description	Cause	Remedy	Personnel
The identifier appears followed by the message *'Mains/ power supply / PFC over-voltage'*.	The mains voltage is too high or too low or not connected.	Rectify the cause.	Technical personnel

15.3 Warning Messages

In the event of a warning:

- The yellow LED display lights up!
- A message and a symbol then appear on the LCD screen.

Fault description	Cause	Remedy	Personnel
'Level' and the identifier appear.	The fluid level in the storage tank has reached "Liquid level low 1st stage".	Fill the storage tank.	Instructed personnel
The identifier appears followed by the message *'Defective stroke metering'*.	The dosing monitor reported more defective strokes than was set in the *'Inputs/ Outputs'* menu.	Press the *[Clickwheel]*. Investigate and clear the cause.	
The identifier appears followed by the message *'Diaphragm rupture'*.	The diaphragm is broken.	Replace the diaphragm and clean the diaphragm rupture indicator, refer to the "Repair" chapter.	Technical personnel
The identifier appears followed by the message *'Overload '*.	The pump has detected too high a back pressure.	Rectify the cause.	Technical personnel
The identifier "Temperature" appears followed by the message *'Temperature'*.	The ambient temperature is too high.	Lower the ambient temperature.	Technical personnel
	The temperature is too high.	Rectify the cause.	Technical personnel
The identifier appears followed by the message *'Air in dosing head'*.	Gas bubbles in the liquid end (leaks, gaseous medium, cavitation).	Bleed the liquid end and rectify the cause. Seal the system or slow the suction stroke.	Technical personnel
The identifier appears followed by the message *'Invalid metering volume'*.	The metering volume cannot be metered.	Adapt the metering parameters.	Technical personnel

15.4 All Other Faults

Please contact the responsible ProMinent branch or representative!

16 Decommissioning

Decommissioning

WARNING!

Danger from chemical residues

There is normally chemical residue in the liquid end and on the housing after operation. This chemical residue could be hazardous to people.

- It is mandatory that the safety notes in the "Storage, Transport and Unpacking" chapter are read before shipping or transport.
- Thoroughly clean the liquid end and the housing of chemicals and dirt. Adhere to the material safety data sheet for the feed chemical.

WARNING!

Warning of dangerous or unknown feed chemical

Should a dangerous or unknown feed chemical be used: It may escape from the hydraulic components when working on the pump.

- Take appropriate protective measures before working on the pump (e.g. safety glasses, safety gloves, ...). Observe the safety data sheet for the feed chemical.
- Drain and flush the liquid end before working on the pump.

WARNING!

Fire hazard with flammable media

Only with combustible media: These may start to burn when combined with oxygen.

- During filling and draining of the liquid end, an expert must ensure that feed chemical does not come into contact with oxygen.

CAUTION!

Warning of feed chemical spraying around

Feed chemical can spray out of the hydraulic components if they are manipulated or opened due to pressure in the liquid end and adjacent parts of the system.

- Disconnect the pump from the mains power supply and ensure that it cannot be switched on again by unauthorised persons.
- Depressurise the system before commencing any work on hydraulic parts.

Danger of damage to the device

Take into account the information in the "Storage, Transport and Unpacking" chapter if the system is decommissioned for a temporary period.

1. Disconnect the pump from the mains power supply.
2. Drain the liquid end by turning the pump upside down and allowing the feed chemical to run out.

3. Flush the liquid end with a suitable medium; flush the dosing head thoroughly when using hazardous feed chemicals!

Disposal



CAUTION!

Risk to the environment from the battery

There is a battery in the pump, which can have a toxic effect on the environment.

- Separate the battery from the remaining parts.
- Note the pertinent regulations currently applicable in your country!



CAUTION!

Environmental hazard due to electronic waste

There are electronic components in the pump, which can have a toxic effect on the environment.

- Separate the electronic components from the remaining parts.
- Note the pertinent regulations currently applicable in your country!

17 Technical Data

17.1 Performance Data

gamma/ X operating at 200 strokes/minute and 100 % stroke length

Type	Minimum pump capacity at maximum back pressure			Connector size outside ∅ x inside ∅	Suction lift**	Priming lift****	Max. priming pressure on the suction side
	bar	l/h	ml/stroke	mm	m WS	m WS	bar
gamma/ X							
2002	20	2.05	0.17	6x3	6.0	2.5	5.5
1602	16	2.3	0.19	6x4	6.0	2.5	5.5
1604	16	3.6	0.30	6x4	6.0	3.0	3
0708	7	7.6	0.63	8x5	6.0	2.0	2
0414	4	14.0	1.17	8x5	3.0	2.5	1.5
0220	2	19.7	1.64	12x9	2.0	2.0	1
2504	25	3.8	0.32	8x4	6.0	3.0	3
1009	10	9.0	0.75	8x5	6.0	3.0	2
0715	7	14.5	1.21	8x5	4.0	3.0	1.5
0424	4	24.0	2.00	12x9	3.0	3.0	1
0245	2	45.0	3.70	12x9	2.0	2.0	0.8
gamma/ X metering pumps with self-bleeding dosing head SEK*							
1602	16	1.3	0.11	6x4	2.1	1.8	0.5
1604	16	2.4	0.21	8x5	2.7	1.8	0.5
0708	7	6.8	0.57	8x5	2.0	1.8	0.5
0414	4	12.0	1.00	8x5	2.0	1.8	0.5
0220	2	18.0	1.50	12x9	2.0	1.8	0.5
1009	10	8.0	0.67	8x5	3.0	1.8	0.5
0715	7	12.0	1.00	8x5	2.5	1.8	0.5
0424	4	20.0	1.67	12x9	2.5	1.8	0.5



gamma/ X metering pumps with dosing heads for higher-viscosity media (HV) have a 10 ... 20 % lower capacity and are not self-priming. Connection G 3/4-DN 10 with hose nozzle d16-DN10.

* - The given performance data constitutes guaranteed minimum values, calculated using water as the medium at room temperature. The bypass connection with a self-bleeding dosing head SEK is 6x4 mm.

** - Suction lift with a filled suction line and filled liquid end. With self-bleeding dosing head with air in the suction line.

*** - The connector width is 6 mm on SST material versions.

**** - Priming lift with clean and moist valves. Priming lift at 100% stroke length and free outlet or opened bleed valve.

All data calculated with water at 20 °C.

17.2 Accuracy

17.2.1 Standard Liquid End

Data	Value	Unit
Capacity range of the series	-5 ... +10	% *
Reproducibility	±2	% **

* - at max. stroke length and max. operating pressure for all material versions

** - at constant conditions and min. 30 % stroke length

17.2.2 Self-Bleeding Liquid End

As the self-bleeding liquid end is used with outgassing media and when operating with air bubbles, no dosing accuracy or reproducibility can be provided.

The recommended minimum stroke length with self-bleeding dosing pumps is 50 %.

17.3 Viscosity

The liquid ends are suitable for the following viscosity ranges:

Design	Range	Unit
Standard	0 ... 200	mPas
With valve springs	200 ... 500	mPas
With HV head	500 ... 3000*	mPas
Self-bleeding (SEK)	0 ... 50	mPas

* Even significantly higher with corrected adjusted installation. Contact Technical; Support in Heidelberg.

17.4 Material specifications

Standard liquid ends

Design	Dosing head	Suction/ pressure connector	Ball seat	Seals	Balls
PPE	Polypro-pylene	Polypro-pylene	EPDM	EPDM	Ceramic
PPB	Polypro-pylene	Polypro-pylene	FKM	FKM	Ceramic
PPT	Polypro-pylene	Polypro-pylene	PVDF	PTFE	Ceramic
NPE	Clear acrylic	PVC	EPDM	EPDM	Ceramic
NPB	Clear acrylic	PVC	FKM	FKM	Ceramic
NPT	Clear acrylic	PVC	PVDF	PTFE	Ceramic
PVT	PVDF	PVDF	PVDF	PTFE	Ceramic
TTT	PTFE with carbon	PTFE with carbon	Ceramic	PTFE	Ceramic
SST	Stainless steel 1.4404	Stainless steel 1.4404	Ceramic	PTFE	Ceramic

Self-bleeding design only in material versions PP and NP with a valve spring made of Hastelloy C and a PVDF valve insert.

Diaphragm: with PTFE coating.

FKM = fluorine rubber

Pump

Housing parts: polyphenylene ether (PPE with fibreglass)

17.5 Electrical Data

Design: 100 - 230 V ±10 %, 50/60 Hz, gamma/ X GMXa

Parameter	M70	M85
Nominal power**, approx.	25 W	30 W
Current I eff	0.24 … 0.13 A	0.3 … 0.17 A
Peak current	3.5 … 1.3 A	3.7 … 1.5 A
Switch on peak current (for 3 ...5 ms)	20 A	20 A
Fuse*	2.5 AT	2.5 AT

** with relay closed: The nominal power rises by 1 W.

* Fuses must have VDE, UL and CSA certification. e.g. type 19195 manufactured by Wickmann in compliance with IEC Publ. 127 - 2/3

17.6 Temperatures

Pump, fully assembled

Data	Value	Unit
Storage and transport temperature:	-20 … +50	°C
Ambient temperature in operation (power end/drive and control):	-10 … +45	°C
Medium temperature:	-10 °C ... see following table	

Liquid end

Material version	Long term	Temporary *
PP	50 °C	100 °C
NP	45 °C	60 °C
PV	50 °C	120 °C
SS	50 °C	120 °C
TT	50 °C	120 °C

* Max. temp., for 15 min at max. 2 bar, depending on the ambient temperature

17.7 Climate

Data	Value	Unit
Maximum air humidity*:	95	% relative humidity

* non-condensing

Test: Humid heat, cyclical

in accordance with EN 680068-2-30: 2005

17.8 Degree of Protection and Safety Requirements

Degree of protection

Protection against accidental contact and humidity:

IP 66 according to DIN EN 60529
NEMA 4X/indoor according to NEMA 250

Safety requirements

Degree of protection:

1 - mains power connection with protective earth conductor

17.9 Compatibility

Unlike the gamma/ L product range, compatibility is guaranteed with the following components:

- Control cable Beta® 5-wire for "External" function.
- Control cable gamma/Vario 2-, 4- and 5-wire for the "External" function
- Level switch 2-stage (gamma / Beta® / delta®)
- Dosing line cross-sections for gamma / Beta®
- Standard connector kit for gamma / Beta®
- Wall brackets for gamma / Beta®

- Dosing tanks and fixing plates
- Distance between suction and pressure connector
- Distance between the connectors and the pump fixing holes
- Distance between the pump fixing holes
- Identical use of accessories, such as back pressure valves, multifunctional valves and flushing assembly
- Compatibility of resistance by the equivalence of the material used for the liquid ends

Compatibility to the gamma/ L product range is not guaranteed for the following points:

- External dimensions of the pump
- Distance between the support surface for the mounting foot and the centre of the dosing head
- Dosing monitor

17.10 Shipping Weight

Shipping weight of gamma/ X types - in kg

Material	Types	
	2002, 1602, 1604, 0708, 0414, 0220	2504, 1009, 0715, 0424, 0245
PP, NP, PV, TT	3.6 .. 3.7	4.9 … 5.2
SS	4.1 … 5.0	5.5 … 7.0

17.11 Sound pressure level

Sound pressure level

Sound pressure level LpA < 70 dB according to EN ISO 20361

at maximum stroke length, maximum stroke rate, maximum back pressure (water)

18 Exploded Drawings and Ordering Information

18.1 Exploded drawings

Liquid end gamma/ X 1602 - 1604 PP_2

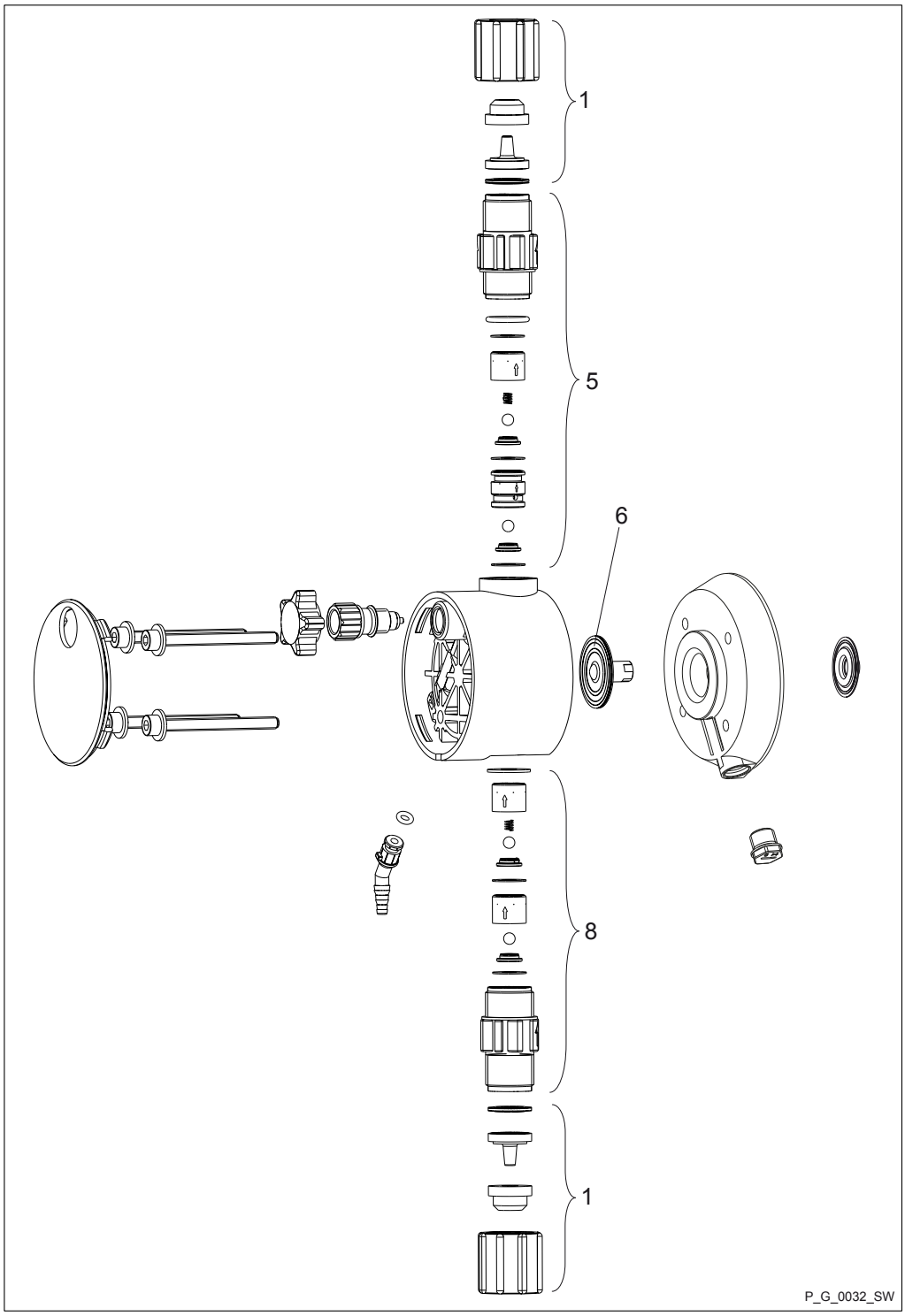


Fig. 39

Spare parts for liquid end gamma/ X 1602 - 1604 PP_2

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 1602 PP_2

	PPE2	PPB2	PPT2
Liquid end	1050931	1050900	1050942
Spare parts kit	1001646	1001654	1023109
Diaphragm	1000246	1000246	1000246

Liquid end gamma/ X 1604 PP_2

	PPE2	PPB2	PPT2
Liquid end	1050932	1050901	1050943
Spare parts kit	1039989	1039987	1035332
Diaphragm	1034612	1034612	1034612

Liquid end gamma/ X 0708 (1009) - 0220 (0424) PP_2

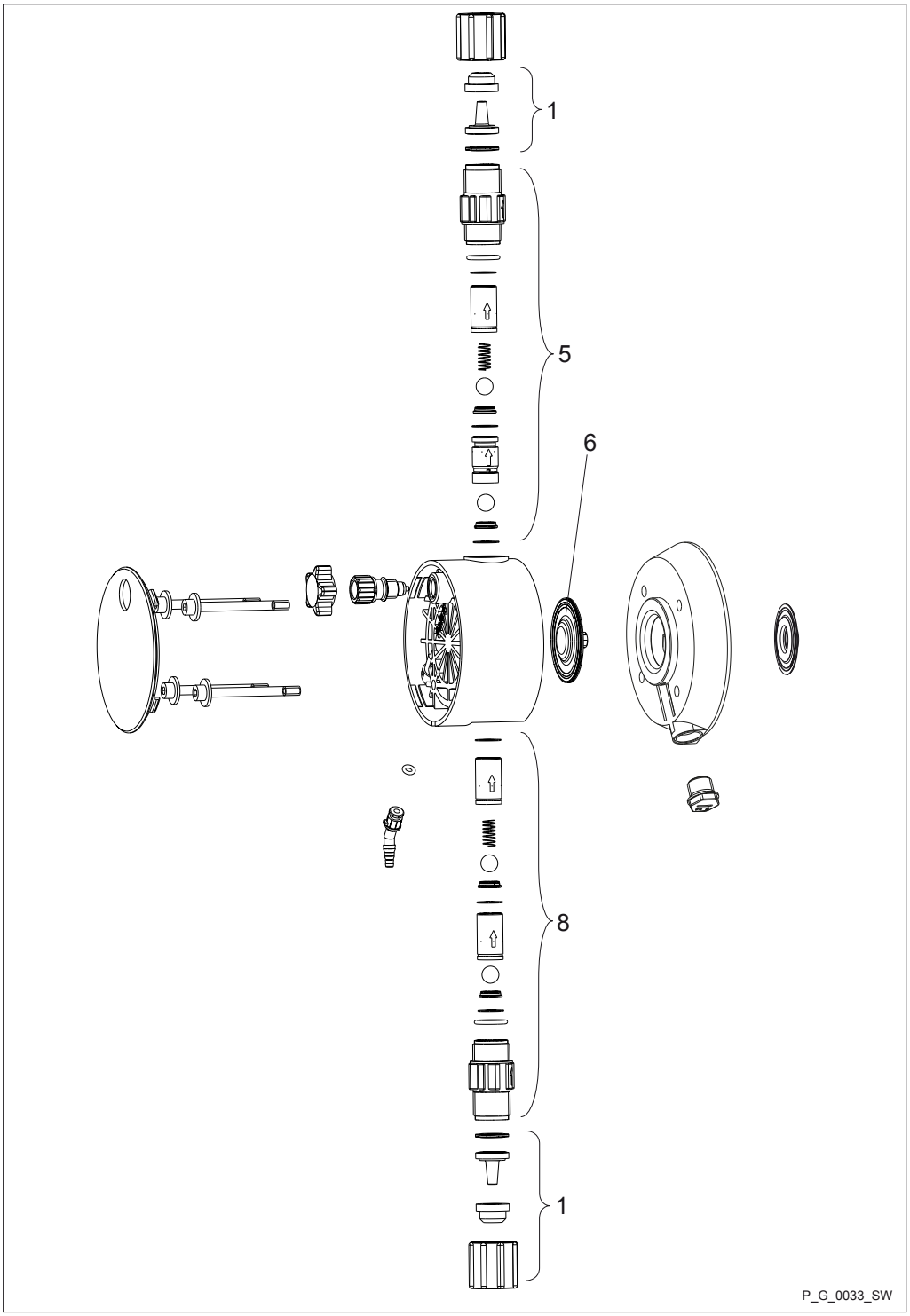


Fig. 40

Spare parts for liquid end gamma/ X 0708 (1009) - 0220 (0424) PP_2

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 0708 (1009) PP_2

	PPE2	PPB2	PPT2
Liquid end	1050933	1050902	1050944
Spare parts kit	1001648	1001656	1023111
Diaphragm	1000248	1000248	1000248

Liquid end gamma/ X 0414 (0715) PP_2

	PPE2	PPB2	PPT2
Liquid end	1050934	1050903	1050945
Spare parts kit	1001649	1001657	1023112
Diaphragm	1000249	1000249	1000249

Liquid end gamma/ X 0220 (0424) PP_2

	PPE2	PPB2	PPT2
Liquid end	1050935	1050924	1050946
Spare parts kit	1051096	1051085	1051129
Diaphragm	1045456	1045456	1045456

Liquid end gamma/ X 0245 PP without bleed valve

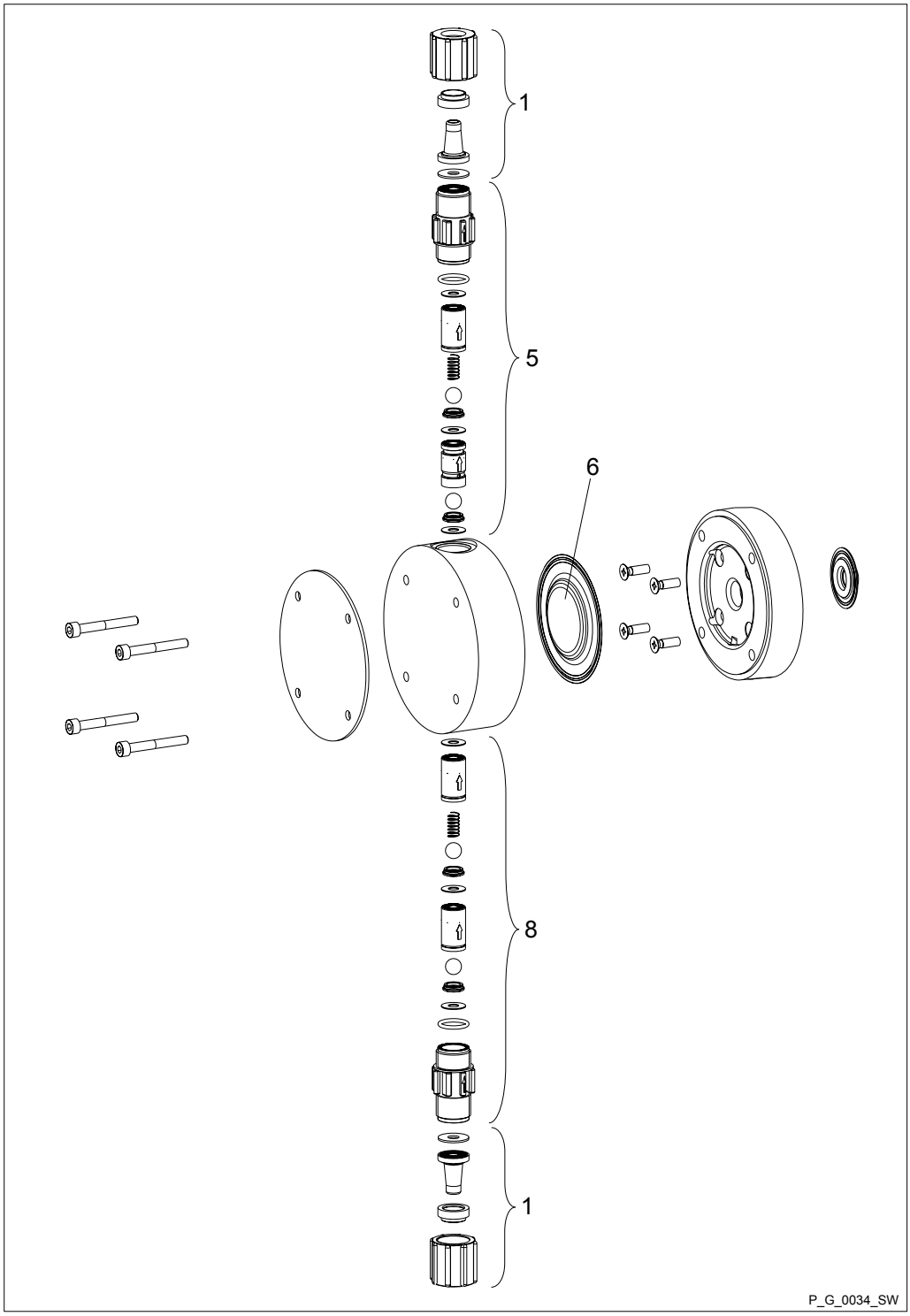


Fig. 41

Spare parts for liquid end gamma/ X 0245 PP without bleed valve

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 0245 without bleed valve

	PPE	PPB	PPT
Liquid end	1050936	1050925	1050947
Spare parts kit	1051097	1051086	1051130
Diaphragm	1045443	1045443	1045443

Liquid end gamma/ X 1602 - 2504 NP with and without bleed valve

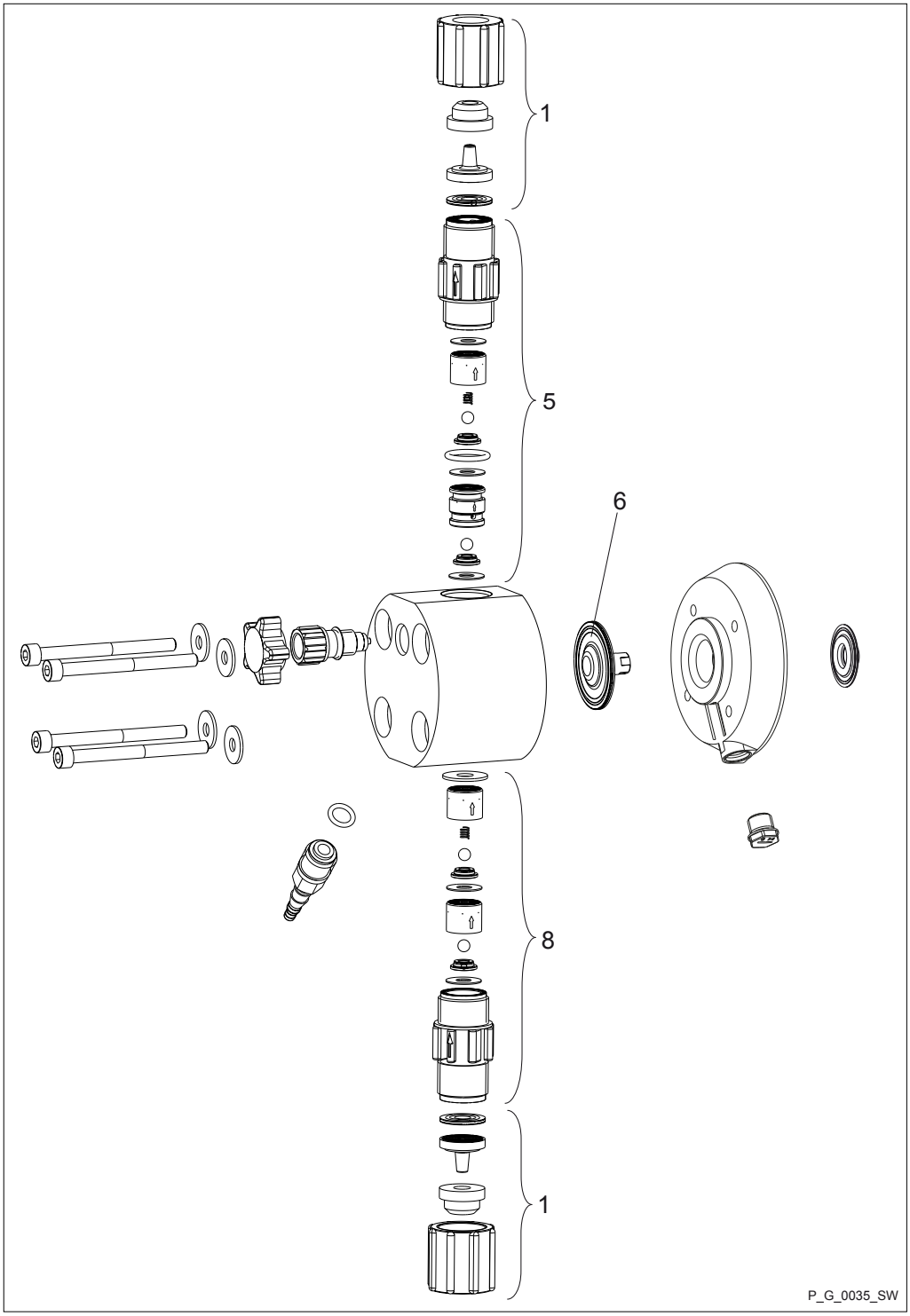


Fig. 42

Spare parts for liquid end gamma/ X 1602 - 2504 NP with and without bleed valve

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 2002 with and without bleed valve

	NPE	NPB	NPT
Liquid end with bleed valve	1050965	1050948	1050982
Liquid end without bleed valve	1050971	1050954	1050988
Spare parts kit	1001715	1001723	1023109
Diaphragm	1000246	1000246	1000246

Liquid end gamma/ X 1602 with and without bleed valve

	NPE	NPB	NPT
Liquid end with bleed valve	1051073	1051071	1051087
Liquid end without bleed valve	1051084	1051072	1051088
Spare parts kit	1001715	1001723	1023109
Diaphragm	1000246	1000246	1000246

Liquid end gamma/ X 2504 with and without bleed valve

	NPE	NPB	NPT
Liquid end with bleed valve	1051175	1051163	1051179
Liquid end without bleed valve	1051176	1051174	1051180
Spare parts kit	1039988	1039986	1035332
Diaphragm	1034612	1034612	1034612

Liquid end gamma/ X 1604 with and without bleed valve

	NPE	NPB	NPT
Liquid end with bleed valve	1050966	1050949	1050983
Liquid end without bleed valve	1050972	1050955	1050989
Spare parts kit	1039988	1039986	1035332
Diaphragm	1034612	1034612	1034612

Liquid end gamma/ X 0708 (1009) - 0220 (0424) NP with and without bleed valve

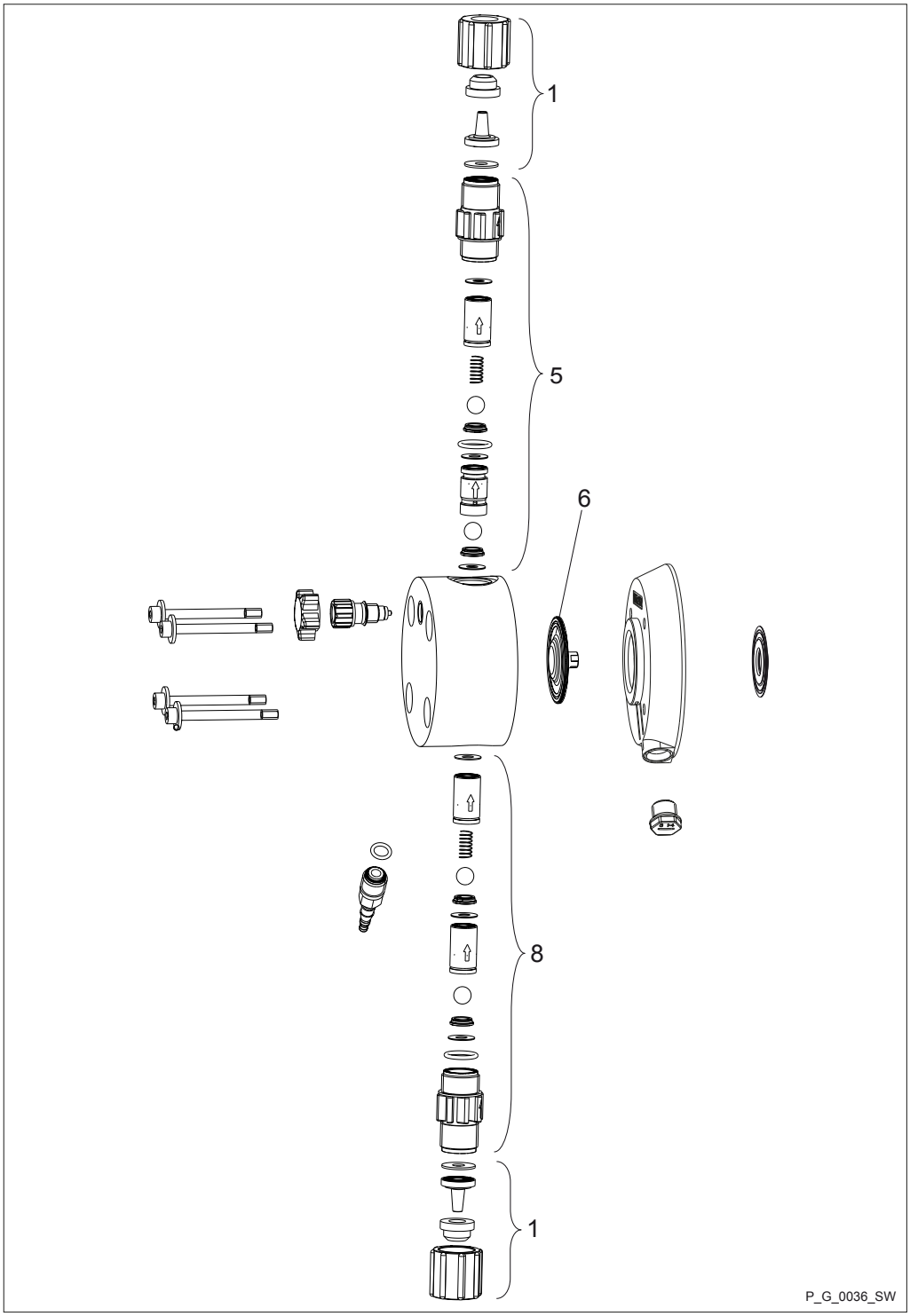


Fig. 43

Spare parts for liquid end gamma/ X 0708 (1009) - 0220 (0424) NP with and without bleed valve

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 0708 (1009) with and without bleed valve

	NPE	NPB	NPT
Liquid end with bleed valve	1050967	1050950	1050984
Liquid end without bleed valve	1050973	1050956	1050990
Spare parts kit	1001717	1001725	1023111
Diaphragm	1000248	1000248	1000248

Liquid end gamma/ X 0414 (0715) with and without bleed valve

	NPE	NPB	NPT
Liquid end with bleed valve	1050968	1050951	1050985
Liquid end without bleed valve	1050974	1050957	1050991
Spare parts kit	1001718	1001726	1023112
Diaphragm	1000249	1000249	1000249

Liquid end gamma/ X 0220 (0424) with and without bleed valve

	NPE	NPB	NPT
Liquid end with bleed valve	1050969	1050952	1050986
Liquid end without bleed valve	1050975	1050958	1050992
Spare parts kit	1051118	1051107	1051129
Diaphragm	1045456	1045456	1045456

Liquid end gamma/ X 0245 NP with and without bleed valve

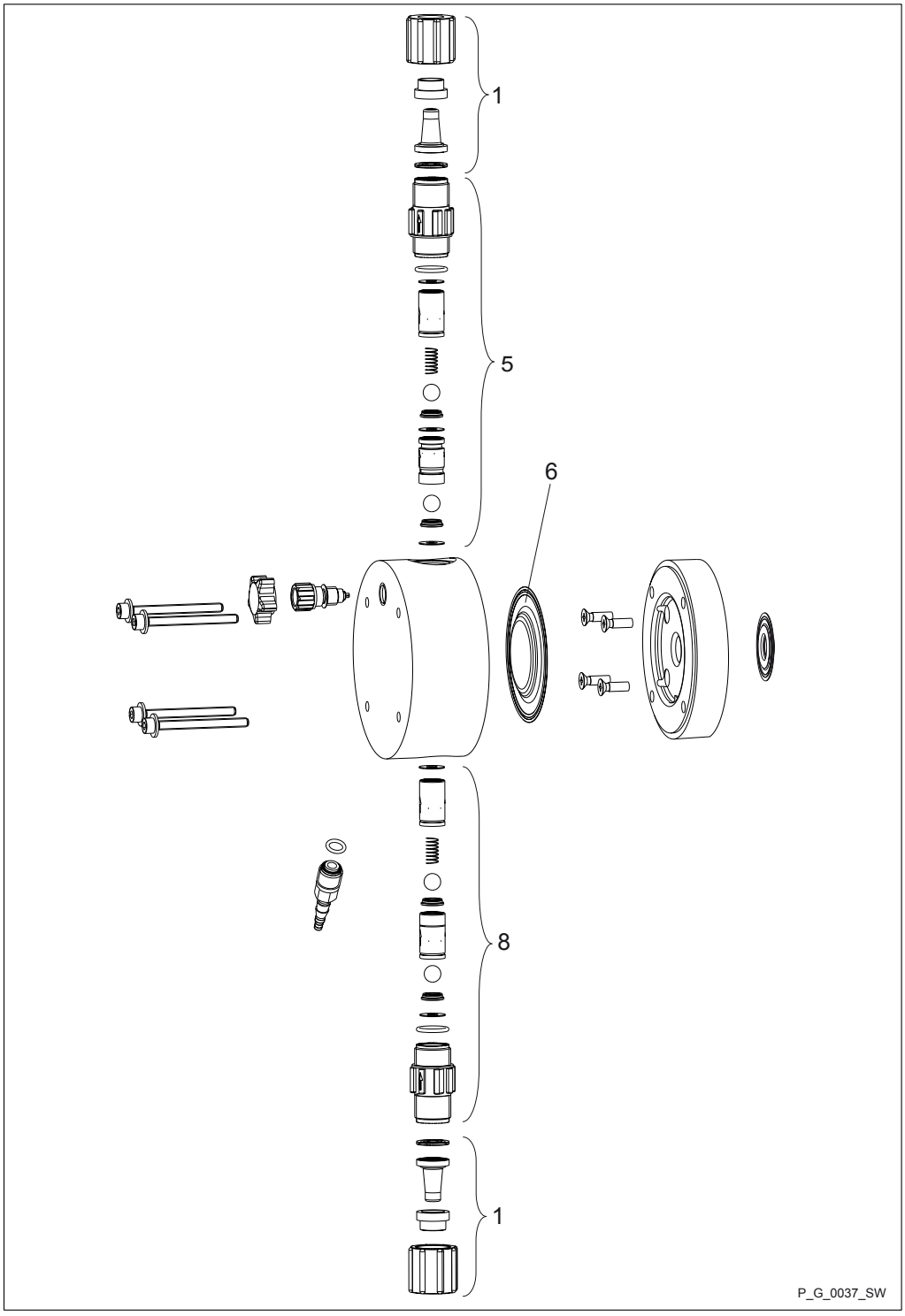


Fig. 44

Spare parts for liquid end gamma/ X 0245 NP with and without bleed valve

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 0245 with and without bleed valve

	NPE	NPB	NPT
Liquid end with bleed valve	1050970	1050953	1050987
Liquid end without bleed valve	1050976	1050959	1050993
Spare parts kit	1051119	1051108	1051130
Diaphragm	1045443	1045443	1045443

Liquid end gamma/ X 1602 -1604 PVT with bleed valve

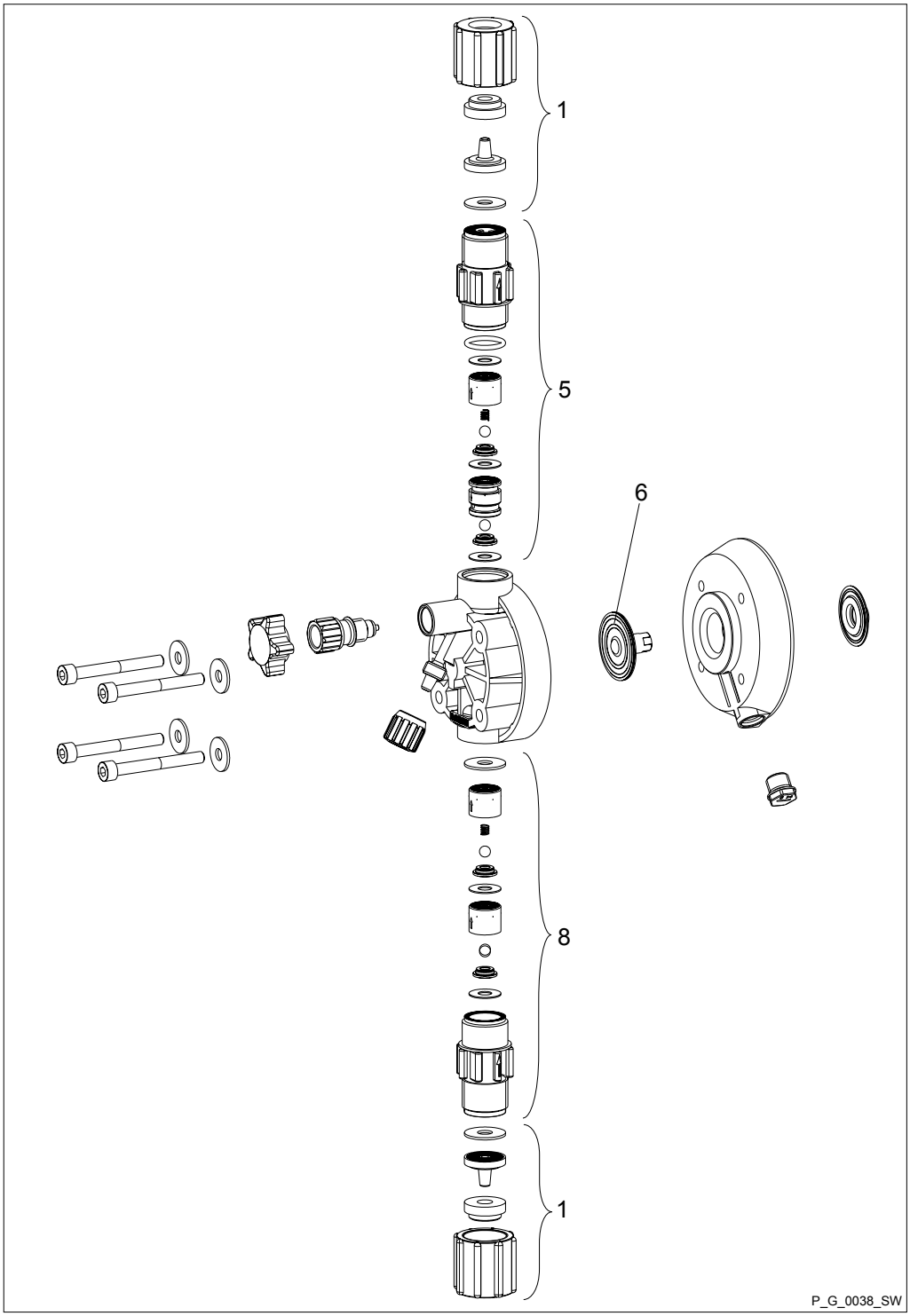


Fig. 45

Spare parts for liquid end gamma/ X 1602 -1604 PVT with bleed valve

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 1602 with bleed valve

	PVT
Liquid end	1050994
Spare parts kit	1023109
Diaphragm	1000246

Liquid end gamma/ X 1604 with bleed valve

	PVT
Liquid end	1050995
Spare parts kit	1035332
Diaphragm	1034612

Liquid end gamma/ X 0708 (1009) - 0220 (0424) PVT with bleed valve

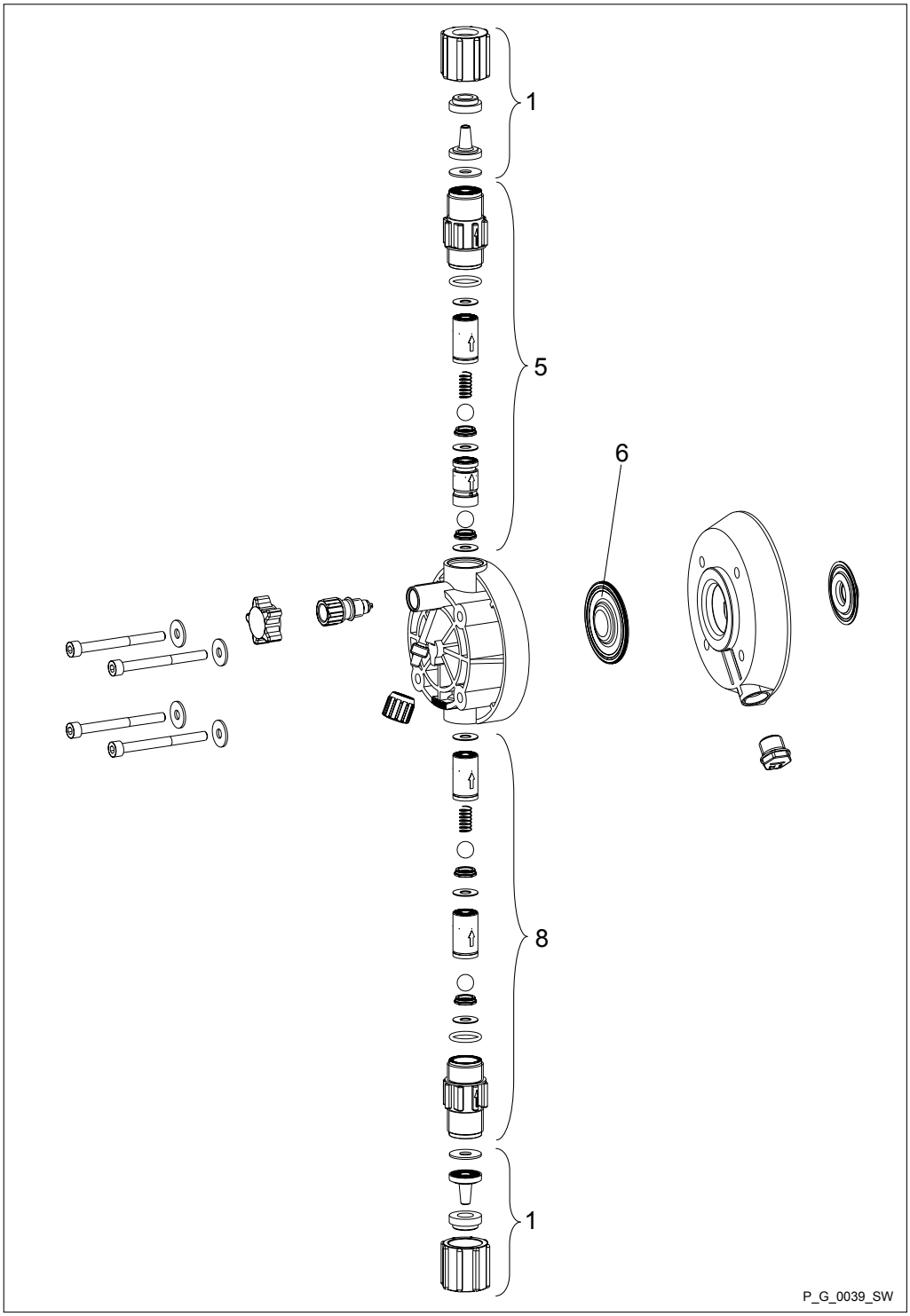


Fig. 46

Spare parts kit for liquid end gamma/ X 0708(1009) - 0220 (0424) PVT with bleed valve

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 0708 (1009) with bleed valve

	PVT
Liquid end	1050996
Spare parts kit	1023111
Diaphragm	1000248

Liquid end gamma/ X 0414 (0715) with bleed valve

	PVT
Liquid end	1050997
Spare parts kit	1023112
Diaphragm	1000249

Liquid end gamma/ X 0220 (0424) with bleed valve

	PVT
Liquid end	1050998
Spare parts kit	1051129
Diaphragm	1045456

Liquid end gamma/ X 0245 PVT without bleed valve

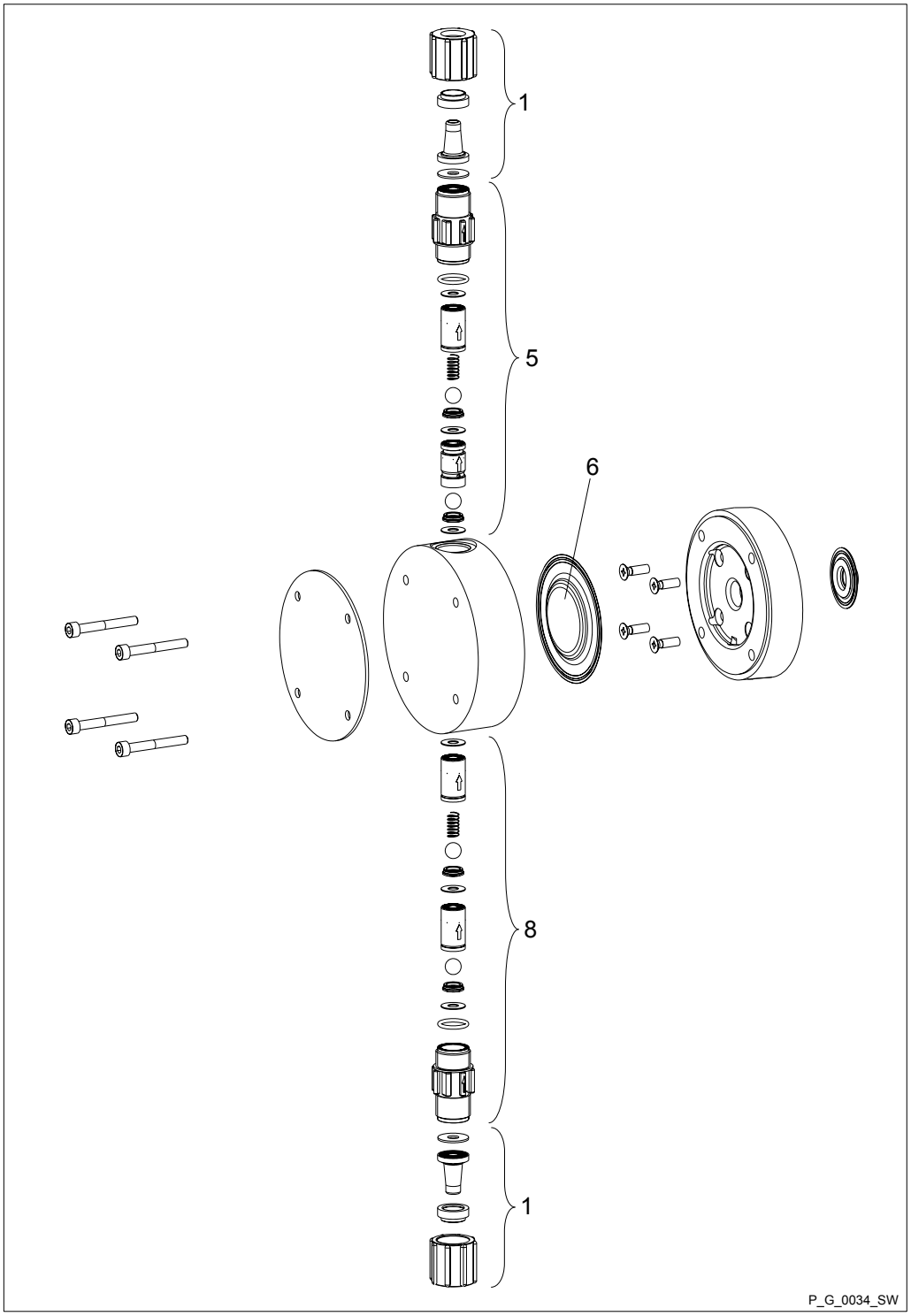


Fig. 47

Spare parts kit for liquid end gamma/ X 0245 PVT without bleed valve

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 0245 without bleed valve

	PVT
Liquid end	1050999
Spare parts kit	1051130
Diaphragm	1045443

Liquid end gamma/ X 1604 - 0220 (0424) PV HV, for high-viscosity feed chemicals

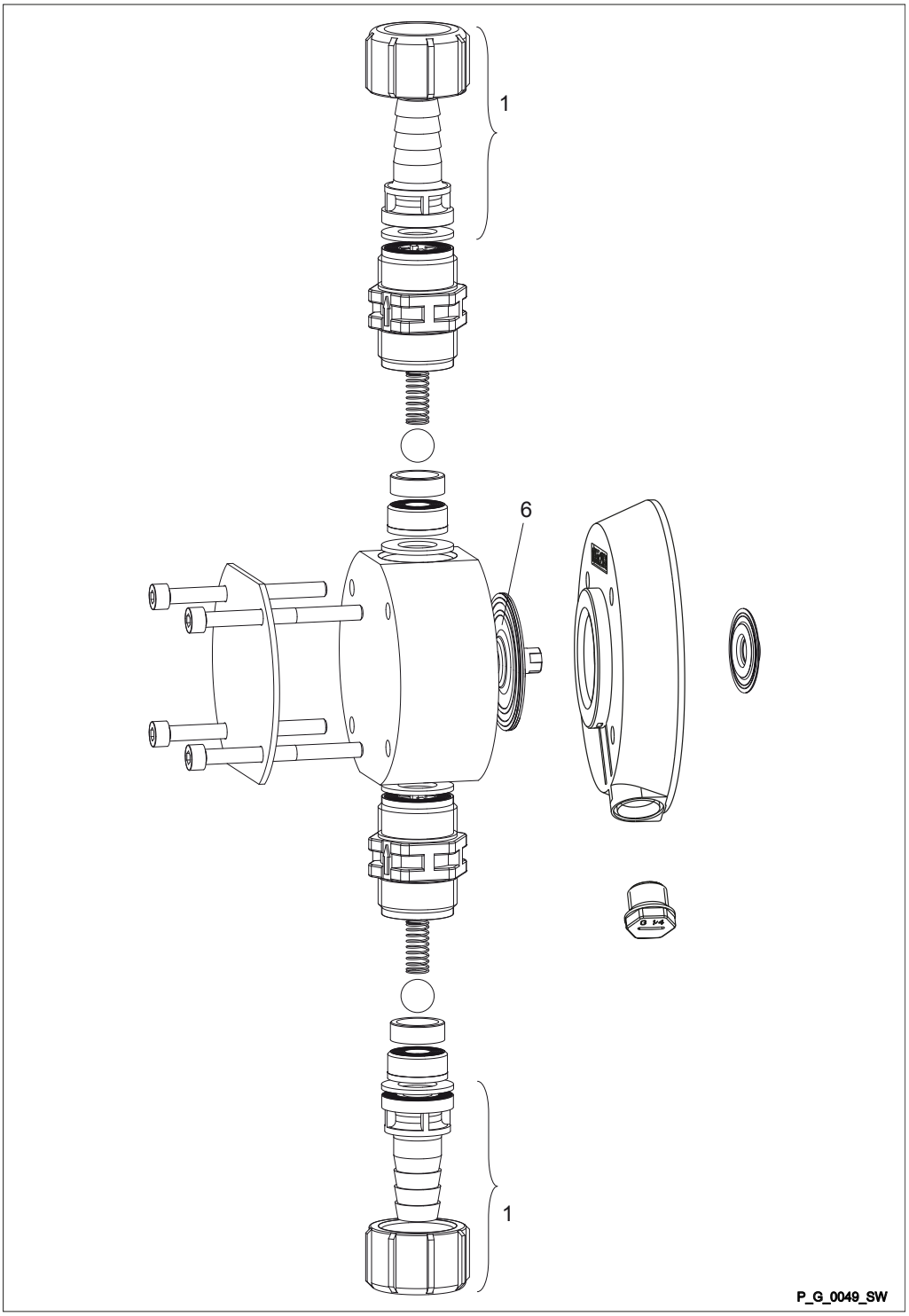


Fig. 48

Spare parts kit for liquid end gamma/ X 1604 - 0220 (0424) PV HV, for high-viscosity feed chemicals

Item	Description
1	Connector kit with hose nozzle
6	Diaphragm

Liquid end gamma/ X 1604

	PV HV
Liquid end	1051000
Spare parts kit	1035342
Diaphragm	1034612

Liquid end gamma/ X 0708 (1009)

	PV HV
Liquid end	1051001
Spare parts kit	1019067
Diaphragm	1000248

Liquid end gamma/ X 0414 (0715)

	PV HV
Liquid end	1051002
Spare parts kit	1019069
Diaphragm	1000249

Liquid end gamma/ X 0220 (0424)

	PV HV
Liquid end	1051003
Spare parts kit	1051134
Diaphragm	1045456

Liquid end gamma/ X 1602 - 1604 TTT

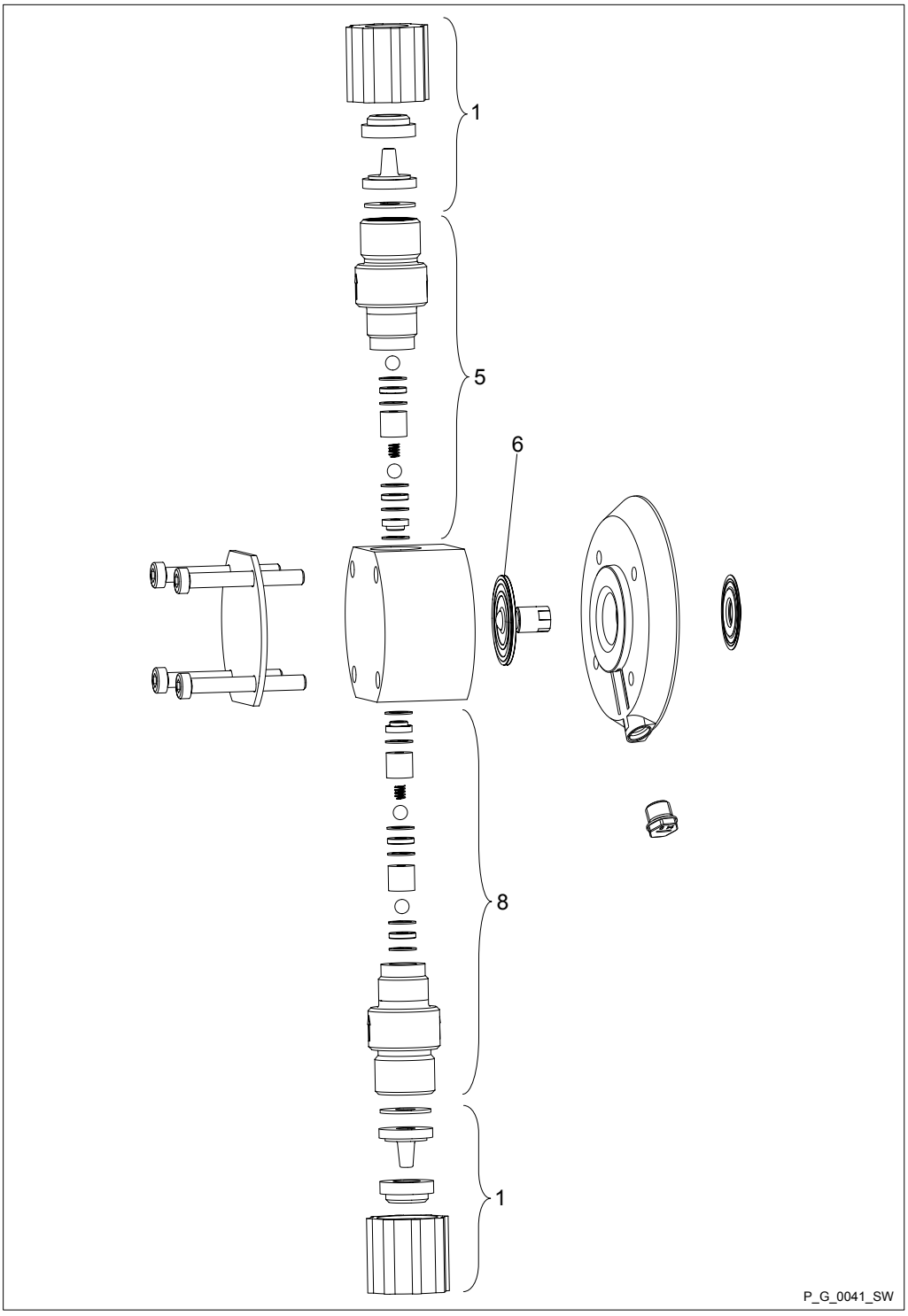


Fig. 49

Spare parts for liquid end gamma/ X 1602 - 1604 TTT

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 1602

	TTT
Liquid end	1051016
Spare parts kit	1001739
Diaphragm	1000246

Liquid end gamma/ X 1604

	TTT
Liquid end	1051017
Spare parts kit	1035331
Diaphragm	1034612

Liquid end gamma/ X 0708 (1009) - 0220 (0424) TTT

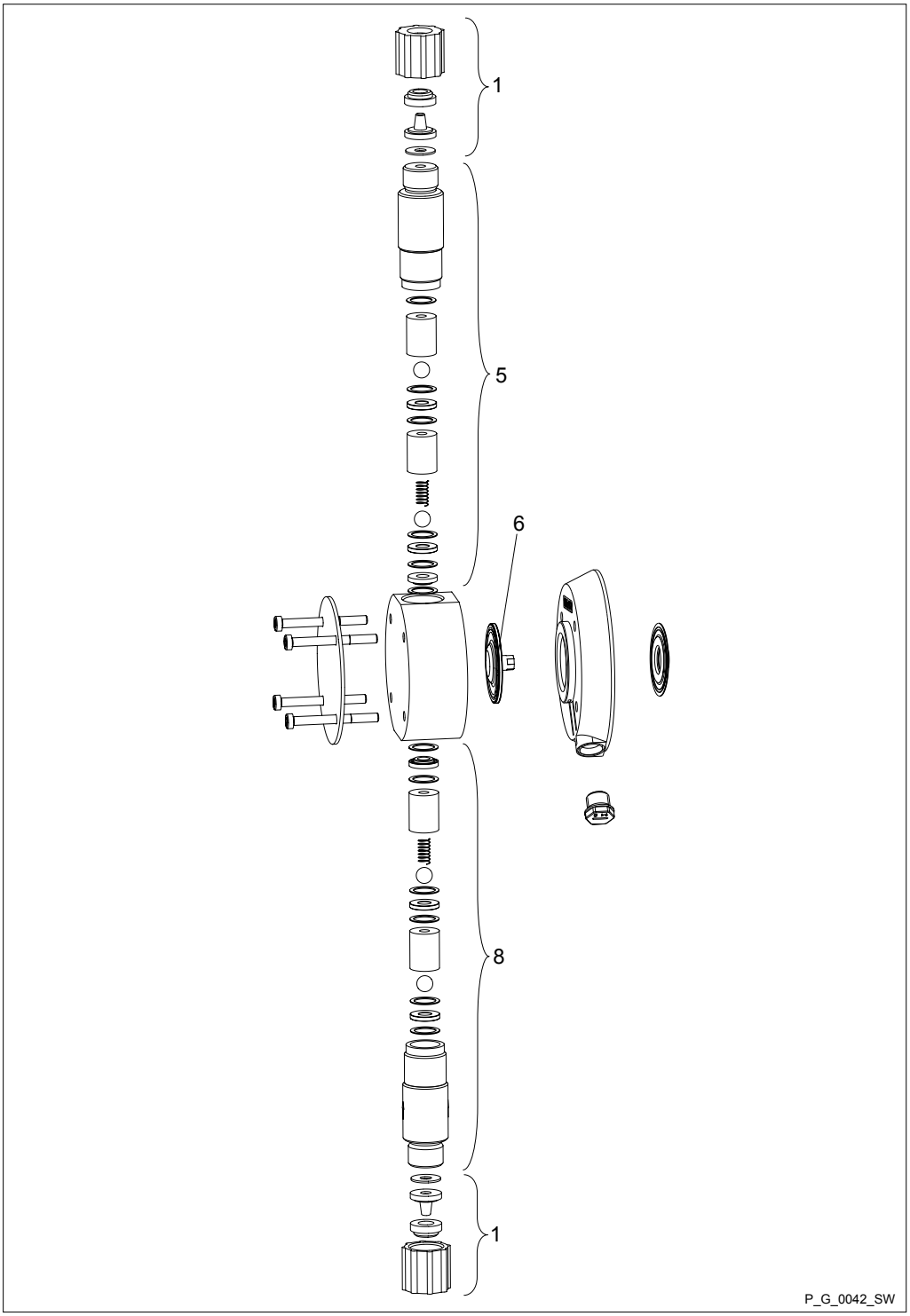


Fig. 50

Liquid end gamma/ X 0708 (1009) - 0220 (0424) TTT

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 0708 (1009)

	TTT
Liquid end	1051018
Spare parts kit	1001741
Diaphragm	1000248

Liquid end gamma/ X 0414 (0715)

	TTT
Liquid end	1051019
Spare parts kit	1001742
Diaphragm	1000249

Liquid end gamma/ X 0220 (0424)

	TTT
Liquid end	1051020
Spare parts kit	1051151
Diaphragm	1045456

Liquid end gamma/ X 0245 TTT

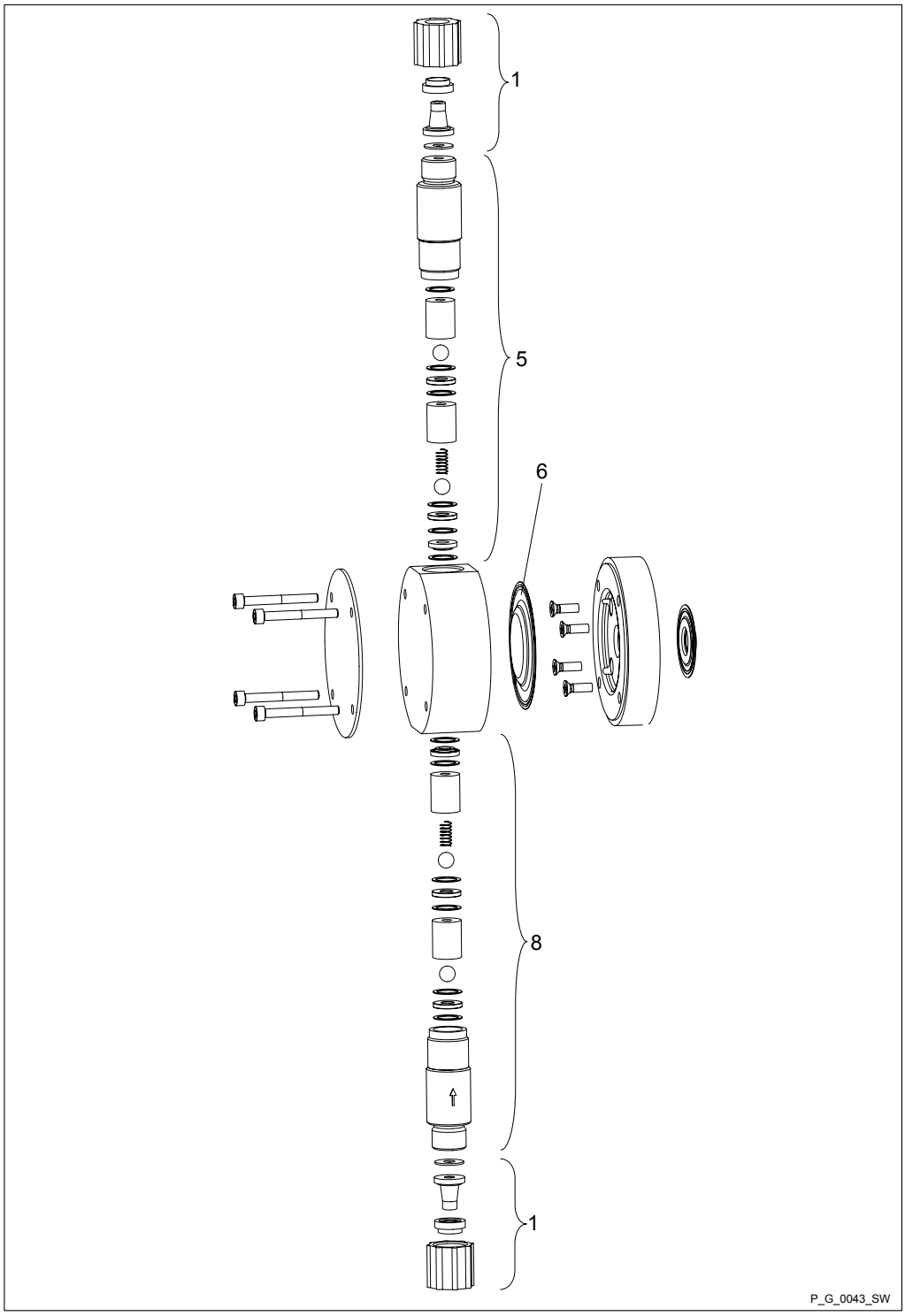


Fig. 51

Spare parts kit for liquid end gamma/ X 0245 TTT

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 0245

	TTT
Liquid end	1051021
Spare parts kit	1051152
Diaphragm	1045443

Liquid end gamma/ X 1602 - 2504 SST

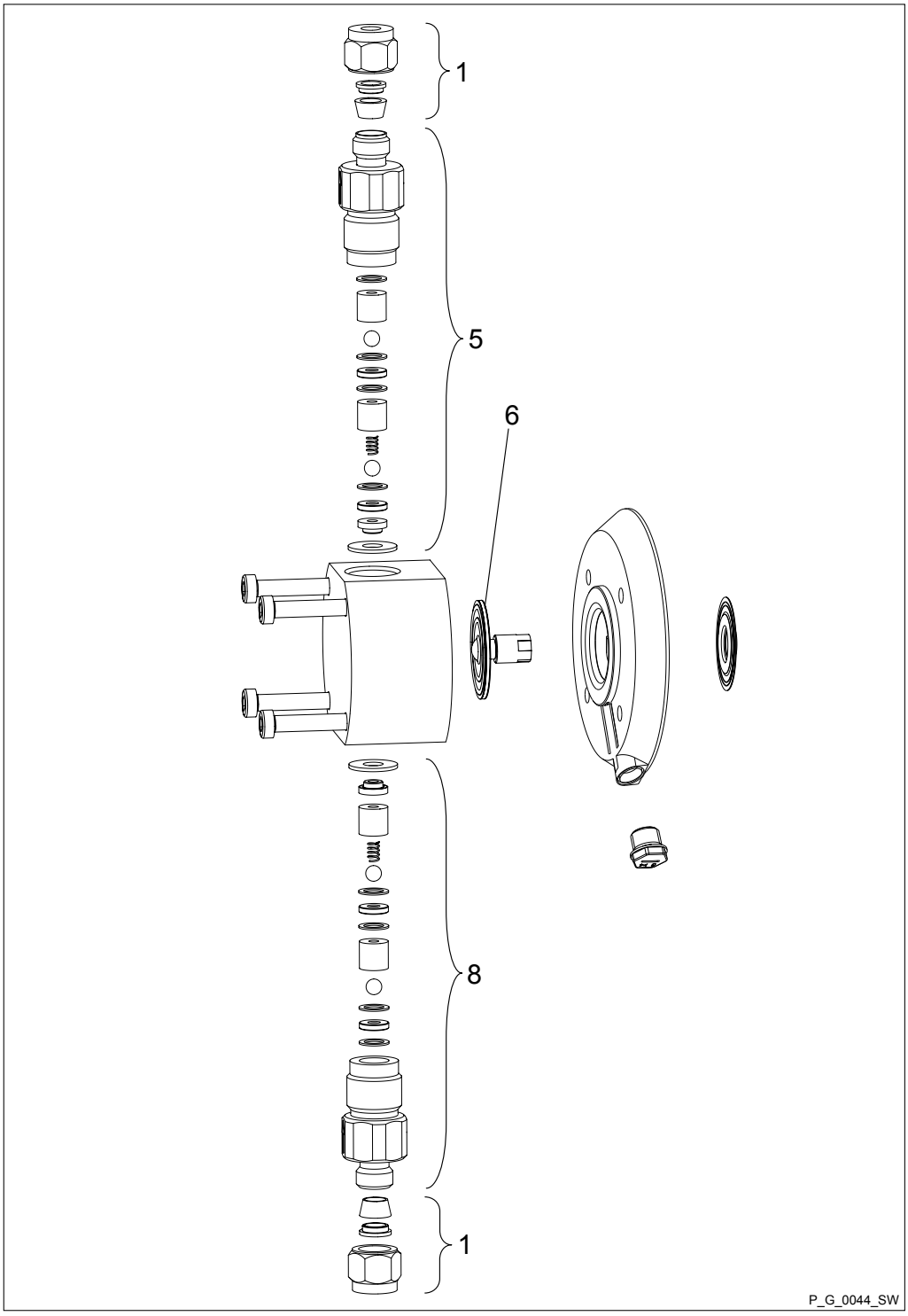


Fig. 52

Spare parts for liquid end gamma/ X 1602 - 2504 SST

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 1602 (2002)

	SST
Liquid end	1051004
Spare parts kit	1001731
Diaphragm	1000246

Liquid end gamma/ X 1604 (2504)

	SST
Liquid end	1051005
Spare parts kit	1035331
Diaphragm	1034612

Liquid end gamma/ X 0708 (1009) - 0220 (0424) SST

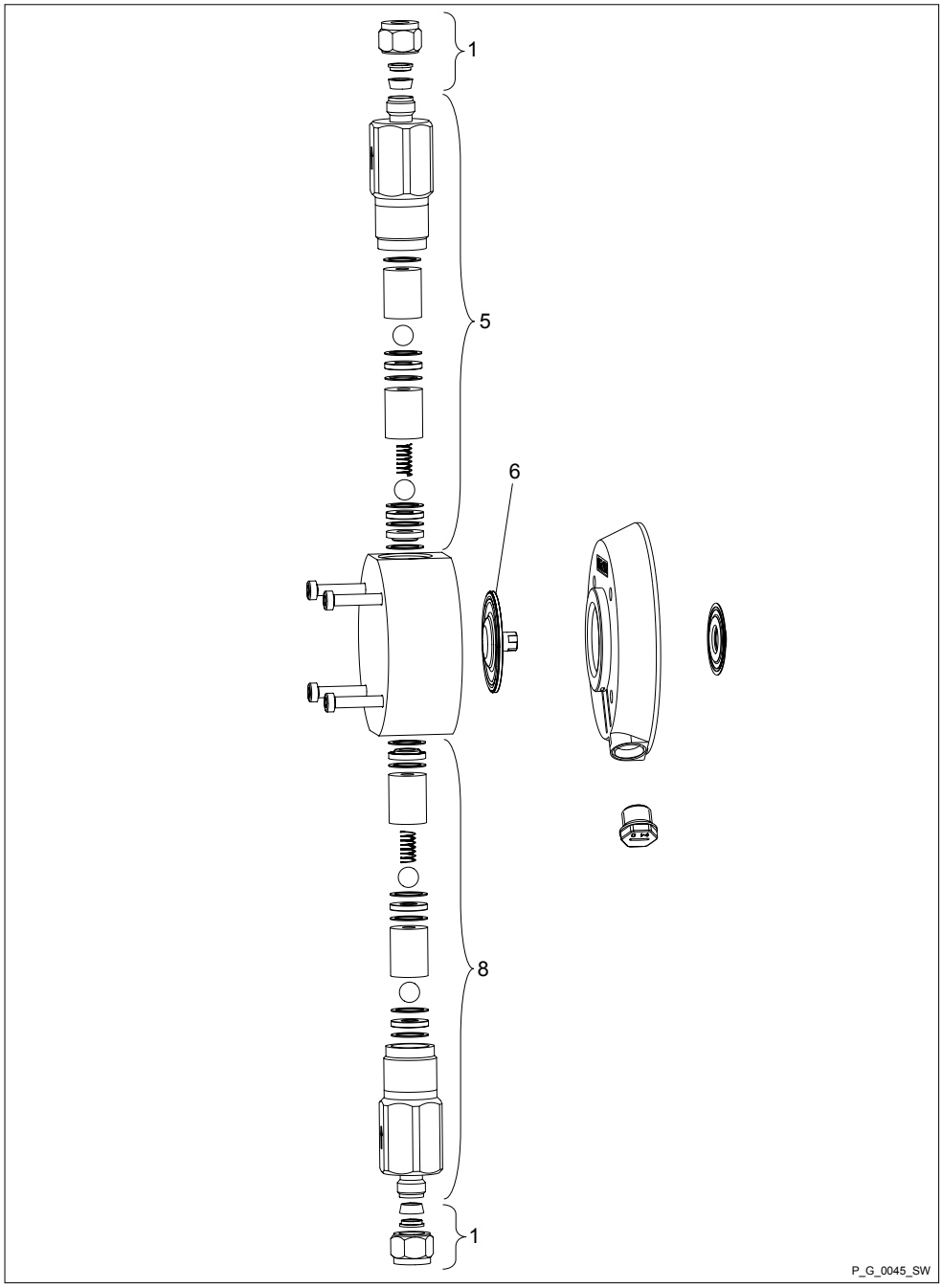


Fig. 53

Spare parts kit for liquid end gamma/ X 0708 (1009) - 0220 (0424) SST

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 0708 (1009)

	SST
Liquid end	1051006
Spare parts kit	1001733
Diaphragm	1000248

Liquid end gamma/ X 0414 (0715)

	SST
Liquid end	1051007
Spare parts kit	1001734
Diaphragm	1000249

Liquid end gamma/ X 0220 (0424)

	SST
Liquid end	1051008
Spare parts kit	1051139
Diaphragm	1045456

Liquid end gamma/ X 0245 SST

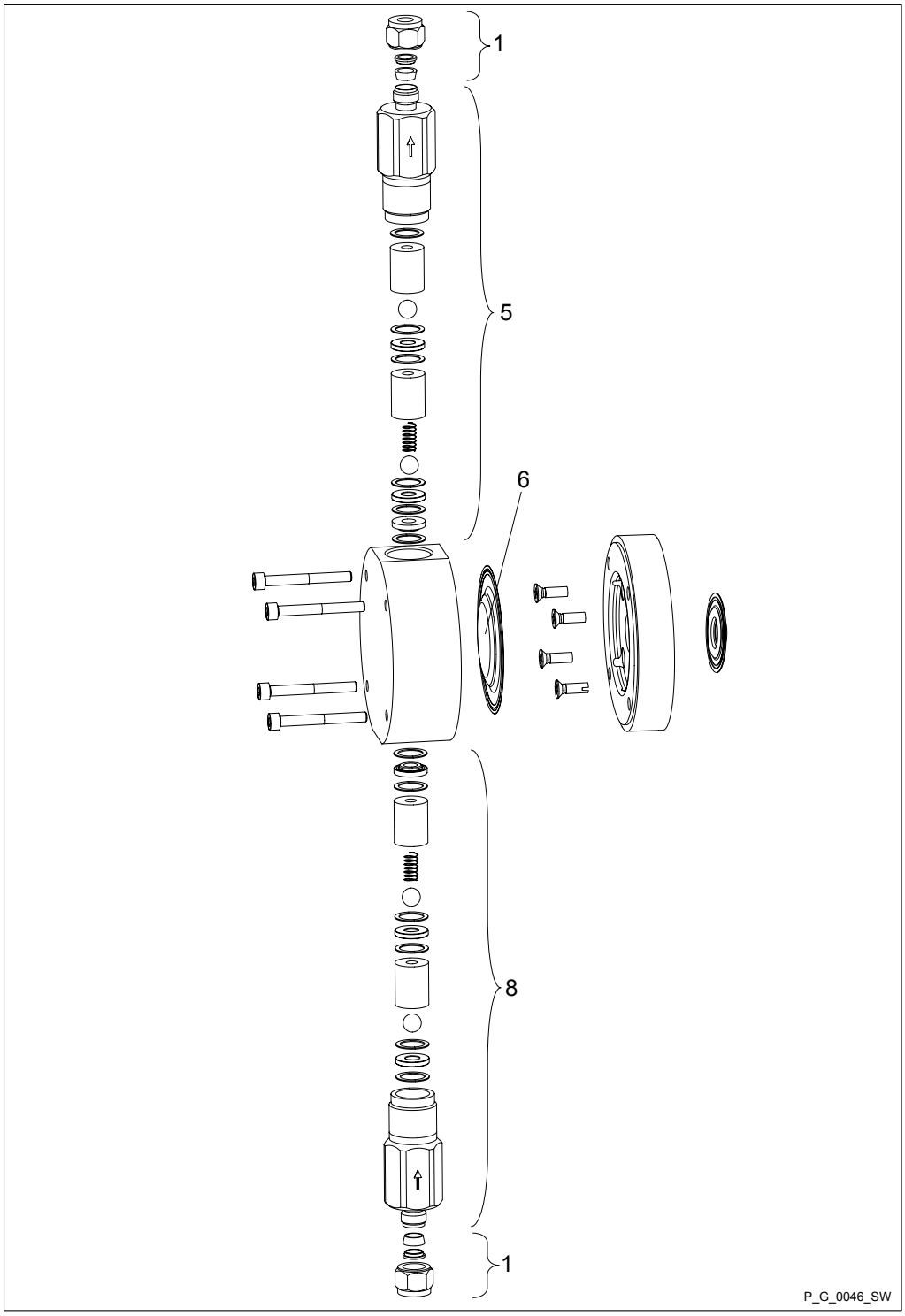


Fig. 54

Spare parts kit for liquid end gamma/ X 0245 SST

Item	Description
1	Connector kit
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid end gamma/ X 0245

	SST
Liquid end	1051009
Spare parts kit	1051140
Diaphragm	1045443

Liquid end gamma/ X 1602 - 1604 PP SEK and 1602 - 1604 NP SEK, self-bleeding

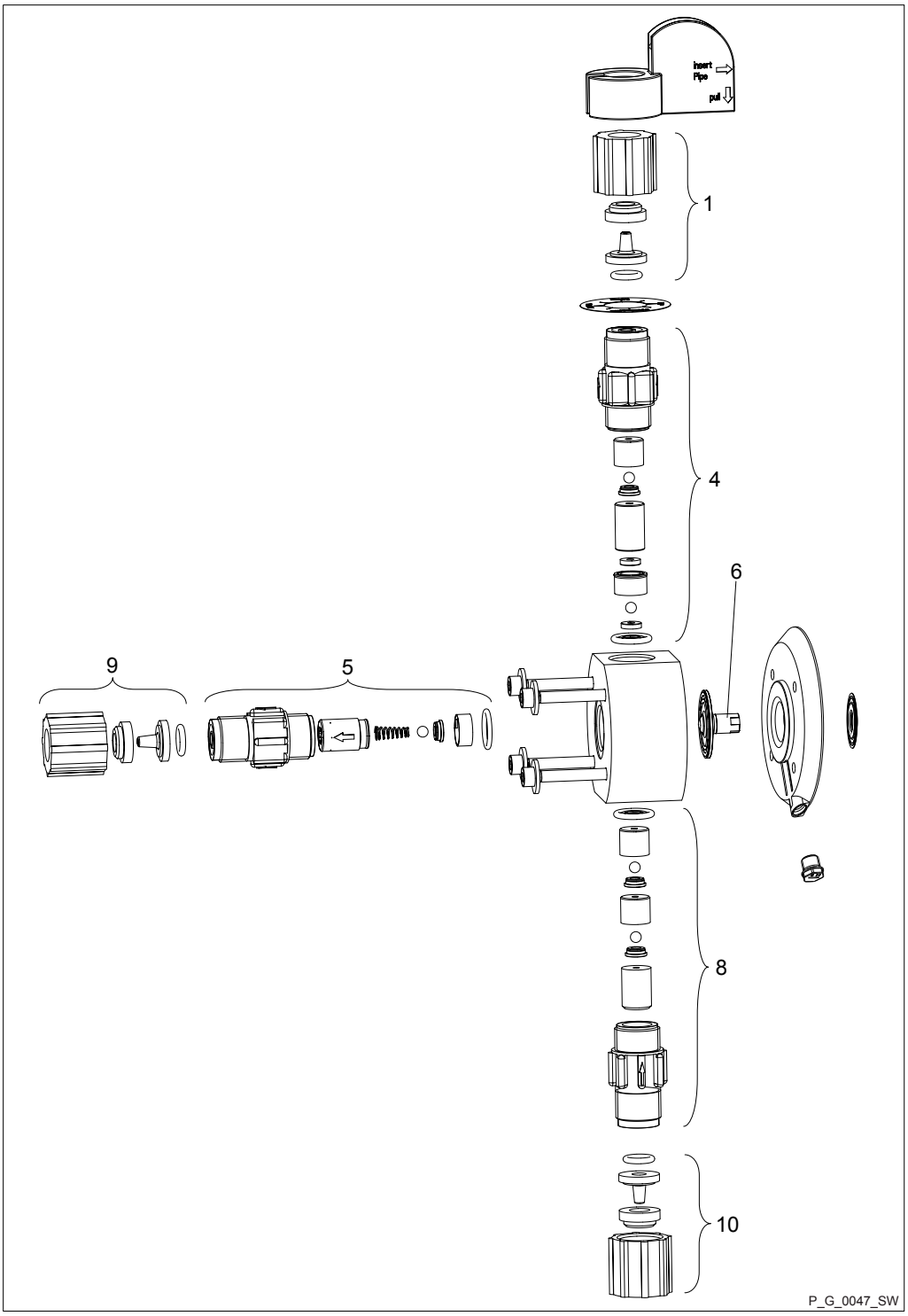


Fig. 55

Item	Part
1, 9, 10	Connector kit
4	Bleed valve
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid ends

Type	Order no:
PPE SEK	-
1602	1050937
1604	1050938
PPB SEK	-
1602	1050926
1604	1050927

Liquid ends

Type	Order no:
NPE SEK	-
1602	1050977
1604	1050978
NPB SEK	-
1602	1050960
1604	1050961

Spare parts kits for type:	Material version	Order no:
1602 with spring	PPE	1001757
1604 with spring	PPE	1035335
1602 with spring	PPB	1001763
1604 with spring	PPB	1035336
1602 with spring	NPE	1001661
1604 with spring	NPE	1035333
1602 with spring	NPB	1001667
1604 with spring	NPB	1035334

Diaphragm for type:	Order no:
1602	1000246
1604	1034612

Liquid end gamma/ X 0708 (1008) - 0220 (0420) PP / NP SEK, self-bleeding

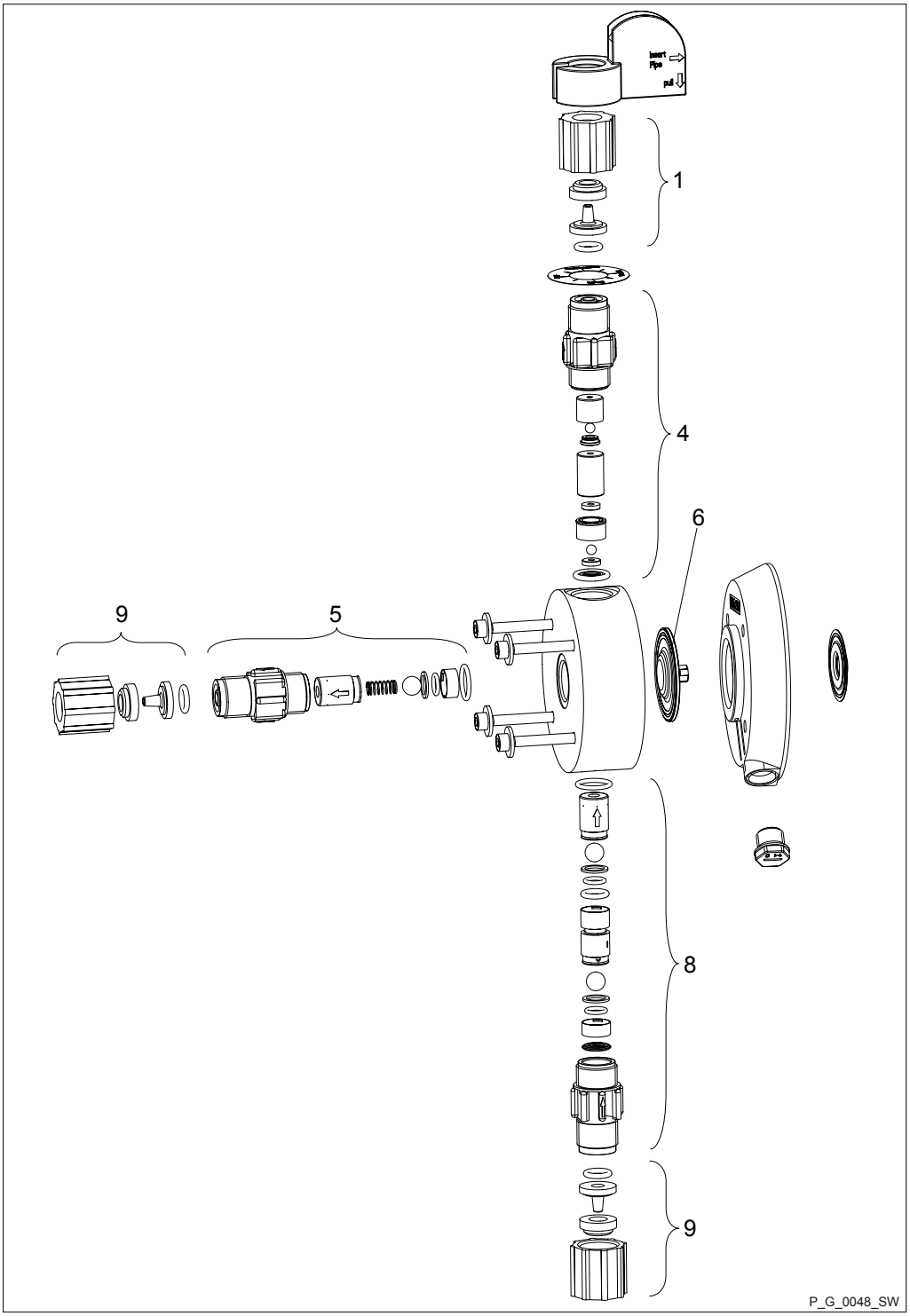


Fig. 56

Item	Part
1, 9, 10	Connector kit
4	Bleed valve
5	Discharge valve
6	Diaphragm
8	Suction valve

Liquid ends

Type	Order no:
PPE SEK	-
0708 / 1009	1050939
0414 / 0715	1050940
0220 / 0424	1050941
PPB SEK	-
0708 / 1009	1050928
0414 / 0715	1050929
0220 / 0424	1050930

Liquid ends

Type	Order no:
NPE SEK	-
0708 / 1009	1050979
0414 / 0715	1050980
0220 / 0424	1050981
NPB SEK	-
0708 / 1009	1050962
0414 / 0715	1050963
0220 / 0424	1050964

Spare parts kits for type:	Material version	Order no:
0708 (1008)	PPE	1001759
0413 (0713)	PPE	1001760
0220 (0420)	PPE	1051102
0708 (1008)	PPB	1001765
0413 (0713)	PPB	1001766
0220 (0420)	PPB	1051091
0708 (1008)	NPE	1001663
0413 (0713)	NPE	1001664
0220 (0420)	NPE	1051124
0708 (1008)	NPB	1001669
0413 (0713)	NPB	1001670
0220 (0420)	NPB	1051113

Diaphragm for type:	Order no:
0708	1000248
0413	1000249
0220	1045456

18.2 Ordering Information

Relay

Retrofit kit	Order no:
Fault indicating relay:	1050643
Fault indicating/pacing relay:	1050654

Further sources of information

Further information on spare parts, accessories and options can be found in:

- the exploded drawings
- the identity code
- under www.prominent.com
- the ProMinent product catalogue

19 Dimensional Drawings

- *Compare the dimensions on the dimensional drawing with those of the pump and mounting foot.*
- *All dimensions are in mm.*

Dimensional drawing of gamma/ X mounting foot

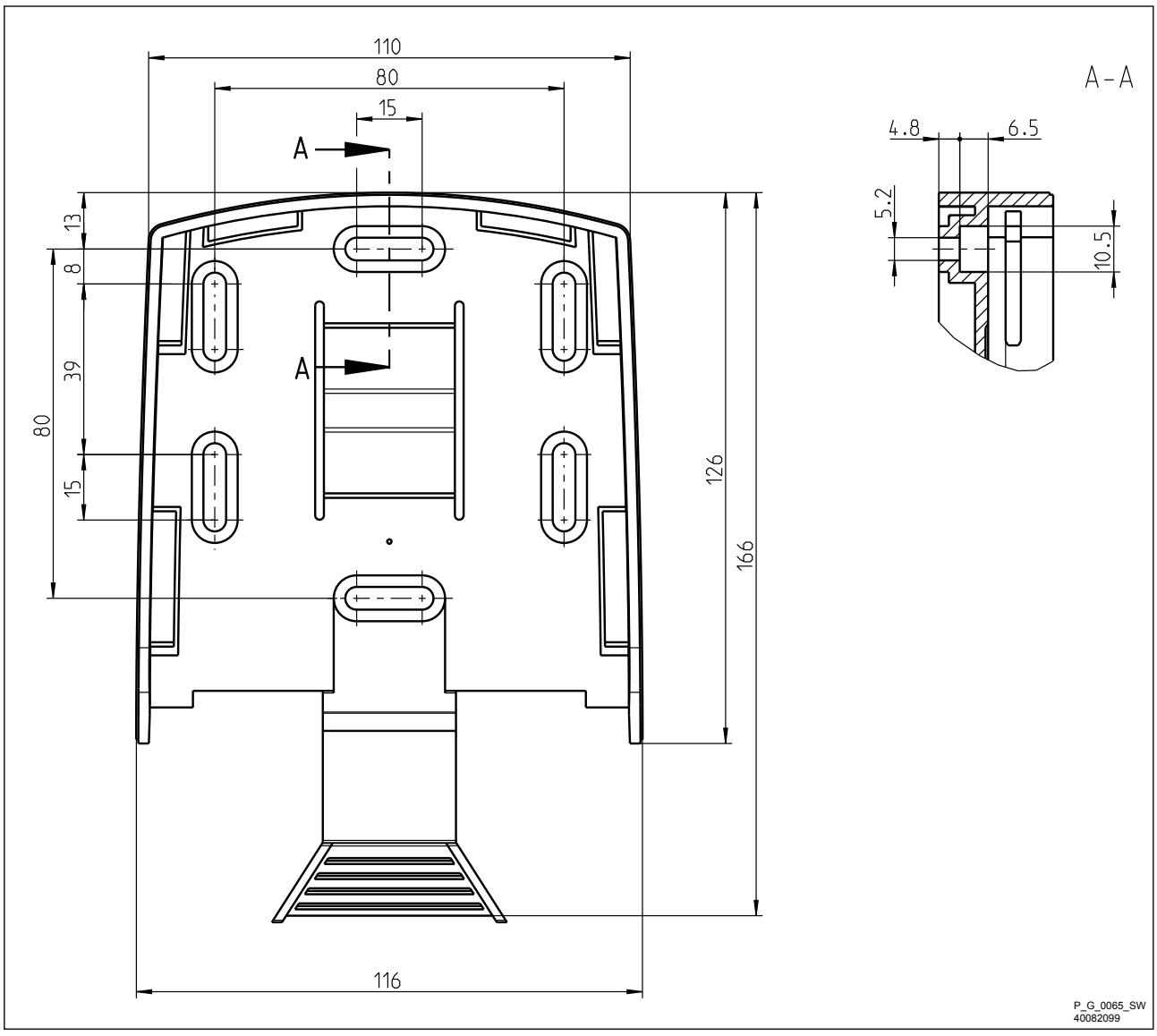


Fig. 57

Dimensional drawing of gamma/ X, material versions PPE, PPB and PPT

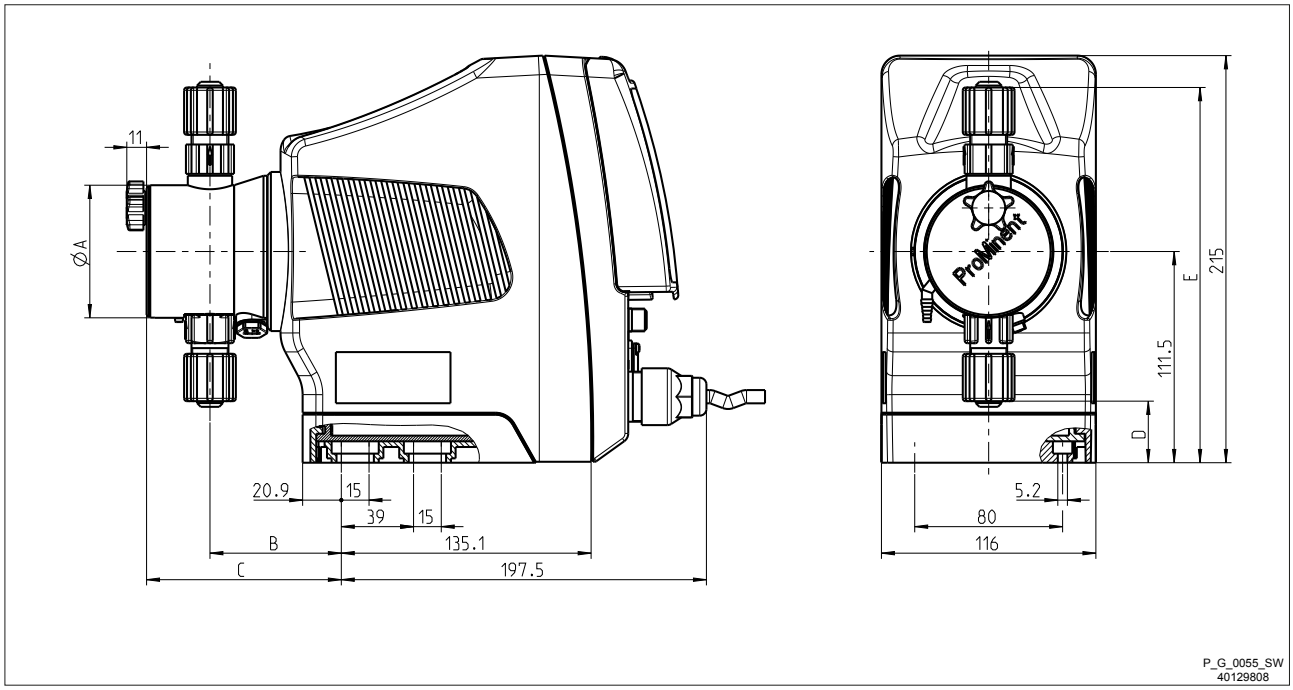


Fig. 58

	gamma/ X M70			gamma/ X M85		
	1602	**1009 - 0708**	**0424 - 220**	**1604**	**0715 - 0414**	**0245**
ØA	70	90	90	70	90	110
B	71	74	76	71	74	76
C (with bleed valve)	106	108	110	106	107	-
C (without bleed valve)	-	-	-	-	-	93
D	32	24	24	32	24	14
E	23	13	15	13	15	5
F	198	202	202	198	202	209

Dimensional drawing of gamma/ X, material versions NPE, NPB and NPT

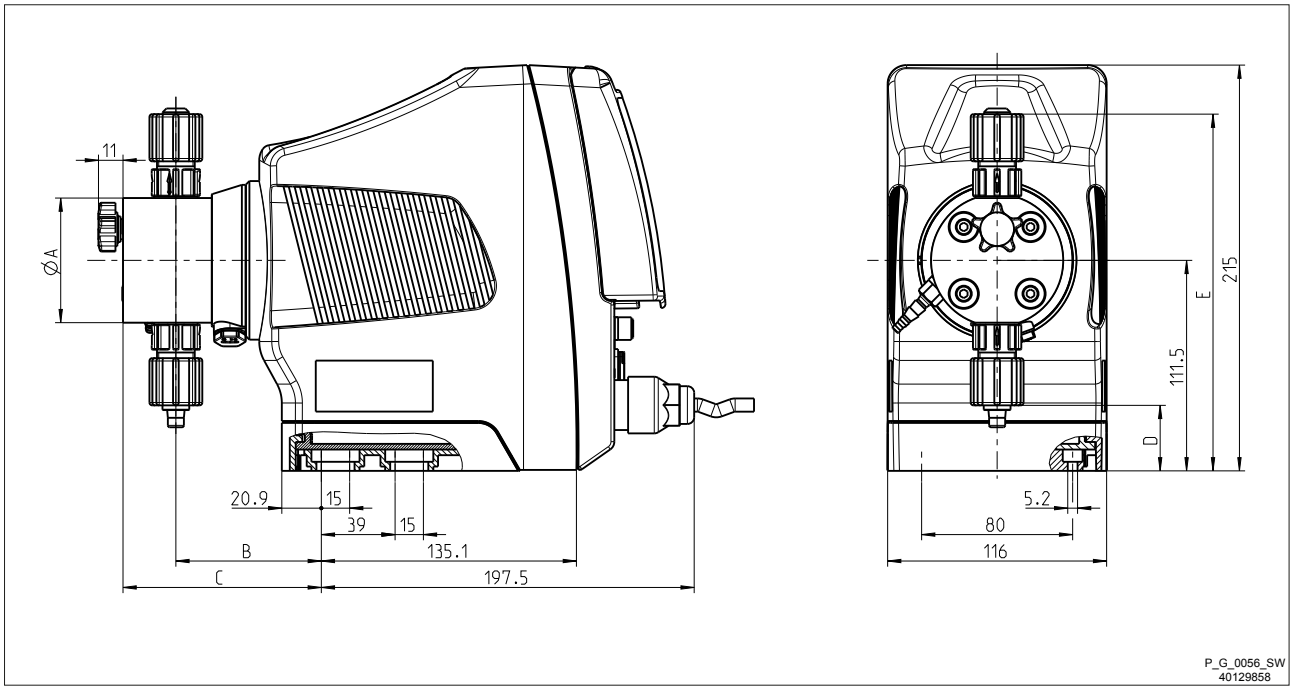


Fig. 59

	gamma/ X M70			gamma/ X M85		
	1602	**1009 - 0708**	**0424 - 220**	**1604**	**0715 - 0414**	**0245**
ØA	70	90	90	70	90	110
B	77	74	76	77	76	76
C (with bleed valve)	105	102	104	105	104	105
C (without bleed valve)	92	91	91	92	91	91
D	33	23	23	33	23	14
E	191	200	200	191	200	210

Dimensional drawing of gamma/ X, material version PVT

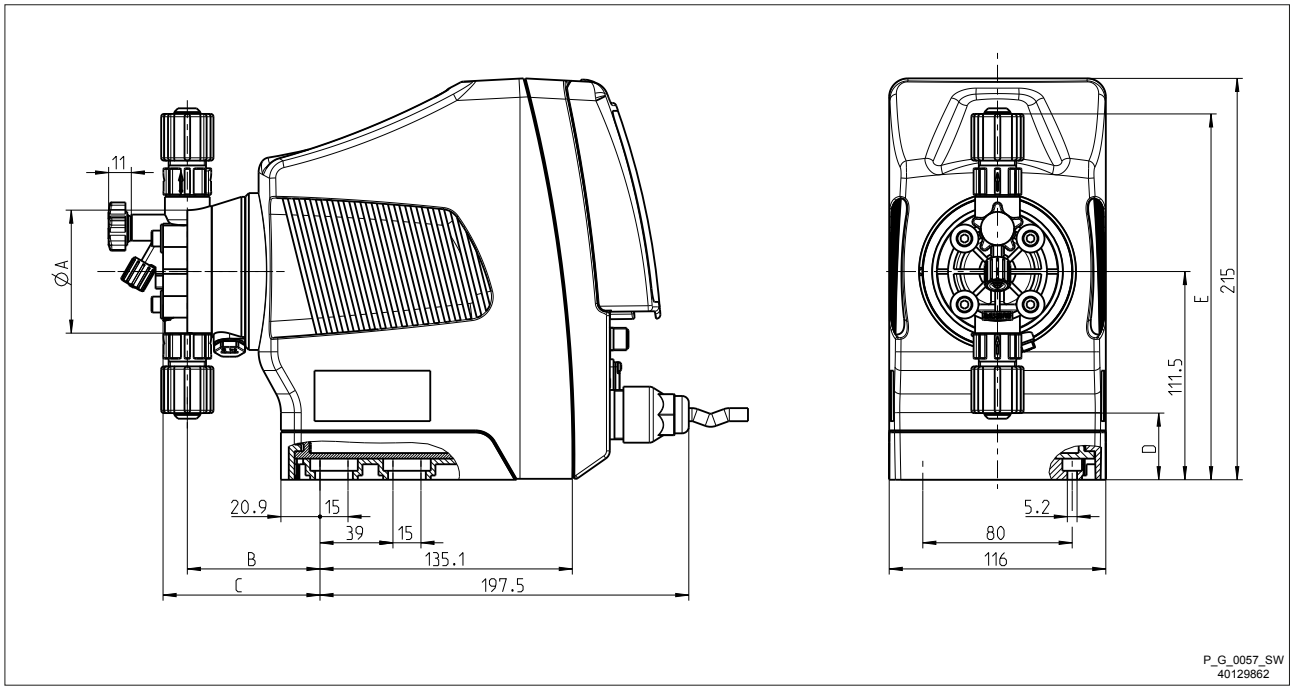


Fig. 60

	gamma/ X M70			gamma/ X M85		
	1602	**1009 - 0708**	**0424 - 220**	**1604**	**0715 - 0414**	**0245**
ØA	70	90	90	70	90	110
B	71	75	79	71	73	76
C (with bleed valve)	84	92	90	84	90	-
C (without bleed valve)	-	-	-	-	-	93
D	36	25	25	36	25	14
E	196	203	203	196	203	209

Dimensional drawing of gamma/ X, material version PVT HV

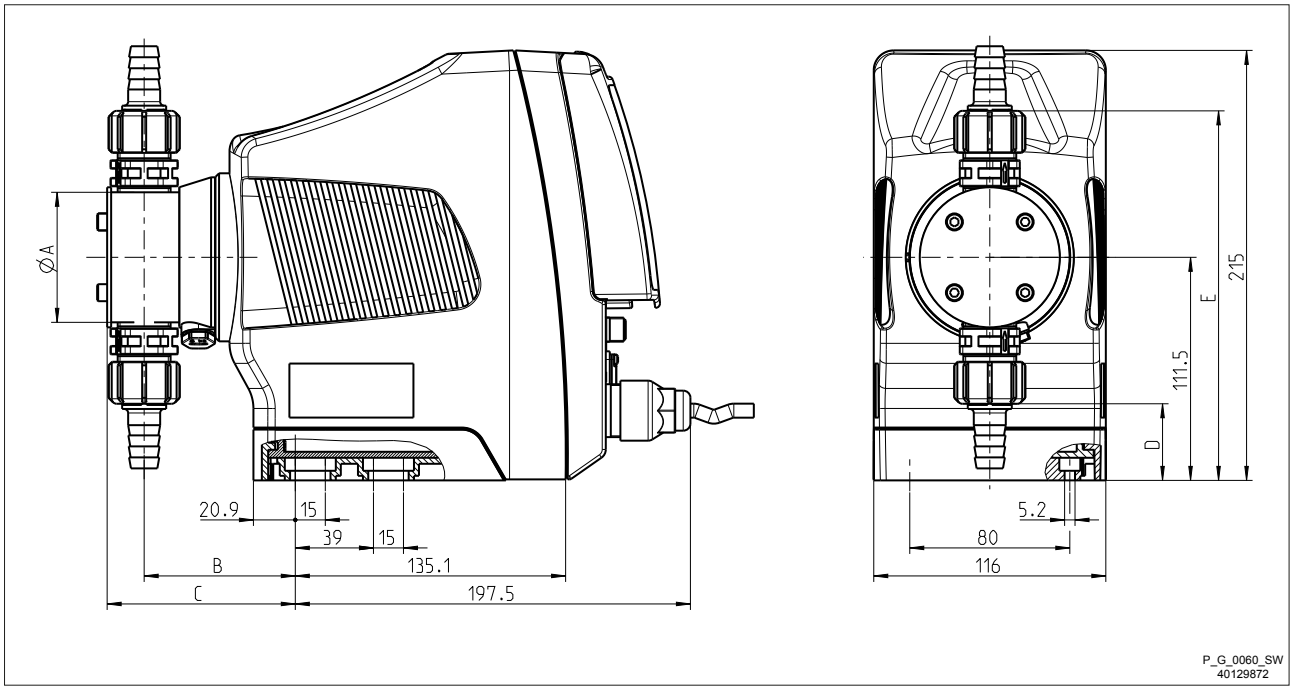


Fig. 61

	gamma/ X M70		gamma/ X M85	
	1009 - 0708	**0424 - 220**	**1604**	**0715 - 0414**
ØA	80	85	70	80
B	78	79	76	78
C	96	97	94	96
D	33	30	38	33
E	190	193	185	190

Dimensional drawing of gamma/ X, material version TTT

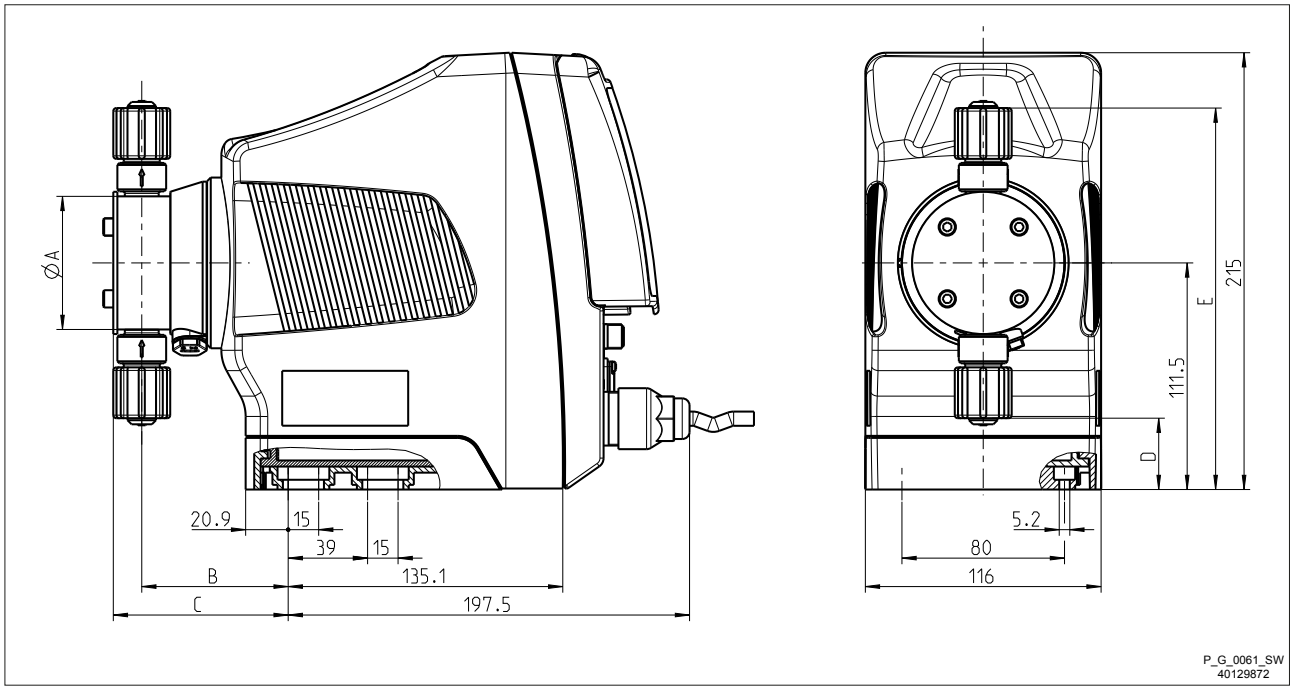


Fig. 62

	gamma/ X M70			gamma/ X M85		
	1602	1009 - 0708	0424 - 220	1604	0715 - 0414	0245
ØA	70	85	85	70	85	100
B	72	79	77	72	77	78
C	86	96	96	86	96	97
D	35	3	3	35	3	-5
E	188	220	202	188	220	227

Dimensional drawing of gamma/ X, material version SST

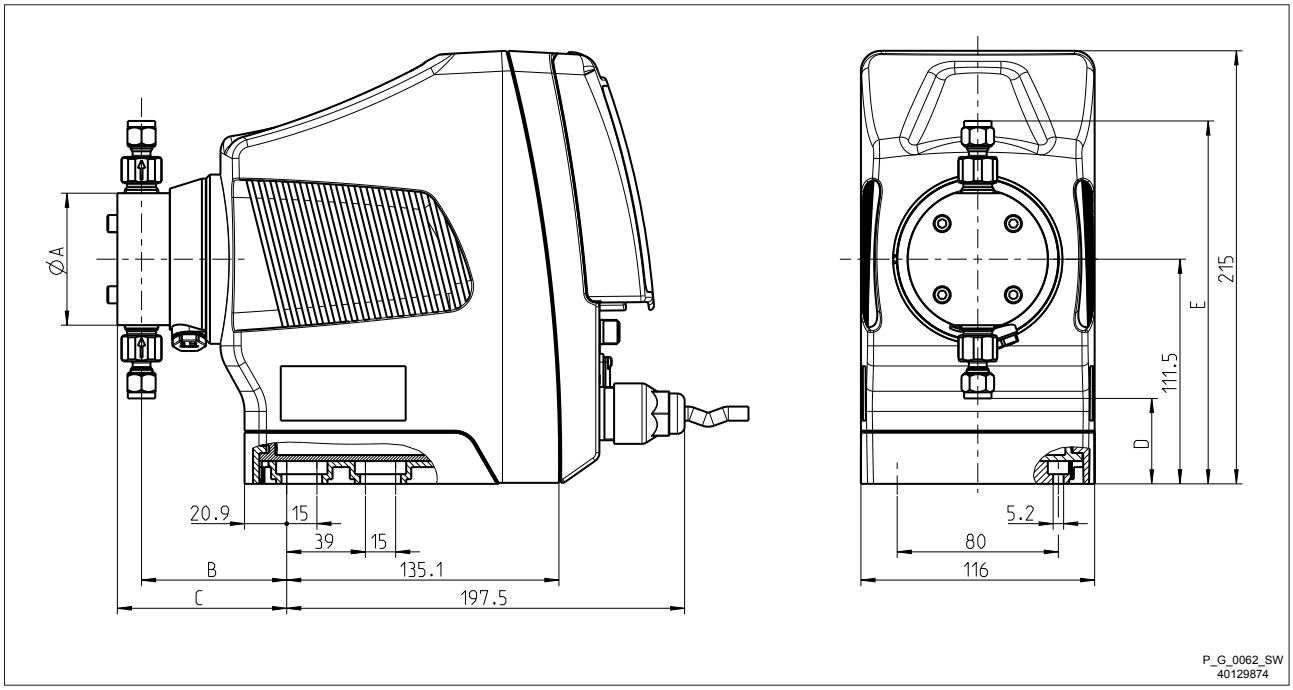


Fig. 63

	gamma/ X M70			gamma/ X M85		
	1602	1009 - 0708	0424 - 220	1604	0715 - 0414	0245
ØA	70	85	85	70	85	100
B	72	79	77	72	77	78
C	84	94	94	84	94	95
D	42	11	11	42	11	4
E	180	211	211	180	211	219

Dimensional drawing of gamma/ X, material version PPB SEK

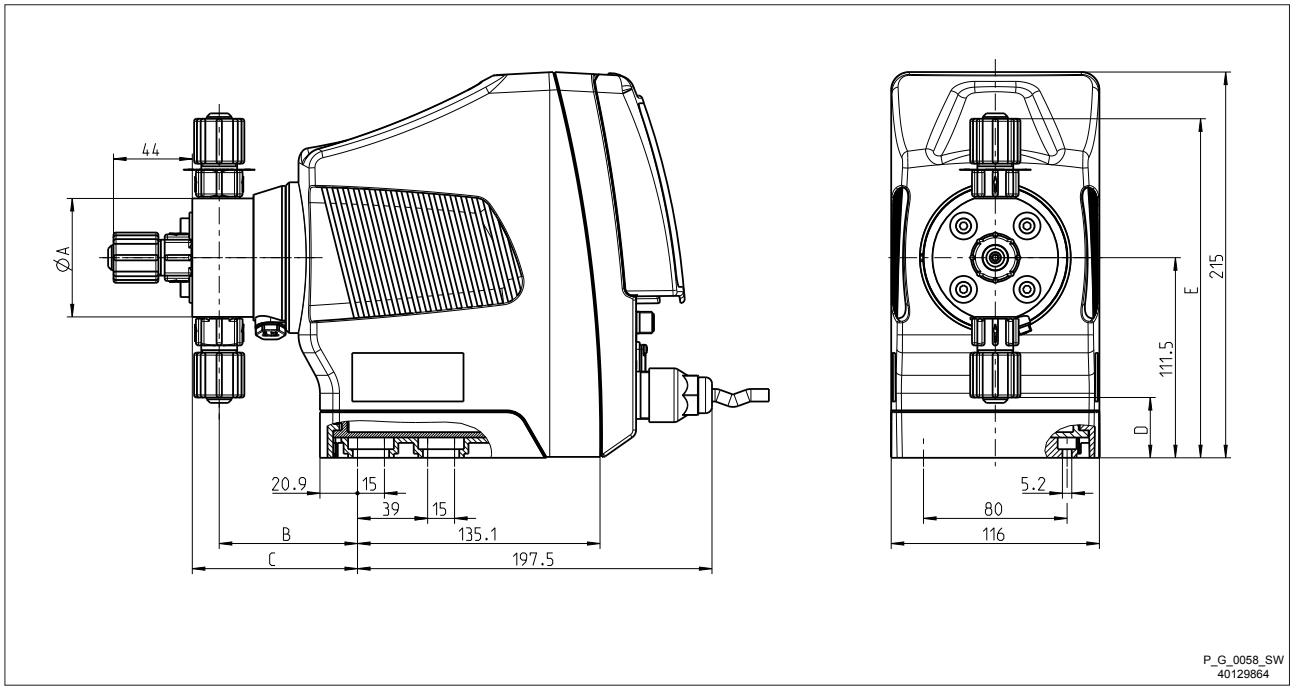


Fig. 64

	gamma/ X M70			gamma/ X M85	
	1602	1009 - 0708	0424 - 220	1604	0715 - 0414
ØA	70	90	90	70	90
B	77	74	76	77	76
C	92	89	91	92	91
D	33	24	24	33	24
E	189	199	199	189	199

Dimensional drawing of gamma/ X, material version NPB SEK

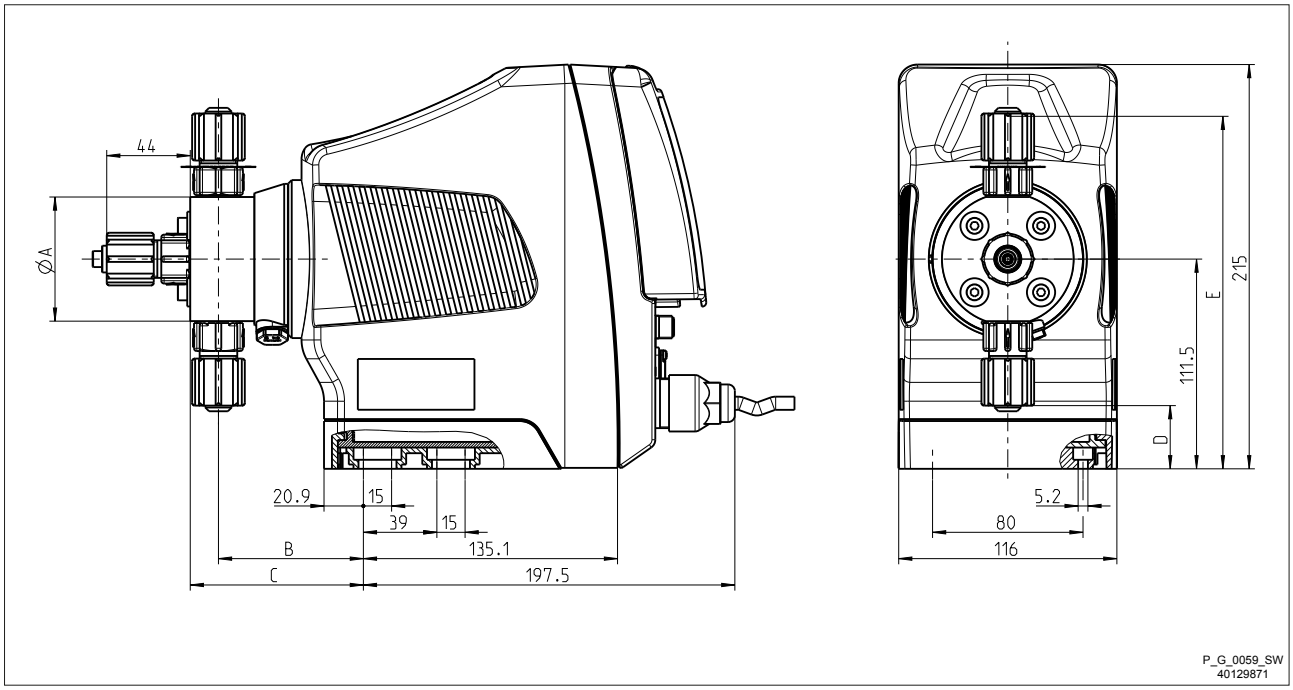


Fig. 65

	gamma/ X M70			gamma/ X M85	
	1602	**1009 - 0708**	**0424 - 220**	**1604**	**0715 - 0414**
ØA	70	90	90	70	90
B	77	76	76	77	76
C	92	91	91	92	91
D	33	24	24	33	24
E	189	199	199	189	199

20 Diagrams for Setting the Capacity

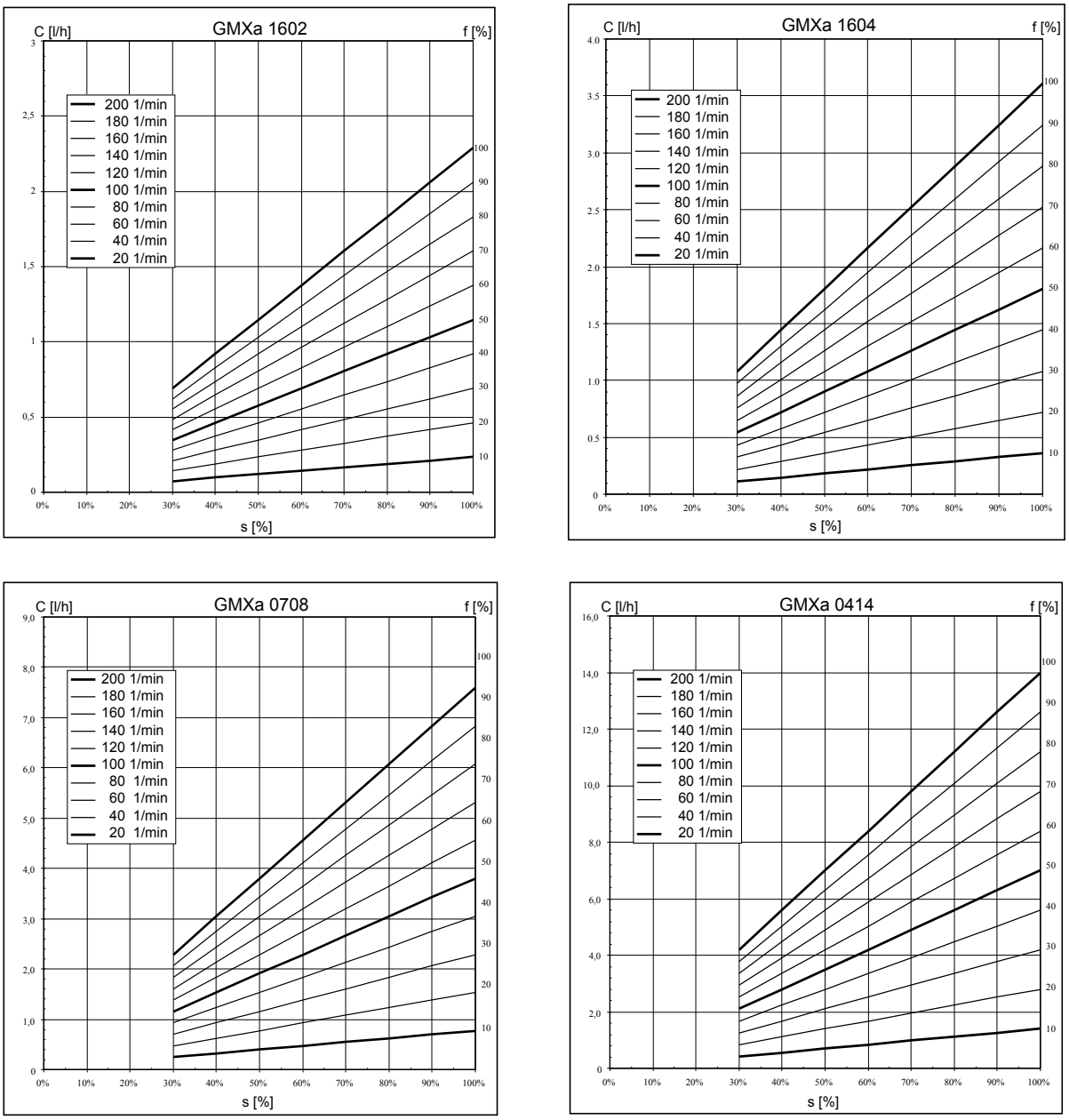
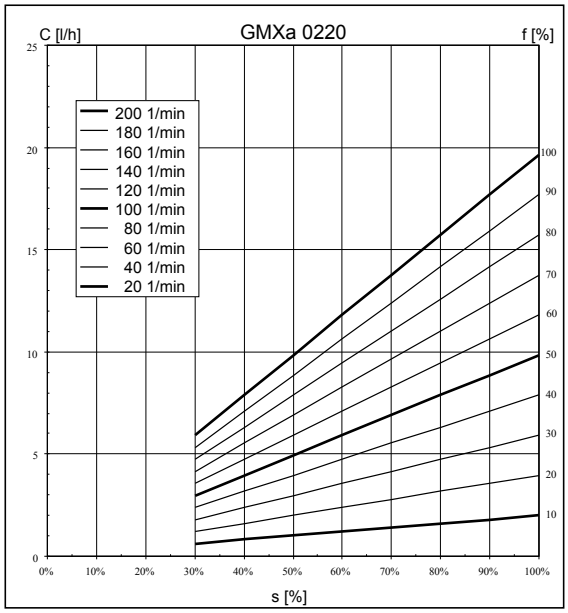
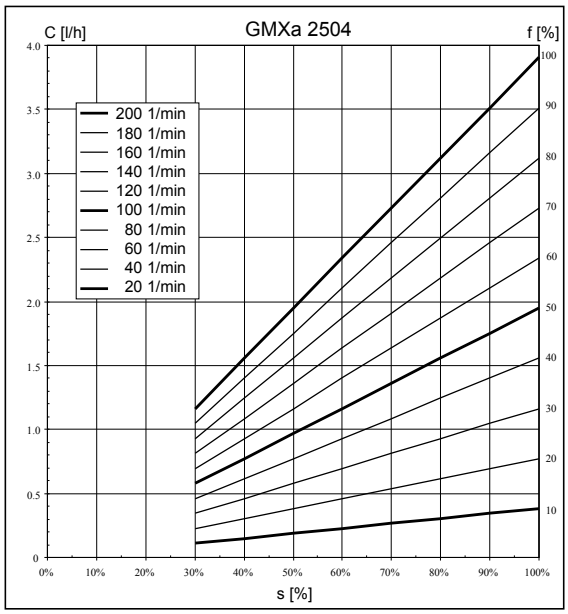
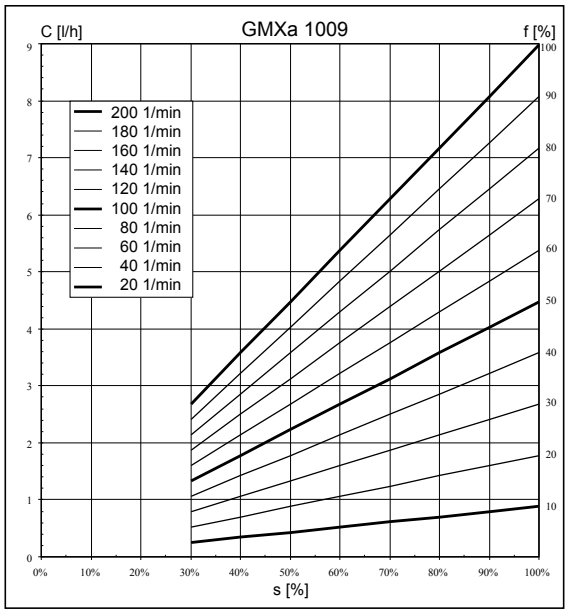


Fig. 66: Capacity C at medium back pressure depending on the stroke length s for different stroke rates f







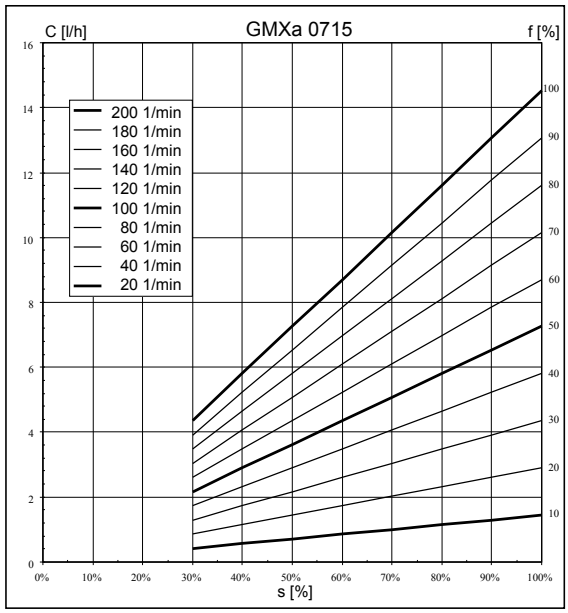


Fig. 67: Capacity C at medium back pressure depending on the stroke length s for different stroke rates f

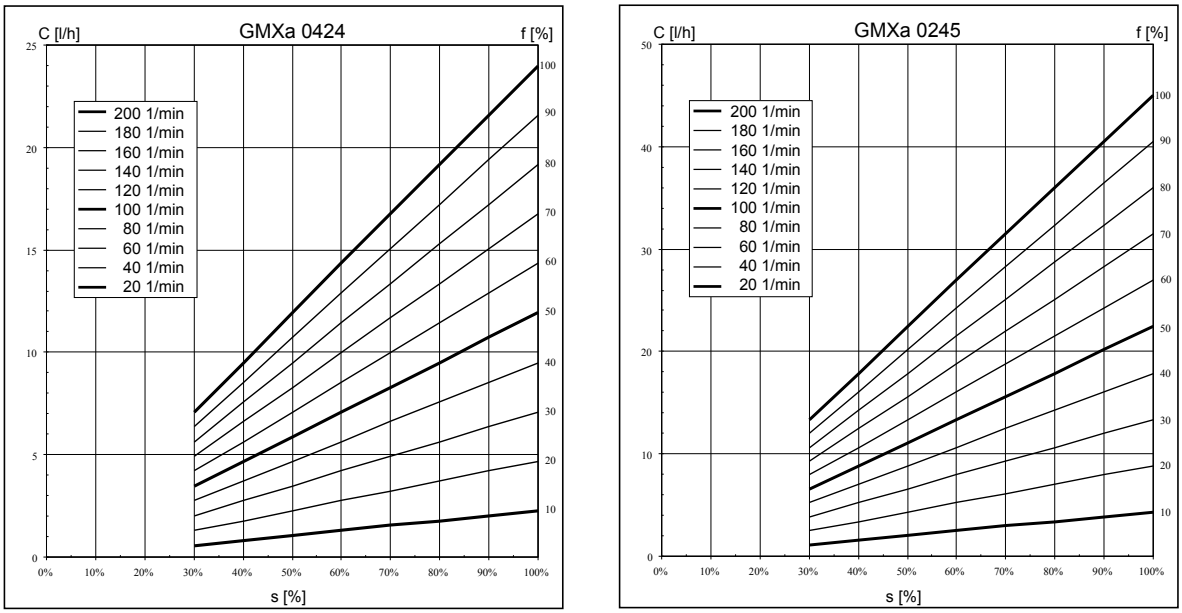


Fig. 68: Capacity C at medium back pressure depending on the stroke length s for different stroke rates f

21 EC Declaration of Conformity for Machinery

For mains voltage pumps:

In accordance with DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, Appendix I, BASIC HEALTH AND SAFETY REQUIREMENTS, section 1.7.4.2. C.

We,

- ProMinent GmbH
- Im Schuhmachergewann 5 - 11
- D - 69123 Heidelberg,

hereby declare that the product specified in the following, complies with the relevant basic health and safety requirements of the EC Directive, on the basis of its functional concept and design and in the version distributed by us.

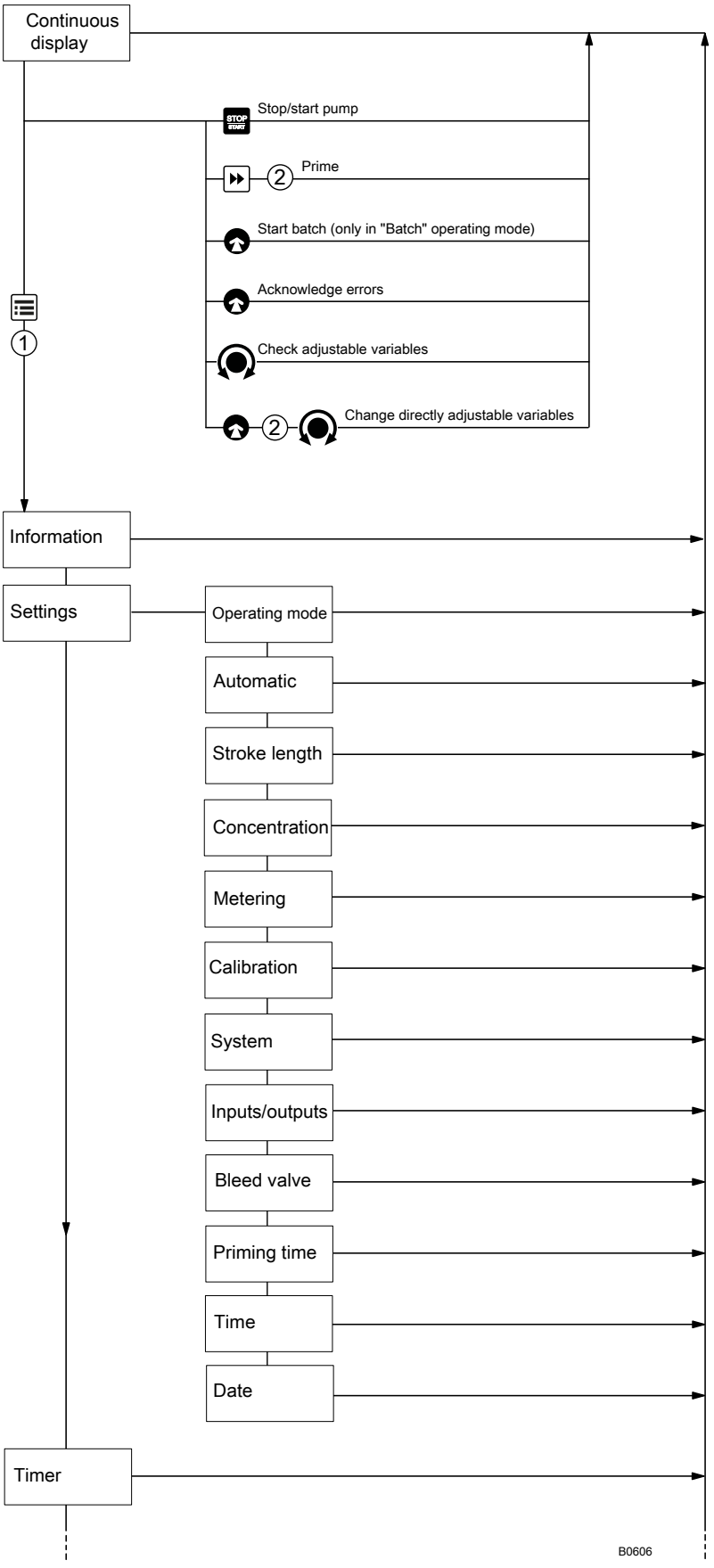
Any modification to the product not approved by us will invalidate this declaration.

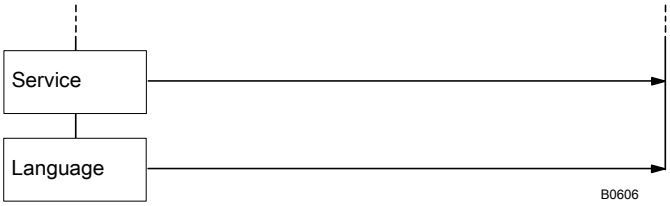
Extract from the EC Declaration of Conformity

Designation of the product:	Metering pump, Gamma/ X product range
Product type:	GMXa _ _ _ _ _ _ _ _ _ _ _ _ U _ _ Y _ 0 Y = 0, 3, 4, 5
Serial number:	see nameplate on the unit
Relevant EC directives:	Machinery Directive (2006/42/EC) EMC Directive (2004/108/EC) Compliance with the protection targets of the Low Voltage Directive (2006/95/EC) as per Appendix I, No. 1.5.1 of the Machinery Directive (2006/42/EC) RoHS Directive (2011/65/EU)
Harmonised standards applied, in particular:	EN 809: 2010 EN ISO 12100: 2010 EN 61010-1: 2010 EN 61000-6-2: 2005 EN 61000-6-3: 2011 EN 50581: 2012
Date:	16.03.2015

The EC Declaration of Conformity is available to download on our homepage.

22 Operating/Set-up Overview of the gamma/ X




Service
Language
B0606

23 Operating Menu of gamma/ X, Entire Unit

1st level	2nd	3rd	4th	5th	xth
Information	Versions	Hardware			
		Software			
		HMI version			
	Time				
	Date				
	Serial number				
	Identity code				
	Max. capacity *1 Max. capacity *2				
	Switch-on counter				
	Total operating time				
	Total metering volume				
	Total number of strokes				
	Current stroke volume				
Settings	Operating mode	Manual			
		Contact	*Memory* On Off	Metering volume *1	
				Factor *2	
		Batch	*Memory* On Off	Metering volume *1	
				Factor *2	...
		Analogue	0..20 mA		
			4..20 mA		
			Linear curve Lower side band Upper side band	Curve point 1 (I1,F1) Error mess. < Imin Error mess. > Imax	...
	Automatic	On Off			
	Stroke length *2	1 … 100%			
	Concentration	Concentration control active inactive	Flow of main medium (for Manual)	Concentration of feed chemical	...
			Contact gap (for Contact)	Concentration of feed chemical	...
			Volume of main medium (for Batch)	Concentration of feed chemical	...

1st level	2nd	3rd	4th	5th	xth
			Max. flow of main medium (for Analogue)	Concentration of feed chemical	...
	Metering	Discharge stroke	optimum fast sine mode continuous DFMa		
		Suction stroke	normal HV1 HV2 HV3		
		Pressure stage	x bar		
		Monitoring	Air lock	Inactive Warning Error	
			Message with overpressure	Warning Error	
		Compensation	active inactive		
	Calibration	Start calibration	Calibration ended	Calibration result	
	System	Dosing head	No dosing head ... 0245		
		Volume unit	Litres Gallons		
		Pressure unit	bar psi		
	Inputs/outputs	Auxiliary capacity *1 Auxiliary frequency *2	...		
		Relay 1	Relay1 type	Inactive Error Warning Warning + error Pump active Metering / Batch Bleed valve	
			Relay 1 polarity	normally-open (NO) normally-closed (NC)	
			Relay cycle quantity	01.000 l	

1st level	2nd	3rd	4th	5th	xth
		Relay 2	Relay type	Inactive Error Warning Warning + error Pump active Metering volume Stroke rate Metering / Batch Bleed valve External	
			Polarity	normally-open (NO) normally-closed (NC)	
		Analogue output	0..20 mA 4..20 mA	Strokes / hour Capacity at 20 mA	
		Flow control	Flow Control	Tolerance / strokes	...
				Activation	...
				if auxiliary	...
		Diaphragm rupture	Inactive Warning Error		
		Pause Input	normally-open (NO) normally-closed (NC)		
		Level warning	normally-open (NO) normally-closed (NC)		
		Level error	normally-open (NO) normally-closed (NC)		
	Bleed valve	Off			
		Periodic	Bleed cycle	Bleed metering time	...
		Air lock	Bleed metering time		
		both	Bleed cycle	Bleed metering time	...
	Priming time	0 … 60 s			
	Set time	Time	Set	hh.mm.ss	
		Auto. summer time			
		Summer time begins in	February March April		
		Sunday the	1st, 2nd, 3rd, 4th, 5th		

1st level	2nd	3rd	4th	5th	xth
		Summer time ends in	August September October November		
		Sunday the	1st, 2nd, 3rd, 4th, 5th		
	Date	Set	dd.mm.yyyy		
Timer	Activation	Active Inactive			
	Setting the timer	New Display Change Clear	Command 01 Command2 …	Init Hourly Daily (Mon-Sun) Weekdays1 (Mo-Fr) Weekdays2 (Mo-Sa) Weekend (Sa+Su) Weekly Monthly	...
	Clear all	No Yes			
Service	Access protect.	*Password?*	None Lock menu Lock all		
	Change password	*Password?*	0000		
	Clear counter	Stroke counter Volume counter All			
	Diaphragm replace-ment	Back To change position			
	Display	Brightness			
		Contrast			
	Factory settings	*Password?*	Yes No		
Language	English German Frenchç Spanishñ				

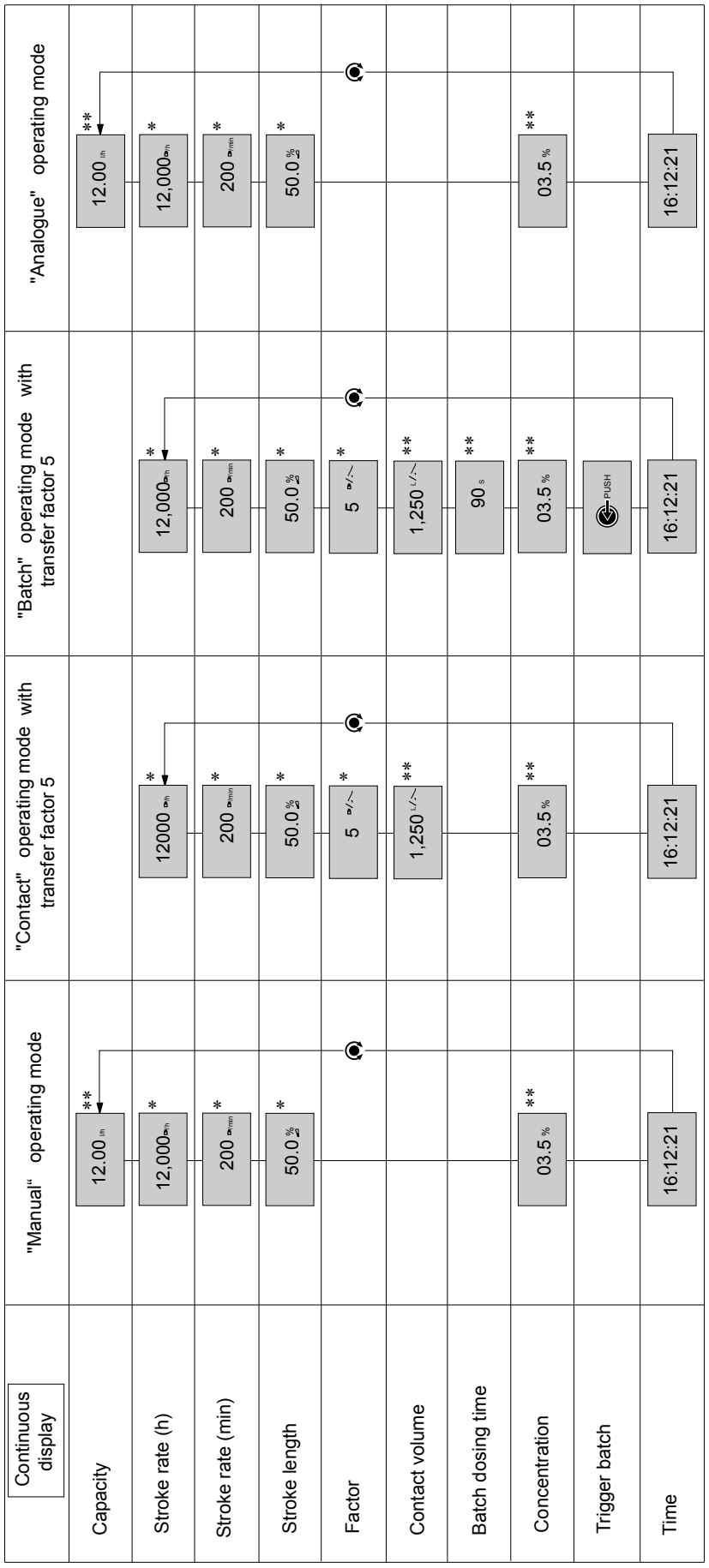
*1 with *'Automatic'* - *'on'* - see Chap. *'Set Up'* - *'Settings'* - *'Automatic'*

*2 with *'Automatic'* - *'off'* / with conventional operating mode

Menus may be missing or added depending on the design and equipment on the pump.

24 Continuous Displays and Secondary Displays

Continuous displays



Auxiliary displays in the continuous display

Auxiliary display	Mode **"Manual"**	Mode **"Batch"** with transfer factor 5	Mode **"Contact"** with transfer factor 5	Mode **"Analogue"**
Capacity	12.00 L / h			12.00 L / h
Stroke rate	12000 / h	12000 / h	12000 / h	12000 / h
Factor		5 /	5 /	
Remaining strokes			25,00 [1]	
Remaining litres			000,833 L [1]	
Total number of strokes	86500	86500	86500	86500
Stroke length	50 %	50 %	50 %	50 %
Signal current (at the input)				12,7 mA [2]
Dosing mode	slow HV1	slow HV1	slow HV1	slow HV1
Pressure display	12.5 bar	12.5 bar	12.5 bar	12.5 bar
Time	16:12:21	16:12:21	16:12:21	16:12:21
Date	2015 - 03 - 27	2015 - 03 - 27	2015 - 03 - 27	2015 - 03 - 27

1 = only with "Storage tank" function extension
2 = only with current output

25 Index

1, 2, 3 ...

"External control" terminal . . . 34
4 - 20 mA . . . 47

A

About this pump . . . 7
Access code . . . 71
Access protect. . . . 43, 70
Accuracy . . . 88
Acknowledgement . . . 73
Action . . . 69
Administration functions for commands . . . 68
Air humidity . . . 90
Air lock . . . 53
Analogue . . . 21, 35
Analogue input . . . 34, 47
Analogue output . . . 64
Anti-kink device . . . 31
Applied harmonised standards . . . 137
Assembly . . . 24
Automatic . . . 49
Automatic bleeding . . . 23
AUX . . . 63
Auxiliary capacity . . . 22, 23, 34, 35, 63
Auxiliary frequency . . . 22, 23, 34, 35, 63

B

Back pressure fluctuations . . . 53
Basic Principles for Setting up the Control . . . 41
Batch . . . 21, 47, 55, 57, 58, 64
Bleed . . . 30, 64, 66
Bleed valve . . . 31
Bleed, function . . . 22
Brightness . . . 72

C

Calibrate . . . 22, 60
Capacity . . . 134
Cavitation . . . 51
Change . . . 68
Check adjustable variables . . . 73
Checking adjustable variables . . . 43
Cleaning the diaphragm rupture sensor . . . 80
Cleaning valves . . . 78
Clear . . . 68, 71
Clear all . . . 70
Clear counter . . . 71
Clear, all . . . 70
Clearing the program . . . 70
Clickwheel . . . 15
Climate . . . 90
Code . . . 71
Compatibility . . . 90
Compensation . . . 53
Concentration . . . 54
Concentration entry . . . 54
Connector size . . . 87
Contact . . . 21, 45
Contact memory . . . 71
Contact water meter . . . 46
Continuous display . . . 16
Continuous displays . . . 43, 144
Contrast . . . 72
Control Elements . . . 15
Creating a program . . . 68
Current output . . . 39
Curve . . . 47

D

Date . . . 44, 67
Declaration of Conformity . . . 137
Decommissioning . . . 85
Decontamination declaration . . . 13
Degree of protection . . . 90
Demonstration purposes . . . 62
Designation of the product . . . 137
DFMa . . . 50
Diagrams for Setting the Capacity . . . 134
Diaphragm replacement . . . 72, 79
Diaphragm replacement position . . . 72
Diaphragm rupture . . . 65
Diaphragm rupture indicator . . . 36
Dimensional Drawings . . . 125
Directly changeable variables . . . 73
Discharge stroke . . . 19, 50
Discharge valve . . . 31
Display . . . 68, 72
Disposal . . . 86
Dosing monitor . . . 36
Dosing precision . . . 53
Draining the liquid end . . . 85
DulcoFlow . . . 50

E

EC Declaration of Conformity . . . 137
Electrical data . . . 89
Emergency . . . 11
Error . . . 23, 64
Error processing . . . 48
Example . . . 70
Exploded drawings . . . 92
External contact . . . 23, 34, 35
External frequency changer . . . 23

F

Factor . . . 45, 47
Factory settings . . . 72
Fast . . . 50
Fault indicating and pacing relay option . . . 22
Fault indicating relay . . . 22, 37, 38, 39
Fault indicator . . . 15
Fault indicator (red) . . . 23
Fault message . . . 16
Fault messages . . . 83
Fault statuses . . . 23
Faults without a fault message . . . 82
Fill . . . 50
Flow . . . 22
Flow control . . . 65
Functional Description . . . 19
Functions . . . 22, 23

G

Gas lock . . . 53
Gaseous feed chemicals . . . 51
Generating instructions . . . 68

H

Hardware . . . 44
Hierarchy of operating modes . . . 23
HV1 . . . 51

I

Identification of safety notes . . . 8
Identifier . . . 16
Identity code . . . 5, 44

Info 44
Information in the event of an emergency 11
Init 68
Inputs/outputs 62
Installation, electrical 33
Installation, hydraulic 26
Installing hose lines 27
Intended Use 8
IP 90

K
Keys 15, 18

L
Language 72
LCD screen 15
Leakage hole 75
Level 65
Level switch 22, 35, 37
Linear curve 48
Lock 70
Lost in hyperspace 41
Lower side band 48

M
mA Input 34, 47
mA output 23, 64
Main display 16
Mains cable 34
Maintenance 75
Manual 21, 23, 45, 54
Material specifications 89
Maximum capacity 44
Maximum metering rate 44
Memory 45, 47
Menu 44
Metering 50, 64, 70
Metering monitor 65
Metering profiles 19, 50
Metering pumps with bleed valve 30
Metering pumps with self-bleeding 30
Metering pumps without integral relief valve 31
Metering pumps without self-bleeding 27
Minimum Stroke Length 88
Module 44
Monitoring 53

N
New 68
Nominal pressure 52
Normal 51

O
Operating indicator (green) 15, 23
Operating menu 140
Operating mode selection 44
Operating Modes 21, 23
Operating overview 138
Operation 73
Optimum 50
Option 64
Ordering Information 124
Out-gassing 49, 53
Overview of Equipment 14

P
Pacing relay 38, 39
Password 43, 71
Pause 22, 23, 34, 35, 65
Performance Data 87
Polarity 63
Power consumption 89
Pressure 52
Pressure display 16
Pressure stage 52
Pressure unit 62
Priming 23, 73
Priming pressure 30
Priming time 67
Protection against contact and humidity 90
Protection class 90
Protection menu 70
Pulse control 46
Pump active 64

Q
Qualification of personnel 11

R
Relay 22, 37, 63
Relay polarity 64
Relay type 63
Relevant EC directives 137
Repairs 77
Replacement position 79
Replacing the diaphragm 79
Replacing the dosing head 62
Reproducibility 88
Return line 31
Return pipe 27, 30

S
Safety Chapter 8
Safety declaration form 13
Safety requirements 90
Scope of Delivery 13
Secondary display 16
Secondary displays 43, 145
SEK 30
SEK types 21
Self-Bleeding 21
Semiconductor switch 38, 39
Serial number 44, 137
Service 70
Set up 41
Set up mode 43
Set Up, chapter 44
Set-up overview 138
Setting the timer 68
Settings 44
Shipping weight 91
Side band 47, 48, 49
Sleeve 31
Slot 15
Slow 50
Sockets 15
Software 44
Sound pressure level 12, 91
Standard installation 32
Starting a batch 73
Stop 22, 23
Storage 13
Stroke counter 71
Stroke length 49
Stroke length, manual 49
Stroke rate 64
Suction stroke 19, 20, 49, 51
Summer time 67
Sunday 67
Supplementary information 2
Supply voltage 34
Switch-on counter 44
Symbols 32

System 62

T

Technical Data 87
Temperatures 90
Test (function) 23
Time 44, 67, 68
Time event 68
Timer 68
Timer activation 68
Total number of strokes 44
Total operating time 44
Transport 13
Troubleshooting 82

U

Unpacking 13
Upper side band 49

V

Viscosity 49, 51, 88
Volume / Stroke 44
Volume counter 71
Volume unit 62

W

Warning 64
Warning alert 16, 37
Warning indicator 15
Warning indicator (yellow) 23
Warning messages 84
Warning sign 8



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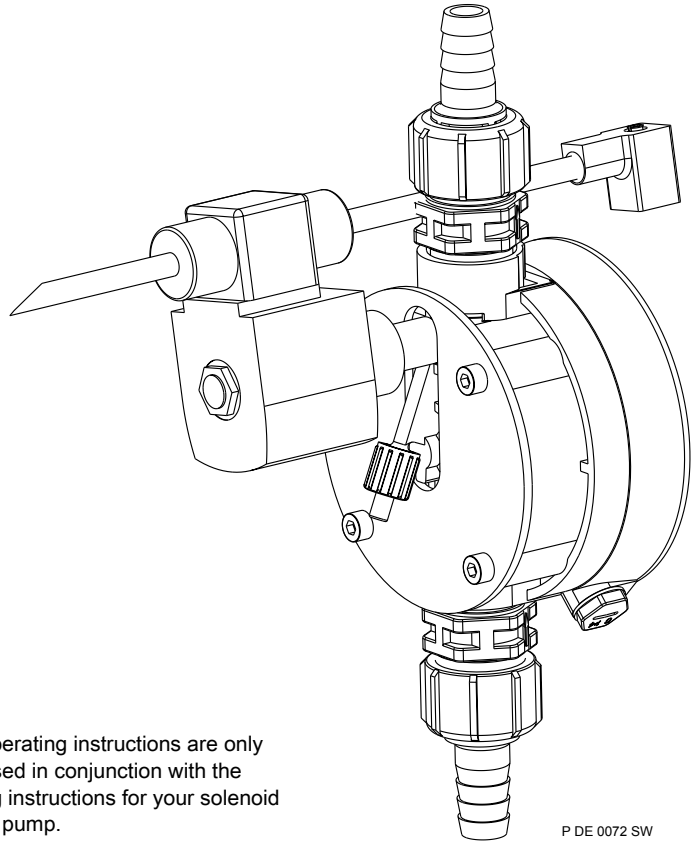
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Supplementary instructions

Bleed module

EN



These operating instructions are only valid if used in conjunction with the operating instructions for your solenoid metering pump.

P DE 0072 SW

Please carefully read these operating instructions before use. · Do not discard.
The operator shall be liable for any damage caused by installation or operating errors.
The latest version of the operating instructions are available on our homepage.

Part no. 986566 BA DE 034 11/15 EN

Table of contents

1 About the Product ... 3

2 Safety Information, Storage and Transport ... 4

2.1 Safety Information ... 4

2.2 Storage, Transport ... 5

3 Construction and Function ... 6

3.1 Construction ... 6

3.2 Function ... 6

4 Installation and Set-up ... 8

4.1 Installing the Bleed Module ... 8

4.2 Assembling the Solenoid Bleed Valve ... 8

4.3 Electrical Installation ... 9

4.4 Hydraulic Installation ... 10

4.5 Adjustment ... 10

5 Start Up ... 11

6 Maintenance, Repair, Troubleshooting and Disposal ... 12

6.1 Maintenance ... 12

6.2 Repairs ... 12

6.2.1 Replacing the O-rings ... 12

6.2.2 Replacing the Coil ... 12

6.3 Troubleshooting ... 13

6.4 Disposal ... 13

7 Technical Data ... 14

1 About the Product

The solenoid bleed valve is used to automatically bleed a liquid end equipped with a bleed valve.

The solenoid bleed valve is only intended for operation with a metering pump.

The solenoid bleed valve is not intended for use with agglutinative feed chemicals.

2 Safety Information, Storage and Transport

2.1 Safety Information

WARNING!

Only allow technical personnel to perform the work described here!

WARNING!

Danger of electric shock

With mains voltage designs, the inside of the coil carries mains voltage.

– Only permit authorised technical personnel to work on the device.

CAUTION!

Hot surface

The coil can become hot if you open the valve for a longer periods.

– Avoid contact with the hot coil or wear gloves.

CAUTION!

– Unintentional activation of the solenoid bleed valve can result in hazardous conditions depending on the hydraulic connection.

  Take appropriate measures to prevent any hazardous conditions.

– Only use the device in accordance with the technical data and specifications outlined in the operating instructions.

– When handling fluids, take into consideration the resistance of the materials used – refer to the ProMinent® resistance list in the product catalogue or at *www.prominent.com*.

2.2 Storage, Transport

CAUTION!

The valve can be damaged by improper storage or transportation.

– Store and transport the valve in a dry and dust-free manner, preferably in its original packaging.
– Also retain the original packaging for possible return of the device.

Data	Value	Unit
Storage and transport temperature	-15 … +60	°C

3 Construction and Function

3.1 Construction

Bleed module

The bleed module consists of an electronic circuit board with a relay and a socket.

The bleed module is recognised as soon as it is plugged in, even when the pump is running, and is integrated into the pump function (plug and play).

There are two available designs:

- Module with only one relay to control the bleed valve. An additional Bleed Menu is displayed - see below.
- Module with a further relay (signal relay), available as required. This appears in the menu under *'SET ➔ RELAY 2 ➔ ...'* where it can be set to a desired function (fault indicating relay, pacing relay,...).

Solenoid bleed valve

The solenoid bleed valve consists of a valve with a PVDF housing and a coil screwed onto it as a power end/drive. The coil is interchangeable - select the coil according to the required power supply - see section "Changing spare parts - coil replacement".

Screw the solenoid bleed valve instead of the bleed valve into the pump's bleed connector.

The power end/drive has type A pin terminals for connecting to the pump. The pump controls the valve externally.

3.2 Function

Bleed process

(1) - At the start of the bleed procedure, the pump first stops normal metering. The Stop symbol appears in the display.

(2) - After 1 s, the bleed relay switches on the solenoid valve and thus opens the bleed valve on the dosing head.

(3) - One second later, the pump begins to work at its maximum possible stroke rate - as it does when priming. The Bleed symbol now appears in the display, instead of the Stop symbol.

(4) - The pump now works for the entire set time, which can be any time between 1 and 300 s, with the bleed valve open and at its maximum possible stroke rate.

(5) - The pump stops once the pre-set time has elapsed. The simple Stop symbol reappears in the display.

(6) - After one second, the pump again switches off the relay, thus closing the bleed valve on the dosing head.

(7) - After a further second, the simple Stop symbol disappears in the display and the pump returns to its normal operation.

Behaviour during a stop

If the pump is stopped at the time of triggering, the start of the bleed procedure is delayed until the pump is switched on.

If the pump is manually stopped during the bleed procedure, the sequence control immediately jumps to phase (5) - see above. This cancels the bleed procedure completely. Bleeding begins again from the start once it is switched on again.

Triggering possibilities

Bleeding is triggered by an *'air lock'* or by a periodic timer control or by both of these.

- When bleeding is triggered by an *'air lock'* (signal from the pump drive), the process starts with the "air lock" alert from the pump drive control. If the alert is still pending after the procedure has been completed, the alert will be repeated up to a maximum of three times. If it is still pending after this, then an error message will be generated that has to be acknowledged manually.

  If a trigger is set - by the menu - for an *'Air lock'*, then the option of a direct error or warning alert as a reaction to the *'Air lock'* alert is no longer available. Also the corresponding menu branch in the *'Metering'* menu is hidden. The signal is only available for bleeding
- When the bleed valve is triggered by the periodic timer control, the bleed procedure always begins at the "start" of a period, that is directly after mains power has been switched on. The time period can be set between 10 and 1440 minutes (= 1 day). A stopped pump does not stop the time count rather it only delays the triggering of the bleed procedure until it is switched on again.

4 Installation and Set-up

4.1 Installing the Bleed Module

The bleed module is usually pre-installed. If not, then install the bleed module in the same way as an additional relay, referring to the operating instructions for your pump.

Before assembly, check whether the existing operating conditions agree with the performance data of the solenoid bleed valve.

4.2 Assembling the Solenoid Bleed Valve

Assemble the solenoid valve onto the dosing head

1. Remove the protective caps from the solenoid valve and from the pin terminals.
2. Check whether the two O-rings are sitting correctly and functioning properly at the solenoid valve hydraulic connector.
3. Depressurise and disconnect the pump from the mains power supply and, if necessary, flush the liquid end.
4. Unscrew the pump's bleed valve from the bleed valve connector.

CAUTION!

The bleed valve connector can break off

– Do not hold the black housing when screwing the solenoid valve into the bleed valve connector.

5. Hold the white hydraulic connector and do not use any tools to carefully screw the solenoid valve into the pump's bleed valve connector to produce a leak-tight connection.
6. Loosen the solenoid valve nut (using an open-ended 14 mm spanner) to point the pin terminals upwards - without loosening the hydraulic connection.
7. Gently tighten the nut after adjusting it.

4.3 Electrical Installation

Wire the solenoid valve electrically:

1. Connect the device plug at the grey end of the cable to the black socket on the front of the pump and secure with the screw.
2. Plug the device plug in the middle of the cable onto the pin terminals and secure with the screw.
3. Only with a simple bleed relay: Connect the mains plug at the end of the black cable to the supply voltage, observing the nameplate.
4. Only with bleed / signal relay: Connect the wire ends of the black cable end to the 24 V supply voltage and connect a device for analysing the signal relay contact signal - see the table below.

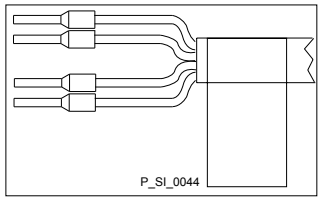


Fig. 1: Cable end with bleed / signal relay

Lead	Supply voltage	Polarity	Input	Output
green	24 V DC	+	Supply voltage for the solenoid bleed valve	
yellow	"	-	"	
brown	24 V DC	+	Voltage looped via the signal relay	Signal relay contact signal
white	"	-	"	"

4.4 Hydraulic Installation

Hydraulically connecting the bypass hose nozzle:

1. Unscrew the union nut of the bypass hose nozzle.
2. Fit an appropriate hose (6x4 mm) to the bypass hose nozzle using the union nut.
3. Guide the other hose end into the storage tank.

4.5 Adjustment

Refer to the relevant chapter in the operating instructions for your pump.

5 Start Up

Starting up the pump and the solenoid valve:

1. Reconnect the pump to the supply voltage and start it up hydraulically.
2. Perform a functional test, e.g. set a periodic bleed with a low P-time in the *'Bleed valve'* menu - refer to the operating instructions for your pump
3. If it is working properly, the pump can be released for operation.

Ensure that the solenoid bleed valve cannot be inadvertently broken off.

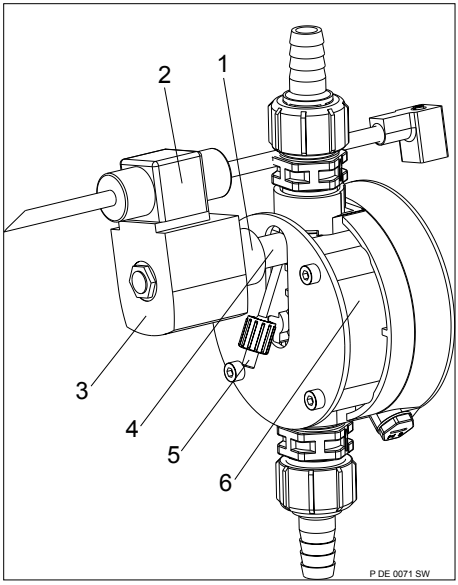


Fig. 2: Solenoid bleed valve with bleed cable on the dosing head

1 Hydraulic connector M
2 Device plug in the middle of the cable
3 Solenoid bleed valve
4 Pump bleed valve connector
5 Bypass hose sleeve
6 Dosing head

6 Maintenance, Repair, Troubleshooting and Disposal

6.1 Maintenance

Interval	Maintenance work
Quarterly	Check the solenoid bleed valve for leaks.
	Check for correct pump operation, via the operating menu.

6.2 Repairs

6.2.1 Replacing the O-rings

1. Depressurise and disconnect the pump from the mains power supply and, if necessary, flush the liquid end.
2. Dismantle the valve.
3. Remove the damaged O-rings.
4. Carefully push undamaged O-rings into the grooves on the feed chemical housing provided for the O-rings.

6.2.2 Replacing the Coil

1. Depressurise and disconnect the pump from the mains power supply and, if necessary, flush the liquid end.
2. Dismantle the valve for safety reasons (the bleed valve connector could break off).
3. Loosen the nut, which connects the valve to the coil (14 mm open-ended spanner).
4. Remove the coil.
5. Fit the new coil and carefully tighten.

6.3 Troubleshooting

Fault description	Cause	Remedy
Leak at the bleed valve connector	The connection to the bleed valve connector leaks.	Check whether the connection to the solenoid bleed valve has come loose. Carefully tighten this at the white hydraulic connector of the solenoid bleed valve.
	O-rings leaking	Replace the O-rings
Other faults	-	Depressurise and disconnect the pump from the mains power supply. Flush the liquid end. Check the power supply. Check the valve's electrical connection.

If this is unsuccessful, contact Service.

6.4 Disposal

Dispose of the device and its packaging in accordance with national regulations!

7 Technical Data

General data

Parameter	Value
Type:	2-way solenoid valve, direct-acting, normally closed (NC) when de-energised
Valve:	Power end/drive type 6027, width 40 mm

Wetted materials

Component	Materials
Valve housing:	PVDF
Sealing element / O-rings:	FPM, EPDM or FFKM
Bellows valve (feed chemical separation):	PTFE

Hydraulic data

Parameter	Value
Feed chemicals:	neutral to aggressive liquids and gases
Feed chemical pressure:	2 … 16 bar
Nominal width of valve:	DN 1.8

Ambient conditions

Parameter	Value
Medium temperature:	0 … +80 °C
Max. ambient temperature:	+ 55 °C
Degree of protection with device socket:	IP 54

Electrical data

Parameter	Value
Operating voltage (refer to nameplate):	24 V DC or 110 V AC ±10% or 230 V AC ±10%
Max. power consumption:	24 VA or 8 W
Electrical connection:	Type A pin terminal

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Supplementary Operating Instructions

Solenoid Metering Pump gamma/ X

Modules, Options, Accessories

EN



The instructions contained herein apply only in conjunction with the "Operating Instructions for Solenoid Metering Pump gamma /X, GMXa"

Please carefully read these operating instructions before use. · Do not discard.
The operator shall be liable for any damage caused by installation or operating errors.
The latest version of the operating instructions are available on our homepage.

Table of contents

1 Supplementary Operating Instructions for Bluetooth Control 4

1.1 Description of Bluetooth Functionality..... 4
1.2 Safety..... 4
1.3 Prerequisites..... 5
1.4 App Test Operation with Pump Simulation..... 6
1.5 Establishing a Bluetooth Connection..... 7
1.5.1 Enable Bluetooth functionality on both devices..... 7
1.5.2 Initiating a Search for Bluetooth Devices on the Smart Device..... 7
1.5.3 Couple the smart device to a pump that has been found..... 8
1.5.4 Connecting the Smart Device to a pump that has been found..... 8
1.5.5 Disconnecting the Smart Device from the Metering Pump..... 9
1.6 Setting and Operating..... 9
1.7 Further Information / Functions..... 10
1.7.1 Bluetooth LED Signal Code..... 10
1.7.2 Finding a Metering Pump Amongst Several Metering Pumps..... 10
1.7.3 Managing the *'Connect to Device'* List..... 11
1.7.4 Saving and Restoring the Pump Configuration..... 11
1.7.5 Bluetooth Address..... 12
1.8 Troubleshooting..... 12
1.9 Extract EC / EU Declaration of Conformity gamma/ X with Bluetooth..... 14

2 Supplementary Operating Instructions CANopen..... 15

2.1 About this pump..... 15
2.2 Control Elements..... 16
2.3 Installation, electrical..... 16
2.4 Emergency mode..... 18
2.5 Troubleshooting..... 18
2.6 Accessories..... 19
2.7 Appendix..... 19
2.7.1 Object list metering pump gamma/ X, GMXa..... 19
2.7.2 EMERGENCY..... 34
2.7.3 Object explanations..... 36
2.7.4 Changing the CANopen node address (node ID)..... 38
2.7.5 Transfer rate (baud rate)..... 39
2.7.6 Calibration, explanations..... 39
2.7.7 Firmware update..... 39
2.7.8 Data storage..... 39
2.7.9 Received directives / standards..... 39

3 Supplementary Operating Instructions PROFIBUS®..... 40

3.1 Prerequisites..... 40
3.2 Adjusting the pump..... 40
3.2.1 General..... 40
3.2.2 Activating / deactivating PROFIBUS®..... 40
3.2.3 Setting the slave address..... 41
3.3 Special features in PROFIBUS® mode..... 42
3.3.1 General..... 42

3.3.2 Display..... 42
3.3.3 LEDs on the PROFIBUS® module..... 43
3.3.4 Use metering monitor..... 43
3.4 Installation..... 43
3.5 Operation..... 45
3.5.1 General..... 45
3.5.2 GSD file..... 45
3.5.3 Data objects gamma/ X, GMXa..... 45
3.5.4 Data objects gamma/ L, GALa..... 54

1 Supplementary Operating Instructions for Bluetooth Control

1.1 Description of Bluetooth Functionality

The metering pump gamma/ X with Bluetooth functionality can largely be wirelessly controlled and monitored via a Bluetooth-enabled Android Smart device using the "gamma/ X" app. A log file containing pump-related events can also be displayed and e-mailed. The app can also be used to save and then restore the pump configuration. The pump configuration can also be e-mailed.

The Bluetooth module is a Class 2 radio product under the R&TTE Directive.



Fig. 1: Device classification label

1.2 Safety

CAUTION!
Danger from hackers
The user has to ensure the IT safety of his smart device (smartphone, tablet ...) to ensure that the metering pump cannot be controlled by hackers.

CAUTION!
Change the temporary *'password'* in the pump menu under *'Settings* ➔ *Service* ➔ *Password'*.

CAUTION!
Only download the "gamma /X" app from the Google Play Store - not from other sources.

CAUTION!
Do not modify the device.

In particular do not increase the size of the aerial.

Qualification of personnel

Personnel must:

- Be familiar with Android smart devices.
- Have read and understood the pump operating instructions and these operating instructions as well.

Licences for Bluetooth metering pumps

The Bluetooth metering pump can be operated licence-free in the following countries:

Belgium, Denmark, Germany, Estonia, Finland, France, Greece, Great Britain, Ireland, Italy, Canada, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Austria, Poland, Portugal, Sweden, Switzerland, Slovakia, Slovenia, Spain, Czech Republic, Hungary, USA and Cyprus.

CAUTION!
For all other countries:

Check whether the operation of Bluetooth metering pumps is permitted in the country in question. Please get in touch with the ProMinent head office.

Emissions

WARNING!
The Bluetooth metering pump is not designed for applications in which interference from or by the metering pump can lead to fatal injury or serious personal injury.

WARNING!
The Bluetooth metering pump can cause interference to or even destroy radio and television frequencies.

This needs to be avoided.

– For assistance, refer to the "Troubleshooting" chapter.

Label

In certain countries, certain information has to be visible on the outside of the metering pump:

Country	Information
USA:	Contains FCC ID: T7VPAN10
Canada:	Contains IC: 216Q-PAN10 Contiens IC: 216Q-PAN10

1.3 Prerequisites

Prerequisites for operation:

- Metering pump gamma/ X with Bluetooth functionality (identity code characteristic "Remote stop/Remote control" = "B, with Bluetooth")
- The metering pump gamma/ X has been fully electrically and hydraulically installed
- Bluetooth-enabled Android smart device - see *'These Android smart devices support the "gamma/ X" app (dated 01.09. 2015):' on page 6*
- Only for handling log files and downloading the app: the smart device has to have access to the internet.
- The "gamma/ X" app can be downloaded free of charge from the Google Play Store:



Fig. 2: QR code for "gamma/ X" download app

CAUTION!
Only download the "gamma /X" app from the Google Play Store - not from other sources.

These Android smart devices support the "gamma/ X" app (dated 01.09. 2015):

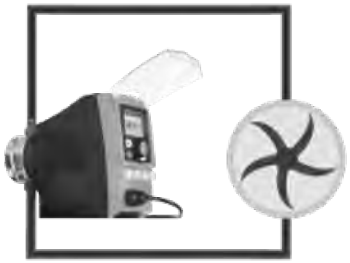
Manufacturer	Model	Android operating system
HTC	One M8	5.0.1
Sony	Xperia Z3 Compact	5.0.2
Motorola	Moto G (2nd generation)	5.0.2
Huawei	Ascend P7	4.4.2
LG	Nexus 5	5.1.1
Samsung	Galaxy S4	4.4.2
Samsung	Galaxy Tab 4	4.4.2

If you have another Android smart device or Android operating system, you can still try to see if the app works correctly with it. However ProMinent has not tested this.

1.4 App Test Operation with Pump Simulation

It is possible to check how the app works even without a metering pump. Use the *'GMXa simulation'* pump simulation to do so.

1. Enable Bluetooth functionality on the smart device - see operating instructions for the smart device.
2. Press *'gamma/ X'* on the app.
   ⇨ The *'Connect to device'* window appears after a few seconds with the *'GMXa simulation'* "device".
3. Press *'GMXa simulation'*.
   ⇨ A *'Simulation ➔ Password'* appears.
4. Enter any 4 digits and press *[Enter]*.
   ⇨ Now you can gain an impression of how certain setting options on the app look and work.



An animation shows whether the simulated pump is currently "pumping" or not.

Fig. 3: Animation

1.5 Establishing a Bluetooth Connection

To establish a Bluetooth connection between the metering pump and the smart device:

1 - Enable Bluetooth functionality on both devices

2 - Initiate a search for Bluetooth devices nearby on the smart device

3 - Couple the smart device to a pump that has been found

4 - Connect the smart device to a pump that has been found

1.5.1 Enable Bluetooth functionality on both devices

1.

The 'System' menu only appears if [Start/Stop] has stopped the metering pump.

Enable Bluetooth functionality on the metering pump:

'Settings ➔ *System* ➔ *Bluetooth enabled'*

⇨ The blue Bluetooth LED flashes and the Bluetooth symbol appears on the display.

2. Enable the Bluetooth function on the smart device - see operating instructions for your smart device.

1.5.2 Initiating a Search for Bluetooth Devices on the Smart Device

If a search is made for the metering pump for the first time:

Stand next to the metering pump in question and trigger a search for Bluetooth devices on the smart device *'Settings* ➔ *Bluetooth'*.

⇨ A metering pump gamma/ X with the Bluetooth name *'ProMinent GMXa (GMXa XYZ)'* appears under *'Available'*. "XYZ" are place holders for the last digits of the serial number of the metering pump.

In all other cases

Stand next to the metering pump in question and trigger a search for Bluetooth devices on the smart device, in the gamma/ X, using *'Refresh list'*.

⇨ A metering pump with the name *'GMXa XYZ'* appears under *'Connect to device'*. "XYZ" are place holders for the last digits of the serial number of the metering pump.

1.5.3 Couple the smart device to a pump that has been found

The coupling is permanent after coupling. This is the case except when the pump has been coupled to a further 6 Bluetooth devices; then the smart device coupled first disappears from the list of coupled devices.

1. Press "gamma/ X" on the app.
   ⇨ The app now creates a *'Connect to device'* list in which only metering pumps gamma/ X are displayed with Bluetooth functionality.

   A metering pump gamma /X has a Bluetooth name like "GMXa XYZ".

   If 'Reachable' does not appear in the list of metering pumps found, hold the smart device closer to the pump and update the list by pressing 'Refresh list'.

   The 'GMXa simulation' pump simulator, which can be used to try out the app without a metering pump, always appears - see chapter "App Test Mode With Pump Simulation".

2. Press *'GMXa XYZ'*.
   ⇨ A window, such as *'Bluetooth pairing request'* with a multi-digit figure appears on the display of the smart device: the smart device security key.

   'Bluetooth pairing' with a multi-digit figure appears on the display of the metering pump: the smart device security key.

3. Only if the two security keys match, press *'Couple'* or *'Pair'* on the display of the smart device.

   Cancel and repeat the process if the two security keys do not match.

1.5.4 Connecting the Smart Device to a pump that has been found

If a dosing pump has not yet been coupled to a smart device to which it has to be connected, it first has to be "coupled" to it - see ↳ Chapter 1.5 'Establishing a Bluetooth Connection' on page 7.

1. Press "gamma/ X" on the app to connect the smart device to a pump that has been found.

   ⇨ The *'Connect to device'* window appears with the Bluetooth devices found.

   'Reachable' should appear under *'GMXa XYZ'*.

   If 'Reachable' does not appear in the list of metering pumps found, hold the smart device closer to the pump and update the list by pressing 'Refresh list'.

2. Press *'GMXa XYZ'*.

   ⇨ A prompt for a *'Password'* appears.

3. The temporary metering pump *'Password'* consists of the last 4 digits of its serial number.

   Enter the *'Password'*.

   ⇨ The metering pump can now be controlled by Bluetooth.

CAUTION!
Change the temporary *'password'* in the pump menu under *'Settings ➔ Service ➔ Password'*.

1.5.5 Disconnecting the Smart Device from the Metering Pump

1. Leave the app menu for the metering pump.

   ⇨ A *'Disconnect from device'* window appears.

2. Press *'Yes'*.

1.6 Setting and Operating

CAUTION!
If a hook ✓ is visible in place of an angle ❭ to the right of a menu point on the app, then you trigger a function, such as *'Tap here to prime'*, when it is pressed.

The individual setting options on the app function similar to the corresponding setting options on the metering pump gamma/ X.

Exceptions:

There is an additional menu: *'Show log'*.

You can view the pump's log file with *'Show log'*. The log file contains messages about events and faults on the pump.

Use *'Send log via email'* to e-mail the log file, for example to the ProMinent Service.

Starting metering pump

First use *[Start/Stop]* to cancel manual stop on the metering pump.

A slide switch is visible in the header of the app.

It can be used to start ("1") or stop ("0") the pump.

1.7 Further Information / Functions

1.7.1 Bluetooth LED Signal Code

LED	Meaning
lit	The Bluetooth function on the metering pump is switched to *'active'* and the metering pump has a connection to a smart device.
flashes slowly	The Bluetooth function on the metering pump is switched to *'active'* but the metering pump does not have a connection to a smart device.
flashes quickly for 5 s	The user uses the app to try to find the Bluetooth metering pump that the user wishes to control amongst several Bluetooth metering pumps - see *Chapter 1.7.2 'Finding a Metering Pump Amongst Several Metering Pumps' on page 10*.
off	■ The Bluetooth function on the metering pump is switched to *'inactive'*. ■ The metering pump is disconnected from the mains/power supply.

1.7.2 Finding a Metering Pump Amongst Several Metering Pumps

The "gamma/ X" app can help users to find a specific metering pump amongst several metering pumps:

> ***Valid coupling***
> *A coupling must have been made in the past and still be applicable to be able to use the identification function.*

Option 1:

1. Switch to the metering pump menu in the app and press the image of the metering pump beside the slide switch.

   ⇨ The blue Bluetooth LED on the metering pump searched for flashes for 5 seconds.

Option 2:

2. Press the small image in the *'connect to device'* menu in the app

   ⇨ The blue Bluetooth LED on the metering pump searched for flashes for 5 seconds.

1.7.3 Managing the *'Connect to Device'* List

The 'Connect to device' list on the app can be updated by pressing 'Refresh list'.

Additional information on the device	Meaning
'Known device'	The device has already been coupled with the smart device.
'Reachable'	The device is within reach of the smart device.
'Out of range'	The device is outside of the reach of the smart device.

Delete device

If you wish to delete a device from the 'Connect to device' list, then you also have to delete the device from the Bluetooth menu in the smart device setting app.

Otherwise the coupling is maintained.

1. To delete a device from the *'Connect to device'* list, swipe along the line containing the device name.
   ⇨ *'Delete'* appears.
2. Press *'Delete'*.
   ⇨ The line with the device name disappears.

1.7.4 Saving and Restoring the Pump Configuration

Saving the pump configuration

1. Use *[Start/Stop]* to stop the metering pump.
2. Connect the smart device to the metering pump.
3. Under *'Expert Settings ➔ Backup '* press the **' + '** button.
   ⇨ The app will ask whether you are sure you want to create a backup.
4. Answer *'yes'* when prompted.
   ⇨ A progress bar will appear.
5. Once the process is complete, assign a name to the backup.

The name must contain only upper and lower case characters and spaces.

⇨ The pump configuration is saved on the smart device as a backup file

Restoring the pump configuration

CAUTION!
Warning of data loss
Do not close the app during restoring.

Do not interrupt the Bluetooth connection, for example by moving the smart device out of the range of the pump.

A pump configuration that has been previously saved, can be restored if need be.

(The pump configuration is dependent on the identity code.)

1. Use *[Start/Stop]* to stop the metering pump.
2. Connect the smart device to the metering pump.
3. Press the relevant backup file under *'Expert settings ➔ Restore pump configuration'*.
   ⇨ A progress bar appears and the pump configuration is saved on the metering pump.

Deleting the backup file from the smart device

1. Open the menu item *'Restore pump configuration'* in the gamma/ X app..
2. Swipe sidewards on a backup file.
   ⇨ A button appears.
3. Delete the backup file by pressing the button.

1.7.5 Bluetooth Address

The metering pump's Bluetooth address can be found:

- ... in the app under *'Device info ➔ BT address'*
- ... in the metering pump under *'Information ➔ BT device address'*

1.8 Troubleshooting

Fault description	Cause	Remedy
The metering pump does not start although I have pressed the slide switch in the app.	The metering pump has been stopped using *[Start/Stop]* or a fault is pending.	Use *[START/STOP]* to start the metering pump. Rectify the fault.
The metering pump and other devices are interfering with each other.*	The WiFi signal from the smart device is interfering with the connection.	Switch off WiFi on the smart device.
	Interference with other devices is causing a problem.	Change the orientation of the metering pump until the problems disappear. Change the installation site of the metering pump until the problems disappear.

Fault description	Cause	Remedy
		Connect the metering pump and the devices experiencing interference to different power circuits. Call in a high-frequency engineer.
	Other devices are interfering with the Bluetooth connection to the metering pump.	Increase the gap between the devices and the metering pump.

* Confirm or cancel this by switch the Bluetooth metering pump on and off.

1.9 Extract EC / EU Declaration of Conformity gamma/ X with Bluetooth

In accordance with DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, Appendix I, BASIC HEALTH AND SAFETY REQUIREMENTS, section 1.7.4.2. C.

We,

- ProMinent GmbH
- Im Schuhmachergewann 5 - 11
- D - 69123 Heidelberg, Germany,

hereby declare that the product specified in the following, complies with the relevant basic health and safety requirements of the EC Directive, on the basis of its functional concept and design and in the version distributed by us.

Any modification to the product not approved by us will invalidate this declaration.

Extract from the EC / EU Declaration of Conformity

Designation of the product:	Metering pump, gamma/ X product range	
Product type:	GMXa _ _ _ _ _ _ _ _ _ _ _ _U _ _ _ Y _ B Y = 0, 3, 4, 5	
Serial number:	see nameplate on the device	
Relevant EC directives:	Machinery Directive (2006/42/EC) Compliance with the protection targets of the Low Voltage Directive according to Appendix I, No. 1.5.1 of the Machinery Directive RoHS- Directive (2011/65/EU) R&TTE Directive (1999/5/EC)	
	up to 19.04.2016 EMC - Directive (2004/108/EC)	from 20.04.2016 EMC Directive (2014/30/EU)
Harmonised standards applied, in particular:	EN ISO 12100:2010 EN 809:1998 + A1:2009 + AC:2010 EN 61010-1:2010 EN 61000-6-3:2007 + A1:2011 EN 61000-6-2:2005 EN 300 328 V1.8.1:2012 EN 50581:2012	
Date:	21.03.2016	

You will find the EC Declaration of Conformity to download on our homepage.

2 Supplementary Operating Instructions CANopen

2.1 About this pump

Solenoid metering pumps gamma/ X with CAN connector differ from standard pumps as they can be connected to a CANopen bus system. A CAN pump gamma/ X can be connected to a CANopen bus or used on its own.

Example:

- Measurement-value dependent metering of sodium-calcium hypochlorite into a swimming pool water circuit, where in the operating mode *'CANopen'*, the pump is controlled from a controller.

A gamma/ X in the "CANopen" version (Identity code feature "Control type" = C or D) is designed for incorporation in a CANopen system.

2.2 Control Elements

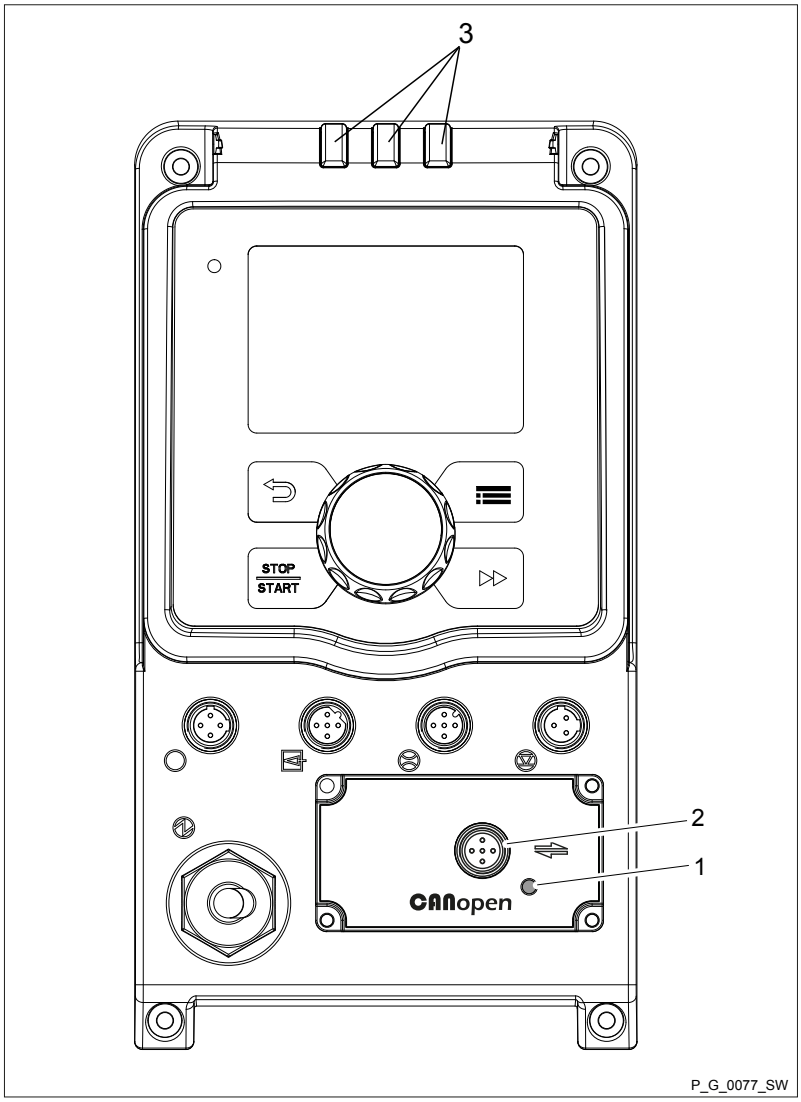


Fig. 4: Control Elements

1 Status LED CAN bus
2 Socket "CAN bus"
3 Device LEDs

2.3 Installation, electrical

CAUTION!

Pump can be damaged

If the CAN cable is not correctly screwed in, the IP65 protection rating is not achieved.

– Manually screw in the CAN cable glands until they reach the stop.

CAUTION!

Pump can be damaged

The panel connector at the housing can break off.

– Never connect a T-coupler directly to the housing.

Connect the CAN cable with the CANopen bus connector as shown below (For more - see the documentation for your CANopen installation).

Insert the mains plug in the power socket - the metering pump starts to pump as necessary.

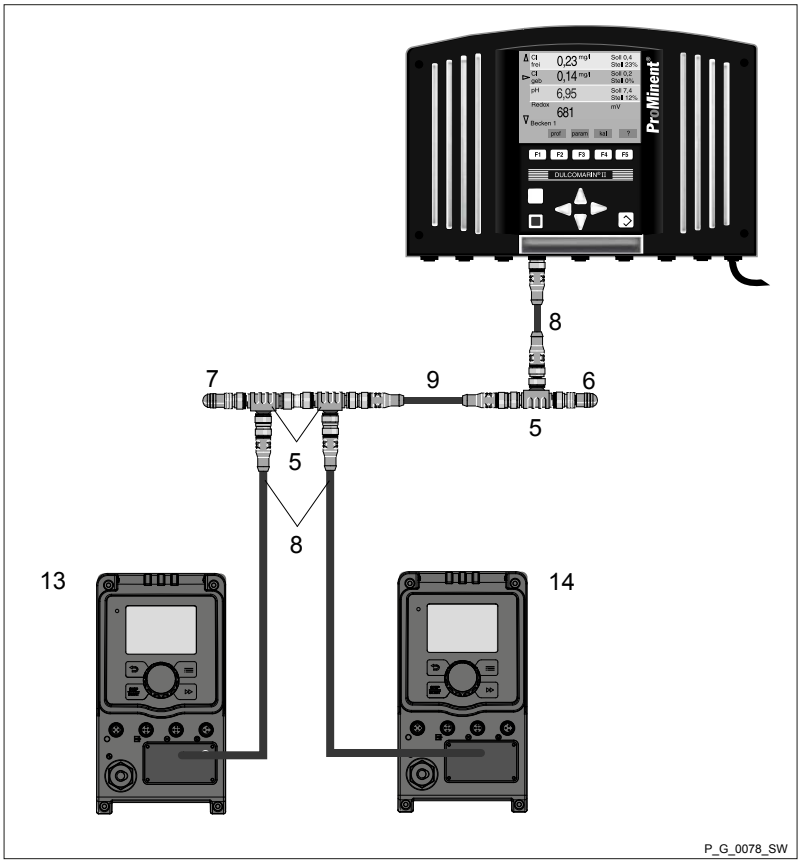


Fig. 5: CAN connector for metering pumps (example with Dulcomarin II as control)

5 T-coupler, M 12, 5-pole CAN
6 Termination resistance M12 coupling
7 Termination resistance M12 plug
8 CAN connecting cable CAN connecting cable
9 CAN connecting cable
13 CAN pump gamma/ X e.g. for acid
14 CAN pump gamma/ X e.g. for alkali

CANopen-Bus connector

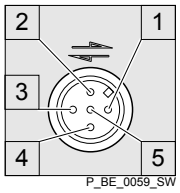


Fig. 6: Pump pin assignments (male)

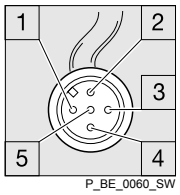


Fig. 7: CAN cable assignments (female)

The "CANopen bus connection" takes place via a five-pin plug.

1 Shielding
2 CAN V+ (supply voltage – not connected)
3 CAN GND (reference potential)
4 CAN H (bus line - dominant high)
5 CAN L (bus line - dominant low)

2.4 Emergency mode

You can guard against the possibility of the CANopen bus control failing in the following way:

1. Program an auxiliary frequency into the pump that fits optimally with a stroke length of 30 ... 100 % into your process in emergency operation.
2. As soon as emergency operation is required, run the pump using the "external control" socket on the auxiliary frequency - see "Operating Instructions for Solenoid Metering Pump gamma/ X GMXa" - "Installation, electrical".

2.5 Troubleshooting

The CANopen status LED indicates the status of the CAN connection.

The display for operating and fault status is carried out using 3 other LEDs - see "Operating Instructions for Solenoid Metering Pump gamma/ X GMXa“.

Flash code CANopen status LED, top

Colour	Flash code	Cause	Remedy
green	illuminated	Bus status OPERATIONAL	- (Pump normal operation)
green	flashing *	Bus status PRE-OPERATIONAL	wait briefly or start the pump over the bus
green	Single flashing **	Bus status STARTUP	wait briefly of set the pump for active bus operation - see "Set-up" chapter
green	off	Error (BUSOFF, Error,…)	CAN bus test
green	flickering	Bus status INIT	wait briefly



Ignore the flash codes for approx. 2 minutes after connecting the metering pump.

For "Error messages about CANopen-telegram", see the end of the appendix.

2.6 Accessories

Accessories	Order no.
T-coupler M12 5-pin CAN	1022155
Termination resistance M12 coupling	1022154
Termination resistance M12 plug	1022592
Connecting cable - CAN, M 12, 5-pole, 1 m	1022139
Connecting cable - CAN, M 12, 5-pole, 2 m	1022140
Connecting cable - CAN, M 12, 5-pole, 5 m	1022141
Connecting cable - CAN, sold by the metre	1022160
Coupling, M12, 5-pole Screw connector	1022157
Plug CAN M12, 5-pole Screw connector	1022156

2.7 Appendix

2.7.1 Object list metering pump gamma/ X, GMXa

2.7.1.1 Communication profile area 0x1000-0x1FFF

Index	S	Name	Type	Description			
1000h	1	p_ident.d_profile	U32	Device type (10.2.1 in 450)	0001 01C2h	RO	M
1001h	1	Error register	U8	9.6.3 in 301		RO	M
1010h	1	Save all parameters	U32			RW	O
	2	Save comm.. parameters					
	3	Save process.. parameters					
1011h	1	Load(restoredefault) parameters	U32			RW	O

Index	S	Name	Type	Description			
	2	Load comm.. parameters					
	3	Load process.. parameters					
1017h	1	p_ident.w_heart_beat_time	U16	50-2000	800	RO	O
1018h	0	Identification					M
		p_ident.b_entries	U8		4	RO	
	1	p_ident.d_vendor_ID	U32		0xE1	RO	
	2	p_ident.d_product_code	U32		0x0E020115	RO	
	3	p_ident.d_rev number	U32		1	RO	
	4	assemblyID	U32	Unit serial number		RW	

Transmit-PDOs MAPPING-Parameter

Index	S	Name	Type	Description	Mapping
1A00h	0	**TPDO1**			
	1	DP_state	U16	Status metering pump (base)	0x2A1000**00**10
	2	DP_output_man (actual)	U16	Pump frequency (actual) in %	0x2A0100**00**10
	3	DP_stroke_len	U8	Stroke length	0x2A0400**00**08
1A01h	0	**TPDO2**			
	1	DP_level	U8	Liquid level metering container	0x2A0500**00**08

Receive-PDOs MAPPING-Parameter

Index	S	Name	Type	Description	Mapping
1600h	0	**RPDO1**			
	1	DP_output_cont	U16	Pump frequency (setpoint) in %	0x2A0000**00**10
1601h	0	**RPDO2**			
	1	DP_batch_time_stamp	U16	Batch time stamp	0x2A0200**00**10
	2	DP_batch_value	U16	Factor (setpoint)	0x2A0300**00**10

2.7.1.2 Manufacturer specific profile area 0x2000-0x5FFF

Index	S	Name	Type	Description	Objects	Attr
2A00h	0	DP_output_cont (set-point)	U16	Frequency in % (0=100.0%)	RPDO1	wr
2A01h	0	DP_output_actual	U16	Frequency in % (0=100.0%)	TPDO1	ro
2A02h	0	DP_batch_time_stamp	U16	Time stamp last received com-mand	RPDO2	wo
2A03h	0	DP_batch_value	U16	Batch factor	RPDO2	wo
2A04h	0	DP_stroke_len	U8	Stroke length	TPDO1	rO
2A05h	0	DP_level	U8	Liquid level metering container	TPDO2	rO
2A10h	0	DP_state	U16	0=out of ctrl, 1=mem, 2=cal, 3=pos/neg 4=prime, 5=warning, 6=errors, 7=stops, 8-11=mode, 12=aux;13=flow; 14=pause, 15=hand/bus	TPDO1	ro
2A11h	0	DP_Control	U8	1= batch-mem, 2=setp. pos/neg, 3=calibrated, 4=flowctrl active, 6=reset	SDO	rw
2A12h	0	DP_Mode	U8	0=stop,1=manual, 2=batch,	SDO	wo
2A20h	0	DP_stroke_max	U16	max. stroke rate (strokes/min)	SDO	ro
2A21h	0	DP_metering volume	Float	in 1/stroke (at 100% stroke)	SDO	wr
2A22h	0	DP_measuring_unit	U8	0=litre, 1=gallon	SDO	wr
2A30h	0	DP_volume	U32	in ml since last reset	SDO	ro
2A31h	0	DP_stroke_cnt	U16	strokes since last reset	SDO	ro
2A33h	0	DP_rem_stroke	U16	Remaining stroke no. (in batch mode)	SDO	ro
2A35h	0	`PCO_HighestSubIndex`	U8			ro
	1	FlowControl	U8	Bit	SDO	wo
	2	BatchMem	U8	Bit	SDO	wo
	3	ClearCount	U8	Bit	SDO	wo
3FBBh	0	`PCO_HighestSubIndex`	U8			
	1		U32	Identity code		RO

Index	S	Name	Type	Description	Objects	Attr
	2		U32			RO
	3		U32			RO
	4		U32			RO
	5		U32			RO
	6		U32			RO
	7		U32			RO
	8		U32			RO
3FBCh	0	PCO_HighestSubIndex	U8			
	1		String	Serial number		RO
	2		String			RO
	3		String			RO
	4		String			RO
	5		String			RO
	6		String			RO
	7		String			RO
	8		String			RO
3FBDh	0	PCO_HighestSubIndex	U8			
	1		String	Hardware Version		RO
	2		String			RO
	3		String			RO
3FBEh	0	PCO_HighestSubIndex	U8			
	1		String	Software Version		RO
	2		String			RO
	3		String			RO

0x5100 – 0x5500

Index	S	Name	Type	Description Max	Objects	Attr
5100h	1	Einschalt-zähler	U32	Switch-on counter	SDO	RO
5101h	1	Fehlerflags	U32	Pump error flags	SDO	RO
5102h	1	Warnflags	U32	Pump warn-ings	SDO	RO
5105h	1	Total calibra-tion volume	U32	Total stroke counter	SDO	RO

Index	S	Name	Type	Description Max	Objects	Attr
5106h	1	Dosiermen-genzähler	Float	Metering volume counter	SDO	RO
5107h	1	Calibration strokes:	U32	Calibration strokes	SDO	RO
5108h	1	Rest-Dosier-menge	Float	Remaining metering quantity	SDO	RO
5109h	1	Ist-Hublänge	Float	Current stroke length	SDO	RO
510Ah	1	Soll-Hublaenge	Float	Setpoint stroke length	SDO	RW
510Bh	1	Soll-Hubfre-quenz	U16	Setpoint stroke rate	SDO	RW
510Ch	1	Ist-Hubfre-quenz	U16	Current stroke rate	SDO	RO
510Dh	1	Dosiervo-lumen pro Auslösung	Float	Metering vol-umes per release	SDO	RW
510Eh	1	Ist-Dosierleis-tung	Float	Current metering capacity	SDO	RO
510Fh	1	Dosierzeit für Batch	U16	Metering time for batch in sec	SDO	RW
5110h	1	maximale Dosierleis-tung	Float	Maximum capacity	SDO	RO
5112h	1	Soll-Dosier-leistung	Float	Setpoint metering capacity	SDO	RW
5113h	1	Auxiliarfre-quenz	U16	Auxiliary fre-quency	SDO	RW
5114h	1	Auxiliar-Dos-ierleistung	Float	Auxiliary capacity	SDO	RW
5115h	1	Dosierart	U32	Metering type (0-optimum, 1-fast,2-sinus mode,3-cont. 4-DFMa)	SDO	RW
5117h	1	Soll-Betrieb-sart	U32	Setpoint operating mode (0-stop,1-manual,..)	SDO	RW
5118h	1	Ist-Betrieb-sart	U32	Current oper-ating mode	SDO	RO

Index	S	Name	Type	Description Max	Objects	Attr
5119h	1	Soll-Unterbetriebsart	U32	Setpoint operating submode (0-0..20mA, 1-4..20mA,4 linear curve,..)	SDO	RW
511Ah	1	Ist-Unterbetriebsart	U32	Current operating submode	SDO	RO
511Bh	1	Betriebsmodus (Automatik On/Off)	U32	Operating mode (automatic on(1)/ off(0))	SDO	RW
511Ch	1	Konzentrationsgesteuerter Betrieb an/ aus	U32	Concentration-controlled operation on(1)/ off(0)	SDO	RW
511Eh	1	Dauer des Ansaugens	U16	Priming duration in sec	SDO	RW
511Fh	1	Batch-Faktor	U32	Batch factor (1-99999)	SDO	RW
5122h	1	Kontakt-Faktor	Float	Contact factor (0.01-99.99)	SDO	RW
5147h	1	Maximale Hubfrequenz	U16	Maximum stroke rate	SDO	RO
5148h	1	Gesamtbetriebsdauer	U32	Operating period in sec	SDO	RO
5152h	1	Dosiermenge pro Vollhub	Float	Metering quantity per full stroke in ml (stroke length100%)	SDO	RO
5153h	1	Löschbarer Hubzähler	U32	Deletable stroke counter	SDO	RW
5154h	1	Löschbarer Mengenzähler	Float	Deletable volume counter	SDO	RW

Strings

Index	S	Name	Type	Description	Objects	Attr
5D00h	0	PCO_HighestSubIndex	U8			RO
	1	Name1	String	Pump name		RO
	2	Name2	String			RO

Index	S	Name	Type	Description	Objects	Attr
	3	Name3	String			RO
	4	Name4	String			RO
	5	Name5	String			RO
	6	Name6	String			RO
	7	Name7	String			RO
	8	Name8	String			RO
5D01h	0	PCO_HighestSubIndex	U8			RO
	1	Location1	String	Pump installation location		RO
	2	Location 2	String			RO
	3	Location 3	String			RO
	4	Location 4	String			RO
	5	Location 5	String			RO
	6	Location 6	String			RO
	7	Location 7	String			RO
	8	Location 8	String			RO
5042h	1	Identification_LED	U16	0- off	SDO	rw
				>0 Set identification time (LED yellow +red flash for duration)		
				1 equivalent to approx. 10 ms		
5FEE	0	CANopenStackRevision	UINT32	ProMinent CANopen-Stack-Revision		RO

2.7.1.3 Device specific area 0x51000-0x5FFF

HMI area 0x5100 – 0x5FFF

Index	S	Name	Type	Description	Objects	Attr
5111h	1	sw_version_ctrl	U32	Software version of control		RO
5112h	1	hw_version_ctrl	U32	Hardware version of control		ro
5113h	1	sw_version_fu	U32	Software version of FC		RO

Index	S	Name	Type	Description	Objects	Attr
5114h	1	hw_version_fc	U32	Hardware version of FC		RO
5115h	1	sw_version_pfc	U32	Software version of PFCU		RO
5116h	1	hw_version_pfc	U32	Hardware version of PFC		RO
5118h	1	serial_number	U32	Serial number of SxCn		RO

Index	S	Name	Type	Description	Objects	Attr
5120h	1	Nominal frequency	U16	Setpoint frequency	PDO	Rw
5121h	1	Actual frequency	U16	Setpoint frequency	PDO	RO
5122h	1	Nominal mode	U8	Setpoint operating mode:	PDO	Rw
5123h	1	Actual mode	U8	Actual operating mode	PDO	RO
5124h	1	Analogue mode	U8	Analogue mode:	PDO	Rw

Index	S	Name	Type	Description	Objects	Attr
5125h	1	Analogue curve	U8	Curve type for analogue		ro
5126h	1	Curve-IP1	U16	Current at curve point 1		rW
5127h	1	Curve-FP1	U16	Stroke rate at curve point 1		rW
5128h	1	Curve-IP2	U16	Current at curve point 2		rW
5129h	1	Curve-FP2	U16	Stroke rate at curve point 2		rW
512Ah	1	Auxiliary	U16	Auxiliary frequency		ro
512Bh	1	Metering mode	U8	Metering mode (metering profile)		Rw

Index	S	Name	Type	Description	Objects	Attr
512Ch	1	Batch memory	U8	Saving function for batch metering:	PDO	ro
512Dh	1	Batch factor	U16	Batch_factor	PDO	ro
512Eh	1	Contact memory	U8	Saving function for contact metering:	PDO	ro
512Fh	1	Contact factor	U16	Contact factor	PDO	ro
5130h	1	Pressure control	U8	Pressure gauge		Rw

Index	S	Name	Type	Description	Objects	Attr
5131h	1	Calibration counter	U8	Calibration stroke counter	PDO	Rw
5132h	1	Calibration value	U16	Calibration value (total quantity)	PDO	Rw

Index	S	Name	Type	Description	Objects	Attr
5133h	1	Viscosity	U8	Viscosity level		ro
5134h	1	Stroke length	U16	Stroke length	PDO	ro
5135h	1	Stroke counter	U32	Stroke counter	PDO	rO
5136h	1	Quantity counter	U32	Volume counter	PDO	rO
5137h	1	Clear counters	U8	Clear counter		WO
5138h	1	Strokes left	U32	Remaining strokes	PDO	RO

Index	S	Name	Type	Description	Objects	Attr
5139h	1	Quantity left	U32	Remaining quantity	PDO	RO
513Ah	1	User code	U16	User password	PDO	WO
513Bh	1	Language index	U8	Language index		RW
513Ch	1	Analogue external	U16	Analogue value at external input	PDO	RO
513Dh	1	Quantity per stroke	U16	Metering quantity per stroke at 100% stroke length	PDO	RO
513Eh	1	NomFreq_Litreper-Hour	U16	Requested metering frequency in litres/ hour	PDO	RO

Index	S	Name	Type	Description	Objects	Attr
513Fh	1	Metering control	U8	Metering monitoring		RW
5140h	1	Metering-Control-Pulses	U16	Defective strokes for metering monitoring		RW
5141h	1	Dosing-Control-by-Aux	U8	Metering monitoring in aux mode		RW
5142h	1	Metering-Control-Errorsignal	U8	Metering monitoring error signalling		RW
5143h	1	Access level	U8	Access protection level (0-none, 1-menu blocked, 2-continuous display and menu blocked)		RW
5144h	1	Unit	U8	Pump unit (0-litre, 1-gallon)		RW

Index	S	Name	Type	Description	Objects	Attr
5145h	1	Diaphragm	U8	Diaphragm error signalling		RW
5146h	1	AnalogueCurveError	U8	Error signalling for analogue curve		RW

Index	S	Name	Type	Description	Objects	Attr
5147h	1	Relay1-Type	U16	Relay-Type (0-warning,1-error, 2-warn.+error, 3-warn. +error+stop, 4-stop, 5-clock)		RW
5148h	1	Relay2-Type	U16	Relay-Type (0-warning,1-error, 2-warn.+error, 3-warn. +error+stop, 4-stop, 5-clock)		RW
5149h	1	Relay1-Polarity	U16	Relay polarity (0-attracting(NO), 1-falling off (NC))		RW
514Ah	1	Relay2-Polarity	U16	Relay polarity (0-attracting(NO), 1-falling off (NC))		RW
514Bh	1	Analogue-Out-Range	U16	Analogue output range (0: 0-20mA,1: 4-20mA)		RW
514Ch	1	Analogue-Out-Function	U16	Analogue-Function (0:strokes/min, 1: current metering capacity, 2: Capacity at 20mA)		RW
514Dh	1	Analog-Out-Capacity	U16	Adjustable capacity at 20mA		RW

Index	S	Name	Type	Description	Objects	Attr
514Eh	1	NomFreqStrokesperHour	U16	Nominal metering capacity in strokes/hour		RW
514Fh	1	CalibReset	U16	Calibration reset		RW
5150h	1	BatchQuantity	U32	Set metering quantity		RW
5151h	1	DeviceName	U16	Device name		ro
5152h	1	DeviceLocation	U16	Device installation location		ro
5153h	1	Betriebsdruck	U16	Pressure stages (0: 4 bar, 1: 7 bar; 2: 10 bar, 4: 12 bar)		RW

Index	S	Name	Type	Description	Objects	Attr
5D00h	0	PCO_HighestSubIndex	U8			RO
	1	Name1	String	Pump name		RO
	2	Name2	String			RO
	3	Name3	String			RO
	4	Name4	String			RO
	5	Name5	String			RO
	6	Name6	String			RO
	7	Name7	String			RO
	8	Name8	String			RO
5D01h	0	PCO_HighestSubIndex	U8			RO
	1	Location1	String	Pump installation location		RO
	2	Location 2	String			RO
	3	Location 3	String			RO
	4	Location 4	String			RO
	5	Location 5	String			RO
	6	Location 6	String			RO
	7	Location 7	String			RO
	8	Location 8	String			RO
5042h	1	Identification_LED	U16	0 - off > 0 - Set identification time (LED yellow + red flash for duration) 1 - equivalent to approx. 10 ms	SDO	RW
5FEE	0	CANopenStackRevision	UINT32	ProMinent CANopen-Stack-Revision		RO

2.7.1.4 Device profile area 0x6000-0x9FFF

Index	Sub	Name	Type	Description	Categ.*	Attr
6000h	00h	HighestSubIndex	U32	Failure codes	MANDA	RO
	01h	Hardware failure codes 1	U32		MANDA	RO
	02h	Hardware failure codes 2	U32		MANDA	RO

Index	Sub	Name	Type	Description	Categ.*	Attr
	03h	Software failure codes 1	U32	Bit#0: Software-Fault	MANDA	RO
				Bit#1: SoftwareR-eset		
				Bit#2: Parameter problem		
				Bit#3: Memory resource problem		
				Bit#4: Application failure		
				Bit#5: Failure in control software		
				Bit#6: Failure of operation system software		
				Bit#7: Failure in communication soft-ware		
				Bit#8 to 31 Reserved		
	04h	Software failure codes 2	U32		MANDA	RO
	05h	Mechanics failure codes 1	U32		MANDA	RO
	06h	Mechanics failure codes 2	U32		MANDA	RO
	07h	Electrics failure codes 1	U32		MANDA	RO
	08h	Electrics failure codes 2	U32		MANDA	RO
	0Dh	Operation failure codes 1	U32		MANDA	RO
	0Eh	Operation failure codes 2	U32		MANDA	RO
	0Fh	Operation failure codes 3	U32		MANDA	RO
	10h	Auxiliary device failure codes 1	U32		MANDA	RO
	11h	Auxiliary device failure codes 2	U32		MANDA	RO
	12h	Auxiliary device failure codes 3	U32		MANDA	RO

Index	Sub	Name	Type	Description	Categ.*	Attr
6001h	00h	HighestSubIndex	U32	Warning codes	MANDA	RO
	01h	Hardware warning codes 1	U32		MANDA	RO
	02h	Hardware warning codes 2	U32		MANDA	RO
	03h	Software warning codes 1	U32	Bit#0: Software-Warning	MANDA	RO
				Bit#1: SoftwareR-eset		
				Bit#2: Parameter problem		
				Bit#3: Memory resource problem		
				Bit#4: Application failure		
				Bit#5: Warning in control software		
				Bit#6: Warning of operation system software		
				Bit#7: Warning in communication software		
				Bit#8 to 31 Reserved		
	04h	Software warning codes 2	U32		MANDA	RO
	05h	Mechanics warning codes 1	U32		MANDA	RO
	06h	Mechanics warning codes 2	U32		MANDA	RO
	07h	Electrics warning codes 1	U32		MANDA	RO
	08h	Electrics warning codes 2	U32		MANDA	RO
	0Dh	Operation warning codes 1	U32		MANDA	RO
	0Eh	Operation warning codes 2	U32		MANDA	RO
	0Fh	Operation warning codes 3	U32		MANDA	RO
	10h	Auxiliary device warning codes 1	U32		MANDA	RO

Index	Sub	Name	Type	Description	Categ.*	Attr
	11h	Auxiliary device warning codes 2	U32		MANDA	RO
	12h	Auxiliary device warning codes 3	U32		MANDA	RO

*

MANDA	mandatory
OPTION	optional
CONDIT	Conditional mandatory

Index	Sub	Name	Type	Description	Categ.*	Attr
6002h	00h	`HighestSubIndex`	U32	Alarm codes	MANDA	RO
	01h	Hardware alarm codes 1	U32		MANDA	RO
	02h	Hardware alarm codes 2	U32		MANDA	RO
	03h	Software alarm codes 1	U32	Bit#0: Software-Fault	MANDA	RO
				Bit#1: SoftwareR-eset		
				Bit#2: Parameter problem		
				Bit#3: Memory resource problem		
				Bit#4: Application failure		
				Bit#5: Failure in control software		
				Bit#6: Failure of operation system software		
				Bit#7: Failure in communication soft-ware		
				Bit#8 to 31 Reserved		
	04h	Software alarm codes 2	U32		MANDA	RO
	05h	Mechanics alarm codes 1	U32		MANDA	RO
	06h	Mechanics alarm codes 2	U32		MANDA	RO
	07h07	Electrics alarm codes 1	U32		MANDA	RO

Index	Sub	Name	Type	Description	Categ.*	Attr
	08h	Electrics alarm codes 2	U32		MANDA	RO
	0Dh	Operation alarm codes 1	U32		MANDA	RO
	0Eh	Operation alarm codes 2	U32		MANDA	RO
	0Fh	Operation alarm codes 3	U32		MANDA	RO
	10h	Auxiliary device alarm codes 1	U32		MANDA	RO
	11h	Auxiliary device alarm codes 2	U32		MANDA	RO
	12h	Auxiliary device alarm codes 3	U32		MANDA	RO

Index	Sub	Name	Type	Description	Categ.*	Attr
6003h	00h	`HighestSubIndex`	U32	Specific physical units	MANDA	RO
	01h	Physical unit pressure	U32	Standard: bar 0x004E0000, gal (AE)	MANDA	RW
6005h	00h	`HighestSubIndex`		GenericPump control	MANDA	
	01h	Generic pump commands	U8	Bit#0: Pump operation: off=0 / on=1	MANDA	RW
				Bit#1: ResetFault: No reset=0 / Reset of fault=1		
				Bit#2: RemoteAccessReq: No remote=0; Remote access=1		
				Bit#3 to 7 Reserved		
6007h	00h	`HighestSubIndex`		Identification	MANDA	RO
	01h	ManufacturerID	String		MANDA	RO
	02h	DeviceType	String		MANDA	RO
	03h	ProfileRevision	String		MANDA	RO

Index	Sub	Name	Type	Description	Categ.*	Attr
6026h	00h	`HighestSubIndex`		Error notification control	MANDA	CO
	02h	Name	String		MANDA	RW
	03h	Class	String		MANDA	RW

Index	Sub	Name	Type	Description	Categ.*	Attr
	07h	NotificationCode	U16		OPTION	RW
6027h	00h	HighestSubIndex		Error notification status	MANDA	
	01h	Status	U8		MANDA	RO

*

MANDA	mandatory
OPTION	optional
CONDIT	Conditional mandatory

2.7.1.5 Alarm action area for measurement devices (404)

Index	Sub	Name	Type	Description	Categ.	Attr
6509h	1	AI1_action=1 warn,=3 err	U8	Level min error		RW
6519h	1	AI2_action =0 inactive	U8	Level min warning		RW
6529h	1	AI3_action	U8	Batch error		RW
6539h	1	AI4_action	U8	Cal warning		RW
6549h	1	AI5_action	U8	Sys error		RW
6559h	1	AI6_action	U8	Not bus		RW
6569h	1	AI7_action	U8	add2		RW
6579h	1	AI8_action	U8	add3		RW
6600	1	AI_state0_7	U8	0=no error, 1=error (DLT/ Sigma/DF3)		RW

2.7.2 EMERGENCY

Emergency Object Data:

Byte	0	1	2	3	4	5	6	7
Content*	Emergency Error Code*		Error register*	Manufacturer specific Error Field*				

*

Content (1 Byte):	80h+Node-Id
Emergency Error Code (2 Byte):	0x1000 (0x10xx = Generic Error) 0x0000 (0x00xx = No Error)

Error Register (1001h-content) (1 Byte):	0x81 (Bit #0=Generic Error,Bit #7= Manufacturer specific)
Manufacturer specific Error Field (5 Byte):	Byte #3: Component no. (channel) Byte #4: Error type Byte #5: Error class Byte #6: free Byte #7: free

Emergency ErrorCode (2 Byte):	0xFF01 (0xFFxx = Device specific, 0x01 = Sigma b)

Manufacturer specific Error Field (5 Byte):

Byte #3:	Component no. (channel)
Byte #4:	Error type
Byte #5:	Error class
Byte #6:	free
Byte #7:	free

Component no. (channel):

0	-
1	GMXa

Error type (1-99):

- see error table

Error class:

Bit0	Emergency active
Bit1	Error (1) / warning (0)
Bit2	Action: 1 active (horn on) – 0 inactive (horn off)

Error table

Fault	EMCY						
	Emergency ErrorCode	Error Register	Manufacturer specific Error Field				
			Component no.	Error type	Error class	-	-
Level warning	0xFF01	0x81	0x01	0x01	0x01	0x00	0x00

Fault	EMCY						
	Emergency ErrorCode	Error Register	Manufacturer specific Error Field				
			Component no.	Error type	Error class	-	-
Metering monitoring warning	0xFF01	0x81	0x01	0x03	0x01	0x00	0x00
Diaphragm warning	0xFF01	0x81	0x01	0x04	0x01	0x00	0x00
Stroke length warning	0xFF01	0x81	0x01	0x05	0x01	0x00	0x00
Overload warning	0xFF01	0x81	0x01	0x06	0x01	0x00	0x00
Temperature warning	0x4201	0x09	0x01	0x07	0x01	0x00	0x00
Level error	0xFF01	0x81	0x01	0x21	0x02	0x00	0x00
Storage tank overflow	0xFF01	0x81	0x01	0x22	0x02	0x00	0x00
Control signal < 4mA	0xFF01	0x81	0x01	0x23	0x02	0x00	0x00
Control signal > 20mA	0xFF01	0x81	0x01	0x24	0x02	0x00	0x00
Defective stroke metering	0xFF01	0x81	0x01	0x25	0x02	0x00	0x00
Diaphragm rupture	0xFF01	0x81	0x01	0x26	0x02	0x00	0x00
Stroke length adjusted	0xFF01	0x81	0x01	0x27	0x02	0x00	0x00
System error	0xFF01	0x81	0x01	0x2A	0x02	0x00	0x00
Module communication	0x8101	0x11	0x01	0x2C	0x02	0x00	0x00
Module missing	0x8101	0x11	0x01	0x2D	0x02	0x00	0x00

Emergency ErrorCodes from stack

	Emergency ErrorCode	
#define ERRCODE_COMM_ERROR	0x8100	communication error
#define ERRCODE_CAN_OVERRUN	0x8110	CAN overrun
#define ERRCODE_CAN_PASSIVE	0x8120	CAN in error passive
#define ERRCODE_HB_ERROR	0x8130	HB or life guard
#define ERRCODE_CAN_RECOVER_BOFF	0x8140	CAN recoverd from bus-off
#define ERRCODE_BAD_PDOPARA	0x8210	PDO not processed due the length
#define ERRCODE_BAD_PDOLEN	0x8220	PDO length exceeded

2.7.3 Object explanations

DeviceState [Index 0x2A10, Subindex 0x00]

The "DeviceState" object contains actual operating conditions and the pump's existing errors. 'DeviceState' can only be read.

DeviceState BitValues

Bit positions	Meaning
15 (MSB)	Manual / bus operation
14	Pause
13	-
12	Auxiliary
11	Operating mode: 1. continuous
10	Operating mode: 2. batch operation
9	Operating mode: 3. external contact
8	Operating mode: 4. analogue input
7	Stop
6	Internal error
5	Warning (e.g. container filling level)
4	Suction active
3	Lowerer (only in ProMinent systems)
2	Calibration invalid
1	Memory metering
0 (LSB)	No remote operation possible

DeviceControl [Index 0x2A11, Subindex 0x00]

The object 'DeviceControl' is used to specify the operating mode more precisely.

DeviceControl BitValues

Bit positions	Meaning
7 (MSB)	Must be set to 0
6	Reset
5	Must be set to 0
4	-
3	Calibration completed
2	Must be set to 0
1	Batch memory active
0 (LSB)	Must be set to 0

If Bit 6 (RESET) is set to ‘1’, the pump is stopped (DeviceMode = 0x00), existing errors are deleted and the batch memory is set to 0.

DeviceMode [Index 0x2A12, Subindex 0x00]

The object 'DeviceMode' is used to configure CANopen operating mode of the pump.

DeviceMode BitValues

Bit positions	Meaning
7 (MSB)	Must be set to 0
6	Must be set to 0
5	Must be set to 0
4	Must be set to 0
3	Must be set to 0
2	Must be set to 0
1	Continuous operation [0], batch operation [1]
0 (LSB)	Stop [0] / Start [1]

		Value of 'DeviceMode'
a)	Stop	0x00
b)	Continuous operation	0x01
c)	Batch operation	0x02

2.7.4 Changing the CANopen node address (node ID)

The CANopen node address can be changed as follows:

Change via the object list using Standard SDO traffic.
The object list index 3F40h, subindex 1 can be used to read the currently configured node address or to configure a new node address.
The permitted range for the node address is 1..127. The standard node address is 119.
The data type of this entry is UNSIGNED SHORT.

1. To change the node address, the new address is written to the Index 3F40h, subindex 1.

CAN message for writing the new node address 55:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
600h + Node ID	8	CMD = 2Bh	40h	3Fh	01h	37h	00h	X	X
			Index 3F40h		Sindex 1	Node ID 0037h			

2. The writing of the signature "save" to index 1010h, subindex 05 causes the saving of the new node address to the non-volatile memory.

CAN message for saving the new node address 250kBit/s:

ID	DLC	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
600h + Node ID	8	CMD = 23h	10h	10Fh	05h	73h	61h	76h	65h
			Index 1010h		Sindex 5		“save”		

3. When the device is next started, the changed baud rate becomes effective. A restart of the device is also possible via the NMT command "ResetNode".

2.7.5 Transfer rate (baud rate)

As supplied, the device is set to the baud rate 125 kBit/s. This is the ProMinent default baud rate.

2.7.6 Calibration, explanations

The pump is precalibrated. The metering volumes can be recalibrated if required.

2.7.7 Firmware update

The firmware cannot be updated via the CAN-Bus.

2.7.8 Data storage

Configuration data (e.g. the determined calibration data) are saved in a power fail-safe memory.

2.7.9 Received directives / standards

Fulfilled CAN standards and specifications

In respect of the hardware, the device complies with the harmonised CAN specification 2.0 (ISO99-1, ISO99-2). This includes the CAN protocol (ISO 11898-1) and details on the physical layer in compliance with ISO 11898-2 (high speed CAN up to 1 Mbit/sec) and ISO 11898-3 (low speed CAN up to 125 kBit/sec).

The unit complies with the CAN-Open specification CIA-DS401 that forms the basis of the European standard EN50325-4 and

also complies with the controller device profile CiA-404.

3 Supplementary Operating Instructions PROFIBUS®

3.1 Prerequisites

Personnel must be familiar with the contents of the "Operating Instructions for Solenoid Metering Pump gamma /X, GMXa"!

The pump must have the identity code feature "Control types": "R" PROFIBUS®DP interface M 12". The menu item *'Fieldbus'* is then available in the operating menu. (When *'Fieldbus* ➔ *active'* is set, *'Settings* ➔ *PROFIBUS'* also appears in the operating menu.)

3.2 Adjusting the pump

3.2.1 General

The pump with PROFIBUS® functionality is adjusted in the same way as the standard pump, with the addition of the bus functionality.

In the event of a pause longer than 60 s, the adjustment process is cancelled.

Using the connected PROFIBUS® module, the PROFIBUS® pump represents a device with slave functionality in conformity with DP-V1. This means that the payload is transferred both cyclically and acyclically.

3.2.2 Activating / deactivating PROFIBUS®

In order for the pump to be controlled using the PROFIBUS®, *'Fieldbus'* must be set to *'Active'* in the operating menu.

1. To access the *'Menu'*: press *[Menu]*.
   ⇨ The cursor immediately points to *'Information'*.
2. To switch from *'Information'* to *'Fieldbus'*: turn the *[Clickwheel]* and press.
3. To switch the *'Fieldbus'* to *'Inactive / active'*: turn the *[Clickwheel]* and press.
4. To switch from *'Inactive'* to *'Active'*, turn the *[Clickwheel]* and press.
   ⇨ The pump saves the *'Active'* setting.
   The *'Settings* ➔ *PROFIBUS'* menu also appears.
   The pump is in "stop" mode. To start controlling it, press the *[Stop/Start]* key. Give the Start command using the BUS.

While the PROFIBUS® is *'Active'*, all external inputs such as level monitoring, metering monitoring and external control (pause, contact input, analogue input) will function. They lead to the expected reactions as in the case of the pump without PROFIBUS® functionality - see pump operating instructions. The pump sends corresponding information over the PROFIBUS® to the master (PCL, PC etc.).

The gamma/ X, GMXa is set to *'Automatic'* metering type at the factory.

Even if the fieldbus is set to inactive, the master is able to read-access the pump data defined in its GSD file.

If the PROFIBUS® is set to *'Inactive'*, the settings for the operating mode previously selected are reloaded.

If the pump is switched to another operating mode, it stops and can only be restarted using the *[Stop/Start]* key.

3.2.3 Setting the slave address

3.2.3.1 using the *'Bus address'*

If the master in the PROFIBUS® segment assigns the slave addresses, manual setting of the slave address is cancelled.

The address is set to "120" for the gamma/ X GMXa.

1. To access the *'Menu'*: press the *[Menu]* key
   ⇨ The cursor immediately points to *'Information'*.
2. To switch from *'Settings'* to *'Fieldbus'*: turn the *[Clickwheel]* and press.
   ⇨ The cursor immediately points to *'Operating mode'*.
3. To switch from *'Operating mode'* to *'PROFIBUS'*: turn the *[Clickwheel]* and press.
   ⇨ The menu *'Bus address'* appears.

The PROFIBUS® address must always be entered as 3 digits (addresses from "002" to "125"):

1. 1. Option: Turn the *[Clickwheel]* until the desired value is reached and then press the *[Clickwheel]* .
2. 2. Option: Press the *[Priming]* key to change to digit-by-digit setting. Set the number using the *[Clickwheel]* and save using the *[Priming]* key. The cursor moves to the next number, and so on .

3.2.3.2 About *'Pump type'*

In this case you only need to make a setting if you want to use the gamma/ L data profile instead of gamma/ X.

1. In accordance with chap. jump to *'Pump type'* .
2. Select, for example, *'GALa'* as the pump type.
   ⇨ The pump loads the data profile for the gamma/ L, GALa pump.

3.3 Special features in PROFIBUS® mode

3.3.1 General

In PROFIBUS® mode, the pump cannot be manually set or programmed! To do this, set the PROFIBUS® to 'Inactive' .

- Using the *[Clickwheel]* it is possible to switch between the continuous displays at any time as in the other operating modes. This has no effect on the operating of the pump.
- When PROFIBUS® mode is selected, the settings from the last operating mode without PROFIBUS® are applied. **Settings made using PROFIBUS® are, however, not saved!** These only apply as long as the pump is linked to the PROFIBUS® . Only the *'stroke counter'* (total number of strokes) and the *'volume counter'* (total number of litres) continue to be counted and saved.
- If the pump is set to PROFIBUS® mode, it stops. It can be controlled again by pressing the STOP START *[Stop/Start]* key. Give the Start command using the BUS.

3.3.2 Display

In running PROFIBUS® mode there are further identifiers in the operating indicator.

The current identifier can be found in the "Controls" chapter in the "Solenoid metering pump gamma/ X, GMXa Operating Instructions".

PROFI BUS Stop PROFIBUS®: The pump has been stopped using the PROFIBUS®. The master has sent the pump a corresponding telegram.

⇌ Connection error: If the pump loses its connection with the PROFIBUS® (as soon as, for example, the BUS cable is removed or the bus master becomes inoperative), the ϟ fault symbol and the ⇌ symbol appear.

•• Fault module: If the pump loses its connection with the BUS module (as soon as, for example, the BUS module is removed or if communication is interrupted for other reasons between the BUS module and the pump), the error symbol ϟ and the •• symbol appear.

3.3.3 LEDs on the PROFIBUS® module

LED 1 (left) - module operating status

Signal	Cause
Off	The module has no supply voltage or connection.
Green	The module and the master are exchanging information.
Green flashing	The module has been initialised.
Red flashing	Error in pump parametrisation
Red flashing, double	Error in PROFIBUS configuration

LED 2 (right) - module status

Signal	Cause
Off	The module has not been initialised.
Green	The module has been initialised.
Green flashing	The module has been initialised and there are diagnostic messages.
Red	Serious exception error

3.3.4 Use metering monitor

In order to use the metering monitor in PROFIBUS® mode, the "Metering monitor" socket must be used. The pump then sends *'Available'* for the "Flow" status bit. The metering monitor can be switched on and off using the PROFIBUS® using the *'Metering monitor'* and *'FlowControl'* parameters.

If the metering monitor is set to *'Active'*, in the event of a problem it only gives a warning with gamma/ L, GALa - the gamma/ X, GMXa can give a warning as a problem or a fault.

3.4 Installation

Bus installation

All devices that are members of the bus system, must be connected in a line. There are up to 32 possible positions (master, slaves, repeaters).

At both the beginning and end of the cable, the bus must be terminated with a terminating resistance.

Plugs and cable

For the PROFIBUS® cable, use a shielded, twisted-pair cable in conformity with EN 50170 (cable type A).

Use of screening which is earthed at one end prevents low-frequency ground loops. Shielding earthed at one end has no effect in combating HF magnetic pick-up. Shielding earthed at both ends as well as twisted conductors work to counter magnetic HF pick-up, but have no effect against electrical HF pick-up.

For PROFIBUS®, it is recommended that a bilateral, low-inductance (i.e. large area and low-impedance) connection is established with the protective earth.

The overall length of the bus cabling without repeaters varies according to the desired data transmission rate:

Data transmission rate and length of the bus cabling

Data transmission rate	Max. length of bus cabling
kBit/s	m
12000	100
6000	100
3000	100
1500	200
500	400
187.5	1000
93.75	1200
19.2	1200
9.6	1200

The PROFIBUS® module has two M12 industry sockets for connecting with the PROFIBUS®cable. The pin configuration complies with the PROFIBUS® standard - see below - which means that commercially available bus plugs may be used. Please note that cable connections made with these plugs are generally only contact and moisture proof to IP 20!

Note for achieving IP 65 protection

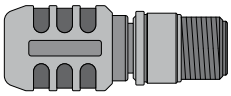
Installation to IP 65 contact and moisture proofing level is possible, since the M12 industry socket of the PROFIBUS® module allows it. Accordingly, the PROFIBUS® cable must be provided with IP 65 class M12 industrial connectors.



CAUTION!

- Protection level IP 65 applies only to a plug/socket combination that has been screwed together!
- In ambient conditions requiring contact and moisture proofing up to IP 65, cables with moulded M12 industry plugs must be used.
- Protection level IP 65 applies only to an unwired pump (with PROFIBUS®module), if IP 65-capable covers are placed over the M12 industry sockets! The cover included in the delivery does not guarantee chemical resistance.

Terminating resistance



P_DE_0079_SW

If the pump is the last bus device connected to the PROFIBUS® cable, it must be connected completely as a termination using the PROFIBUS®terminating resistance, pluggable (order no. 1036622) see EN 50170. The PROFIBUS® terminating resistance has IP 65 class contact and moisture protection.

3.5 Operation

3.5.1 General

Using the connected PROFIBUS® module, the PROFIBUS® pump represents a device with slave functionality in conformity with DP-V1. This means that the payload is transferred both cyclically and acyclically.

3.5.2 GSD file

The GSD file must be used for configuring the master. It describes all of the features of the pump in PROFIBUS® mode (keywords, diagnosis, modules, slots). The GSD file can be downloaded from the PROFIBUS® website and from the ProMinent website. The file-name is clearly indicated: `GMXA0F4E.GSD`.

3.5.3 Data objects gamma/ X, GMXa

Status and control

Module/slot	Index	Name	Module name	Diag. number	Identi-fication (hex)	Type	Data-flow *	Description		
								bit	Name	Function
1	1	State	**Status**	1	40.83	u32	R	0	Service	There are service requests
								1	Mes-sages	There are reports
								2	Mode	00 – stop 03 – contact
								3		01 – manual 04 – analogue
								4		02 – batch
								5	Fault	There are faults - see "Fault"
								6	Warn-ings	There are warn-ings - see "Warnings"
								7	Hand stop	Pump has been stopped man-ually

Module/slot	Index	Name	Module name	Diag. number	Identification (hex)	Type	Dataflow *	Description		
								bit	Name	Function
								8	Stop	Pump has stopped
								9	Priming	Pump is in priming mode (higher-level function)
								10	Auxiliary	Pump is in auxiliary mode (higher-level function)
								11	Pause	Pump has been switched to *'Pause'* status (higher-level function)
								12	Module	Fieldbus active
								13	Flow	Metering monitor is activated
								14	Batch-Mem.	Batch memory is activated
								15	Calibrated	Pump is calibrated
								16	-	-
								17	-	-
								18	-	-
								19	Diaphragm rupture	Diaphragm rupture indicator is installed
								20	Concentration	Concentration calculation is activated
								21	-	-
								22	Cavitation	Priming occurred during cavitation
								23	Airlock	Air in dosing-head
								24	Overpressure	Excessive back pressure
								25	Underpressure	Low back pressure
								26	Bleed valve	Pump vented

Module/slot	Index	Name	Module name	Diag. number	Identification (hex)	Type	Dataflow *	Description		
								bit	Name	Function
								27	-	-
								28	-	-
								29	-	-
								30	-	-
								31	-	-
2	1	Start / Stop	Control	2	80.81	u8	S	Complies with *[Start/Stop]* key; If Start / Stop = 0, then the pump is stopped		
	2	Reset		3		u8		If the Reset value is switched from 1 to 0, the internal pump memory is erased (e.g. in the event of a batch metering) and - as far as possible - the existing faults deleted		

* R = read, W = write

Mode, flow rate, max. flow rate, batch, contact, concentration, metering monitor

Module/slot	Index	Name	Module name	Diag. number	Identification (hex)	Type	Dataflow *	Description		
3	1	Mode	Mode	4.5	C0,80, 80	u8	R, W	Value	Name	Description
								0.16	Stop	Pump is ready but not metering.
								1	Manual	Pump is metering continuously with the set volumes
								2	Batch	When triggered, the pump is metering the volumes set in the batch code
								3	Contact	Pump meters volumes in the predefined time
								4	Analogue	Pump is metering in accordance with the analogue signal and the analogue mode set at the pump.
								17	Manual (concentr.)	Manual in concentration mode

Module/slot	Index	Name	Module name	Diag. number	Identification (hex)	Type	Data-flow *	Description		
								18	Batch (concentr.)	Batch in concentration mode
								19	Contact (concentr.)	Contact in concentration mode
								20	Analogue (concentr.)	Analogue in concentration mode
4	1	nominal flow rate	**Flow rate**	6	C0,83, 83	f32	S	Metering capacity setpoint in litres / hour		
	2	Actual flow rate		7		f32	R	Metering capacity actual value		
5	1	max. flow rate	**Max. flow rate**	8	40.83	f32	R	Maximum metering capacity in litres / hour		
6	1	Batch volume	**Batch**	9	C0,83, 88	f32	S	Batch metering volumes		
	2	Batch time		10		u16		Time in which the batch should be metered		
	3	Batch start		11		u8		If the value changes from 1 to 0, a batch metering is activated in batch mode. (Batches may also be activated via contact input.)		
	4	Batch memory		12		u8		If "Batch Memory" is activated and a new batch is activated during a batch metering already in progress, the remaining metering volumes are increased by that of the new batch. If the "Batch Memory" is not activated, the remaining volume is deleted and the new batch started.		
	5	Remaining volume		13		f32	R	The remaining volumes to be metered in batch mode		
7	1	Contact volume	**Contact**	14	80.84	f32	S	Volumes that are metered per contact		
	2	Contact memory		14		u8		- see "Batch Memory"		
8	1	Concentration rate	**Concentration**	15	C0,83, 83	f32	S	Concentration setting setpoint (only in *'Concentration'* operating mode)		

Module/slot	Index	Name	Module name	Diag. number	Identification (hex)	Type	Dataflow *	Description
	2	Actual concentration		16		f32	R	Concentration setting actual value (only in *'Concentration'* operating mode)
9	1	Metering monitor	**Metering Monitor**	17	80.80	u8	S	If metering monitoring is installed, it can be activated by yourself (1). Deactivate is 0.

* R = read, W = write

Error / Warning

Module/slot	Index	Name	Module name	Diag. number	Identification (hex)	Type	Dataflow *	Description		
10	1	Error	**Error / Warning**	18	40.85	u32	R	**Bit**	**Name**	**Function**
								0	Minimum	Metering medium level is too low
								1	Batch	Too many metering strokes: > 100 000
								2	Analog < 4mA	Analogue current is less than 4 mA
								3	Analog > 23mA	Analogue current is greater than 23 mA
								4	Dosing monitor	Fault metering monitoring
								5	Diaphragm rupture	Dosing head diaphragm broken
								6	Airlock	Air in dosing-head
								7	Overpressure	Overpressure (feed chemical)
								8	-	
								9	Cavitation	
								10	Low pressure	Pressure too low (feed chemical)
								11	Change stroke length	The stroke length has been adjusted in locked state

Module/slot	Index	Name	Module name	Diag. number	Identification (hex)	Type	Dataflow *	Description		
								12	Bleed valve	Automatic ventilation is not possible
								13	Bus fault	Bus fault reported by module
								14	System fault	System components defect - see display
								15	Module fault	Fault in module handling
								16	-	
								17	-	
								18	-	
								19	-	
								20	-	
								21	-	
								22	-	
								23	-	
								24	-	
								25	-	
								26	-	
								27	-	
								28	-	
								29	-	
								30	-	
								31	-	
	2	Warnings		19		u16		**Bit**	**Name**	**Function**
								0	Minimum	Metering liquid is low
								1	Calibration	-
								2	Dosing monitor	Metering monitoring warning
								3	Diaphragm rupture	Defective diaphragm in the dosing head
								4	Airlock	Air in dosing-head
								5	-	
								6	Cavitation	

Module/slot	Index	Name	Module name	Diag. number	Identification (hex)	Type	Dataflow *	Description		
								7	Over-pressure	Overpressure in hydraulics
								8	Low pressure	Pressure too low in hydraulics
								9	-	
								10	-	
								11	-	
								12	-	
								13	-	
								14	-	
								15	-	

* R = read, W = write

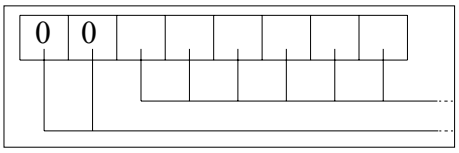
Strokes / quantity and individual data

Module/slot	Index	Name	Module name	Diag. number	Identification (hex)	Type	Dataflow *	Description
11	1	Reset stroke counter	**Strokes /quantity**	20	C0,81, C5	u8	S	If the value changes from 1 to 0, the *'Stroke counter'* (total number of strokes) is reset
	2	Reset quantity counter		21		u8		If the value changes from 1 to 0, the *'Volume counter'* (total number of litres) is reset
	3	Stroke counter		22		u32	R	Count the number of strokes - since the last reset (*'Stroke counter'*)
	4	Quantity counter		23		f32		Count the metering volumes in litres - since the last reset (*'Volume counter'*)
	5	Litres per stroke		24		f32		Litres per stroke
acyclical only / 12	1	Identity code		25		s32		Pump identity code
	2	Serial number		26		s16		Pump serial number
	3	Name		27		s32		Pump name (freely editable)
	4	Installation location		28		s32		Installation site (freely editable)

* R = read, W = write

Diagnostics frame

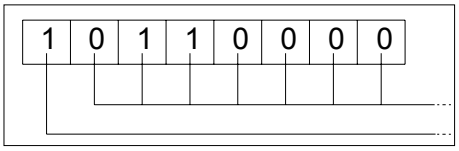
In conformity with PROFIBUS® standard, the device makes the *[Get_Sl_Diag]* service available. The diagnostics data comprise standard diagnostics information (6-Bytes according to PROFIBUS® standard) and any possible diagnostics data specific to the device. A maximum of 63 bytes can be inserted for the device-specific diagnostics data. The first 4 bytes in the PROFIBUS® standard are specified from this:



Encode the byte `sign_len` as follows:

Length of the DU status including the header byte: 04..63

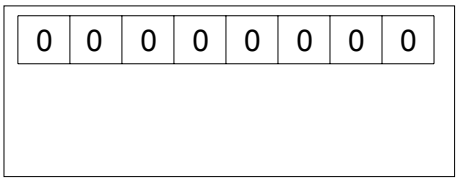
Flags ‘device-related diagnostics’: 00 constant



Encode the byte `status_type` as follows:

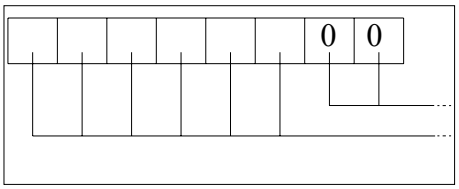
Status type: 48 (manufacturer specific)

Flags ‘Status’: 1 constant



Encode the byte `slot_number` as follows:

Slot number: 0 (because only slot 0 is being used)



Encode the byte `specifier` as follows:

Status specification: 00 constant

Reserved

59 bytes subsequently remain freely available (user_data):

User_Data

Order Number	Name	Explanation
1	Status	- see "data objects GMXa" table
11	Start/Stop	Complies with Start/Stop switch; If Start/Stop = 0, then the pump is stopped
12	Reset	Delete internal pump memory and pending faults by changing "1" to "0"
21	Setpoint operating mode	- see "data objects GMXa" table
22	Actual operating mode	- see "data objects GMXa" table
31	Setpoint metering capacity	Setpoint metering capacity in [L/h]

Order Number	Name	Explanation
32	Actual metering capacity	Actual value metering capacity in [L/h]
41	Max. metering capacity	Maximum metering capacity in [L/h]
51	Volumes per contact "batch mode"	Volumes to be delivered in contact in batch mode
52	Metering time batch mode	Time in which the batch volumes are to be delivered
53	Batch start	Start batch metering by changing "1" to "0"
54	Batch memory	For "1", the volumes to be delivered are added up for each additional batch contact; for "0", the remaining volumes are deleted and a new batch process is started
55	Remaining volumes batch mode	Remaining volumes to be metered in batch mode
61	Volumes per contact "contact mode"	Volumes to be delivered in contact in contact mode
62	Contact memory	For "1", the volumes to be delivered are added up for each additional batch contact; for "0", the remaining volumes are deleted and a new contact process is started (analogous to "batch memory")
71	Setpoint final concentration	Desired final concentration in concentration mode
72	Actual value final concentration	current final concentration in concentration mode
81	Dosing monitor	Activate/deactivate metering monitoring:
		0 – deactivated
		1 – activated / warning
		3 – activated / fault
91	Fault	- see "data objects GMXa" table
92	Warnings	- see "data objects GMXa" table
101	Reset stroke counter	Reset stroke counter by changing "1" to "0"
102	Reset metering quantity counter	Reset metering volume counter by changing "1" to "0"
103	Deletable stroke counter	Number of strokes since the last reset
104	Deletable metering quantity counter	Totalled metering volumes since the last reset
105	Litres per stroke	Litres per stroke
111	Identity code	Pump identity code

Order Number	Name	Explanation
112	Serial number	Pump serial number
113	Pump name	Pump name, freely determinable
114	Installation site	Installation site, freely determinable

3.5.4 Data objects gamma/ L, GALa

So that the pump can participate in the cyclic data transfer, the initial parameters must be transferred from the master. To do this only standard parametrisation is necessary; there are no application-specific parameters.

Please note: Data are stored in the "Big-Endian" format! This means that the byte with the highest value bits is initially stored at the memory location with the lowest address:

Example using "number of strokes"- see "data from pump"

The pump stroke rate is stored as Integer32 type at the offset addresses +17 to +20. Bytes are stored in this sequence:

Name	Type	Off.	Byte	Bits
Number of strokes	Integer32	17	0	24 ... 31
		18	1	16 ... 23
		19	2	8 … 15
		20	3	0 … 7

Communication takes place in cyclic data traffic.

The cyclic data frame comprises:

Data on the pump

Start byte	Length	Data type	Name	Explanation
1	1	Byte	StartStop	1=on, 0=deactivation of pump function
2	1	Byte	FlowControl	1=on-, 0=deactivation of metering monitoring (option)
3	1	Byte	StartBatch	A batch is started in "Batch" operating mode when 0 is changed to 1

Start byte	Length	Data type	Name	Explanation
4	1	Byte	BatchMemory	1=on, 0=deactivation of saving function for batches and external metering
5	1	Byte	Reset	Delete faults and basic setting by changing 0 to 1
6	1	Byte	ClearCount	Delete internal stroke and volume counter by ≠ 0
7	1	Unsigned8	SetpointOperation	Operating mode 0=continuous; 1=Batch; 2=External contact; 3=Analogue
8	2	Unsigned16	SetpointFactor	Batch size in batch metering operating mode transmission ratio *100 in "external contact" operating mode (range 0...32767)
10	2	Unsigned16	SetpointMetfreq	Metering frequency in "continual" operating mode max. metering frequency in "batch" and "ext. contact" operating modes (range 0 ... Max-Freq. (dependent on pump))

Pump data

Start byte	Length	Data type	Name	Explanation
1	2	Unsigned16	Status	- see "Status" table
3	1	Unsigned8	ActualOperation	Operating mode 0=continuous; 1=Batch; 2=External contact; 3=Analogue
4	2	Unsigned16	ActualFactor	Batch size in "batch metering" operating mode Transmission ratio *100 in "external contact" operating mode

Start byte	Length	Data type	Name	Explanation
6	2	Unsigned16	ActualMetFreq	Metering frequency in "continual" operating mode max. metering rate in "batch" and "ext. Contact" operating modes
8	2	Unsigned16	ActualFreq	Actual frequency. The number of strokes actually metered by the pump. In "batch" and ext. contact, the Dosfreq. is displayed
10	1	Unsigned8	Stroke length	Adjusted stroke length in % from end stop
11	2	Unsigned16	Remaining strokes	The number of strokes still to be performed in batch metering in progress
13	1	Unsigned8	Fault	Flags for fault sources - see "Fault" table
14	1	Unsigned8	Warning	Flags for warning sources - see "Warning" table
15	2	Integer16	MaxFreq	Maximum frequency in strokes/min that can be metered
17	4	Integer32	Number of strokes	Number of strokes performed since the last reset
21	4	Floating	LpH	Metering volume in litres (gallons) per stroke
25	4	Floating	Quantity	Metered volume in litres (gallons) since the last reset

Status

Item	Name	Status "0"	Status "1"
2^0	Operating mode	continuous	Charge=1; Contact=2; Analogue=3
2^1	Operating mode	-	-
2^2	Fault	No fault	No fault present

Item	Name	Status "0"	Status "1"
2^3	Warning	No warning	Warning present
2^4	Priming	No priming	Priming
2^5	Auxiliary frequency	Aux. Freq. off	Pump metering with aux. Freq.
2^6	Pause	No pause	Pause externally connected
2^7	Stop	Pump is running	Pump stopped
2^8	Option FlowControl	Not present	Present
2^9	FlowControl	Metering monitoring deactivated	Metering monitoring activated
2^{10}	-	-	-
2^{11}	Dividing factor	1:1	1:100
2^{12}	BatchMemory	Deactivated	Activated
2^{13}	Measuring unit	Litres	Gallons
2^{14}	Calibration	Pump not calibrated	Pump calibrated
2^{15}	Operation	Manual mode	BUS mode

Fault

Item	Fault
2^0	Minimum (storage empty)
2^1	Fault analogue current
2^2	-
2^3	-
2^4	Diaphragm rupture (option)
2^5	Metering monitoring (option)
2^6	Overflow stroke storage
2^7	System fault

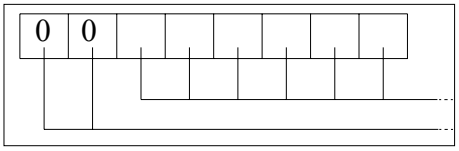
Warning

Item	Warning
2^0	Minimum (storage empty)
2^1	Stroke length adjustment beyond tolerance
2^2	Diaphragm rupture (option)
2^3	-
2^4	-
2^5	-

Item	Warning
2^6	-
2^7	-

Diagnostics frame

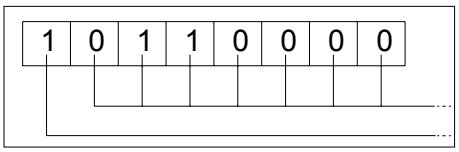
In conformity with PROFIBUS® standard, the device makes the *[Get_Sl_Diag]* service available. The diagnostics data comprise standard diagnostics information (6-Bytes according to PROFIBUS® standard) and any possible diagnostics data specific to the device. A maximum of 63 bytes can be inserted for the device-specific diagnostics data. The first 4 bytes in the PROFIBUS® standard are specified from this:



Encode the byte `sign_len` as follows:

Length of the DU status including the header byte: 04..63

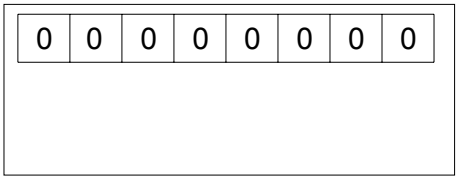
Flags ‘device-related diagnostics’: 00 constant



Encode the byte `status_type` as follows:

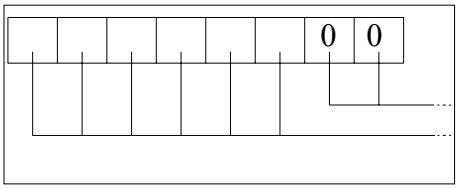
Status type: 48 (manufacturer specific)

Flags ‘Status’: 1 constant



Encode the byte `slot_number` as follows:

Slot number: 0 (because only slot 0 is being used)



Encode the byte `specifier` as follows:

Status specification: 00 constant

Reserved

59 bytes subsequently remain freely available (user_data):

user_data

Errors are indicated using the user_data fields.

The user_data fields are each combined in blocks of 3 bytes and are interpreted as follows:

1 - Service

2 - Error type

3 - Type of data access (read/write)

Thus up to 19 errors can be signalled.

Encoding user_data

1 service

Index	Name	Explanation
0x01	Status	- see "Status" table
0x02	StartStop	1=on, 0=deactivation of pump function
0x03	FlowControl	1=on-, 0=deactivation of metering monitoring (option)
0x04	StartBatch	A batch is started in "Batch" operating mode when 0 is changed to 1
0x05	BatchMemory	Saving function for batch and external metering
0x06	Reset	Delete faults and basic setting by changing 0 to 1
0x07	ClearCount	Delete internal stroke and volume counter by ≠ 0
0x08	SetpointOperation	Operating mode 0=Continuous; 1= Batch; 2=External contact; 3=Analogue
0x09	ActualOperation	Operating mode 0=continuous; 1= Batch; 2=External contact; 3=Analogue
0x0A	SetpointFactor	Batch size in batch metering operating mode transmission ratio *100 in "external contact" operating mode
0x0B	ActualFactor	Batch size in batch metering operating mode transmission ratio *100 in "external contact" operating mode
0x0C	SetpointMetfrequency	Max metering frequency in "continuous" operating mode max. metering frequency in "batch" operating mode and "ext. Contact" operating modes
0x0D	ActualMetfrequency	Max metering frequency in "continuous" operating mode max. metering frequency in "batch" operating mode and "ext. Contact" operating modes
0x0E	Actualfrequency	Actual frequency. The number of strokes actually metered by the pump. In "batch" and "ext. contact" the metering frequency is displayed

Index	Name	Explanation
0x0F	Stroke length	Adjusted stroke length in % from end stop
0x10	Remaining strokes	The number of strokes still to be performed in batch metering in progress
0x11	Fault	Fault sources flags - see below
0x12	Warning	Warning sources flags - see below
0x13	MaxFrequency	Maximum frequency in strokes / min that can be metered
0x14	Number of strokes	Number of strokes performed since the last reset
0x15	LpH	Number of strokes performed since the last reset
0x16	Quantity	Metered volume in litres (gallons) since the last reset

Value	Meaning	
0x30	OK	-
0x31	Transfer OK	Date outside of permitted range
0x32	Transfer OK	Date protected
0x33	Transfer OK	Date rejected, due to device in manual and not in remote operation
0x34	Transfer OK	Date rejected, due to uninstalled option
0x35	Transfer OK	Service not defined
0x36	Transfer OK	Value cannot be read or changed in current device context
0x37	Transfer OK	No further updating
0x55	Transfer OK	Fuse / UART error
0x56	Error in timeout	-

Data access types

Value	Meaning
0xD3	Write access
0xE5	Read access



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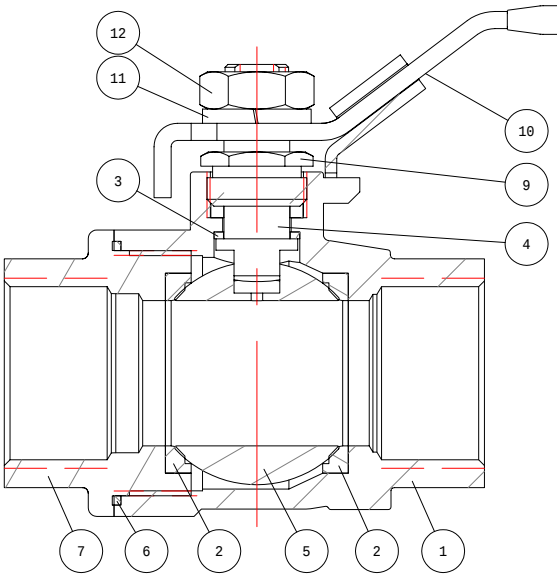
Heidelberg, 3, en_GB

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11.21 - S1 – SHARPE BALL VALVE

SHARPE® VALVES
A Division of Smith-Cooper International, LLC

FULL PORT BALL VALVE – MODEL 50M76
INSTALLATION, OPERATION, AND MAINTENANCE INSTRUCTIONS



ITEM	PART NAME
1	BODY
2	SEAT
3	STEM THRUST SEAL
4	STEM
5	BALL
6	BODY SEAL
7	CAP
8	STEM PACKING
9	GLAND
10	HANDLE
11	SPRING WASHER
12	HANDLE NUT

INSTALLATION:

These valves may be installed in the pipeline in any orientation or position, using good piping practice. For threaded end valves, use a suitable joint compound or TFE tape on pipe threads for ease of fit-up.

OPERATION:

These are quarter-turn (90° rotation) ball valves, and are normal fitted with a latching lever handle for manual operation. The handles also contain travel stop tabs at the open and closed positions. To open the valve, lift the latch/lock slider up, and turn the handle counterclockwise. To close the valve, lift the latch/lock and turn the handle clockwise.

MAINTENANCE:

----WARNING----
Do not attempt to perform maintenance on valves in pressurized lines.

Stem Seal Adjustment:

If leakage is evident from the stem packing area, tighten the gland nut 1/8 turn. If the leakage persists, repeat tightening. When leakage cannot be corrected by tightening the stem nut, replacement of the valve will be necessary.

SHARPE® VALVES
A Division of Smith-Cooper International, LLC
1260 Garnet Drive, Northlake, Illinois 60164-1028 Phone (877) 774-2773 Fax: (708) 562-0890 www.sharpevalves.com

11.22 - S2 – SHELCO CARTRIDGE FILTER

SHELCO FILTERS

SERVICE INSTRUCTIONS MULTI TUBE SWING BOLT DESIGN

SERVICE INSTRUCTIONS
FOR
FILTER SERIES
4FO, 5FO, 7FO, 12FO, 22FO, 36FO, 52FO

This filter has been inspected and found to be free from manufacturing defects.

Before installing this housing be sure the proper cartridge and gasket seals have been selected for the application.

Be sure to connect the inlet and outlet of the housing correctly, marked by labels. Do not install the filter backwards.

Make sure you anchor and mount the housing securely before opening. This will support the head in the open position.

Please note not all housing models require the spring and seal assembly.

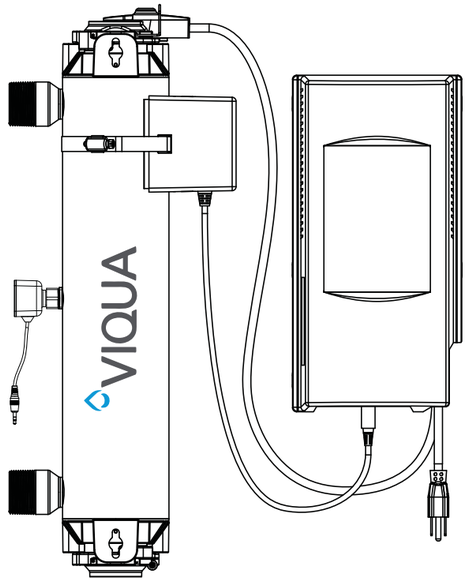
CARTRIDGE CHANGE

1. Close inlet valve.
2. Open vent or drain plug and release all pressure in housing
3. Open dirty drain plug to begin draining filter.
4. Remove top vent plug and allow filter to drain.
5. When filter is drained loosen eye nuts on swing bolts and swing down. Remove head or swing away with davit arm.
6. Remove hold down device and spring and seal assemblies.
7. Remove and discard the used cartridges and install new ones.
8. Replace spring and seal assemblies and hold down device
9. Examine the shell gasket for deterioration and positioning.
10. If gasket is warn replace it.
11. Replace the head.
12. Swing the bolts back into location and align the head and bolts, make sure the eye nut and washer are on top of head.
13. Begin tightening the eye nuts in a crisscross sequence until firmly tight.
14. Replace drain plugs.
15. Open inlet valve slowly. Allow the vent to remain open until a steady stream of liquid comes out the vent hole. Replace vent plug. Check for leaks. If a leak appears close the inlet valve relieve the pressure by opening the drain and repeat steps 9, 10, 11, 12, 13, 14 and 15.

Your filter is now operational.

11.23 - T2 – TROJAN UV TREATMENT UNITS

Owner's Manual



Models:
H, K

Plus Models:
H Plus, K Plus

PRO Models:
PRO10, PRO20, PRO30, PRO50

Powered by UVMAX™

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www.viqua.com

System Tested and Certified by NSF International against CSA B483.1 and NSF/ANSI 55 for Disinfection Performance, Class A

MEMBER Water Quality Association

602936_RevV

get genuine

Congratulations on the purchase of your ultraviolet (UV) water disinfection system! This system uses the most advanced UV technology on the market and is designed to provide you with years of trouble free operation with minimal maintenance required to protect your drinking water from microbiological contaminants.

To ensure ongoing disinfection of your water, UV lamps need to be replaced annually with VIQUA factory-supplied replacements. VIQUA lamps are the result of extensive development resulting in a highly efficient disinfection platform with extremely stable UV output over the entire 9000 hour lifetime. Its success has led to a proliferation of non-genuine copies in the market.

The UV lamp is the heart of the disinfection system, and there should be no compromise when it's time for a replacement.

Why should you insist on genuine factory supplied VIQUA replacement lamps?

- Use of widely available, non-genuine, replacement lamps has been shown to damage the control module of VIQUA UV disinfection equipment.
- An increasing number of calls to VIQUA Technical Support are connected with non-genuine lamps being used (unknowingly) as replacements.
- Damage arising from the use of non-genuine lamps poses a safety risk and is not covered by equipment warranty.
- Unless the UV equipment is equipped with a UV sensor (monitor), it is not possible to verify the UV (invisible) output of replacement lamps.
- Similar appearance to the original lamp and the presence of (visible) blue light does not mean equivalent disinfection performance.
- VIQUA replacement lamps undergo rigorous performance testing and strict quality control processes to ensure that the safety and performance certifications of the original equipment are not compromised.

So, you can see that it's simply not worth the risk! Insist on genuine VIQUA replacement lamps.

Sección 8 Garantía del fabricante

Nuestro compromiso

VIQUA se compromete a asegurar que su experiencia con nuestros productos y organización superen sus expectativas. Hemos fabricado el sistema de desinfección UV según los más altos estándares y lo valoramos como cliente. Si necesitara soporte técnico o tiene preguntas acerca de su sistema, póngase en contacto con nuestro equipo de soporte técnico en el 1.800.265.7246 o en technicalsupport@viqua.com. Estaremos encantados de ayudarle. Esperamos que disfrute de las ventajas que ofrece un agua potable limpia y segura después de la instalación del sistema de desinfección VIQUA.

Cómo realizar una reclamación bajo garantía

Nota: *Para maximizar el rendimiento de desinfección y la fiabilidad de su producto VIQUA, el sistema se debe dimensionar, instalar y mantener adecuadamente. En el manual del propietario encontrará información de utilidad sobre los parámetros de calidad del agua necesarios y los requisitos de mantenimiento.*

En el caso de que se necesitara una reparación o reposición de piezas cubiertas bajo esta garantía, el proceso lo gestionará el distribuidor. Si no está seguro de si un problema o fallo del sistema está cubierto por la garantía, póngase en contacto con nuestro equipo de soporte técnico en el 1.800.265.7246 o por correo electrónico en la dirección technicalsupport@viqua.com. Nuestro técnicos completamente formados le ayudarán a resolver el problema e identificar una solución. Tenga a mano el número de modelo (tipo de sistema), la fecha de compra, el nombre del distribuidor al que adquirió el producto VIQUA ("distribuidor de origen") y una descripción del problema que está experimentando. Para establecer la prueba de compra al realizar una reclamación bajo garantía, necesitará su factura original, o bien deberá haber completado y enviado su tarjeta de registro de producto por correo postal o en línea.

Cobertura específica de la garantía

La cobertura de la garantía es específica de la gama de productos de VIQUA. La cobertura de la garantía está sujeta a las condiciones y limitaciones establecidas en la sección "Condiciones y limitaciones generales".

Garantía limitada de diez años para la cámara UV de VIQUA

VIQUA garantiza que la cámara UV del producto VIQUA estará libre de defectos de material y mano de obra durante un período de diez (10) años desde la fecha de compra. Durante este período, VIQUA reparará o reemplazará, a su criterio, toda cámara UV VIQUA defectuosa. Devuelva la pieza defectuosa a su distribuidor, quién procesará su reclamación.

Garantía limitada de cinco años para los componentes eléctricos y de hardware

VIQUA garantiza que los componentes eléctricos (controlador) y de hardware estarán libres de defectos de material y mano de obra durante un período de cinco (5) años desde la fecha de compra. Durante este período, VIQUA reparará o reemplazará, a su criterio, toda pieza defectuosa cubierta por la garantía. Devuelva la pieza defectuosa a su distribuidor, quién procesará su reclamación.

Garantía limitada de un año para lámparas UV, vainas tubulares y sensores UV

VIQUA garantiza que las lámparas UV, las vainas tubulares y los sensores UV estarán libres de defectos de material y mano de obra durante un período de un (1) año desde la fecha de compra. Durante este período, VIQUA reparará o reemplazará, a su criterio, toda pieza defectuosa cubierta por la garantía. Su distribuidor procesará su reclamación y ofrecerá consejos sobre si el artículo defectuoso se debe devolver para realizar un análisis de fallos.

Nota: *Utilice únicamente lámparas y vainas tubulares de reposición VIQUA originales en el sistema. El incumplimiento de este requisito podría poner en riesgo el rendimiento de la desinfección y afectar a la cobertura de la garantía.*

Condiciones y limitaciones generales

Ninguna de las garantías anteriores cubre los daños provocados por el uso o mantenimiento inadecuados, accidentes, actos de la naturaleza o arañazos e imperfecciones menores que no afectan materialmente el funcionamiento del producto. Las garantías tampoco cubren los productos que no se han instalado según las instrucciones del manual del propietario correspondiente.

Las piezas reparadas o reemplazadas según estas garantías serán cubiertas bajo garantía hasta el final del período de garantía aplicable a la pieza original.

Las garantías anteriores no incluyen el coste de envío y manipulación de los artículos devueltos. Las garantías limitadas que se describen anteriormente son las únicas garantías aplicables a la gama de productos VIQUA. En estas garantías limitadas se describe el único recurso para todas las reclamaciones basadas en un fallo o defecto de cualquiera de estos productos, ya sea que la reclamación se base en contrato, agravio (incluida la negligencia), responsabilidad estricta u otro. Estas garantías reemplazan a todas las demás garantías escritas, orales, implícitas o reglamentarias. No corresponde, sin limitación, ninguna garantía de comerciabilidad o aptitud para un propósito particular a ninguno de estos productos.

VIQUA no asume ninguna responsabilidad por lesiones o daños a la propiedad causados por el uso o el mal uso de cualquiera de los productos mencionados anteriormente. VIQUA no será de ningún modo responsable de los daños especiales, incidentales, indirectos o consecuentes. La responsabilidad de VIQUA se limitará, en todos los casos, a la reparación o reposición del producto o la pieza defectuosa y esta responsabilidad finalizará al finalizar el período de garantía aplicable.

	Serie PRO	Serie Plus	Serie Basic
Sensor	Sí	Sí	No
Ventilador CoolTouch	Sí	Sí	Sí
Boquilla de flujo dinámica	Sí (excepto PRO50)	No	No
Puertos de comunicación (dos, RJ45)	Sí	Sí	Sí
Paquete de control COMMcenter	Opcional	Opcional	Opcional
Válvula de solenoide	Opcional	Opcional	Opcional
Sensor de medidor de flujo (Solo modelos PRO10, 20, 30)	Sí	No	No
Controles			
Botón de silencio de alarma sonora	Sí	Sí	Sí
Botón de lámpara nueva	Sí	Sí	Sí
Indicador de antigüedad de la lámpara	Sí	Sí	Sí
Indicador de funcionamiento de la lámpara	Sí	Sí	Sí
Indicador de funcionamiento del controlador	Sí	Sí	Sí
Indicador de funcionamiento del solenoide	Sí	Sí	Sí
Indicador de funcionamiento del ventilador	Sí	Sí	Sí
Indicador de lectura de sensor	Sí	Sí	No
Certificación NSF/ANSI (Solo modelos PRO10, 20, 30)	NSF C US Estándar 55 Clase A	No	No
USEPA UVDGM 2006 (Solo modelo PRO50)	Sí	No	No
Otras certificaciones	c UL us LISTED CE	c UL us LISTED CE	c UL us LISTED CE

Section 1 Safety Information

Please read this entire manual before operating this equipment. Pay attention to all danger, warning, and caution statements in this manual. Failure to do so could result in serious personal injury or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. DO NOT use or install this equipment in any manner other than that specified in the installation manual.

1.1 Potential Hazards:

Read all labels and tags attached to the system. Personal injury or damage to the system could occur if not observed.

	Waste electrical and electronic equipment (WEEE). This symbol indicates that you should not discard wasted electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling/reuse or hazardous waste center.		This symbol indicates not to store any combustible or flammable material close to the system.
Hg	This symbol indicates there is Mercury present.		This symbol indicates that the contents of the transport package are fragile and the package should be handled with care.
	This is the safety alert symbol. Obey all safety messages that follow this symbol to avoid potential injury. When on the equipment, refer to the Operational and Maintenance manual for additional safety		This symbol indicates safety glasses with side protection is required for protection against UV exposure.
	This symbol indicates a risk of electrical shock and/or electrocution exists.		This symbol indicates gloves must be worn.
	This symbol indicates the marked equipment may contain a component that can eject forcibly. Obey all procedures to safely depressurize.		This symbol indicates safety boots must be worn.
	This symbol indicates the system is under pressure.		This symbol indicates the operator must read all available documentation to perform required procedures.
	This symbol indicates there is a potential UV hazard. Proper protection must be worn.	Cu	This symbol indicates the plumber must use copper piping.
	This symbol indicates the marked item could be hot and should not be touched without care.		This symbol indicates that the system should only be connected to a properly grounded, grounding-type controller receptacle that is protected by a Ground Fault Circuit Interrupter (GFCI).
	This symbol indicates there is a potential for VERY hot water when flow is started.		

Warning: *This product may contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.*

1.2 Safety Precautions:

⚠DANGER

Failure to follow these instructions will result in serious injury or death.

- **Electric Shock:** To avoid possible electric shock, special care should be taken since water is present near the electrical equipment. Unless a situation is encountered that is explicitly addressed by the provided maintenance and troubleshooting sections, DO NOT attempt repairs yourself, refer to an authorized service facility.
- **GROUNDING:** This product must be grounded. If it should malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electrical shock. This system is equipped with a cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances. Improper connection of the equipment-grounding conductor can result in a risk of electrocution. Check with a qualified electrician or service personnel if you are in doubt as to whether the outlet is properly grounded. DO NOT modify the plug provided with this system – if it does not fit in the outlet, have a proper outlet installed by a qualified electrician. DO NOT use any type of adapter with this system.
- **GROUND FAULT CIRCUIT INTERRUPTER PROTECTION**: To comply with the National Electrical Code (NFPA 70) and to provide additional protection from the risk of electric shock, this system should only be connected to a properly grounded, grounding-type controller receptacle that is protected by a Ground Fault Circuit Interrupter (GFCI). Inspect operation of GFCI as per manufacturer's suggested maintenance schedule.
- DO NOT operate the disinfection system if it has a damaged cord or plug, if it is malfunctioning or if it has been dropped or damaged in any manner.
- DO NOT use this disinfection system for other than intended use (potable water applications). The use of attachments not recommended or sold by the manufacturer / distributor may cause an unsafe condition.
- DO NOT install this disinfection system where it will be exposed to the weather or to temperatures below freezing.
- DO NOT store this disinfection system where it will be exposed to the weather.
- DO NOT store this disinfection system where it will be exposed to temperatures below freezing unless all water has been drained from it and the water supply has been disconnected.

⚠WARNING

- During extended periods of no water flow, the water in your chamber can become very hot (Approx. 60 °C) and potentially lead to scalding. It is recommended to run your water until this hot water has been purged from your chamber. Do not allow water to contact your skin during this time. To eliminate this condition, a temperature management valve can be installed at the outlet of your UV system.
- Changes or modifications made to this system without the consent of the manufacturer could render the system unsafe for operation and may void the manufacturer's warranty.

⚠CAUTION

Failure to follow these instructions could result in minor or moderate injury.

- Carefully examine the disinfection system after installation. It should not be plugged in if there is water on parts not intended to be wet such as, the controller or lamp connector.
- Due to thermal expansion concerns and potential material degradation due to UV exposure, it is recommended to use metal fittings and at least 10" of copper pipe on the outlet of your UV chamber.

NOTICE

- The UV lamp inside the disinfection system is rated at an effective life of approximately 9000 hours. To ensure continuous protection, replace the UV lamp annually.
- The UV system is not to be used or played with by children. Persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, are also not to handle the UV system unless they have been given supervision or instruction.
- **EXTENSION CORDS**: If an extension cord is necessary, use only 3-wire extension cords that have 3-prong grounding-type plugs and 3-pole cord connectors that accept the plug from this system. Use only extension cords that are intended for outdoor use. Use only extension cords having an electrical rating not less than the rating of the system. A cord rated for less amperes or watts than this system rating may overheat. Exercise caution when arranging the cord so that it will not be tripped over or pulled. DO NOT use damaged extension cords. Examine extension cord before using and replace if damaged. DO NOT abuse extension cord. Keep extension cord away from heat and sharp edges. Always disconnect the extension cord from the receptacle before disconnecting this system from the extension cord. Never yank cord to pull plug from outlet. Always grasp the plug and pull to disconnect.
- **SYSTEM PROTECTION**: To protect your Controller, a UL1449 certified (or equivalent) transient voltage surge suppressor is strongly recommended.
- The UV lamp in this system conforms to the applicable provisions of the Code of Federal Regulations (CFR) requirements including, Title 21, Chapter 1, Subchapter J, Radiological Health.
- Read and understand the Owner's Manual before operating and performing any maintenance on this equipment.

1.3 Water Chemistry

Water quality is extremely important for the optimum performance of your UV system. The following levels are recommended for installation:

Water Quality and Minerals	Level
Iron	< 0.3 ppm (0.3 mg/L)
Hardness*	< 7 gpg (120 mg/L)
Turbidity	< 1 NTU
Manganese	< 0.05 ppm (0.05 mg/L)
Tannins	< 0.1 ppm (0.1 mg/L)
UV Transmittance	> 75% (call factory for recommendations on applications where UVT < 75%)

* Where total hardness is less than 7 gpg, the UV unit should operate efficiently provided the quartz sleeve is cleaned periodically. If total hardness exceeds 7 gpg, the water should be softened. If your water chemistry contains levels in excess of those mentioned above, proper pre-treatment is recommended to correct these water problems prior to the installation of your UV disinfection system. These water quality parameters can be tested by your local dealer, or by most private analytical laboratories. *Proper pre-treatment is essential for the UV disinfection system to operate as intended*.

1. En algunos casos, se pueden crear flujos de corto plazo del agua de transmisión de rayos ultravioletas bajos (TUV) después y durante el ciclo de regeneración de un ablandador de agua, lo que provoca la activación de una alarma del sensor. La limpieza del sistema UV alivia esta condición, hasta que el ablandador pase por otro ciclo de regeneración. A más largo plazo, se deben modificar los ajustes del ablandador. Para limpiar el sistema UV, desenchufe el sensor, abra un grifo aguas abajo y deje que el agua corra durante dos (2) minutos. Desinfecte las líneas de agua según los procedimientos que se indican en "Desinfección de las líneas de agua" de la sección sobre la instalación.
2. Consulte la sección sobre la limpieza de la vaina tubular y la reposición de la lámpara del manual del propietario.
3. Póngase en contacto con el distribuidor de tratamientos de agua para consultar sobre la prueba de TUV del agua.

Sección 7 Especificaciones

General (todos los modelos)	
Parámetros de funcionamiento	
Presión máxima de funcionamiento	100 PSI (689 kPa)
Presión mínima de funcionamiento	15 PSI (103 kPa)
Temperatura máxima del aire ambiental	40 ºC (104 ºF)
Temperatura mínima del aire ambiental	0 ºC (32 ºF)
Humedad máxima	100 %
Dureza máxima	120 ppm (7 granos por 3,79 litros)
Nivel máximo de hierro	0,3 ppm
TUV mínimo	75 %*
Instalación	SOLO vertical
Otros	
Material de la cámara	316L SST
Ciclo de vida nominal de la lámpara	hasta 2 años
* PRO50 cuenta con una calificación TUV mínima del 85 %	

	PRO10	PRO20	PRO30	PRO50	H, H Plus	K, K Plus
Flujo nominal para NSF Estándar 55, Clase A	10 gpm (38 lpm) (2,2 m^3/h)	20 gpm (76 lpm) (4,5 m^3/h)	30 gpm (113 lpm) (6,8 m^3/h)	-	-	-
Caudal a una dosis de 30 mJ/cm^2 al 95 % TUV	-	-	-	-	45 gpm (170 lpm) (10 m^3/h)	80 gpm (303 lpm) (18 m^3/h)
Caudal a una dosis de 40 mJ/cm^2 al 95 % TUV	-	-	-	-	37 gpm (140 lpm) (8,4 m3/h)	60 gpm (226 lpm) (13,6 m3/h)
Caudal para protocolo USEPA UVDGM 2006	-	-	-	50 gpm (189 lpm) (11,3 m3/h)	-	-
Eléctrico						
Voltaje	100 a 240 V 50 a 60 Hz	100 a 240 V 50 a 60 Hz	100 a 240 V 50 a 60 Hz	100 a 240 V 50 a 60 Hz	100 a 240 V 50 a 60 Hz	100 a 240 V 50 a 60 Hz
Corriente máxima	1,2 Amp	1,6 Amp	2,4 Amp	2,4 Amp	1,6 Amp	2,4 Amp
Consumo eléctrico máximo	120 vatios	160 vatios	230 vatios	230 vatios	160 vatios	230 vatios
Consumo eléctrico de la lámpara	100 vatios	140 vatios	200 vatios	200 vatios	140 vatios	200 vatios
Tamaño del puerto						
Entrada y salida	Combinación NPT de 3,175 cm, FNPT de 2,54 cm	Combinación NPT de 3,175 cm, FNPT de 2,54 cm	Combinación NPT de 3,175 cm, FNPT de 2,54 cm	MNPT de 5,08 cm	Combinación NPT de 3,175 cm, FNPT de 2,54 cm	MNPT de 5,08 cm

Sección 6 Solución de problemas

Síntoma	Causa probable	Posible solución
Sin potencia	Disparo del GFCI o contacto Fusible del controlador quemado Supresor de tensiones transitorias (TVSS) dañado Controlador dañado	Restablecer el GFCI o contacto. Reemplazar el fusible del controlador; consultar la sección sobre la reposición de fusibles (consultar la Sección 4.3). Reemplazar TVSS Reemplazar el controlador y usar TVSS
Disparo repetido del GFCI o contacto	La conexión entre la lámpara y el enchufe de la lámpara está mojada Cortocircuito en el conjunto eléctrico	Limpiar y secar las clavijas de la lámpara y el enchufe de la lámpara; inspeccionar la unidad en búsqueda de fugas o condensación Reemplazar el controlador
Fuga en la entrada o salida	Hay una fuga en los accesorios de canalización con rosca	Limpiar las roscas, volver a sellar con cinta Teflon y volver a apretar
Fuga detectada en el área de la cámara UV	Condensación de aire húmedo en la cámara fría (acumulación lenta) Junta tórica dañada, deteriorada o instalada de manera incorrecta Conjunto de lámpara/vaina tubular no instalado correctamente (demasiado o insuficientemente apretado)	Controlar la humedad o cambiar la ubicación de la unidad Inspeccionar la junta y reemplazar si está deteriorada Asegurarse de que la tuerca se ha girado por completo
Alarma	Consulte Sección 5.1.	Consulte Sección 5.1.
El sistema funciona pero las pruebas de agua indican contaminación bacteriana	Los equipos instalados aguas abajo del sistema UV funcionan como caldo de cultivo de agentes patógenos Hay agentes patógenos que residen en las líneas de distribución posteriores al tratamiento UV Recontaminación de extremos sin salida de la canalización	Asegurarse de que UV sea el último equipo de tratamiento. Asegurarse de que todas las líneas de distribución se hayan desinfectado con cloro. Consulte Sección 3.2. Quitar los extremos sin salida de la canalización y enjuagar con cloro. Consulte Sección 3.2.
Indicador LED del sensor de medidor de flujo en estado rojo	El sensor de detección de flujo no detecta el flujo El sensor de detección de flujo no funciona	Aumentar el caudal a través del medidor El medidor de flujo requiere mantenimiento o reposición

6.1 ALARMAS DE UV BAJO (solo las series PRO y Plus)

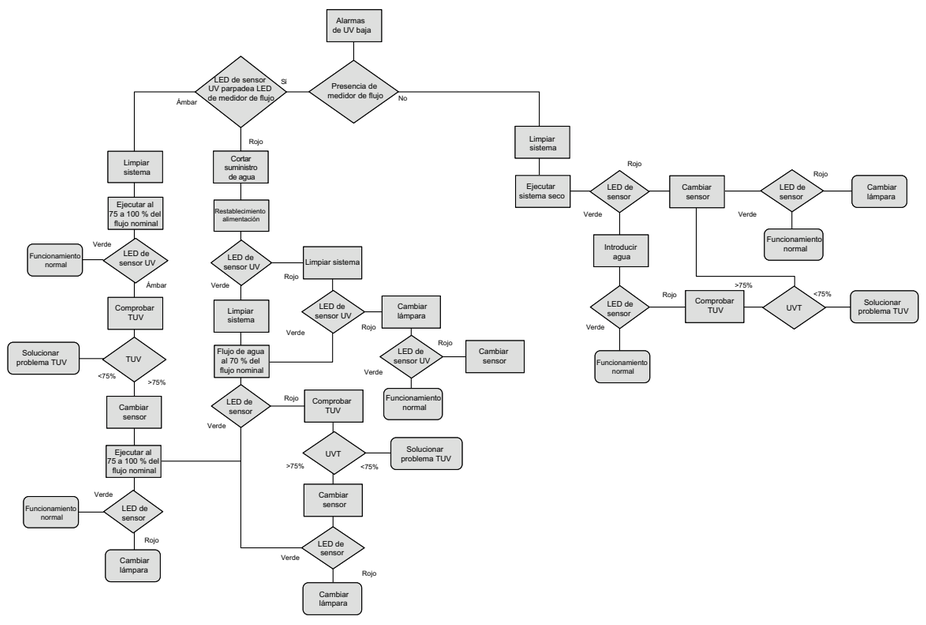


Figura 4 Alarmas de UV bajo (solo las series PRO y Plus)

Section 2 General Information

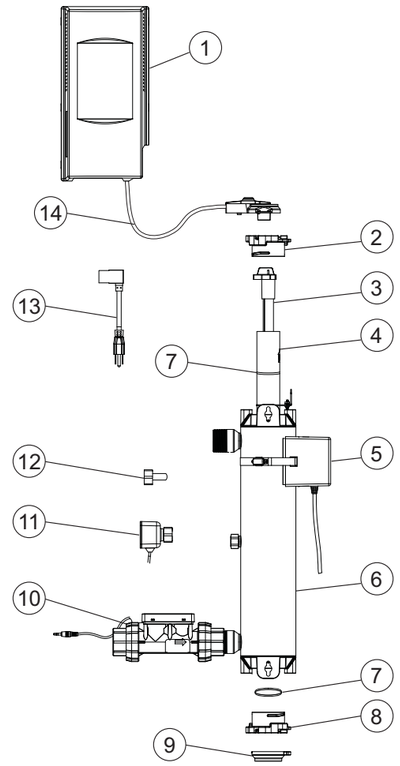


Figure 1 System Components

Item	Description	Part Number	UV Systems
1	Controller	650709-003	PRO10
		650709-006	PRO20
		650709-009	PRO30
		660020-R	PRO50
		650709-005	H Plus
		660019-R	K Plus
		650709-004	H
		660018-R	K
2	Top Bolt and Wireform	602916 & 602896	Used for all systems
3	Lamp	602854	PRO10
		602855	PRO20, H Plus, H
		602856	PRO30/50, K Plus, K
4	Sleeve	602974	PRO10
		602975	PRO20, H Plus, H
		602976	PRO30/50, K Plus, K
5	CoolTouch Fan	650630	Used for all systems
6	Chamber	-	Used for all systems
7	O-ring	002233	Used for all systems

8	Bottom bolt (includes screw)	603053	Used for all systems
9	Sleeve Removal Tool	602988	Used for all systems
10	Flow Meter Sensor (PRO models only)	410982R-10	PRO10
		410982R-20	PRO20
		410982R-30	PRO30
11	Sensor	650580	PRO and Plus models
12	Plug	-	Basic models
13	Power cord	602636	110V - Used for all systems
		602637	220V - Used for all systems
14	Lamp cord	-	Used for all systems

2.1 Dimensions and Layout

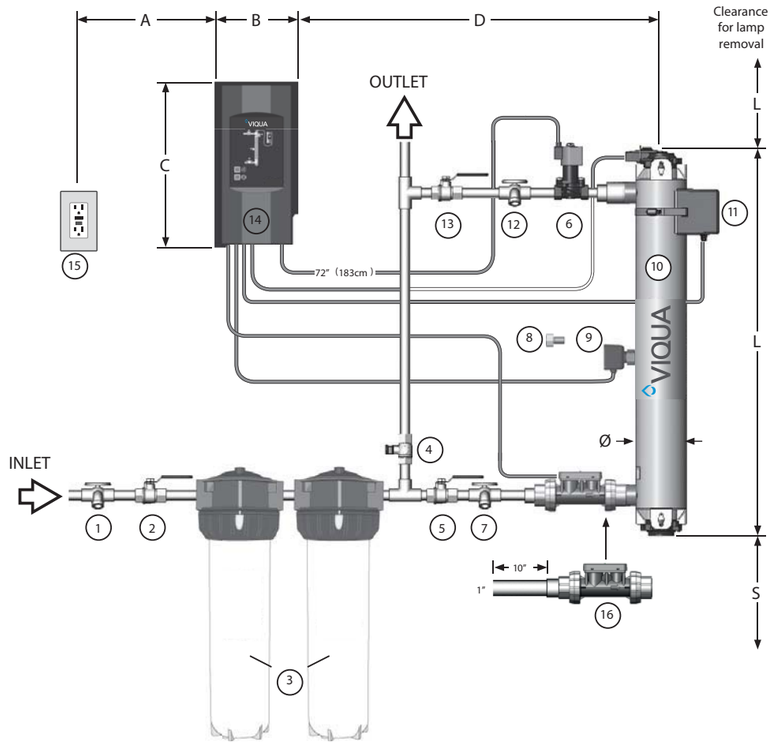


Figure 2 System - Dimension and Layout

Item	Description	Function
1	Sample Valve	Allows for sampling of raw water.
2	Shut-off Valve	Allows for ease of maintenance of pre-treatment equipment.
3	Pre-Treatment	Pre-treatment allows the UV system to operate effectively. The water should meet certain water quality parameters before entering UV System.
4	Bypass shut-off valve:	Bypass line and valve are optional. Intended to provide emergency water supply in the event that the UV system is unavailable.
5	Shut-off valve	Required to allow maintenance of UV system.

Sección 5 Funcionamiento

5.1 Panel de control

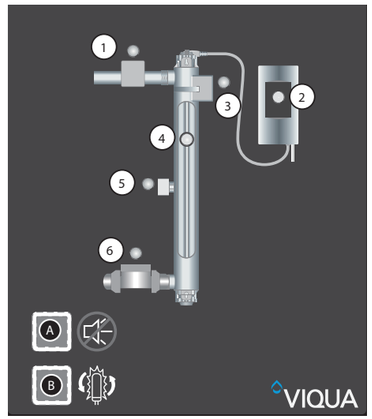
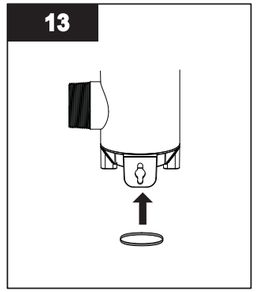


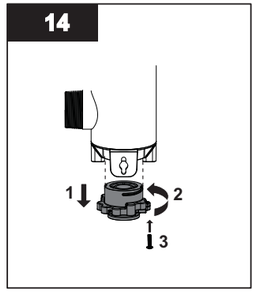
Figura 3 Panel de control

Botones y pantalla		
Característica	**Descripción**	**Función**
A	Silencio	Presionar para silenciar la alarma sonora. Cuando la alarma se debe a la antigüedad de la lámpara, el botón Silencio silenciará la alarma sonora durante 7 días; esto se puede repetir un máximo de 4 veces. Luego, el botón se silenciará solo durante 24 horas. Cuando la alarma se debe a algún otro problema, el botón Silenciar silenciará la alarma sonora durante 24 horas.
B	Lámpara nueva	Después de instalar una lámpara nueva, mantener pulsado durante cinco segundos para restablecer el temporizador de la lámpara en 365.

Luces indicadoras				
LED	**Verde**	**Amarillo**	**Parpadea en rojo**	**Rojo continuo**
1	Válvula de solenoide abierta (Si hay un solenoide)	No aplicable	Válvula de solenoide desconectada; volver a conectar. Bobina de solenoide dañada; reemplazar la bobina (no todo el solenoide).	Válvula de solenoide inactiva (cerrada) debido a un fallo de otro componente, para garantizar la seguridad del suministro de agua
2	Funcionamiento normal	No aplicable	El conector de la lámpara no se ha instalado correctamente. Asegurarse de que la conexión a tierra del arnés de la lámpara se ha insertado en el terminal de conexión a tierra de la cámara. Fallo del controlador; reemplazar el controlador	Lámpara inactiva debido a un fallo del controlador.
3	Funcionamiento normal	No aplicable	Ventilador desconectado; volver a conectar. El ventilador gira a una velocidad más lenta que la necesaria; desenchufar el sistema, limpiar las hojas con un hisopo Ventilador dañado; reemplácelo.	No aplicable
4	Funcionamiento normal ***Nota:*** *El indicador parpadea durante el calentamiento de la lámpara*	Advertencia: La lámpara se deberá reemplazar próximamente	Lámpara desconectada; desconectar la alimentación, volver a conectar la lámpara y conectar el controlador. Fallo de la lámpara; reemplazar la lámpara	Lámpara inactiva debido a un fallo del controlador
5	La dosis UV es adecuada y el sensor funciona con normalidad (solo para modelos Plus)	La dosis UV está cerca de la mínima requerida	Sensor desconectado; desenchufar el sistema, volver a conectar el sensor y volver a enchufar el sistema Fallo del sensor La dosis UV es inferior a la mínima requerida, consultar la sección sobre la alarma de UV bajo	Sensor inactivo debido a un fallo de la lámpara o el controlador
6	El medidor de flujo funciona con normalidad	Dosis UV de flujo alto inadecuada, reducir el flujo para conseguir niveles de dosis más elevados (solo PRO10, PRO20 y PRO30)	Fallo del sensor de medidor de flujo; reparar o reemplazar el sensor	Dosis de UV de flujo bajo inadecuada; se requiere servicio.



- Vuelva a instalar la junta tórica en la parte inferior de la vaina tubular.



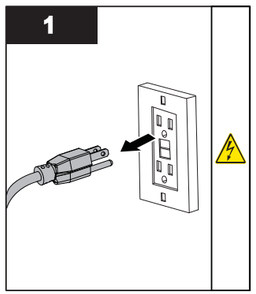
- Conecte el perno de la vaina tubular en la parte inferior.
- Cuando haya finalizado el servicio, realice los pasos que aparecen en los requisitos previos en orden inverso al desmontaje.

Nota: *Tras reemplazar la lámpara UV o la vaina tubular, realizar el procedimiento de desinfección, consulte la Sección 3.2.*

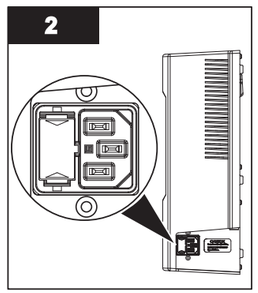
4.3 Reposición de fusibles

El sistema viene equipado de dos fusibles 3A de 250 V en funcionamiento. Para acceder a los fusibles, primero desenchufe el sistema y desconecte el cable de alimentación del controlador. Para extraer el fusible, presione la pestaña en un lado con un cuchillo u otra herramienta y tire de ella suavemente hacia afuera. Repita el proceso en el otro lado.

Procedimiento:



- Desconecte el controlador del sistema.



- Reemplace el fusible.

4.4 Mantenimiento del sensor de medidor de flujo

Inspeccione periódicamente el sensor de medidor de flujo para asegurarse de que no hay suciedad y que la rueda de paletas gira libremente, sin resistencia.

Si la rueda de paletas no gira libremente o está suelta, deberá enviarse el sensor para ser reparado y calibrado. Para garantizar un funcionamiento preciso del sistema, es recomendable enviar el sensor de medidor de flujo para calibrarlo cada dos años.

6	Solenoid valve	Allows water supply to be shut-off when proper disinfection cannot be assured. ***Note:*** *If the ground from your electrical panel is tied to your copper water lines, and you are using a Plastic Body solenoid valve, installation of an approved ground strap is required. This ground strap will maintain continuity between the lines that have been cut to install the solenoid. Check your local electrical code for the correct clamp and cable size.*
7	Sample valve	Allows for sampling of water entering UV chamber; necessary in order to confirm water being treated is of adequate quality.
8	Plug	A stopper provided and installed on Basic models.
9	Sensor	Monitors UV output to ensure proper dose (UV exposure) is being provided.
10	UV chamber	Provides disinfection of the water. MUST BE INSTALLED VERTICALLY.
11	CoolTouch™ fan	Removes excess heat from water in chamber during periods without water flow.
12	Sample valve	Allows for sampling of water immediately following UV treatment; necessary in order to confirm proper operation of UV system.
13	Shut-off valve	Allows maintenance of UV system.
14	Controller	Powers and controls the UV lamp and other devices. Provides human interface, displaying information and allowing control inputs (such as muting the audible alarm).
15	Power source	Provides power to the controller. For safety reasons the outlet must be protected by a Ground Fault Circuit Interrupter (GFCI). ***Note:*** *To protect the controller, a UL1449 certified (or equivalent) transient voltage surge suppressor is required.*
16	Flow Sensor	Monitors flow to provide real time dose (UV exposure) Flow Meter Sensor must be installed in this orientation with the LED facing up. (PRO10, PRO20, PRO30 only)

Item	L	S (minimum)	O	A (maximum)	B	C	D
PRO10	21.4” (55 cm)	12” (30 cm)	4” (10 cm)	72” (182 cm)	6.5” (16.5 cm)	13” (33 cm)	48” (122 cm)
PRO20, H Plus, H	31" (78 cm)	12” (30 cm)	4” (10 cm)	72” (182 cm)	6.5” (16.5 cm)	13” (33 cm)	48” (122 cm)
PRO30	41" (103 cm)	12” (30 cm)	4” (10 cm)	72” (182 cm)	6.5” (16.5 cm)	13” (33 cm)	48” (122 cm)
PRO50, K Plus, K	41" (103 cm)	12” (30 cm)	4” (10 cm)	72” (182 cm)	6.5” (16.5 cm)	13” (33 cm)	48” (122 cm)

2.2 Pipe Lengths

The recommended minimum straight pipe lengths for the various piping configurations are:



Straight Flange 10" straight pipe



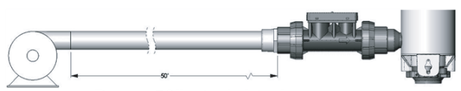
Reducing Flange 15" straight pipe



2 x 90 degree Elbows 25" straight pipe



2 x 90 degree Elbows 3 dimensions 40" straight pipe



Pump 50" straight pipe

Note: *Flow Meter Sensor must be mounted in the following orientation with the LED facing up. Ensure all air is purged from the piping and Flow Meter Sensor. All straight length to the Flow Meter Sensor must be 1.00" in diameter.*

Section 3 Installation

3.1 Installing UV System

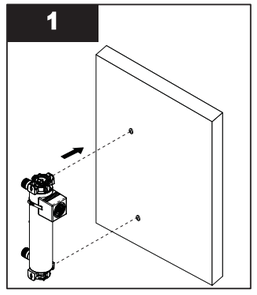
⚠CAUTION

Electronic controller must be connected to a Ground Fault Protected Circuit (GFCI) receptacle.

Prerequisites:

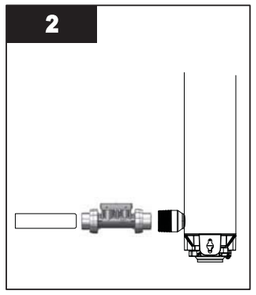
- Determine appropriate indoor location of the controller and chamber, refer to Section 2.1.
- Make sure that the controller is installed higher than the chamber and away from all water sources.
- Ensure adequate clearance above chamber to allow for removal of the lamp and sleeve.
- Make sure to turn off the main water supply.
- Make all necessary plumbing connections refer to Section 2.1.

Procedure:



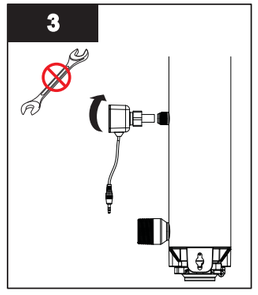
- Install the UV Chamber vertically with the following spacing on the wall using screws.
  - PRO10: 18.5"
  - H, PRO20: 27.5"
  - K, PRO30/50: 37.5"

  Note: *Ensure chamber is installed with green arrows pointing upwards.*



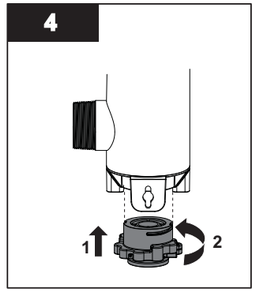
- Connect Flow Meter Sensor (PRO10,20,30 models only) to chamber using 1¼" unions supplied.

  Note: *LED must face up. Ensure proper length of straight pipe 1.0" Diameter at inlet side of Flow Meter Sensor and use a 1¼" to 1" Reducing Coupler (not supplied).*

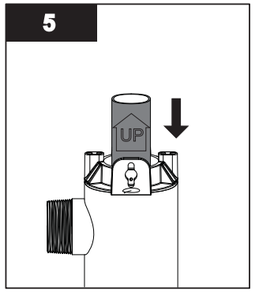


- Install the sensor to the UV system (for PRO models only).

  Note: *DO NOT use wrench to tighten the sensor.*

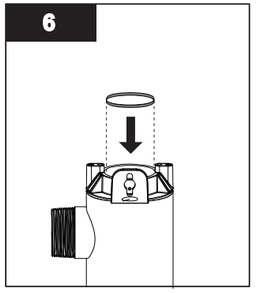


- Connect the sleeve bolt at the bottom of the sleeve assembly. Ensure sleeve bolt is rotated full 1/4 turn until positive stop.

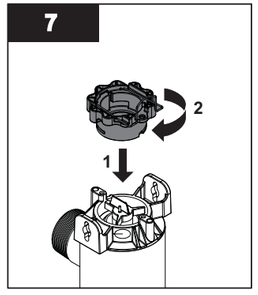


- Insert sleeve with arrow pointing up.

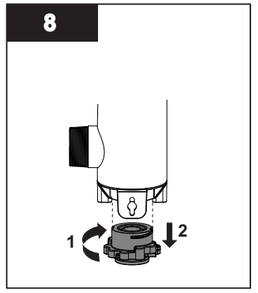
  Note: *DO NOT rotate sleeve and touch glass with bare hands.*



- Wet O-ring with water then place over top end of sleeve.

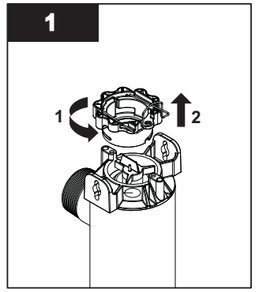


- Connect the sleeve bolt to the top of the sleeve assembly. Ensure sleeve bolt is rotated full 1/4 turn until positive stop.

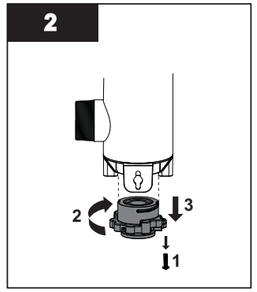


- Remove the sleeve bolt at the bottom of the sleeve assembly.

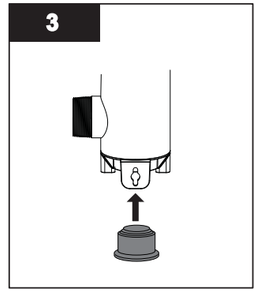
Procedimiento:



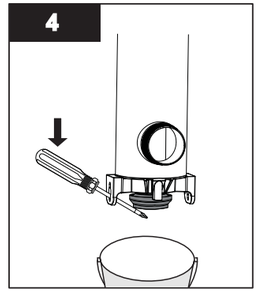
- Extraiga el perno de la vaina tubular de la parte superior del conjunto de la vaina tubular.



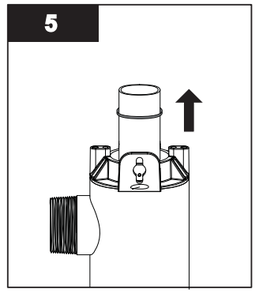
- Quite el tornillo del perno de la vaina tubular.
- Extraiga el perno de la vaina tubular en la parte inferior del conjunto de vaina tubular.



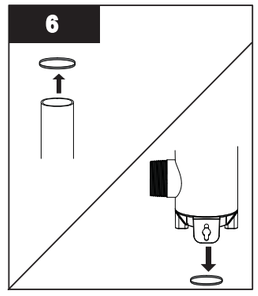
- Inserte la herramienta de extracción de la vaina tubular en la parte inferior de la vaina tubular.



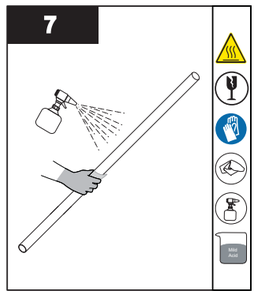
- Levante la vaina tubular hasta que se suelte.
- Coloque un cubo debajo de la cámara UV, ya que saldrá agua.



- Quite la vaina tubular.

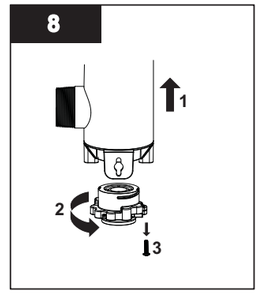


- Quite la junta tórica de la parte superior de la vaina tubular.
- Quite la junta tórica de la parte inferior de la cámara (es posible que se caiga durante el proceso de extracción de la vaina tubular).

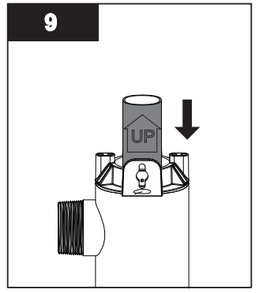


- Limpie la vaina tubular con un trapo empapado en CLR, vinagre u otro ácido blando y luego aclárela con agua.

  Nota: *Si no es posible limpiar la vaina tubular por completo o si se raya o se quiebra, reemplácela.*

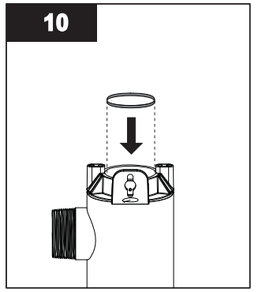


- Conecte el perno de la vaina tubular en la parte inferior del conjunto de vaina tubular.

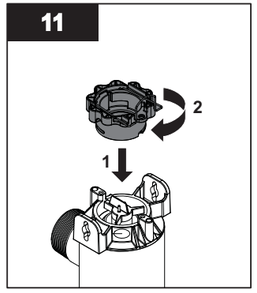


- Vuelva a instalar la vaina tubular con la flecha orientada hacia arriba.

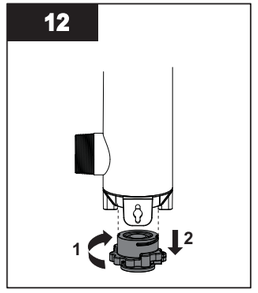
  Nota: *NO gire la vaina tubular ni toque el cristal con las manos sin protección.*



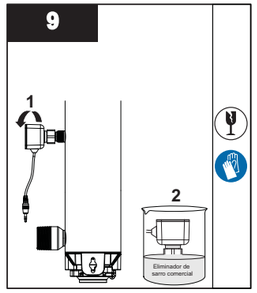
- Vuelva a instalar las nuevas juntas tóricas lubricadas sobre la parte superior de la vaina tubular.



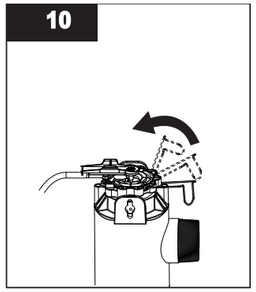
- Conecte el perno de la vaina tubular en la parte superior del conjunto de vaina tubular.



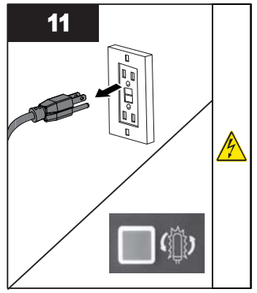
- Extraiga el perno de la vaina tubular en la parte inferior del conjunto de vaina tubular.



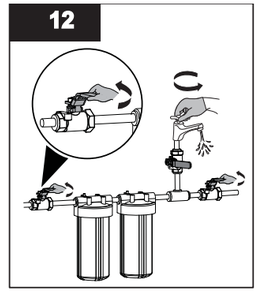
- Extraiga el sensor UV de la unidad.
- Sumerja el extremo del sensor y límpielo con un hisopo.
- En el modelo básico, vaya al paso 10.



- Fije la forma de alambre en su posición.



- Restaure la energía.
- Mantenga pulsado el botón "Lámpara nueva" durante 5 segundos, hasta oír un pitido.



- Active el suministro de agua.

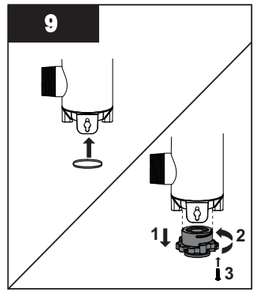
Nota: *Tras reemplazar la lámpara UV, realice el procedimiento de desinfección, consulte la Sección 3.2.*

4.2 Limpieza y reposición de la vaina tubular

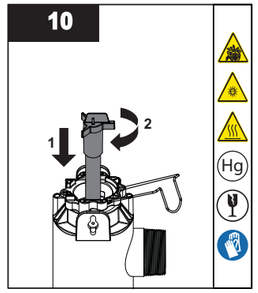
Nota: *Los minerales del agua van formando lentamente una capa en la vaina tubular de la lámpara. Esta capa debe retirarse porque reduce la cantidad de luz UV que llega al agua, reduciendo de este modo el rendimiento de la desinfección. Si la vaina tubular no puede limpiarse, deberá reemplazarse por otra.*

Requisitos previos:

- Cortar el suministro de agua y drenar todas las líneas.
- Quitar la lámpara UV. Consulte Sección 4.1.

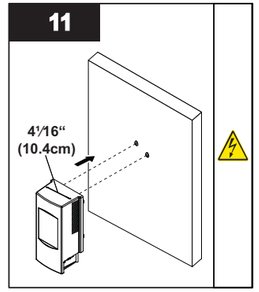


- Wet O-ring with water then place over bottom end of sleeve.
- Reconnect the sleeve bolt and install screw.

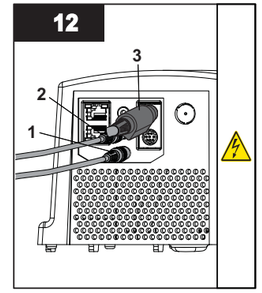


- Install and rotate the lamp into the sleeve assembly. Ensure to rotate the lamp completely.

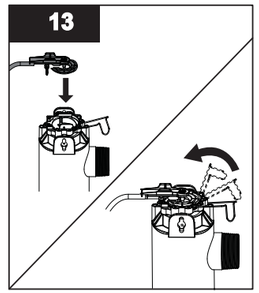
  Note: *Do not touch glass with bare hands.*



- Install the controller unit to the wall. Ensure that the controller is installed higher than the chamber and away from all water sources.



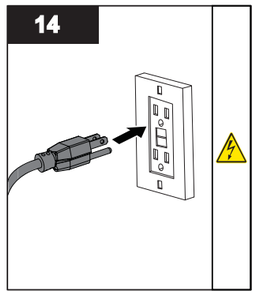
- Connect UV sensor into blue jack (For PRO and Plus models only).
- Connect Flow meter sensor into green jack (For PRO10, 20, 30 only).
- Connect CoolTouch™ fan into either receptacle.



- Install lamp harness onto chamber.

  Notes: *1) Ensure lamp harness ground is inserted into chamber ground terminal.*

  2) Ensure magnet on top of chamber aligns with proximity sensor on lamp harness.
- Lock wire form into position.



- Connect controller to power outlet.
- Allow water flow to one faucet or other water outlet, then close the outlet and inspect for leaks.

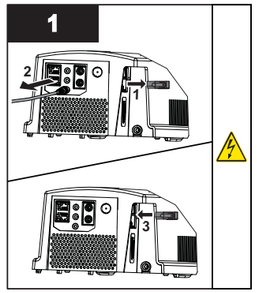
  Note: *Outlet must be protected by a Ground Fault Circuit Interrupter (GFCI).*

Note: *After installing the UV lamp or sleeve perform the disinfection procedure, refer to Section 3.2.*

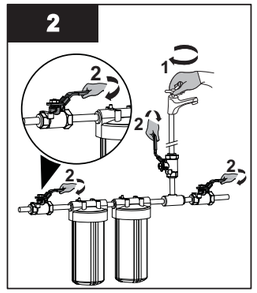
3.2 Disinfection Procedure

UV disinfection is a physical disinfection process and does not add any potentially harmful chemicals to the water. As UV does not provide a disinfection residual, it is imperative that the entire distribution system located after the UV be chemically disinfected to ensure that the plumbing system is free from any bacteriological contaminants. The disinfection process must be performed immediately after the UV unit is installed and repeated thereafter whenever the UV is shut down for service, without power, or inoperative for any reason. The procedure for sanitizing the plumbing system is readily accomplished as follows:

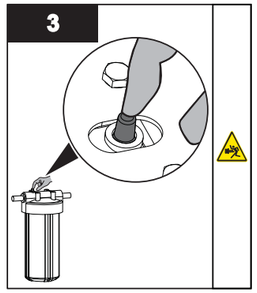
Procedure:



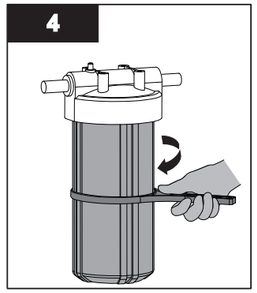
- Disconnect the controller then disconnect the UV sensor from blue jack.
- Reconnect the controller with out UV sensor.



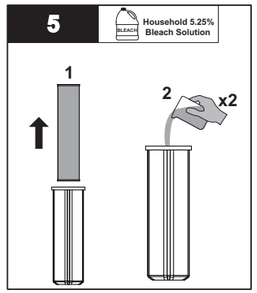
- Shut off the water supply.
- Open an upstream faucet to release line pressure



- Press the pressure button to release the pressure from the cartridges.

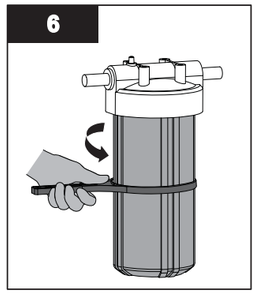


- Remove filter housing(s) using sump wrench.

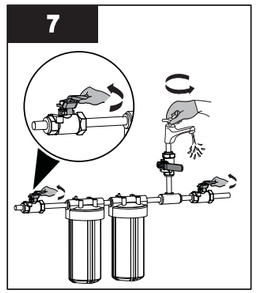


- Remove cartridge(s) and pour 2 cups of household bleach solution into the filter housing(s).

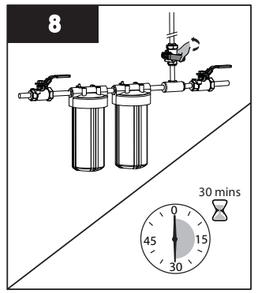
  Note: *DO NOT use Hydrogen Peroxide.*



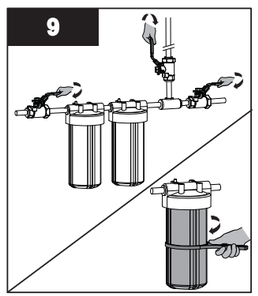
- Connect only the filter housing(s) to the unit.



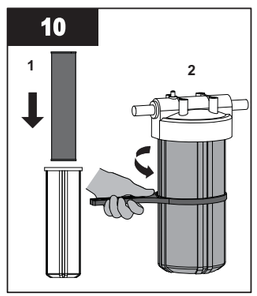
- Open each faucets and turn on water supply.
- Allow water to fill the chamber.



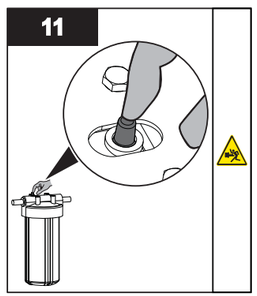
- Turn on the cold water supply followed by hot water (if available) until you smell the bleach.
- Close all faucets and allow bleach to settle in the water lines for 30 minutes.



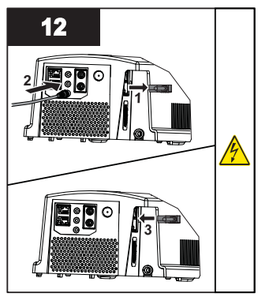
- With all faucets closed, remove filter housing(s) using sump wrench.



- Reinstall the cartridge(s) into filter housing(s) and connect to the unit.
- Flush all water outlets until bleach can no longer be smelled (at least 5 minutes).



- Press the pressure button to purge air and to complete the disinfection procedure.



- Disconnect the controller then connect the UV sensor from blue jack.
- Reconnect the controller.

Sección 4 Mantenimiento

⚠ADVERTENCIA

- Desconecte siempre la corriente antes de llevar a cabo cualquier trabajo en el sistema de desinfección.
- Corte siempre el flujo de agua y libere la presión del agua antes de realizar el servicio.
- Examine con frecuencia el sistema de desinfección para asegurar que los indicadores de corriente estén encendidos y que no hay ninguna alarma.
- Reemplace la lámpara UV anualmente (o cada dos años si se trata de un uso casero temporal) para garantizar la máxima desinfección.
- Drene siempre la cámara al cerrar la temporada o al dejar la unidad en un área sujeta a temperaturas de congelación.

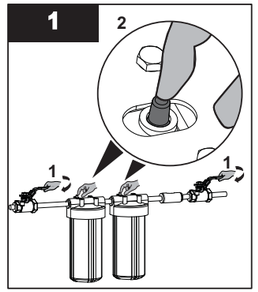
4.1 Reemplazo de la lámpara UV

AVISO

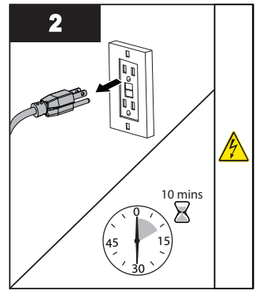
No utilice agua durante la reposición de la lámpara UV.

La reposición de la lámpara UV es un procedimiento rápido y sencillo que no necesita herramientas especiales. Se debe reemplazar la lámpara después de 9000 horas de funcionamiento continuo (un año aproximadamente) con el fin de garantizar una desinfección adecuada.

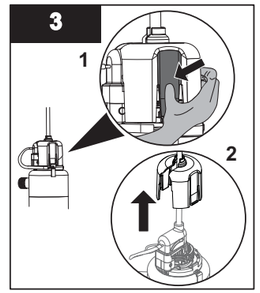
Procedimiento:



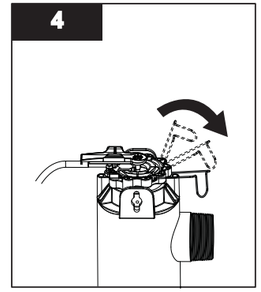
- Cierre todos los grifos y suministros de agua.
- Pulse el botón de presión para liberar la presión de los cartuchos.



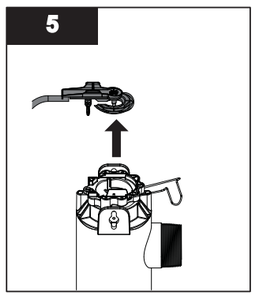
- Desconecte la fuente de alimentación principal y deje que la unidad se apague durante 10 minutos.



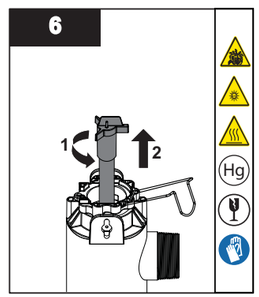
- Drene el agua del sistema UV.
- Cuando se haya drenado toda el agua, cierre la entrada de agua.



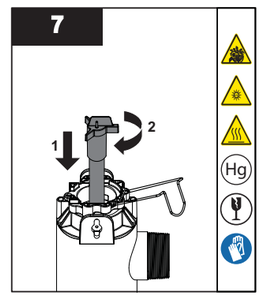
- Apriete la forma de alambre para liberar el conector de la lámpara.



- Quite el conector de la lámpara.

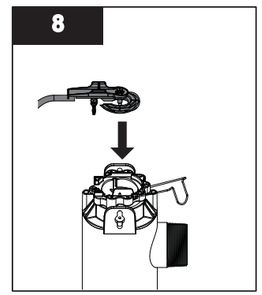


- Gire la lámpara UV y extráigala de la vaina tubular.



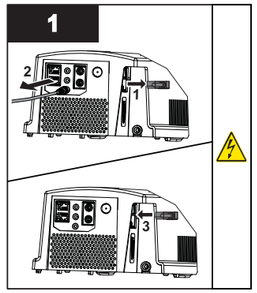
- Instale y gire la lámpara en el conjunto de la vaina tubular. Asegúrese de rotar la lámpara por completo.

  Nota: *No toque el cristal con las manos sin protección.*

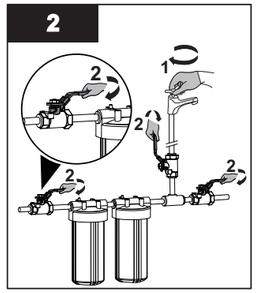


- Vuelva a instalar el conector de la lámpara.

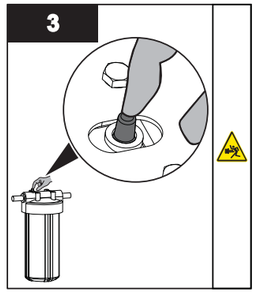
Procedimiento:



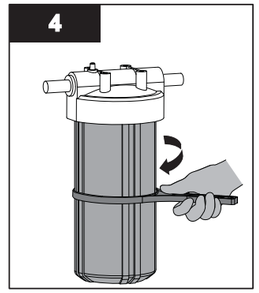
- Desconecte el controlador y luego el sensor UV de la toma azul.
- Vuelva a conectar el controlador sin el sensor UV.



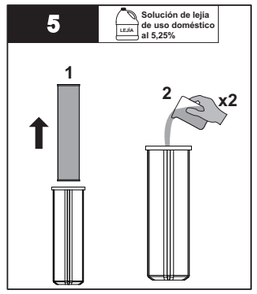
- Corte el suministro de agua.
- Abra un grupo aguas arriba para liberar la presión de la línea.



- Pulse el botón de presión para liberar la presión de los cartuchos.

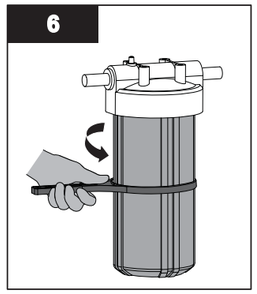


- Quite la carcasa del filtro con una llave para filtros de agua.

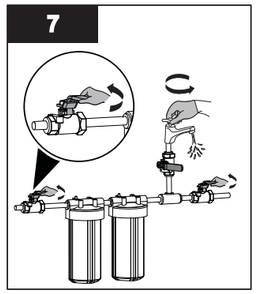


- Quite los cartuchos y vierta dos vasos de solución de lejía de uso doméstico en la carcasa del filtro.

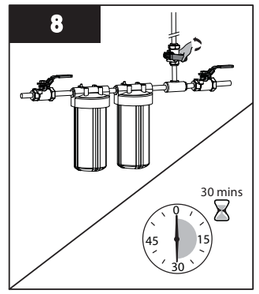
  Nota: *NO utilice peróxido de hidrógeno.*



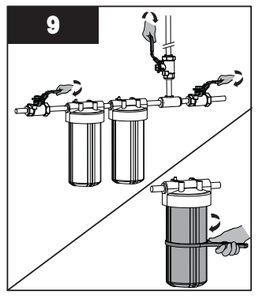
- Conecte solo la carcasa del filtro a la unidad.



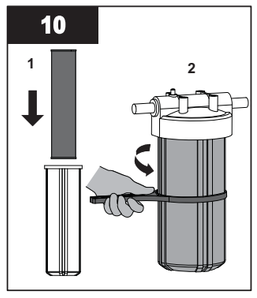
- Abra los grifos y encienda el suministro de agua.
- Permita que el agua rellene la cámara.



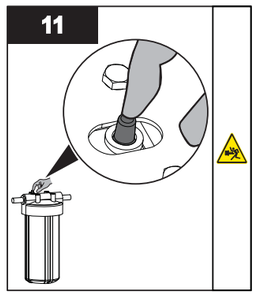
- Encienda el suministro de agua fría seguido de agua caliente (si está disponible) hasta que huela la lejía.
- Cierre todos los grifos y permita que la lejía se deposite en las líneas de agua durante 30 minutos.



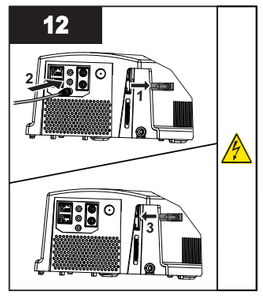
- Con todos los grifos cerrados, quite la carcasa del filtro con una llave para filtros de agua.



- Vuelva a instalar los cartuchos en las carcasas del filtro y conéctelos a la unidad.
- Limpie todas las salidas de agua hasta que no huela a lejía (5 minutos por lo menos).



- Pulse el botón de presión para purgar el aire y para finalizar el procedimiento de desinfección.



- Desconecte el controlador y luego conecte el sensor UV de la toma azul.
- Vuelva a conectar el controlador.

Section 4 Maintenance

⚠WARNING

- Always disconnect power before performing any work on the disinfection system.
- Always shut-off water flow and release water pressure before servicing.
- Regularly inspect your disinfection system to ensure that the power indicators are on and no alarms are present.
- Replace the UV lamp annually (or biennially if seasonal home use) to ensure maximum disinfection.
- Always drain the chamber when closing a seasonal home or leaving the unit in an area subject to freezing temperatures.

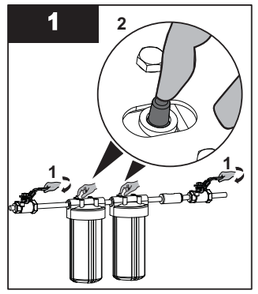
4.1 Replacing UV Lamp

NOTICE

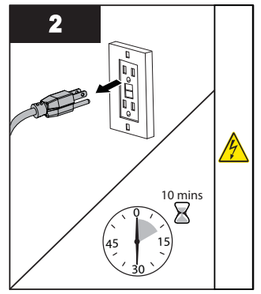
Do not use water during replacement of UV lamp.

UV lamp replacement is a quick and simple procedure requiring no special tools. The UV lamp must be replaced after 9000 hours of continuous operation (approximately one year) in order to ensure adequate disinfection.

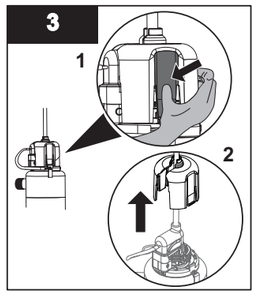
Procedure:



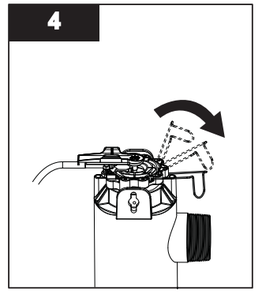
- Close all faucets and water supply.
- Press the pressure button to release the pressure from the cartridges.



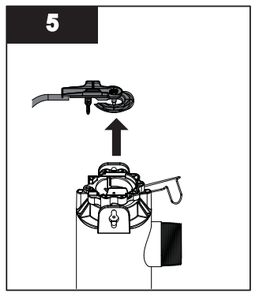
- Disconnect main power source and allow the unit to power down for 10 minutes.



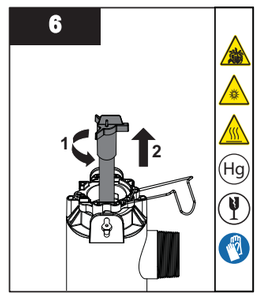
- Drain the water from the UV system.
- Close the water inlet after the water is drained.



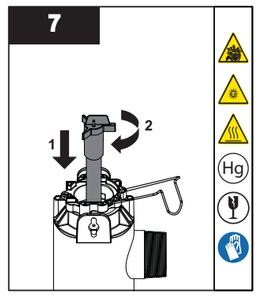
- Pinch wire form to release the lamp connector.



- Remove the lamp connector.

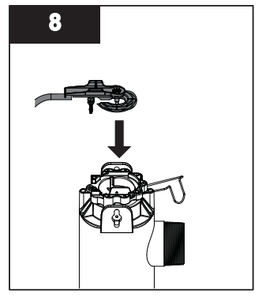


- Rotate and remove the UV lamp from the sleeve.

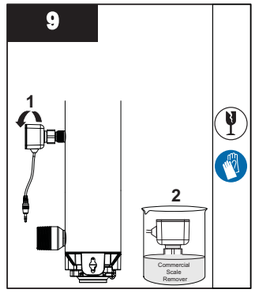


- Install and rotate the lamp into the sleeve assembly. Ensure to rotate the lamp completely.

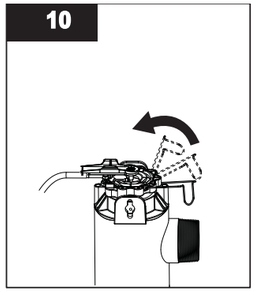
  Note: *Do not touch glass with bare hands.*



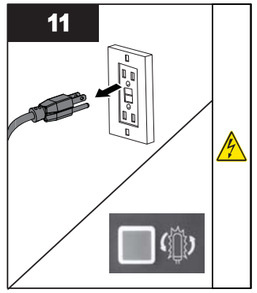
- Reinstall the lamp connector.



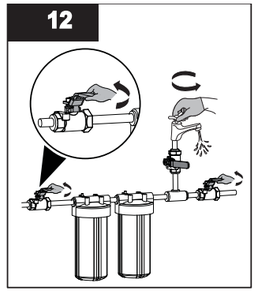
- Remove the UV sensor from the unit.
- Submerge end of the sensor and clean with cotton swab.
- For Basic model skip to step 10.



- Lock the wire form into position.



- Restore Power.
- Press and hold the “New Lamp” button for 5 seconds till you hear a beep.



- Turn on the water supply.

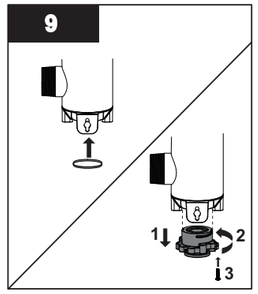
Note: *After replacing the UV lamp perform the disinfection procedure, refer to Section 3.2.*

4.2 Cleaning and Replacing Sleeve

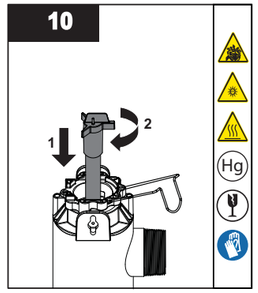
Note: *Minerals in the water slowly form a coating on the lamp sleeve. This coating must be removed because it reduces the amount of UV light reaching the water, thereby reducing disinfection performance. If the sleeve can not be cleaned, it must be replaced.*

Prerequisites:

- Shut off water supply and drain all lines.
- Remove the UV lamp. Refer to Section 4.1.

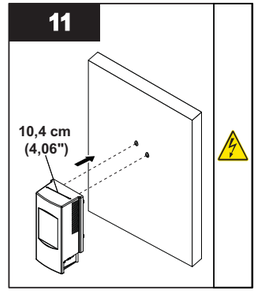


- Moje la junta tórica con agua y colóquela sobre el extremo inferior de la vaina tubular.
- Vuelva a conectar el perno de la vaina tubular e instale el tornillo.

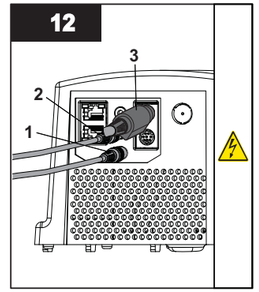


- Instale y gire la lámpara en el conjunto de la vaina tubular. Asegúrese de rotar la lámpara por completo.

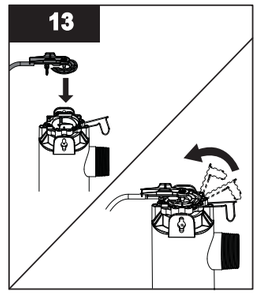
  Nota: *No toque el cristal con las manos sin protección.*



- Instale la unidad del controlador en la pared. Asegúrese de que el controlador se instale a una altura mayor que la de la cámara y alejado de las fuentes de agua.



- Conecte el sensor UV a la toma azul (solo para los modelos PRO y Plus).
- Conecte el sensor de medidor de flujo en la toma verde (solo para PRO10, 20, 30).
- Conecte el ventilador CoolTouch™ en cualquiera de los receptáculos.

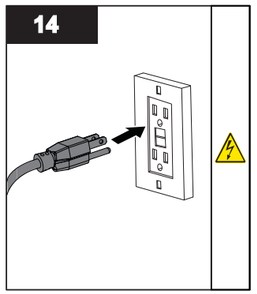


- Instale el arnés de la lámpara en la cámara.

  Notas: *1) Asegurarse de que la conexión a tierra del arnés de la lámpara se ha insertado en el terminal de conexión a tierra de la cámara.*

  2) Asegúrese que el imán, en la parte superior de la cámara, esté alineado con el sensor de proximidad en el arnés de la lámpara.

- Fije la forma de alambre en su posición.



- Conecte el controlador a la fuente de alimentación.
- Active el flujo de agua a un grifo u otra salida de agua y luego cierre la salida e inspeccione para ver si hay fugas.
  Nota: *La salida debe estar protegida mediante un interruptor de circuito de fallos de conexión a tierra (GFCI).*

Nota: *Tras instalar la lámpara UV o la vaina tubular, realizar el procedimiento de desinfección, consulte la Sección 3.2.*

3.2 Procedimiento de desinfección

La desinfección UV es un proceso de desinfección física que no añade sustancias químicas potencialmente dañinas al agua. Dado que la tecnología UV no proporciona residuos de desinfección, es imprescindible que se desinfecte químicamente todo el sistema de distribución situado después de UV para asegurar que el sistema de tuberías esté libre de cualquier contaminante bacteriológico. Se debe llevar a cabo el proceso de desinfección inmediatamente después de instalar la unidad de UV. Asimismo, se debe repetir un poco después cuando la UV deje de funcionar por el servicio, cuando no haya energía o cuando no esté operativa por algún motivo. El procedimiento para sanear el sistema de tuberías se realiza rápidamente del siguiente modo:

Sección 3 Instalación

3.1 Instalación del sistema UV

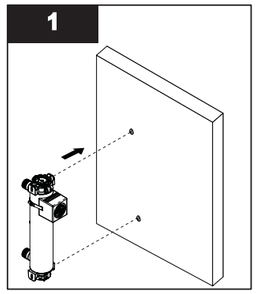
⚠PRECAUCIÓN

El controlador electrónico se debe conectar a un receptáculo de circuito de protección de fallos de conexión a tierra (GFCI).

Requisitos previos:

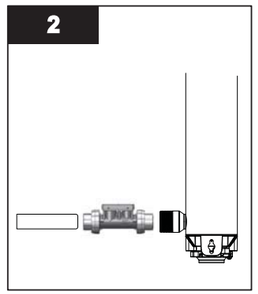
- Determinar la ubicación interior adecuada del controlador y la cámara; consultar la Sección 2.1.
- Asegurarse de que el controlador se instale a una altura mayor que la de la cámara y alejado de las fuentes de agua.
- Asegurarse de que haya una distancia suficiente sobre la cámara como para permitir la extracción de la lámpara y la vaina tubular.
- Asegurarse de cortar la fuente de agua principal.
- Realizar todas las conexiones de fontanería necesarias. Consultar la Sección 2.1.

Procedimiento:



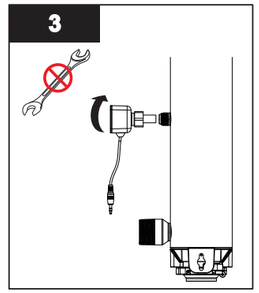
- Utilice tornillos para instalar la cámara UV en orientación vertical con los espacios siguientes en la pared.
  - PRO10: 46,99 cm (18,5")
  - H, PRO20: 69,85 cm (27,5")
  - K, PRO30/50: 95,25 cm (37,5")

Nota: *Asegúrese de que la cámara se instala con las flechas en verde orientadas hacia arriba.*



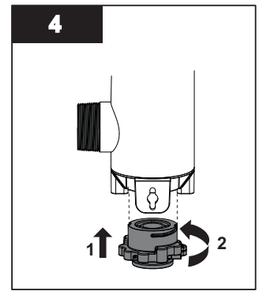
- Conecte el sensor de medidor de flujo (solo modelos PRO10,20,30) a la cámara con las uniones de 3,175 cm (1,25") suministradas.

Nota: *El indicador LED debe estar orientado hacia arriba. Asegúrese de disponer de una longitud adecuada de la canalización recta de 2,54 cm de diámetro en el lado de entrada del sensor de medidor de flujo y use el acoplador de reducción de 3,175 cm a 2,54 cm (no suministrado).*

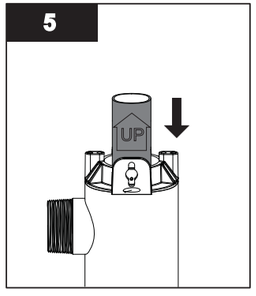


- Instale el sensor en el sistema UV (solo modelos PRO).

Nota: *NO use una llave de ajuste para apretar el sensor.*

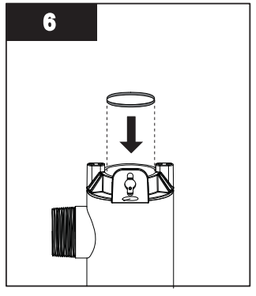


- Conecte el perno de la vaina tubular en la parte inferior del conjunto de vaina tubular. Asegúrese de girar el perno de la vaina tubular una vuelta 1/4 completa hasta alcanzar el tope fijo.

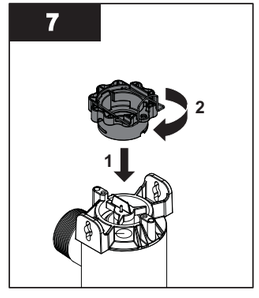


- Inserte la vaina tubular con la flecha orientada hacia arriba.

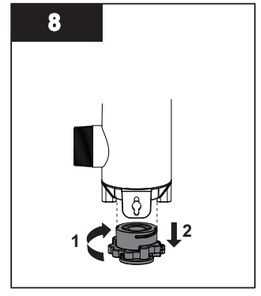
Nota: *NO gire la vaina tubular ni toque el cristal con las manos sin protección.*



- Moje la junta tórica con agua y colóquela sobre el extremo superior de la vaina tubular.

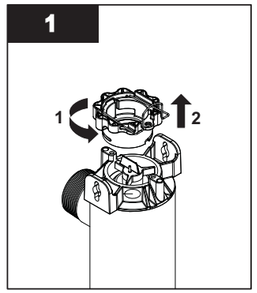


- Conecte el perno de la vaina tubular en la parte superior del conjunto de vaina tubular. Asegúrese de girar el perno de la vaina tubular una vuelta 1/4 completa hasta alcanzar el tope fijo.

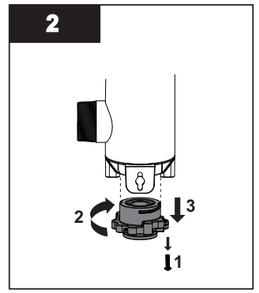


- Extraiga el perno de la vaina tubular en la parte inferior del conjunto de vaina tubular.

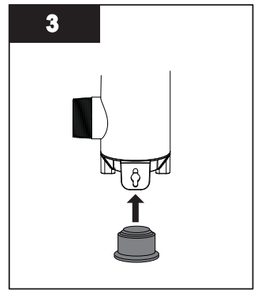
Procedure:



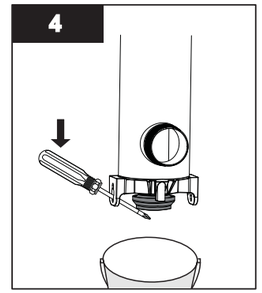
- Remove the sleeve bolt from top of the sleeve assembly.



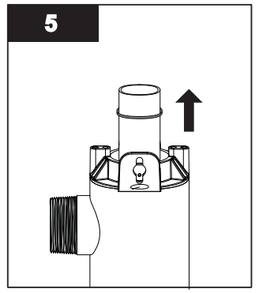
- Remove screw from the sleeve bolt.
- Remove the sleeve bolt at the bottom of the sleeve assembly.



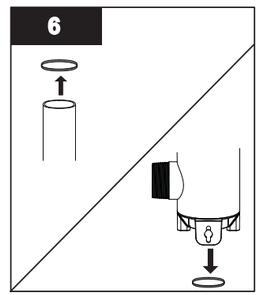
- Insert the sleeve removal tool into the bottom of the sleeve.



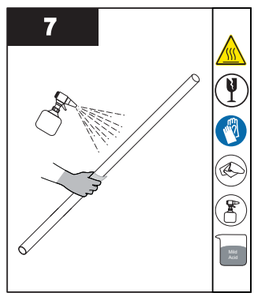
- Pry sleeve upward until it come loose.
- Place bucket under UV chamber, water will escape.



- Remove the sleeve.

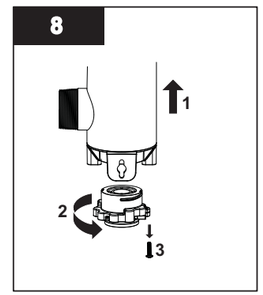


- Remove O-ring from top of the sleeve.
- Remove O-ring from bottom of the chamber (it may fall during sleeve removal process).

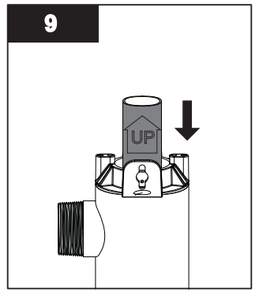


- Clean the sleeve with a cloth soaked in CLR, vinegar or some other mild acid and then rinse with water.

Note: *If sleeve cannot be cleaned completely or it is scratched or cracked, then replace the sleeve.*

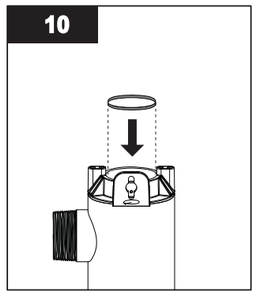


- Connect the sleeve bolt at the bottom of the sleeve assembly.

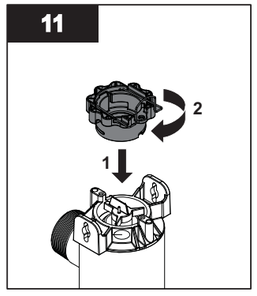


- Reinstall the sleeve with arrow pointing up.

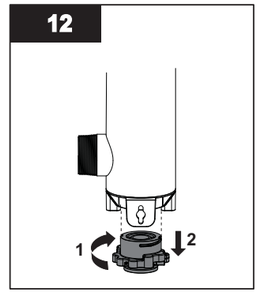
Note: *DO NOT rotate sleeve and touch glass with bare hands.*



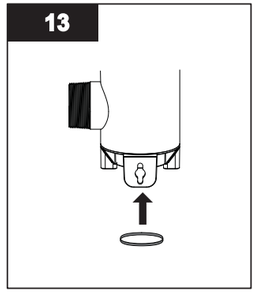
- Reinstall the new lubricated O-rings over the top end of the sleeve.



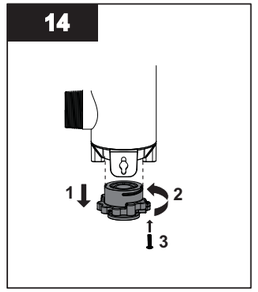
- Connect the sleeve bolt to the top of the sleeve assembly.



- Remove the sleeve bolt at the bottom of the sleeve assembly.



- Reinstall the O-ring at the bottom of the sleeve.



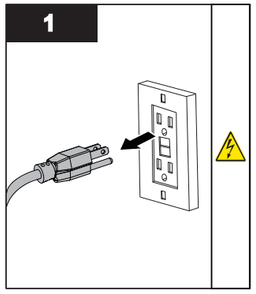
- Connect the sleeve bolt at the bottom.
- When service is complete, assemble the prerequisites in the reverse order of disassembly.

Note: *After replacing the UV lamp or sleeve perform the disinfection procedure, refer to Section 3.2.*

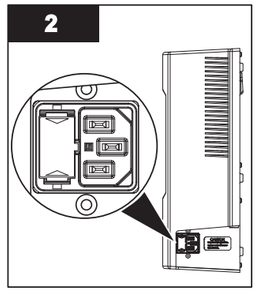
4.3 Fuse Replacement

The system comes equipped with two functioning 250V 3A fuses. To access the fuses, first unplug system and disconnect the power cord from the controller. Remove the fuse door by pushing in the tab on one side using a knife or other tool and gently prying outwards. Repeat on the other side.

Procedure:



- Disconnect the controller to the system.



- Replace the fuse.

4.4 Flow Meter Sensor Maintenance

Inspect Flow Meter Sensor periodically to ensure that there is no fouling and the paddle wheel spins freely with no resistance.

If paddle wheel does not spin freely or is loose the sensor should be returned for service and calibration. It is recommended that the Flow Meter Sensor be returned for calibration every two years to ensure accurate system operation.

6	Válvula de solenoide	Permite cortar el suministro de agua cuando no se puede garantizar una desinfección adecuada. ***Nota:*** *Si la conexión a tierra desde el panel eléctrico está atada a las líneas de agua de cobre y usa una válvula de solenoide de plástico, se requiere la instalación de una correa de conexión a tierra adecuada. Esta correa de conexión a tierra mantendrá la continuidad entre las líneas que se han cortado para la instalación del solenoide. Consulte las normativas de instalaciones eléctricas locales para ver cuáles son la abrazadera y el tamaño de cable correctos.*
7	Válvula de muestra	Permite tomar muestras del agua que entra en la cámara UV; se necesita para confirmar que la calidad del agua que se está tratando es adecuada.
8	Tapón	Un tapón que se suministra e instala en los modelos básicos.
9	Sensor	Controla la salida de UV para garantizar el suministro de una dosis (exposición de UV) adecuada.
10	Cámara UV	Proporciona la desinfección del agua. SE DEBE INSTALAR VERTICALMENTE.
11	Ventilador CoolTouch™	Elimina el calor excesivo del agua en la cámara durante períodos sin caudal.
12	Válvula de muestra	Permite tomar muestras del agua inmediatamente después del tratamiento UV; se necesita para confirmar el funcionamiento adecuado del sistema UV.
13	Válvula de corte	Permite realizar el mantenimiento del sistema UV.
14	Controlador	Alimenta y controla la lámpara UV y otros dispositivos. Proporciona la interfaz humana, muestra información y permite la entrada de controles (por ejemplo, silenciar la alarma sonora).
15	Fuente de alimentación	Proporciona alimentación al controlador. Por motivos de seguridad, la salida debe estar protegida mediante un interruptor de circuito de fallos de conexión a tierra (GFCI). ***Nota:*** *Para proteger el controlador, se requiere el uso de un supresor de tensiones transitorias certificado por UL1449 o equivalente.*
16	Sensor de flujo	Controla el flujo para proporcionar una dosis (exposición UV) en tiempo real. El sensor de medidor de flujo se debe instalar con esta orientación, con el indicador LED orientado hacia arriba. (Solo PRO10, PRO20, PRO30)

Elemento	L	S (mínimo)	O	A (máximo)	B	C	D
PRO10	55 cm (21,4")	30 cm (12")	10 cm (4")	182 cm (72")	16,5 cm (6,5")	33 cm (13")	122 cm (48")
PRO20, H Plus, H	78 cm (31")	30 cm (12")	10 cm (4")	182 cm (72")	16,5 cm (6,5")	33 cm (13")	122 cm (48")
PRO30	103 cm (41")	30 cm (12")	10 cm (4")	182 cm (72")	16,5 cm (6,5")	33 cm (13")	122 cm (48")
PRO50, K Plus, K	103 cm (41")	30 cm (12")	10 cm (4")	182 cm (72")	16,5 cm (6,5")	33 cm (13")	122 cm (48")

2.2 Longitudes de la canalización

Las longitudes mínimas recomendadas para las canalizaciones rectas de las distintas configuraciones de canalización son las siguientes:



Canalización recta de 25,4 cm de brida recta



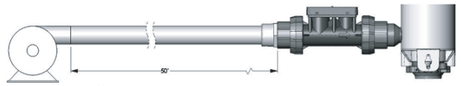
Canalización recta de 38,1 cm de brida de reducción



Canalización recta de 63,5 cm de 2 codos de 90 grados



Canalización recta de 101,6 cm de 3 dimensiones y 2 codos de 90 grados



Canalización recta de 127 cm de bomba

Nota: *El sensor de medidor de flujo se debe montar con la siguiente orientación, con el indicador LED orientado hacia arriba. Asegúrese de purgar todo el aire de la canalización y el sensor de medidor de flujo. Todas las canalizaciones rectas al sensor de medidor de flujo deben tener un diámetro de 2,54 cm.*

8	Perno inferior (incluye tornillo)	603053	Se utiliza en todos los sistemas
9	Herramienta de extracción de la vaina tubular	602988	Se utiliza en todos los sistemas
10	Sensor de medidor de flujo (solo modelos PRO)	410982R-10	PRO10
		410982R-20	PRO20
		410982R-30	PRO30
11	Sensor	650580	Modelos PRO y Plus
12	Tapón	-	Modelos básicos
13	Cable de alimentación	602636	110 V: se utiliza en todos los sistemas
		602637	220 V: se utiliza en todos los sistemas
14	Cable de la lámpara	-	Se utiliza en todos los sistemas

2.1 Dimensiones y distribución

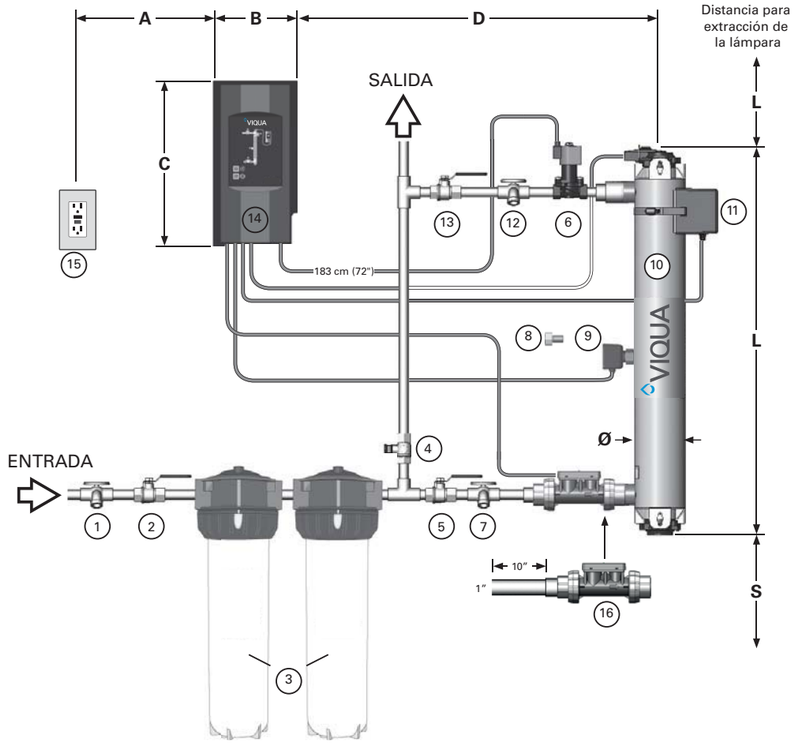


Figura 2 Sistema: dimensiones y distribución

Elemento	Descripción	Función
1	Válvula de muestra	Permite realizar una muestra del agua sin tratar.
2	Válvula de corte	Facilita las tareas de mantenimiento del equipo de tratamiento previo.
3	Tratamiento previo	El tratamiento previo permite el funcionamiento eficaz del sistema UV. El agua debe satisfacer determinados parámetros de calidad antes de acceder al sistema UV.
4	Válvula de corte de desvío:	La línea y válvula de desvío son opcionales. Están diseñadas para proporcionar un suministro de agua de emergencia cuando el sistema UV no esté disponible.
5	Válvula de corte	Se requiere para permitir realizar las tareas de mantenimiento del sistema UV.

Section 5 Operation

5.1 Control Panel

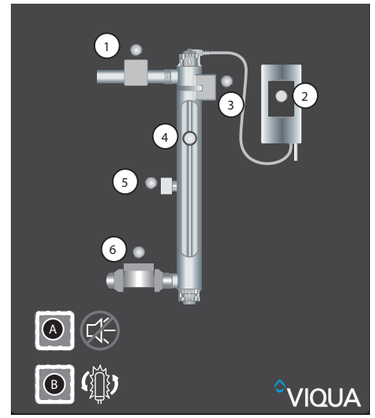


Figure 3 Control Panel

Buttons and Display		
Feature	**Description**	**Function**
A	Mute	Press to silence audible alarm. When the alarm is due to the lamp's age, the mute button will silence the audible alarm for 7 days; this may be repeated up to a maximum of 4 times. After that, the button will silence for only 24 hours. When the alarm is due to any other issue, the mute button will silence the audible alarm for 24 hours.
B	New Lamp	After installing a new lamp, press and hold for five seconds to reset Lamp timer to 365.

Indicator Lights				
LED	**Green**	**Yellow**	**Flashing red**	**Solid red**
1	Solenoid valve open (If equipped with solenoid)	Not applicable	Solenoid valve disconnected; reconnect. Solenoid coil damaged; replace coil (not entire solenoid).	Solenoid valve inactive (closed) due to failure of another component, in order to ensure safety of the water supply
2	Operating normally	Not applicable	Lamp connector not installed properly. Ensure lamp harness ground is inserted into chamber ground terminal. Controller failure, replace controller	Lamp inactive due to controller failure.
3	Operating normally	Not applicable	Fan disconnected, reconnect. Fan turning slower than required; unplug system, clean blades using a Q-tip Fan damaged, replace fan.	Not applicable
4	Operating normally ***Note:*** *During the lamp warm up, the indicator will flash*	Warning: Lamp will require replacement shortly	Lamp disconnected; remove power, reconnect lamp and connect the controller. Lamp failure, replace lamp	Lamp inactive due to controller failure
5	UV dose is adequate and sensor is operating normally (For Plus Models only)	UV dose is near the minimum required	Sensor disconnected; unplug system, reconnect sensor and plug-in system again Sensor failure UV dose is below minimum required, see Low UV Alarm section	Sensor inactive due to lamp or controller failure
6	Flow Meter operating normally	High flow UV dose inadequate, reduce flow to achieve higher dose levels (PRO10, PRO20, and PRO30 only)	Flow meter sensor failure; service or replace sensor	Low flow UV dose inadequate, service required.

Section 6 Troubleshooting

Symptom	Possible Cause	Possible Solution
No power	GFCI and/or breaker tripped Controller fuse has blown Transient voltage surge suppressor (TVSS) damaged Controller damaged	Reset GFCI and/or breaker Replace controller fuse - see Fuse Replacement section (Refer Section 4.3). Replace TVSS Replace controller and use a TVSS
GFCI or breaker repeatedly trips	Connection between lamp and lamp plug is wet Short-circuit in the electrical assembly	Clean and dry lamp pins and lamp plug, check unit for leaks or condensation Replace controller
Leak at inlet or outlet	Threaded pipe fittings are leaking	Clean threads, reseal with Teflon tape and retighten
Leak detected from area of UV chamber	Condensation of moist air on cold chamber (slow accumulation) O-ring damaged, deteriorated or incorrectly installed Lamp/sleeve assembly not properly installed (too tight or not tight enough)	Control humidity or relocate unit Inspect and replace if deteriorated Ensure nut is turned completely
Alarm	Refer to Section 5.1.	Refer to Section 5.1.
System is operating but water tests reveal bacterial contamination	Equipment downstream of UV system is acting as a breeding ground for pathogens Pathogens are residing in the distribution lines post-UV Recontamination from pipe dead-ends	Ensure UV is the last piece of treatment equipment Ensure all distribution lines have been disinfected with chlorine. Refer to Section 3.2. Remove any pipe dead-ends and flush with chlorine. Refer to Section 3.2.
Flow Meter Sensor red status LED	Detect Flow Sensor not detecting flow Flow Meter Sensor not functioning	Increase Flow rate through meter Flow Meter requires maintenance or replacement

6.1 LOW UV ALARMS (PRO and Plus Series Only)

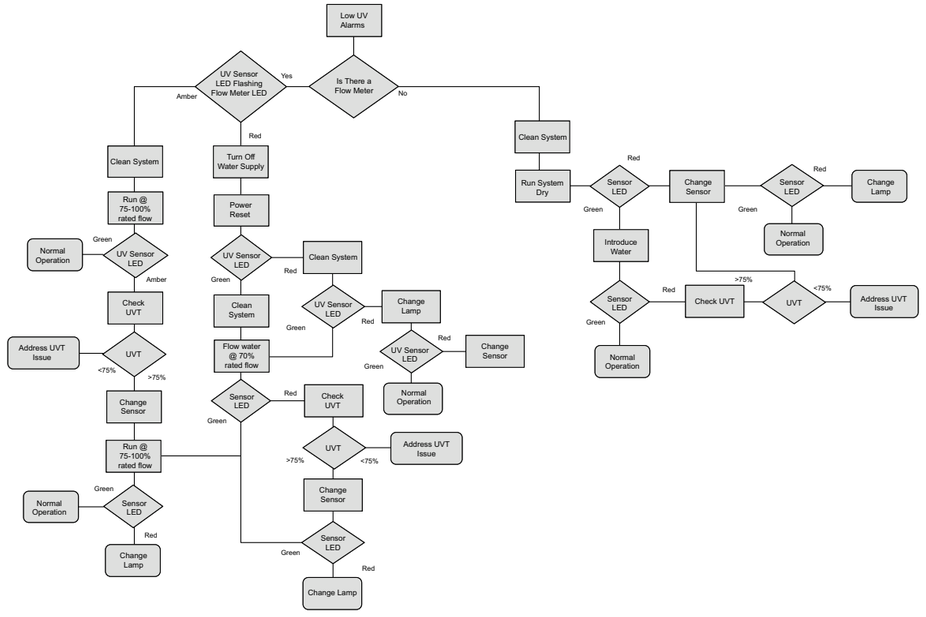


Figure 4 Low UV Alarms (PRO and Plus Series Only)

Sección 2 Información general

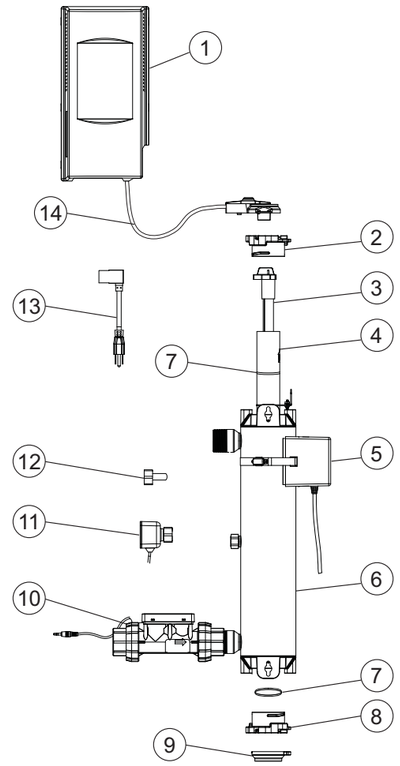


Figura 1 Componentes del sistema

Elemento	Descripción	N.º pieza	Sistemas UV
1	Controlador	650709-003	PRO10
		650709-006	PRO20
		650709-009	PRO30
		660020-R	PRO50
		650709-005	H Plus
		660019-R	K Plus
		650709-004	H
		660018-R	K
2	Perno superior y forma de alambre	602916 y 602896	Se utiliza en todos los sistemas
3	Lámpara	602854	PRO10
		602855	PRO20, H Plus, H
		602856	PRO30/50, K Plus, K
4	Vaina tubular	602974	PRO10
		602975	PRO20, H Plus, H
		602976	PRO30/50, K Plus, K
5	Ventilador CoolTouch	650630	Se utiliza en todos los sistemas
6	Cámara	-	Se utiliza en todos los sistemas
7	Junta tórica	002233	Se utiliza en todos los sistemas

⚠ADVERTENCIA

- Durante períodos prolongados sin flujo de agua, el agua del depósito se podría calentar excesivamente (aprox. 60 °C) y provocar quemaduras. Se recomienda hacer correr el agua hasta que se haya drenado el agua caliente del depósito. Durante esta operación, evite que el agua entre en contacto con la piel. Para eliminar esta condición, se puede instalar una válvula de temperatura en la salida del sistema UV.
- Los cambios o modificaciones realizadas a este sistema sin el consentimiento del fabricante pueden hacer el sistema no seguro para su operación, y pueden anular la garantía del fabricante.

⚠PRECAUCIÓN

El incumplimiento de estas instrucciones puede ocasionar lesiones leves o moderadas.

- Examine cuidadosamente el sistema de desinfección después de su instalación. No se debe enchufar si hay agua en las piezas que no están diseñadas para mojarse, por ejemplo, el controlador o el conector de la lámpara.
- Debido a las preocupaciones de expansión térmica y la degradación potencial del material debido la exposición a rayos UV, es recomendable usar accesorios metálicos y canalización de cobre de al menos 25,4 cm en la salida de la cámara UV.

AVISO

- La lámpara UV en el interior del sistema de desinfección tiene una clasificación nominal con una vida eficaz de aproximadamente 9000 horas. Para garantizar una protección continua, reemplace la lámpara UV una vez al año.
- Los niños no deben usar el sistema UV ni deben jugar con él. Las personas con capacidades físicas, sensoriales y mentales reducidas, o las que carecen de experiencia y conocimientos, tampoco no deberían manipular el sistema UV a menos que hayan recibido supervisión o instrucción.
- **CABLES ALARGADORES:** Si es necesario usar un cable alargador, utilice únicamente cables de 3 hilos con tomas de conexión a tierra de 3 clavijas y conectores de cable de 3 polos que acepten la toma de este sistema. Utilice solo cables alargadores diseñados para uso en exteriores. Utilice solo cables alargadores con una clasificación eléctrica superior a la clasificación del sistema. Un cable con una clasificación de menos amperios o vatios que los del sistema puede sobrecalentarse. Tenga cuidado a la hora de colocar el cable para evitar que las personas tropiecen o tiren de él. NO use cables alargadores dañados. Examine el cable alargador antes de usarlo y reemplácelo si está dañado. NO abuse del cable alargador. Mantenga el alargue alejado de fuentes de calor y cantos agudos. Desconecte siempre el cable alargador del receptáculo antes de desconectar el sistema del alargador. No tire nunca del cable para desenchufarlo. Sujete siempre la toma y tire de ella para desconectar.
- **PROTECCIÓN DEL SISTEMA:** Para proteger el controlador, se recomienda el uso de un supresor de tensiones transitorias certificado por UL1449 o equivalente.
- La lámpara UV de este sistema cumple las disposiciones vigentes de los requisitos del Código de reglamentos federales (CFR) de Estados Unidos, incluido el título 21, capítulo 1, subcapítulo J sobre salud radiológica.
- Lea y comprenda el manual del propietario antes de usar este equipo y realizar tareas de mantenimiento en él.

1.3 Química del agua

La calidad del agua es muy importante para el rendimiento óptimo del sistema UV. Se recomiendan los siguientes niveles para la instalación:

Calidad del agua y minerales	Nivel
Hierro	< 0,3 ppm (0,3 mg/L)
Dureza*	< 7 gpg (120 mg/L)
Turbiedad	< 1 NTU
Manganeso	< 0,05 ppm (0,05 mg/L)
Taninos	< 0,1 ppm (0,1 mg/L)
Transmisión UV	> 75 % (póngase en contacto con la fábrica para conocer las recomendaciones para aplicaciones con TUV < 75%)

* Cuando la dureza total es inferior a 7 gpg, la unidad UV debería funcionar de manera eficaz, siempre y cuando la vaina tubular de cuarzo se limpie periódicamente. Si la dureza total supera los 7 gpg, el agua se debería ablandar. Si la química del agua presenta niveles superiores a los indicados anteriormente, se recomienda realizar un tratamiento previo adecuado para corregir estos problemas del agua antes de instalar el sistema de desinfección UV. Estos parámetros de calidad del agua los puede probar su distribuidor local o la mayoría de los laboratorios de análisis privados. *El tratamiento previo adecuado es fundamental para el funcionamiento correcto del sistema de desinfección UV.*

1. In some cases, short-term flows of low ultraviolet transmittance (UVT) water can be created following and during the regeneration cycle of a water softener, resulting in a sensor alarm. Flushing the UV system alleviates this condition until the softener goes through another regeneration cycle. In the longer term, the softener's settings must be modified. To flush the UV system, unplug the sensor, then open a tap downstream and let water run for two (2) minutes. Disinfect the water lines following the procedures outlined under “Disinfecting The Water Lines” in the Installation section.
2. Refer to Sleeve Cleaning And Lamp Replacement section of the Owner's Manual.
3. Contact your water treatment dealer to inquire about testing the UVT of your water.

Section 7 Specifications

General (All Models)	
Operating Parameters	
Maximum operating pressure	100 PSI (689 kPa)
Minimum operating pressure	15 PSI (103 kPa)
Maximum ambient air temperature	104 ºF (40 ºC)
Minimum ambient air temperature	32 ºF (0 ºC)
Maximum humidity	100%
Maximum hardness	120 ppm (7 grains per gallon)
Maximum iron	0.3 ppm
Minimum UVT	75%*
Installation	Vertical ONLY
Others	
Chamber material	316L SST
Rated service life of lamp	up to 2 years
* PRO50 has a minimum UVT rating of 85%	

	PRO10	PRO20	PRO30	PRO50	H, H Plus	K, K Plus
Rated flow for NSF Std 55, Class A	10 gpm (38 lpm) (2.2 m^3/hr)	20 gpm (76 lpm) (4.5 m^3/hr)	30 gpm (113 lpm) (6.8 m^3/hr)	-	-	-
Rated flow dose of 30 mJ/cm^2 @ 95% UVT	-	-	-	-	45 gpm (170 lpm) (10 m^3/hr)	80 gpm (303 lpm) (18 m^3/hr)
Rated flow dose of 40 mJ/cm^2 @ 95% UVT	-	-	-	-	37 gpm (140 lpm) (8.4 m3/hr)	60 gpm (226 lpm) (13.6 m3/hr)
Rated flow for USEPA UVDGM 2006 protocol	-	-	-	50 gpm (189 lpm) (11.3 m3/hr)	-	-
Electrical						
Voltage	100-240V 50-60Hz	100-240V 50-60Hz	100-240V 50-60Hz	100-240V 50-60Hz	100-240V 50-60Hz	100-240V 50-60Hz
Max. current	1.2 Amp	1.6 Amp	2.4 Amp	2.4 Amp	1.6 Amp	2.4 Amp
Max. power consumption	120 Watts	160 Watts	230 Watts	230 Watts	160 Watts	230 Watts
Lamp power consumption	100 Watts	140 Watts	200 Watts	200 Watts	140 Watts	200 Watts
Port Size						
Inlet and outlet	Combo 1¼” NPT, 1" FNPT	Combo 1¼” NPT, 1" FNPT	Combo 1¼” NPT, 1" FNPT	2“ MNPT	Combo 1¼” NPT, 1" FNPT	2“ MNPT

	PRO Series	Plus Series	Basic Series
Sensor	Yes	Yes	No
CoolTouch fan	Yes	Yes	Yes
Dynamic flow restrictor	Yes (Except PRO50)	No	No
Communications ports (two, RJ45)	Yes	Yes	Yes
COMMcenter control package	Optional	Optional	Optional
Solenoid valve	Optional	Optional	Optional
Flow Meter Sensor (PRO10, 20, 30 Models only)	Yes	No	No
Controls			
Audible alarm mute button	Yes	Yes	Yes
New lamp button	Yes	Yes	Yes
Lamp age indicator	Yes	Yes	Yes
Lamp operation indicator	Yes	Yes	Yes
Controller operation indicator	Yes	Yes	Yes
Solenoid operation indicator	Yes	Yes	Yes
Fan operation indicator	Yes	Yes	Yes
Sensor reading indicator	Yes	Yes	No
NSF/ANSI certification PRO10, 20, 30 models only)	NSF C US Standard 55 Class A	No	No
USEPA UVDGM 2006 (PRO50 model only)	Yes	No	No
Other Certifications	c UL us LISTED CE	c UL us LISTED CE	c UL us LISTED CE

Sección 1 Información de seguridad

Lea este manual en su totalidad antes de usar este equipo. Preste atención a todas las declaraciones de peligro, advertencia y precaución que figuran en este manual. No hacerlo podría resultar en lesiones graves o daños al equipo.

Asegúrese de no dañar la protección que proporciona el equipo. NO use ni instale este equipo de manera distinta de la especificada en el manual de instalación.

1.1 Peligros potenciales:

Lea todos los rótulos y etiquetas incluidos en el sistema. Si no se respetan, podrían producirse lesiones o daños al sistema.

	Residuos de aparatos eléctricos y electrónicos (RAEE). Este símbolo indica que no debe desechar residuos de aparatos eléctricos y electrónicos (RAEE) en la basura. Para su eliminación adecuada, póngase en contacto con su centro de reciclaje/reutilización o de desechos peligrosos.		Este símbolo indica que no se debe almacenar material combustible o inflamable cerca del sistema.
Hg	Este símbolo indica que hay presencia de mercurio.		Este símbolo indica que el contenido del paquete de transporte es frágil y que el paquete se debe manipular con cuidado.
	Este es el símbolo de alerta de seguridad. Para evitar lesiones potenciales, respete todos los mensajes de seguridad que siguen a este símbolo. En el equipo, consulte el manual de funcionamiento y mantenimiento para obtener información adicional sobre la seguridad.		Este símbolo indica que se requiere el uso de gafas de seguridad con protección lateral para proteger contra la exposición a rayos UV.
	Este símbolo indica que existe un riesgo de descarga eléctrica o electrocución.		Este símbolo indica que se requiere el uso de guantes.
	Este símbolo indica que es posible que el equipo marcado contenga un componente que se podría expulsar con fuerza. Respete todos los procedimientos para realizar la despresurización segura.		Este símbolo indica que se requiere el uso de botas de seguridad.
	Este símbolo indica que el sistema está bajo presión.		Este símbolo indica que el operador debe leer toda la documentación disponible para realizar los procedimientos requeridos.
	Este símbolo indica que existe peligro de exposición a rayos UV. Se debe usar protección adecuada.	Cu	Este símbolo indica que el fontanero debe usar canalizaciones de cobre.
	Este símbolo indica que el artículo marcado podría estar caliente y no se debe tocar sin tomar las precauciones necesarias.		Este símbolo indica que el sistema se debe conectar únicamente a un receptáculo de control adecuadamente conectado a tierra y protegido con un interruptor de circuito de fallos de conexión a tierra (GFCI).
	Este símbolo indica que existe el potencial de agua MUY caliente cuando se inicie el flujo.		

Advertencia: *Este producto puede contener productos químicos que, según considera el Estado de California, pueden provocar cáncer, deformaciones congénitas u otros problemas reproductivos.*

1.2 Precauciones de seguridad:

⚠PELIGRO

El incumplimiento de estas instrucciones puede ocasionar lesiones graves o la muerte.

- **Descarga eléctrica:** Para evitar posibles descargas eléctricas, se deben tomar precauciones debido a la presencia de agua cerca de los equipos eléctricos. A menos que surja una situación que se indique explícitamente en las secciones de mantenimiento y solución de problemas, NO intente realizar reparaciones usted mismo. Póngase en contacto con un proveedor de servicio autorizado.
- **CONEXIÓN A TIERRA:** Este producto se debe conectar a tierra. En el caso de que se produzca un fallo o una avería, la conexión a tierra proporciona una ruta de menor resistencia de la corriente eléctrica para reducir el riesgo de descarga eléctrica. Este sistema viene equipado con un cable con conductor y toma de conexión a tierra. La toma se debe enchufar a una toma de corriente instalada correctamente, con conexión a tierra, de acuerdo con las leyes y normativas locales. La conexión inadecuada del conductor de conexión a tierra del equipo puede resultar en riesgo de electrocución. Si tiene dudas sobre si la toma de corriente está conectada a tierra correctamente, consulte con un electricista o personal de servicio cualificado. NO modifique la toma que se suministra con este sistema. Si no cabe en la toma de corriente, solicite a un electricista cualificado que cambie la toma de corriente. NO use ningún tipo de adaptador con este sistema.
- **PROTECCIÓN DE INTERRUPTOR DE CIRCUITO DE FALLOS DE CONEXIÓN A TIERRA:** Para cumplir con el Código Eléctrico Nacional (NFPA 70) de Estados Unidos y proporcionar protección adicional contra el riesgo de descarga eléctrica, este sistema se debe conectar únicamente a un receptáculo de control adecuadamente conectado a tierra y protegido mediante un interruptor de circuito de fallos de conexión a tierra (GFCI). Inspeccione el funcionamiento del GFCI según el programa de mantenimiento sugerido por el fabricante.
- NO use el sistema de desinfección si su cable o toma está dañado, si no funciona correctamente o si se ha caído o dañado de algún modo.
- No use el sistema de desinfección para propósitos distintos de los previstos (aplicaciones de agua potable). El uso de accesorios no recomendados o comercializados por el fabricante o distribuidor pueden provocar condiciones inseguras.
- NO instale el sistema de desinfección en una ubicación en la que quedará expuesto a la intemperie o a temperaturas bajo cero.
- NO almacene este sistema de desinfección en una ubicación en la que quedará expuesto a la intemperie.
- NO almacene este sistema de desinfección en una ubicación en la que quedará expuesto a temperaturas bajo cero, a menos que el agua se haya drenado y el suministro de agua se haya desconectado.

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Enhorabuena por la compra de su sistema de desinfección de agua por luz ultravioleta (UV). Este sistema usa la tecnología UV más avanzada del mercado y está diseñado para proporcionarle años de funcionamiento sin problemas con un mínimo mantenimiento para proteger su agua potable contra contaminantes microbiológicos.

Para garantizar la continua desinfección del agua, las lámparas UV se deben reemplazar cada año por repuestos VIQUA de fábrica. Las lámparas VIQUA son fruto de un extenso desarrollo que ha resultado en una plataforma de desinfección altamente eficaz con un rendimiento de UV extremadamente estable a lo largo de todo su ciclo de vida de 9000 horas. Su éxito ha llevado a una proliferación de copias no originales en el mercado.

La lámpara UV es el corazón del sistema de desinfección y no debería hacer concesiones a la hora de reponerla.

¿Por qué debería insistir en obtener lámparas de reposición VIQUA originales de fábrica?

- Se ha demostrado que el uso de las lámparas de reposición no originales, disponibles ampliamente en el mercado, daña el módulo de control del equipo de desinfección UV VIQUA.
- El soporte técnico de VIQUA recibe cada vez más llamadas relacionadas con el uso (inadvertido) de lámparas de reposición no originales.
- Los daños derivados del uso de lámparas no originales implican un riesgo para la seguridad y no se cubren en la garantía del equipo.
- A menos que el equipo UV venga equipado con un sensor UV (monitor), no es posible comprobar la salida UV (invisible) de las lámparas de reposición.
- Un aspecto similar a la lámpara original y la presencia de la luz azul (visible) no significan que el rendimiento de desinfección sea equivalente.
- Las lámparas de reposición VIQUA se someten a rigurosas pruebas de rendimiento y estrictos procesos de control de calidad para garantizar que no se ponen en riesgo las certificaciones de seguridad y el rendimiento del equipo.

Como puede ver, simplemente no vale la pena correr el riesgo. Exija lámparas de reposición VIQUA originales.

Section 8 Manufacturer's Warranty

Our Commitment

VIQUA is committed to ensuring your experience with our products and organization exceeds your expectations. We have manufactured your UV disinfection system to the highest quality standards and value you as our customer. Should you need any support, or have questions about your system, please contact our Technical Support team at 1.800.265.7246 or technicalsupport@viqua.com and we will be happy to assist you. We sincerely hope you enjoy the benefits of clean, safe drinking water after the installation of your VIQUA disinfection system.

How to Make a Warranty Claim

Note: *To maximise the disinfection performance and reliability of your VIQUA product, the system must be properly sized, installed and maintained. Guidance on the necessary water quality parameters and maintenance requirements can be found in your Owner's Manual.*

In the event that repair or replacement of parts covered by this warranty are required, the process will be handled by your dealer. If you are unsure whether an equipment problem or failure is covered by warranty, contact our Technical Support team at 1.800.265.7246 or e-mail technicalsupport@viqua.com. Our fully trained technicians will help you troubleshoot the problem and identify a solution. Please have available the model number (system type), the date of purchase, the name of the dealer from whom you purchased your VIQUA product ("the source dealer"), as well as a description of the problem you are experiencing. To establish proof of purchase when making a warranty claim, you will either need your original invoice, or have previously completed and returned your product registration card via mail or online.

Specific Warranty Coverage

Warranty coverage is specific to the VIQUA range of products. Warranty coverage is subject to the conditions and limitations outlined under "General Conditions and Limitations".

Ten-Year Limited Warranty for VIQUA UV Chamber

VIQUA warrants the UV chamber on the VIQUA product to be free from defects in material and workmanship for a period of ten (10) years from the date of purchase. During this time, VIQUA will repair or replace, at its option, any defective VIQUA UV chamber. Please return the defective part to your dealer who will process your claim.

Five-Year Limited Warranty for Electrical and Hardware Components

VIQUA warrants the electrical (controller) and hardware components to be free from defects in material and workmanship for a period of five (5) years from the date of purchase. During this time, VIQUA will repair or replace, at its option, any defective parts covered by the warranty. Please return the defective part to your dealer who will process your claim.

One-Year Limited Warranty for UV lamps, Sleeves, and UV Sensors

VIQUA warrants UV lamps, sleeves, and UV Sensors to be free from defects in material and workmanship for a period of one (1) year from the date of purchase. During this time, VIQUA will repair or replace, at its option, any defective parts covered by the warranty.Your dealer will process your claim and advise whether the defective item needs to be returned for failure analysis.

Note: *Use only genuine VIQUA replacement lamps and sleeves in your system. Failure to do so may seriously compromise disinfection performance and affect warranty coverage.*

General Conditions and Limitations

None of the above warranties cover damage caused by improper use or maintenance, accidents, acts of God or minor scratches or imperfections that do not materially impair the operation of the product. The warranties also do not cover products that are not installed as outlined in the applicable Owner's Manual.

Parts repaired or replaced under these warranties will be covered under warranty up to the end of the warranty period applicable to the original part.

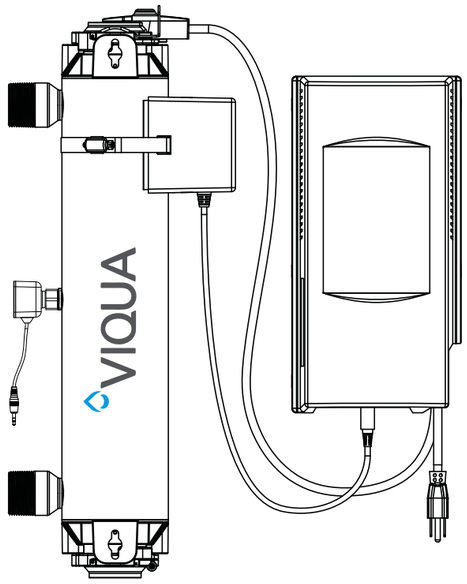
The above warranties do not include the cost of shipping and handling of returned items.The limited warranties described above are the only warranties applicable to the VIQUA range of products. These limited warranties outline the exclusive remedy for all claims based on a failure of or defect in any of these products, whether the claim is based on contract, tort (including negligence), strict liability or otherwise. These warranties are in lieu of all other warranties whether written, oral, implied or statutory. Without limitation, no warranty of merchantability or of fitness for a particular purpose shall apply to any of these products.

VIQUA does not assume any liability for personal injury or property damage caused by the use or misuse of any of the above products. VIQUA shall not in any event be liable for special, incidental, indirect or consequential damages. VIQUA's liability shall, in all instances, be limited to repair or replacement of the defective product or part and this liability will terminate upon expiration of the applicable warranty period.

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VIQUA

Manual del propietario



Modelos:
H, K

Modelos Plus:
H Plus, K Plus

Modelos PRO:
PRO10, PRO20, PRO30, PRO50

Desarrollado por
UVMAX™

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www.viqua.com

NSF C US
Sistema probado y certificado por NSF International en relación con CSA B483.1 y NSF/ANSI 55 sobre el rendimiento de desinfección, clase A

c UL us LISTED

CE

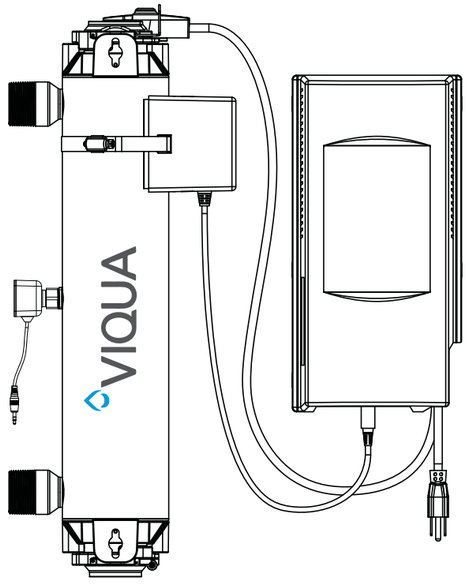
TRC ISO 9001 CERTIFIED

MEMBER Water Quality ASSOCIATION

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Manuel d'utilisation



Modèles :
H, K

Modèles Plus :
H Plus, K Plus

Modèles PRO :
PRO10, PRO20, PRO30, PRO50

Supporter par
UVMAX™

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NSF C US
Système testé et certifié par NSF International par rapport à CSA B483.1 et NSF/ANSI 55 pour les performances de désinfection, Classe A
c UL us LISTED
CE
TRC ISO 9001 CERTIFIED
MEMBER Water Quality ASSOCIATION

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Félicitations pour l'achat de votre système de désinfection d'eau par ultraviolets (UV) ! Ce système fait appel à la technologie UV la plus récente sur le marché et il est conçu pour vous apporter des années de fonctionnement sans souci avec un minimum d'entretien pour protéger votre eau potable de toute contamination microbiologique.

Pour assurer une désinfection continue de votre eau, les lampes UV doivent être remplacées chaque année par les pièces de rechange fournies par l'usine VIQUA. Les lampes VIQUA sont le résultat d'un important développement aboutissant à une plateforme de désinfection hautement efficace avec une production d'UV extrêmement stable sur toute la durée de vie de 9 000 heures. Son succès a mené à une prolifération de copies qui ne sont pas d'origine sur le marché.

La lampe UV est le cœur du système de désinfection et aucun compromis n'est autorisé quand vient le moment de la remplacer.

Pourquoi vous devriez insister sur des lampes de rechange fournies par l'usine d'origine VIQUA ?

- Il a été démontré que l'utilisation de lampes de rechange qui ne sont pas d'origine et largement disponibles endommage le module du dispositif de commande du système de désinfection par UV VIQUA.
- Un nombre croissant d'appels au Service d'assistance technique VIQUA en lien avec les lampes qui ne sont pas d'origine utilisées (sans le savoir) comme pièces de rechange.
- Les dommages provenant de l'utilisation de lampes qui ne sont pas d'origine constituent un risque de sécurité et ne sont pas couverts par la garantie de l'équipement.
- À moins que l'équipement UV ne soit équipé d'un capteur à UV (écran), il est impossible de vérifier la production des UV (invisible) des lampes de rechange.
- Une apparence similaire à la lampe d'origine et la présence d'une lumière bleue (visible) ne garantissent pas une performance de désinfection équivalente.
- Les lampes de rechange VIQUA subissent des tests de performance rigoureux et des processus de contrôle de qualité stricts pour assurer que les certifications de performance et de sécurité de l'équipement d'origine ne sont pas compromises.

Ainsi, vous pouvez voir que ça ne vaut pas la peine de prendre le risque ! Insistez sur des lampes de rechange d'origine VIQUA.

Section 8 Garantie du constructeur

Notre engagement

VIQUA s'engage à dépasser vos attentes dans tous vos rapports avec nos produits comme avec notre société. Nous avons fabriqué votre système de désinfection par UV aux normes de qualité les plus élevées, nous apprécions nos clients à leur juste valeur. Pour tout besoin d'assistance ou question sur votre système, n'hésitez pas à contacter notre équipe de support technique au 1.800.265.7246 ou technicalsupport@viqua.com, nous nous ferons un plaisir de vous aider. Nous espérons sincèrement que vous profiterez de tous les avantages d'une eau de boisson propre et sûre après l'installation de votre système de désinfection VIQUA.

Recours en garantie

Remarque : *pour optimiser les performances de désinfection comme la fiabilité de votre produit VIQUA, le système doit être dimensionné, installé et entretenu correctement. Le manuel de l'utilisateur contient des instructions sur les paramètres nécessaires de qualité de l'eau comme sur les exigences d'entretien.*

Au cas où une réparation ou un remplacement des pièces couvertes par cette garantie serait nécessaire, votre revendeur pourra se charger de la procédure. En cas de doute sur la couverture par la garantie d'un problème ou d'une défaillance de l'équipement, contactez notre équipe de support technique au 1.800.265.7246 ou par e-mail à l'adresse technicalsupport@viqua.com. Nos techniciens parfaitement formés pourront vous aider dans le dépistage du problème pour trouver une solution. Vous devez avoir à disposition le numéro du modèle (type du système), la date d'achat, le nom du revendeur auprès duquel vous avez acheté votre produit VIQUA (« revendeur source ») ainsi qu'une description du problème rencontré. La preuve d'achat pour tout recours en garantie peut être la facture d'origine ou la carte d'enregistrement du produit remplie et renvoyée précédemment par e-mail ou en ligne.

Couverture spécifique de garantie

La couverture de garantie est spécifique à la gamme de produits VIQUA. La couverture de garantie est soumise aux conditions et aux limitations abordées dans « Conditions générales et limitations ».

Garantie limitée de dix ans pour la chambre à UV VIQUA

VIQUA garantit la chambre à UV du produit VIQUA contre tout défaut de matière et de main-d'œuvre pour une durée de dix (10) années à compter de la date d'achat. Dans cette période, VIQUA pourra remplacer ou réparer à son choix, toute chambre à UV VIQUA défectueuse. Veuillez renvoyer la pièce défectueuse à votre revendeur pour traitement de votre recours.

Garantie limitée de cinq ans sur les composants matériels et électriques

VIQUA garantit les composants matériels et électriques (dispositif de commande) contre tout défaut de matière et de main-d'œuvre pour une durée de cinq (5) années à compter de la date d'achat. Dans cette période, VIQUA pourra remplacer ou réparer à son choix, toute pièce défectueuse couverte par la garantie. Veuillez renvoyer la pièce défectueuse à votre revendeur pour traitement de votre recours.

Garantie limitée d'un an pour les lampes UV, manchons et capteurs UV

VIQUA garantit les lampes UV, manchons et capteurs UV contre tout défaut de matière et de main-d'œuvre pour une durée d'une (1) année à compter de la date d'achat. Dans cette période, VIQUA pourra remplacer ou réparer à son choix, toute pièce défectueuse couverte par la garantie. Votre revendeur pourra traiter votre recours et vous indiquer si le ou les éléments défectueux doivent être renvoyés pour analyse de panne.

Remarque : *n'utilisez que des lampes et manchons de rechange d'origine VIQUA dans votre système. Le non-respect de cette prescription peut compromettre sérieusement les performances de désinfection et annuler votre garantie.*

Conditions générales et limitations

Aucune des garanties ci-dessus ne couvre les dégâts causés par une utilisation ou un entretien incorrect, par des accidents, catastrophes naturelles, et ne couvre pas les imperfections ou rayures mineures ne gênant pas matériellement le fonctionnement du produit. Les garanties ne couvrent pas non plus les produits qui n'ont pas été installés conformément aux instructions du manuel de l'utilisateur.

Les pièces réparées ou remplacées dans le cadre de ces garanties restent couvertes par la garantie jusqu'au terme de la garantie de la pièce d'origine.

Les garanties ci-dessus ne comprennent pas le coût d'expédition et de manutention des objets renvoyés. Les garanties limitées ci-dessus sont les seules garanties applicables à la gamme de produits VIQUA. Ces garanties limitées détaillent le recours exclusif pour toute défaillance ou défaut d'un de ces produits, à titre contractuel, délictuel (y compris négligence), de la responsabilité du gardien de la chose ou autre. Ces garanties remplacent toutes autres garanties écrites, orales, implicites ou habituelles. Sans limitation, aucune garantie de qualité marchande ou d'adéquation à un usage particulier n'est applicable à aucun de ces produits.

VIQUA ne saurait être tenu responsable des blessures ou dommages aux biens causés par l'utilisation correcte ou abusive d'un des produits mentionnés ci-dessus. VIQUA ne saurait en aucun cas être responsable des dommages spéciaux, accessoires, indirects ou consécutifs. La responsabilité de VIQUA sera dans tous les cas limitée à la réparation ou au remplacement de la pièce ou du produit défectueux, cette responsabilité prendra fin à l'expiration de la période de garantie applicable.

	Série PRO	Série Plus	Série de base
Capteur	Oui	Oui	Non
Ventilateur CoolTouch	Oui	Oui	Oui
Limiteur de débit dynamique	Oui (excepté PRO50)	Non	Non
Ports de communications (deux, RJ45)	Oui	Oui	Oui
Paquet de contrôle CommCenter	En option	En option	En option
Électrovanne	En option	En option	En option
Capteur de débitmètre (Modèles PRO10, 20, 30 seulement)	Oui	Non	Non
Contrôles			
Bouton de mise en discrétion de l'alarme	Oui	Oui	Oui
Nouveau bouton de lampe	Oui	Oui	Oui
Indicateur de l'âge de la lampe	Oui	Oui	Oui
Indicateur du fonctionnement de la lampe	Oui	Oui	Oui
Indicateur du fonctionnement du dispositif de commande	Oui	Oui	Oui
Indicateur du fonctionnement de l'électrovanne	Oui	Oui	Oui
Indicateur du fonctionnement du ventilateur	Oui	Oui	Oui
Indicateur de lecture du capteur	Oui	Oui	Non
Certification NSF/ANSI Modèles PRO10, 20, 30 seulement)	Norme 55 Classe A	Non	Non
USEPA UVDGM 2006 (Modèle PRO50 seulement)	Oui	Non	Non
Autres certifications			

Section 1 Informations de sécurité

Veuillez lire la totalité de ce manuel avant d'utiliser cet équipement. Prêtez attention à toutes les mentions de danger, d'avertissement et d'attention dans ce manuel. Le non-respect de ces mentions pourrait conduire à des blessures graves de l'opérateur ou à des dommages sur l'équipement.

Assurez-vous que la protection fournie par cet équipement ne soit pas compromise. NI utiliser NI installer cet équipement autrement que comme spécifié dans le manuel d'installation.

1.1 Dangers potentiels :

Lisez toutes les étiquettes et autocollants fixés sur le système. Leur non-respect pourrait conduire à des blessures ou à des dommages sur le système.

	Déchets d'équipements électriques et électroniques (DEEE). Ce symbole indique que les déchets d'équipements électriques et électroniques (DEEE) ne doivent pas être jetés dans la poubelle. Pour une élimination appropriée, contactez votre centre de recyclage/réutilisation local ou un centre de déchets dangereux.		Ce symbole indique de ne pas stocker de matière combustible ou inflammable à proximité du système.
Hg	Ce symbole indique qu'il y a du mercure présent.		Ce symbole indique que le contenu de l'emballage de transport est fragile et que le colis doit être manipulé avec soin.
	Ce symbole est une alerte de sécurité. Respectez les messages de sécurité suivant ce symbole pour éviter des risques de blessures. Lorsqu'il se trouve sur l'équipement, consultez le manuel d'utilisation et d'entretien manuel d'utilisation et de maintenance pour des informations sur la sécurité supplémentaires.		Ce symbole indique que des lunettes de sécurité avec protections latérales sont exigées pour la protection contre une exposition à des UV.
	Ce symbole indique un risque d'électrocution ou de décharge électrique.		Ce symbole indique que des gants doivent être utilisés.
	Ce symbole indique que l'équipement marqué peut contenir un composant qui peut s'éjecter vigoureusement. Respectez toutes les procédures pour une dépressurisation sûre.		Ce symbole indique que des bottes de sécurité doivent être utilisées.
	Ce symbole indique que le système est sous pression.		Ce symbole indique que l'opérateur doit lire toute la documentation disponible pour effectuer les procédures nécessaires.
	Ce symbole signale un risque potentiel d'UV. Une protection appropriée doit être portée.	Cu	Ce symbole indique que le plombier doit utiliser des tuyaux en cuivre.
	Ce symbole indique que le composant marqué peut être chaud et ne devrait pas être touché sans précaution.		Ce symbole indique que le système devrait être connecté à une prise correctement mise à la terre protégée par un disjoncteur de fuite de terre (DFT).
	Ce symbole indique qu'il y a un risque potentiel d'eau TRÈS chaude lorsque l'écoulement commence.		

Avertissement : *ce produit peut contenir des produits chimiques connus par l'État de Californie pour causer des cancers, des anomalies congénitales et autres problèmes reproductifs.*

1.2 Précautions de sécurité :

⚠ DANGER

Le non-respect de ces instructions conduira à des blessures graves ou mortelles.

- **Choc électrique :** pour éviter tout choc électrique, une attention particulière doit être observée car de l'eau est présente à côté de l'équipement électrique. À moins qu'une situation rencontrée soit explicitement abordée dans les sections de maintenance et de dépannage fournies, N'essayez PAS de réparer par vous-même, reportez-vous au centre de service autorisé.
- **MISE À LA TERRE :** ce produit doit être mis à la terre. Si un dysfonctionnement ou une panne devait survenir, la mise à la terre fournit un chemin de moindre résistance au courant électrique afin de réduire le risque de choc électrique. Ce système est équipé d'un cordon muni d'un conducteur de terre et d'une fiche de mise à la terre. La fiche doit être branchée dans une prise appropriée correctement installée et mise à la terre conformément aux codes et règlements locaux. Un mauvais branchement du conducteur de terre peut entraîner un risque d'électrocution. Consultez un électricien ou technicien de maintenance qualifié en cas de doute sur la mise à la terre correcte de la prise. NE modifiez PAS la fiche fournie avec ce système, si elle ne rentre pas dans la prise, faites installer la bonne prise par une électricien qualifié. N'utiliser AUCUN adaptateur avec ce système.
- **DISJONTEUR DE FUITE DE TERRE :** pour être en conformité avec le Code national de l'électricité (NFPA 70) et fournir une protection supplémentaire par rapport au risque de choc électrique, ce système ne devrait être branché que sur une prise correctement mise à la terre protégée par un disjoncteur de fuite de terre (DFT). Vérifiez le fonctionnement du DFT selon le calendrier de maintenance proposé par le constructeur.
- NE PAS faire fonctionner le système de désinfection si un cordon ou une prise est endommagé(e), s'il fonctionne mal ou s'il a été échappé ou endommagé d'une manière ou d'une autre.
- NE PAS utiliser ce système de désinfection pour toute autre application (la purification d'eau potable prévue). L'utilisation d'accessoires non recommandés ou vendus par le distributeur ou le constructeur peut causer un problème de sécurité.
- NE PAS installer ce système de désinfection dans des lieux exposés aux intempéries ou au gel.
- NE PAS stocker ce système de désinfection où il serait exposé aux intempéries.
- NE PAS stocker ce système de désinfection où il serait exposé au gel à moins qu'il n'y ait plus du tout d'eau dedans et que l'alimentation en eau ait été débranchée.

⚠AVERTISSEMENT

- Pendant les longues périodes où l'eau ne s'est pas écoulée, l'eau de votre chambre peut devenir très chaude (environ 60 ºC) et potentiellement mener à des brûlures. Il est recommandé de faire couler l'eau jusqu'à ce que cette eau chaude ait été purgée de votre chambre. Ne mettez pas l'eau en contact avec votre peau pendant ce temps. Pour résoudre ce problème, il est possible d'installer une vanne de régulation de la température sur le robinet de votre système UV.
- Tout changement ou toute modification apportée à ce système sans l'autorisation du fabricant peut rendre son fonctionnement dangereux et en annuler la garantie.

⚠ATTENTION

Le non-respect de ces instructions peut conduire à des blessures mineures voire modérées.

- Examiner soigneusement le système de désinfection après son installation. Il ne doit pas être branché en cas de présence d'eau sur les pièces non prévues pour être mouillées, par exemple dispositif de commande ou connecteur de la lampe.
- En raison de préoccupations liées à la dilatation thermique et la dégradation potentielle des matériaux due à l'exposition aux UV, il est recommandé d'utiliser des raccords métalliques et de la tuyauterie en cuivre d'au moins 10" à la sortie de votre chambre UV.

AVIS

- La lampe UV à l'intérieur du système de désinfection a une durée de vie nominale d'environ 9000 heures. Pour une protection permanente, remplacez la lampe UV chaque année.
- Les enfants ne doivent pas utiliser ou jouer avec le système UV. Les personnes avec des capacités physiques, sensorielles ou mentales réduites, ou un manque d'expérience et de connaissances, ne doivent pas non plus manipuler le système UV à moins qu'elles soient supervisées ou formées.
- **RALLONGES :** si une rallonge est nécessaire, utilisez seulement les rallonges 3 fils qui ont des fiches de mise à la terre à 3 branches et des connecteurs de cordon à 3 trous qui acceptent la fiche de ce système. Utilisez seulement les rallonges destinées à être utilisées en extérieur. Utilisez seulement les rallonges avec une puissance électrique qui n'est pas inférieure à la puissance du système. Un cordon avec une puissance en ampères ou en watt inférieure à celle de ce système pourrait surchauffer. Faites preuve de prudence lorsque vous arranger le cordon afin qu'il ne soit pas tiré ou qu'on ne s'y prenne pas les pieds dedans. N'utilisez PAS de rallonges endommagées. Vérifiez la rallonge avant de l'utiliser, et remplacez-la si elle est endommagée. N'utilisez PAS trop de rallonges. Tenez les rallonges loin des sources de chaleur et des bords tranchants. Débranchez toujours la rallonge de la prise avant de débrancher ce système de la rallonge. Ne tirez jamais sur le cordon pour débrancher de la prise. Attrapez toujours la prise et tirez pour débrancher.
- **PROTECTION DU SYSTÈME :** un suppresseur de tension transitoire certifié UL 1449 (ou équivalent) est fortement recommandé pour protéger le dispositif de commande.
- La lampe UV de ce système est conforme aux dispositions applicables des exigences du Code des règlements fédéraux (CFR) comprenant, Titre 21, chapitre 1, sous-chapitre J, Santé radiologique.
- S'assurer d'avoir lu et bien compris le Manuel de l'utilisateur avant utilisation et avant toute intervention d'entretien sur cet équipement.

1.3 Propriétés chimiques de l'eau

La qualité de l'eau est extrêmement importante pour la performance optimale de votre système UV. Les niveaux suivants sont recommandés pour l'installation :

Qualité de l'eau et minéraux	Niveau
Fer	< 0,3 ppm (0,3 mg/l)
Dureté*	< 7 gpg (120 mg/l)
Turbidité	< 1 NTU
Manganèse	< 0,05 ppm (0,05 mg/l)
Tanins	< 0,1 ppm (0,1 mg/l)
Transmittance UV	> 75 % (appeler l'usine pour des recommandations sur les applications dans les cas où la TUV < 75 %)

* Dans les cas où la dureté totale est inférieure à 7 gpg, l'unité UV devrait fonctionner efficacement si le manchon en quartz est nettoyé périodiquement. Si la dureté totale dépasse 7 gpg, l'eau devrait être adoucie. Si les propriétés chimiques de votre eau contiennent des niveaux supérieurs à ceux qui sont mentionnés ci-dessus, un pré-traitement approprié est recommandé pour corriger les problèmes de l'eau avant d'installer votre système de désinfection par UV. Ces paramètres de qualité de l'eau peuvent être testés par votre fournisseur local ou par la plupart des laboratoires d'analyses privés. *Un pré-traitement approprié est essentiel pour que le système de désinfection par UV fonctionne comme prévu.*

1. Dans certains cas, des écoulements à court terme d'eau à faible transmittance d'ultraviolet (TNE) peuvent être créés à la suite et pendant le cycle de régénération d'un adoucisseur d'eau, provoquant une alarme du capteur. Le rinçage du système UV soulage cette condition jusqu'à ce que l'adoucisseur passe par un autre cycle de régénération. À plus long terme, les paramètres de l'adoucisseur doivent être modifiés. Pour rincer le système UV, débrancher le capteur, puis ouvrir un robinet en aval et laisser couler l'eau pendant deux (2) minutes. Désinfecter les conduites d'eau suivant les procédures décrites sous « Désinfection des conduites d'eau » dans la section installation.
2. Reportez-vous à la section Remplacement et nettoyage de la lampe et du manchon du manuel du propriétaire.
3. Contactez votre concessionnaire de traitement de l'eau pour vous informer sur les essais par traitement ultra-violet (UVT) de votre eau.

Section 7 Caractéristiques

Général (Tous les modèles)	
Paramètres de fonctionnement	
Pression maximale de fonctionnement	689 kPa (100 psi)
Pression minimale de fonctionnement	103 kPa (15 psi)
Température ambiante maximale	104 ºF (40 ºC)
Température ambiante minimale	32 ºF (0 ºC)
Humidité maximale	100%
Dureté maximale	120 ppm (7 grains par gallon)
Fer maximum	0,3 ppm
TUV minimale	75%*
Installation	Verticale SEULEMENT
Autres	
Matériau de la chambre	316L SST
Durée de fonctionnement nominale de la lampe	jusqu'à 2 ans
* PRO50 a un taux de TUV minimum de 85 %	

	PRO10	PRO20	PRO30	PRO50	H, H Plus	K, K Plus
Débit pour NSF Std 55, Classe A	10 GPM (38 LPM) (2,2 m^3/hr)	20 gpm (76 lpm) (4,5 m^3/hr)	30 GPM (113 LPM) (6,8 m^3/h)	-	-	-
Débit dose de 30 mJ/cm^2 TUV @ 95 %	-	-	-	-	45 gpm (170 lpm) (10 m^3/hr)	80 GPM (303 LPM) (18 m^3/h)
Débit dose de 40 mJ/cm^2 TUV @ 95 %	-	-	-	-	37 GPM (140 LPM) (8,4 m3/hr)	60 GPM (226 LPM) (13,6 m3/hr)
Débit pour protocole USEPA UVDGM 2006	-	-	-	50 GPM (189 LPM) (11,3 m3/hr)	-	-
Électrique						
Tension	100-240V 50-60Hz	100-240V 50-60Hz	100-240V 50-60Hz	100-240V 50-60Hz	100-240V 50-60Hz	100-240V 50-60Hz
Courant max.	1,2 ampères	1,6 ampères	2,4 ampères	2,4 ampères	1,6 ampères	2,4 ampères
Consommation électrique max.	120 watts	160 watts	230 watts	230 watts	160 watts	230 watts
Consommation électrique de la lampe	100 watts	140 watts	200 watts	200 watts	140 watts	200 watts
Taille du port						
Entrée et sortie	Combiné 1¼" NPT, 1" FNPT	Combiné 1¼" NPT, 1" FNPT	Combiné 1¼" NPT, 1" FNPT	2" MNPT	Combiné 1¼" NPT, 1" FNPT	2" MNPT

Section 6 Dépannage

Symptôme	Cause possible	Solution Possible
Pas d'alimentation	Le disjoncteur de fuite de terre (DFT) et/ou le disjoncteur s'est déclenché Le fusible du dispositif de commande a grillé Suppresseur de tension transitoire (TVSS) endommagé Dispositif de commande endommagé	Réinitialiser le DFT et/ou disjoncteur Remplacer le fusible du dispositif de commande - voir la section Remplacement de fusible (Consultez Section 4.3). Remplacer le TVSS Remplacer le dispositif de commande et utiliser un TVSS
Le DFT ou le disjoncteur s'est déclenché à maintes reprises	La connexion entre la lampe et la prise de la lampe est humide Court-circuit dans l'assemblage électrique	Nettoyer et sécher les broches de la lampe et la prise de la lampe, vérifier l'étanchéité de l'appareil ou de la condensation Remplacer le dispositif de commande
Fuite au niveau de l'entrée ou de la sortie	Les raccords de tuyaux filetés fuient	Nettoyer les filetages, resceller avec du ruban Téflon et resserrer
Fuite détectée dans la zone de la chambre UV	Condensation d'air humide sur la chambre froide (accumulation lente) Joint torique endommagé, s'est détérioré ou est incorrectement installé Ensemble lampe/manchon mal installé (trop serré ou pas assez serré)	Contrôler l'humidité ou déplacer unité Inspecter et remplacer en cas de détérioration S'assurer que l'écrou est complètement tourné
Alarme	Consultez la Section 5.1.	Consultez la Section 5.1.
Le système fonctionne mais les tests de l'eau révèlent une contamination bactérienne	L'équipement en aval du système UV agit comme un terreau fertile pour les agents pathogènes Les agents pathogènes résident dans les lignes de distribution après les UV Recontamination des embouts de tuyau	Garantir que les UV sont la dernière pièce d'équipement de traitement S'assurer que toutes les lignes de distribution ont été désinfectées à la chlorine. Consultez la Section 3.2. Retirer tous les embouts de tuyaux et rincer à la chlorine. Consultez la Section 3.2.
État rouge de la diode DEL du capteur du débitmètre	Capteur de détection de débit ne détecte pas d'écoulement Capteur du débitmètre ne fonctionne pas	Augmenter le débit à travers le débitmètre Le débitmètre exige un entretien ou le remplacement

6.1 ALARMES D'UV FAIBLE (séries PRO et Plus seulement)

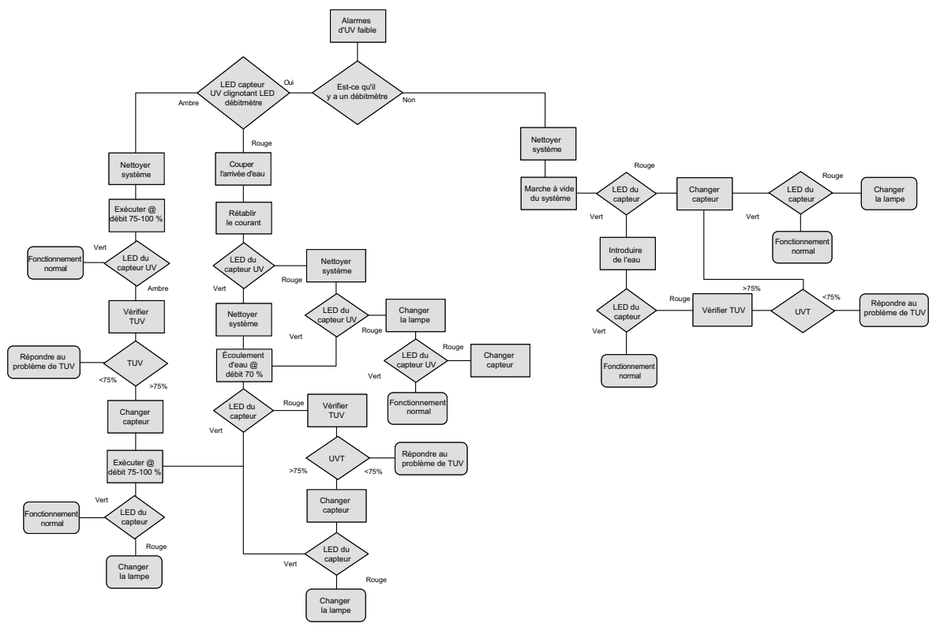


Figure 4 Alarmes d'UV faible (séries PRO et Plus seulement)

Section 2 Informations générales

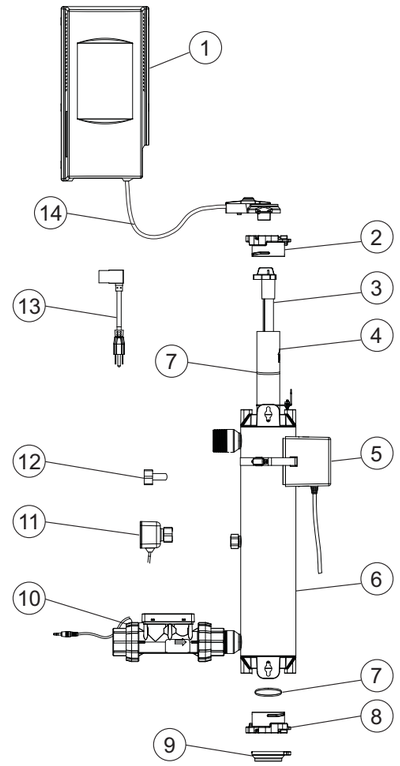


Figure 1 Composants du système

Composant	Description	Référence	Systèmes UV
1	Dispositif de commande	650709-003	PRO10
		650709-006	PRO20
		650709-009	PRO30
		660020-R	PRO50
		650709-005	H Plus
		660019-R	K Plus
		650709-004	H
		660018-R	K
2	Boulon et attache-câble supérieurs	602916 & 602896	Utilisé sur tous les systèmes
3	Lampe	602854	PRO10
		602855	PRO20, H Plus, H
		602856	PRO30/50, K Plus, K
4	Manchon	602974	PRO10
		602975	PRO20, H Plus, H
		602976	PRO30/50, K Plus, K
5	Ventilateur CoolTouch	650630	Utilisé sur tous les systèmes
6	Chambre	-	Utilisé sur tous les systèmes
7	Joint torique	002233	Utilisé sur tous les systèmes

8	Boulon inférieur (comprend vis)	603053	Utilisé sur tous les systèmes
9	Outil de dépose de manchon	602988	Utilisé sur tous les systèmes
10	Capetur de débitmètre (Modèles PRO seulement)	410982R-10	PRO10
		410982R-20	PRO20
		410982R-30	PRO30
11	Capteur	650580	Modèles PRO et Plus
12	Prise	-	Modèles de base
13	Cordon d'alimentation	602636	110V - Utilisé sur tous les systèmes
		602637	220V - Utilisé sur tous les systèmes
14	Cordon de lampe	-	Utilisé sur tous les systèmes

2.1 Dimensions et agencement

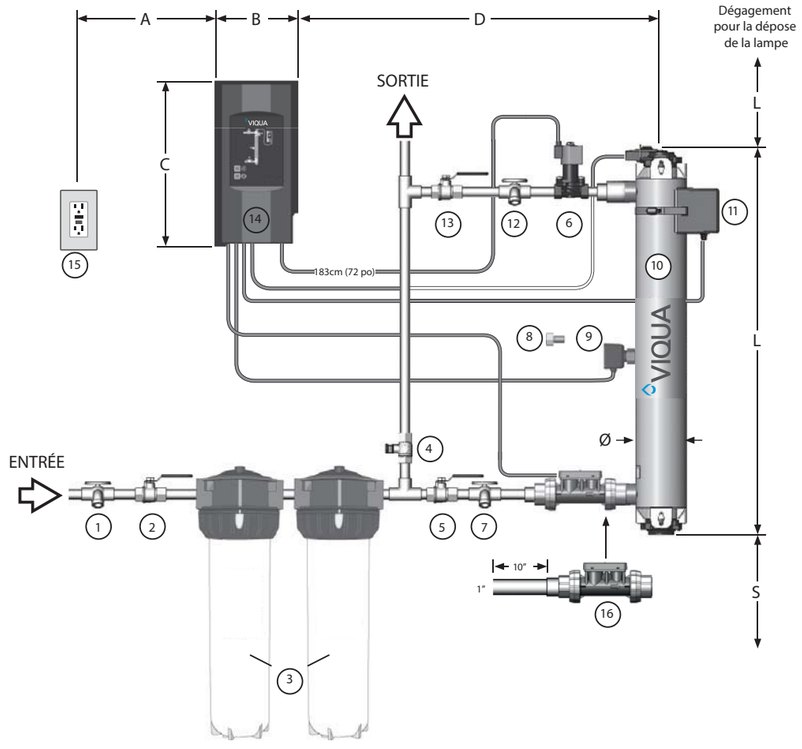


Figure 2 Système - Dimension et agencement

Composant	Description	Fonction
1	Vanne d'échantillonnage	Permet l'échantillonnage de l'eau brute.
2	Vanne d'arrêt	Permet l'entretien facile de l'équipement de prétraitement.
3	Prétraitement	Le pré-traitement permet au système UV de fonctionner efficacement. L'eau doit répondre à certains paramètres de qualité de l'eau avant d'entrer dans le système UV.
4	Vanne d'arrêt de dérivation	Conduite et vanne de dérivation en option. Destiné à fournir l'approvisionnement d'urgence en eau dans le cas où le système UV est indisponible.
5	Vanne d'arrêt	Nécessaire pour permettre l'entretien du système UV.

Section 5 Fonctionnement

5.1 Panneau de commande

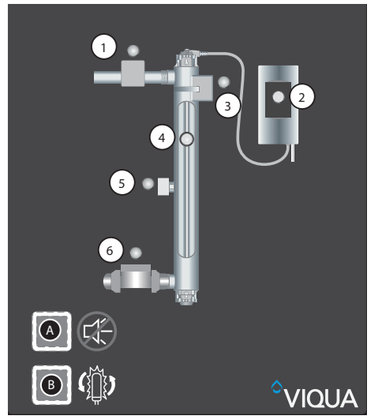
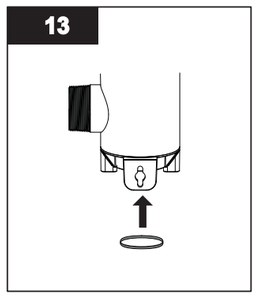


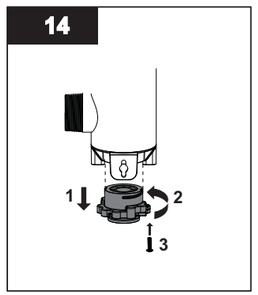
Figure 3 Panneau de commande

Boutons et affichage		
Caractéristique	**Description**	**Fonction**
A	Mode discrétion	Appuyez pour arrêter le signal sonore. Lorsque l'alarme sonne à cause de l'âge de la lampe, le bouton de mise en discrétion arrête le signal sonore pendant 7 jours : il est possible de le répéter jusqu'à 4 fois maximum. Ensuite, le bouton met le signal sous silence seulement pendant 24 heures. Lorsque l'alarme sonne à cause d'un autre problème, le bouton de mise en discrétion arrête le signal sonore pendant 24 heures.
B	Nouvelle lampe	Après avoir installé une nouvelle lampe, appuyez et maintenez pendant cinq secondes pour réinitialiser le compteur de la lampe à 365.

Indicateurs lumineux				
DEL	**Vert**	**Jaune**	**Rouge clignotant**	**Rouge fixe**
1	Vanne d'électrovanne ouverte (si la machine est équipée d'une électrovanne)	Non applicable	Vanne d'électrovanne débranchée ; rebrancher. Bobine d'électrovanne endommagée ; remplacer la bobine (pas l'ensemble électrovanne)	Vanne d'électrovanne inactive (fermée) en raison de la défaillance d'un autre composant, afin de garantir la sécurité de l'approvisionnement en eau
2	Fonctionne normalement	Non applicable	Le connecteur de la lampe n'est pas installé correctement. garantir que la masse du faisceau de la lampe est insérée dans la borne de masse de la chambre. Défaillance du dispositif de commande, remplacer le dispositif de commande	Lampe inactive à cause d'une défaillance du dispositif de commande.
3	Fonctionne normalement	Non applicable	Ventilateur débranché, rebrancher. Le ventilateur tourne plus lentement que requis ; débrancher le système, nettoyer les pales à l'aide d'un coton-tige Ventilateur endommagé, remplacer le ventilateur.	Non applicable
4	Fonctionne normalement ***Remarque :*** *au cours du préchauffage de la lampe, l'indicateur se met à clignoter*	Avertissement : la lampe exigera un remplacement sous peu	Lampe débranchée ; débrancher l'alimentation, rebrancher la lampe et brancher le dispositif de commande. Défaillance de la lampe, remplacer la lampe	Lampe inactive à cause d'une défaillance du dispositif de commande
5	La dose d'UV est adéquate et le capteur fonctionne normalement (Pour les modèles Plus seulement)	La dose d'UV est proche du minimum requis	Capteur débranché, débrancher le système, rebrancher le capteur et brancher à nouveau le système Défaillance du capteur La dose d'UV est inférieure au minimum requis, voir la section Alarme d'UV faible	Capteur inactif en raison de la défaillance du dispositif de commande ou de la lampe
6	Le débitmètre fonctionne normalement	Dose d'UV à débit élevé inadéquate, réduire l'écoulement pour atteindre des niveaux de dose plus élevée (PRO10, PRO20 et PRO30 seulement)	Défaillance du capteur du débitmètre ; faire l'entretien ou remplacer le capteur	Dose d'UV à débit faible inadéquate, entretien requis.



- Réinstaller le joint torique au bas du manchon.



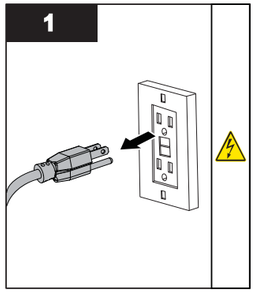
- Brancher le boulon du manchon en bas.
- Une fois la révision terminée, remonter les pièces dans l'ordre inverse de la dépose.

Remarque : *après avoir remplacé la lampe UV ou le manchon, effectuez la procédure de désinfection, consultez la Section 3.2.*

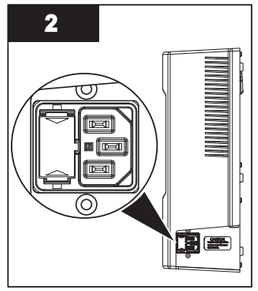
4.3 Remplacement du fusible

Le système est fourni équipé de deux fusibles 3A fonctionnant sur du 250V. Pour accéder aux fusibles, débrancher d'abord le système et débrancher le cordon d'alimentation du dispositif de commande. Enlever la porte du fusible en appuyant sur la patte sur un côté à l'aide d'un couteau ou d'un autre outil et en soulevant avec précaution vers l'extérieur. Répéter l'opération de l'autre côté.

Procédure :



- Débrancher le dispositif de commande du système.



- Remplacer le fusible.

4.4 Entretien du capteur du débitmètre

Inspecter le capteur du débitmètre régulièrement pour garantir qu'il n'y a pas d'encrassement et la roue à aubes tourne librement sans aucune résistance.

Si la roue à aubes ne tourne pas librement ou est détachée, le capteur doit être renvoyé pour l'entretien et l'étalonnage. Il est recommandé que le capteur du débitmètre soit retourné pour étalonnage tous les deux ans afin de garantir la précision de fonctionnement du système.

6	Électrovanne	Permet l'arrêt de l'alimentation d'eau quand la désinfection convenable ne peut pas être assurée. ***Remarque :*** *si la masse de votre panneau électrique est reliée à vos conduites d'eau en cuivre et vous utilisez une électrovanne à corps plastique, l'installation d'une barrette de masse est nécessaire. La barrette de masse permettra de maintenir la continuité entre les canalisations qui ont été coupées pour installer l'électrovanne. Vérifier votre code électrique local pour la bride de serrage et la taille de câble correctes.*
7	Vanne d'échantillonnage	Permet l'échantillonnage d'eau entrant dans la chambre UV ; nécessaire afin de confirmer que l'eau traitée est de qualité adéquate.
8	Prise	Un bouchon fourni et installé sur les modèles de base.
9	Capteur	Contrôle la sortie des UV pour garantir qu'une dose convenable (exposition aux UV) est fournie.
10	Chambre à UV	Fournit la désinfection de l'eau. DOIT ÊTRE INSTALLÉ VERTICALEMENT.
11	Ventilateur CoolTouch™	Élimine l'excédent de chaleur de l'eau dans la chambre pendant les périodes sans débit d'eau.
12	Vanne d'échantillonnage	Permet l'échantillonnage d'eau immédiatement après un traitement aux rayons UV ; nécessaire afin de confirmer le bon fonctionnement du système de traitement aux rayons UV.
13	Vanne d'arrêt	Permet l'entretien du système UV.
14	Dispositif de commande	Alimente et contrôle la lampe UV et autres dispositifs. Fournit l'interface humaine, l'affichage d'informations et permet des entrées de commande (telle que la mise en sourdine de l'alarme sonore).
15	Source d'alimentation	Apporte le courant au dispositif de commande. Pour des raisons de sécurité, la sortie doit être protégée par un disjoncteur de fuite de terre (GFCI). ***Remarque :*** *un suppresseur de tension transitoire certifié UL 1449 (ou équivalent) est nécessaire pour protéger le dispositif de commande.*
16	Capteur de débit	Contrôle le débit pour fournir la dose en temps réel (exposition UV), le capteur du débitmètre doit être installé dans cette orientation DEL vers le haut. (PRO10, PRO20, PRO30 seulement)

Composant	L	S (minimum)	O	A (maximum)	B	C	D
PRO10	55 cm (21,4 po)	30 cm (12 po)	10 cm (4 po)	182 cm (72 po)	16,5 cm (6,5 po)	33 cm (13 po)	122 cm (48 po)
PRO20, H Plus, H	78 cm (31 po)	30 cm (12 po)	10 cm (4 po)	182 cm (72 po)	16,5 cm (6,5 po)	33 cm (13 po)	122 cm (48 po)
PRO30	103 cm (41 po)	30 cm (12 po)	10 cm (4 po)	182 cm (72 po)	16,5 cm (6,5 po)	33 cm (13 po)	122 cm (48 po)
PRO50, K Plus, K	103 cm(41 po)	30 cm (12 po)	10 cm (4 po)	182 cm (72 po)	16,5 cm (6,5 po)	33 cm (13 po)	122 cm (48 po)

2.2 Longueurs de tuyau

Les longueurs de tuyau droit minimales recommandées pour les différentes configurations sont :



Bride droite, tuyau droit de 10 po



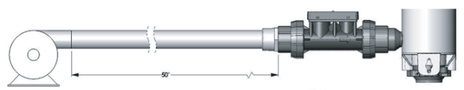
Bride de réduction, tuyau droit de 15 po



2 x coudes à 90 degrés, tuyau droit de 25 po



2 x coudes 3 dimensions à 90 degrés, tuyau droit de 40 po



Pompe, tuyau droit de 50 po

Remarque : *le capteur du débitmètre doit être fixé dans l'orientation suivante avec la diode DEL orientée vers le haut. Garantir que tout l'air est purgé de la tuyauterie et du capteur du débitmètre. Toute la longueur droite vers le capteur du débitmètre doit être de 1,00 po de diamètre.*

Section 3 Installation

3.1 Installation du système UV

⚠ATTENTION

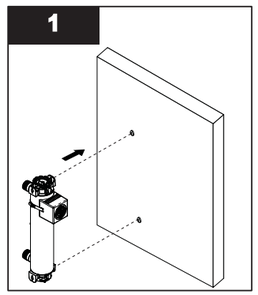
⚠ Le dispositif électronique de commande doit être connecté à une prise à disjoncteur de fuite de terre (DFT).

Préalables :

- Déterminer l'emplacement approprié à l'intérieur du dispositif de commande et de la chambre, consultez la Section 2.1.
- S'assurer que le dispositif de commande est installé plus haut que la chambre et loin de toute source d'eau.
- S'assurer d'un dégagement approprié au-dessus de la chambre pour permettre la dépose de la lampe et du manchon.
- S'assurer de couper l'arrivée principale de l'eau.
- Réaliser tous les branchements de plomberie nécessaires, consultez la Section 2.1.

Procédure :

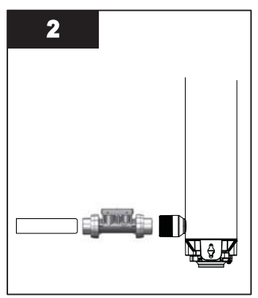
1



- Installer la chambre UV verticalement avec l'espace suivant sur le mur à l'aide des vis.
  - PRO10 : 18.5"
  - H, PRO20 : 27.5"
  - K, PRO30/50 : 37.5"

Remarque : *s'assurer que la chambre est installée avec les flèches vertes pointant vers le haut.*

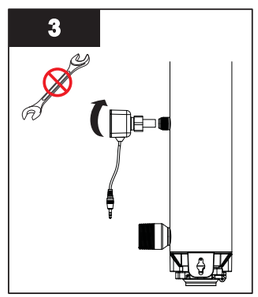
2



- Brancher le capteur du débitmètre (Modèles PRO10,20,30 uniquement) à la chambre à l'aide des raccords 1¼ po fournis.

Remarque : *la diode DEL doit faire face vers le haut. S'assurer de la bonne longueur de tuyau droit d'un diamètre de 1,0 po vers l'entrée du capteur de débitmètre et utiliser un raccord de réduction de 1¼ po à 1 po (non fourni).*

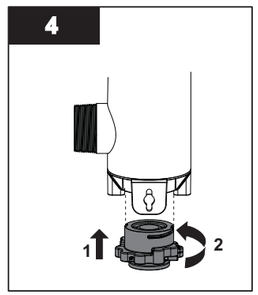
3



- Installer le capteur au système UV (pour les modèles PRO uniquement).

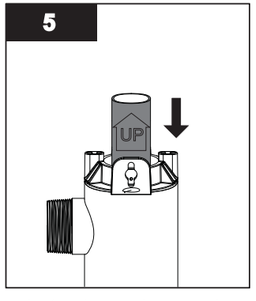
Remarque : *NE PAS utiliser de clé pour serrer le capteur.*

4



- Brancher le boulon de manchon au bas de l'ensemble de manchon. S'assurer que le boulon de manchon est fait 1/4 de tour complet jusqu'à l'arrêt positif.

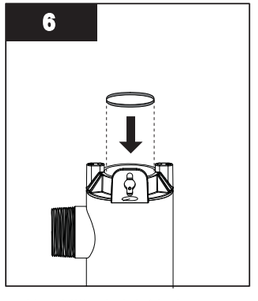
5



- Insérer le manchon avec la flèche pointant en haut.

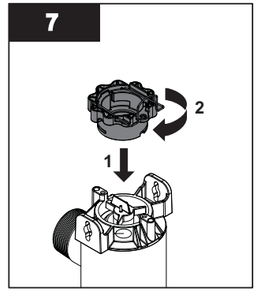
Remarque : *NE PAS faire tourner le manchon NI toucher le verre avec les mains nues.*

6



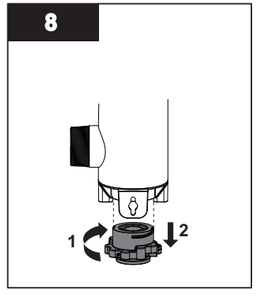
- Humidifier le joint torique avec de l'eau, puis le placer sur l'extrémité supérieure du manchon.

7



- Brancher le boulon de manchon sur le haut de l'ensemble de manchon. S'assurer que le boulon de manchon est fait 1/4 de tour complet jusqu'à l'arrêt positif.

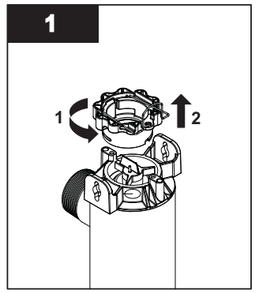
8



- Déposer le boulon de manchon au bas de l'ensemble de manchon.

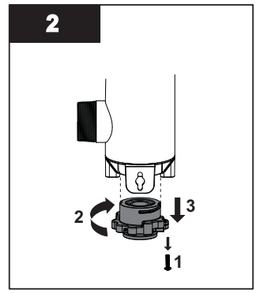
Procédure :

1



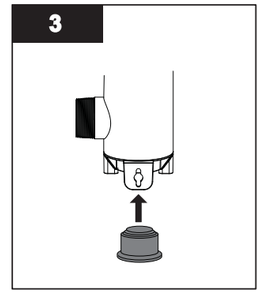
- Déposer le boulon de manchon en haut de l'ensemble de manchon.

2



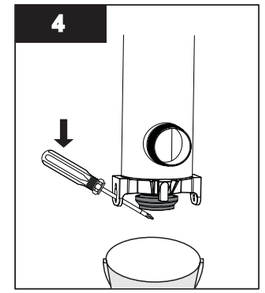
- Déposer la vis du boulon de manchon.
- Déposer le boulon de manchon au bas de l'ensemble de manchon.

3



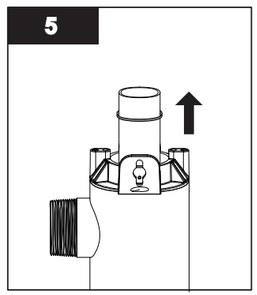
- Insérer l'outil de dépose du manchon au bas du manchon.

4



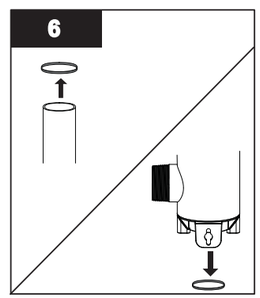
- Soulever le manchon vers le haut jusqu'à ce qu'il se détache.
- Placer un seau sous la chambre UV, de l'eau va s'écouler.

5



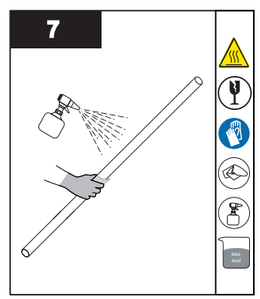
- Déposer le manchon.

6



- Déposer le joint torique de la partie supérieure du manchon.
- Déposer le joint torique de la partie inférieure de la chambre (il est possible qu'il

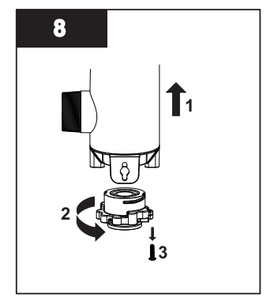
7



- Nettoyer le manchon avec un chiffon imbibé de CLR, de vinaigre ou tout autre acide doux, puis rincer à l'eau.

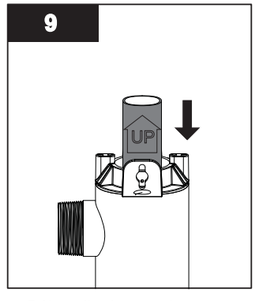
Remarque : *si le manchon ne peut pas être nettoyé ou s'il est rayé ou fissuré, remplacer le manchon.*

8



- Brancher le boulon de manchon au bas de l'ensemble de manchon.

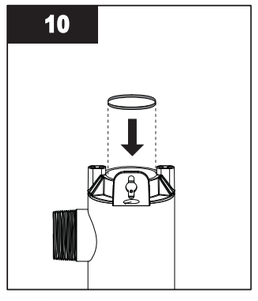
9



- Réinstaller le manchon avec la flèche pointant en haut.

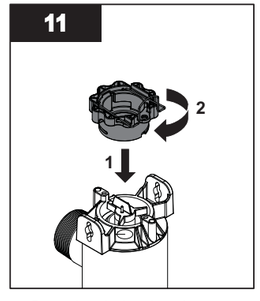
Remarque : *NE PAS faire tourner le manchon NI toucher le verre avec les mains nues.*

10



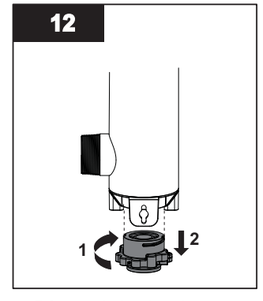
- Réinstaller les nouveaux joints toriques lubrifiés sur l'extrémité supérieure du manchon.

11

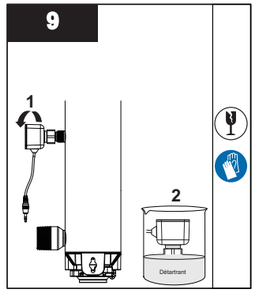


- Brancher le boulon de manchon sur le haut de l'ensemble de manchon.

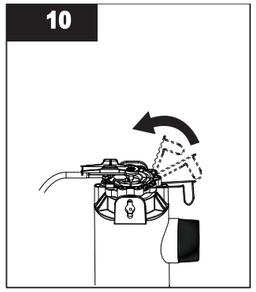
12



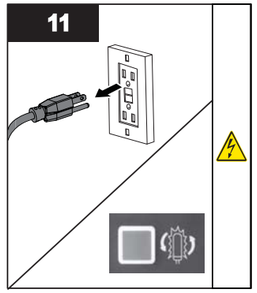
- Déposer le boulon de manchon au bas de l'ensemble de manchon.



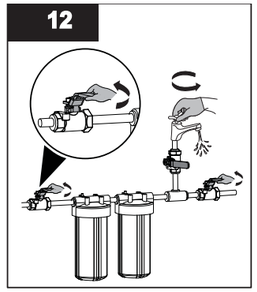
- Déposer le capteur UV de l'unité.
- Immerger l'extrémité du capteur et nettoyer à l'aide de coton-tige.
- Pour le modèle de base, ignorer l'étape 10.



- Verrouiller l'attache-câble en position.



- Rétablir le courant.
- Appuyer et maintenir le bouton « Nouvelle lampe » enfoncé pendant 5 secondes jusqu'à l'émission d'un bip.



- Ouvrir l'alimentation en eau.

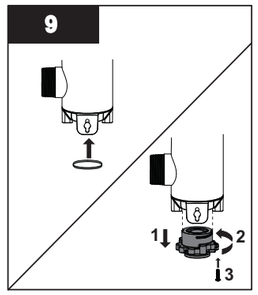
Remarque : *après avoir remplacé la lampe UV, effectuez la procédure de désinfection, consultez la Section 3.2.*

4.2 Nettoyage et remplacement du manchon

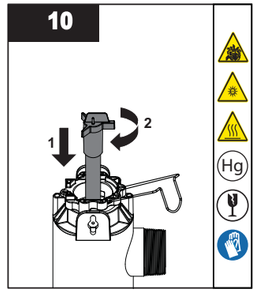
Remarque : *les matières minérales dans l'eau forment progressivement un dépôt sur le manchon de lampe. Ce dépôt doit être éliminé parce qu'il réduit la quantité de lumière UV qui atteint l'eau, et limite donc les performances de désinfection. S'il n'est pas possible de nettoyer le manchon, celui-ci doit être remplacé.*

Préalables :

- Couper l'arrivée d'eau et vidanger toutes les canalisations.
- Déposer la lampe UV. Consultez la Section 4.1.

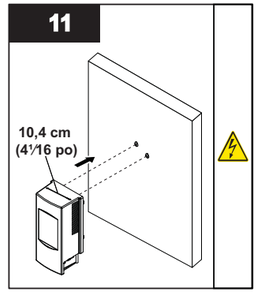


- Humidifier le joint torique avec de l'eau, puis le placer sur l'extrémité inférieure du manchon.
- Rebrancher le boulon de manchon et installer la vis.

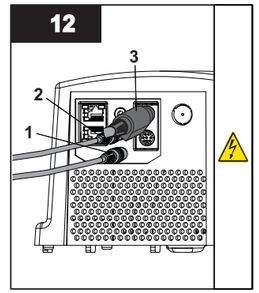


- Installer et tourner la lampe dans l'ensemble de manchon. S'assurer de tourner la lampe complètement.

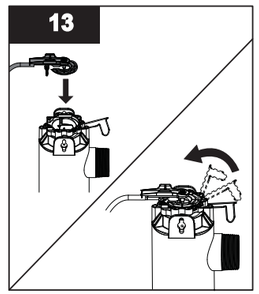
Remarque : *ne pas toucher le verre avec les mains nues.*



- Installer l'unité du dispositif de commande au mur. S'assurer que le dispositif de commande est installé plus haut que la chambre et loin de toute source d'eau.



- Brancher le capteur UV dans la prise bleue (Pour les modèles PRO et Plus uniquement).
- Brancher le capteur du débitmètre dans la prise verte (Pour les modèles PRO10, 20, 30 uniquement).
- Brancher le ventilateur du CoolTouch™ dans une prise ou l'autre.

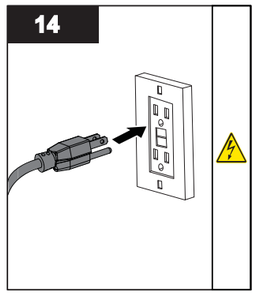


- Installer le câblage de la lampe dans la chambre.

  Remarques : *1) garantir que la masse du faisceau de la lampe est insérée dans la borne de masse de la chambre.*

  2) Assurer que l'aimant au-dessus du chambre est aligné avec le capteur de proximité sur le harnais de lampe.

- Verrouiller l'attache-câble en position.



- Brancher le dispositif de commande à la prise de courant.
- Laisser l'eau s'écouler vers une vanne ou autre sortie d'eau, puis fermer la sortie et vérifier l'absence de fuites.

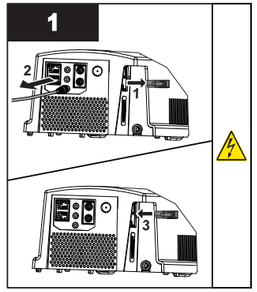
  Remarque : *la sortie doit être protégée par un disjoncteur de fuite de terre (DFT).*

Remarque : *après avoir installé la lampe UV ou le manchon, effectuez la procédure de désinfection, consultez la Section 3.2.*

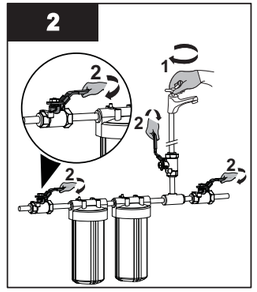
3.2 Procédure de désinfection

La désinfection par UV est un processus physique qui n'ajoute à l'eau aucun produit chimique potentiellement nocif. Du fait que les UV ne laissent aucun résidu de désinfection, il est impératif de faire désinfecter chimiquement la totalité du circuit de distribution après le système à UV pour garantir que la plomberie soit exempte de toute contamination bactériologique. La procédure de désinfection doit être effectuée immédiatement après l'installation de l'appareil à UV et répétée ensuite à chaque arrêt du système à UV pour entretien, coupure d'alimentation ou arrêt du fonctionnement pour quelque raison que ce soit. La procédure d'assainissement du système de plomberie s'effectue facilement comme suit :

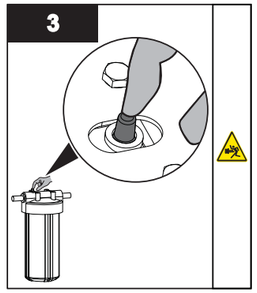
Procédure :



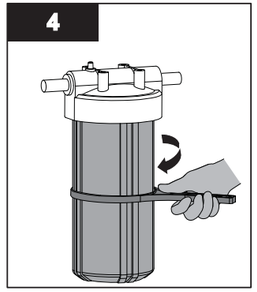
- Débrancher le dispositif de commande, puis débrancher le capteur UV de la prise bleue.
- Rebrancher le dispositif de commande sans le capteur UV.



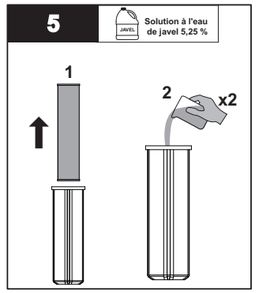
- Couper l'arrivée d'eau.
- Ouvrir un robinet en amont pour libérer la pression de la canalisation.



- Appuyer sur le bouton pressoir pour libérer la pression des cartouches.

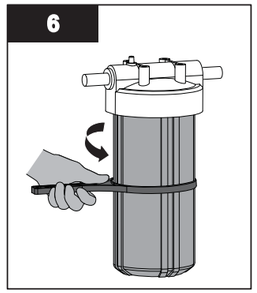


- Déposer le(s) boîtier(s) de filtre à l'aide de la clé appropriée.

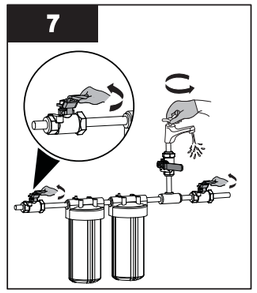


- Déposer la(les) cartouche(s) et verser 2 tasses de solution à l'eau de javel dans le(s) boîtier(s) de filtre.

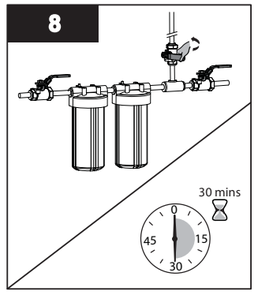
Remarque : *NE PAS utiliser de peroxyde d'hydrogène.*



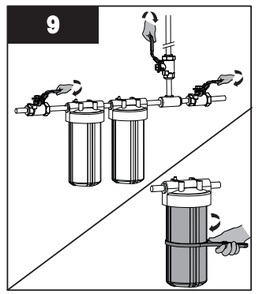
- Brancher seulement le(s) boîtier(s) de filtre à l'unité.



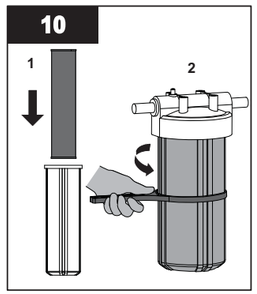
- Ouvrir chaque robinet et l'approvisionnement en eau.
- Laisser l'eau remplir la chambre.



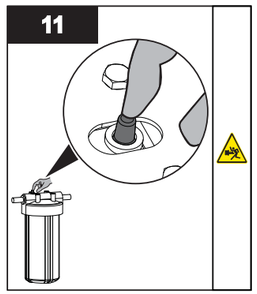
- Ouvrir l'eau froide suivie par l'eau chaude (si disponible) jusqu'à ce que l'odeur de l'eau de javel sorte.
- Fermer tous les robinets et laisser l'eau de javel s'infiltrer dans les canalisations d'eau pendant 30 minutes.



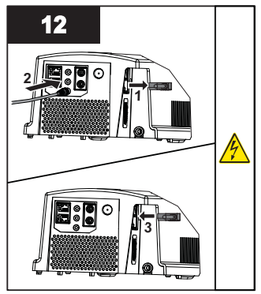
- Déposer le(s) boîtier(s) de filtre à l'aide de la clé appropriée, tous robinets fermés.



- Réinstaller la(les) cartouche(s) dans le(s) boîtier(s) de filtre et brancher à l'unité.
- Rincer toutes les sorties d'eau jusqu'à ce que la javel ne puisse plus être sentie (au moins 5 minutes).



- Appuyer sur le bouton pression pour purger l'air et compléter la procédure de désinfection.



- Débrancher le dispositif de commande, puis brancher le capteur UV de la prise bleue.
- Rebrancher le dispositif de commande.

Section 4 Maintenance

⚠AVERTISSEMENT

- Toujours débrancher l'alimentation avant d'effectuer tout travail sur le système de désinfection.
- Toujours arrêter l'écoulement d'eau et relâcher la pression d'eau avant de procéder à l'entretien.
- Inspecter régulièrement votre système de désinfection pour s'assurer que les indicateurs d'alimentation sont sous tension et qu'aucune alarme n'est présente.
- Remplacer la lampe UV chaque année (ou tous les deux ans en cas de résidence secondaire) pour assurer une désinfection maximale.
- Toujours vidanger la chambre UV lors de la fermeture d'une résidence secondaire ou lorsque l'unité est laissée dans une zone soumise à des températures glaciales.

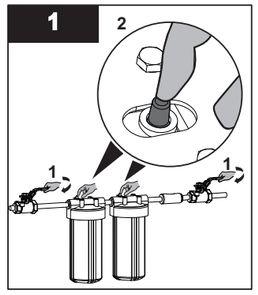
4.1 Remplacement de la lampe UV

AVIS

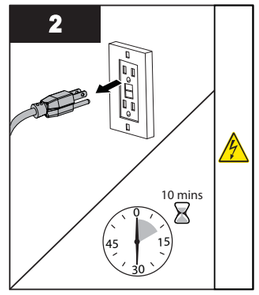
Ne pas utiliser d'eau pendant le remplacement de la lampe UV.

Le remplacement d'une lampe UV est une procédure simple et rapide ne nécessitant aucun outil spécial. La lampe UV doit être remplacée après 9 000 heures de fonctionnement continu (environ un an) pour assurer une désinfection appropriée.

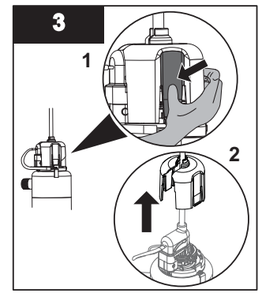
Procédure :



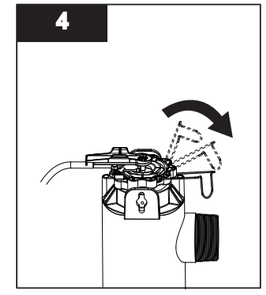
- Fermer tous les robinets et l'alimentation en eau.
- Appuyer sur le bouton pressoir pour libérer la pression des cartouches.



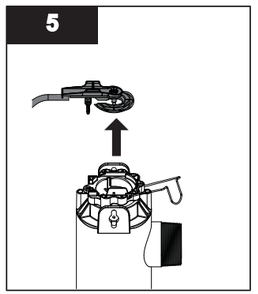
- Débrancher la source d'alimentation principale et laisser l'unité refroidir pendant 10 minutes.



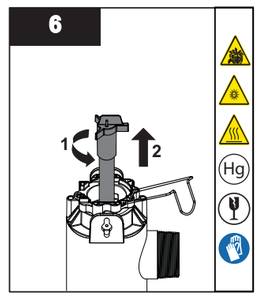
- Vidanger l'eau du système UV.
- Fermer l'entrée d'eau après la vidange de l'eau.



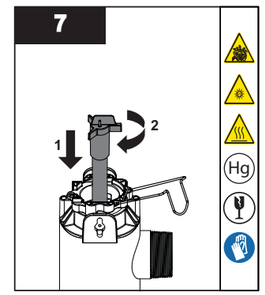
- Pincer l'attache-câble pour libérer le connecteur de lampe.



- Déposer le connecteur de lampe.

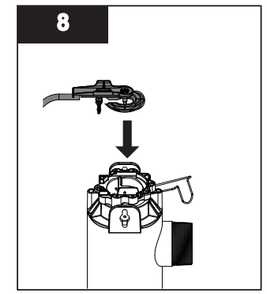


- Tourner et déposer la lampe UV du manchon.



- Installer et tourner la lampe dans l'ensemble de manchon. S'assurer de tourner la lampe complètement.

Remarque : *ne pas toucher le verre avec les mains nues.*



- Réinstaller le connecteur de lampe.

11.24 - V1 – VIQUA SOLENOID VALVE



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Instruction Sheet

VIQUA Solenoid Valve Installation and Replacement

Models: G+, H+, J+, K+, PRO10, PRO20, PRO30, PRO50

Section 1 Safety Information

Please read this entire instruction sheet before operating this equipment. Pay attention to all danger, warning, and caution statements in this instruction sheet. Failure to do so could result in serious personal injury or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in the instruction sheet.

1.1 Safety Precautions

⚠DANGER

Failure to follow these instructions will result in serious injury or death.

Shock Hazard - Stored Energy

- Disconnect power to system before performing any maintenance or repair.
- There may be more than one source of power. Only connect to a GFCI.
- Protective ground
- DO NOT touch with wet hands.

Pressurized Device - Impalement Hazard

- NEVER perform any physical inspection, repair or maintenance on UV chamber unless UV chamber has been isolated and depressurized.
- NEVER service UV lamps, quartz sleeves or associated hardware until depressurization of UV chamber has been confirmed.
- DO NOT store any combustible or flammable material close to the system.

⚠WARNING

Failure to follow these instructions could result in serious injury or death.

UV Light Hazard

- ALWAYS use UV protective gear, including gloves and UV safety glasses.
- NEVER look directly at illuminated UV lamp, even when using protective gear.
- NEVER illuminate UV lamp outside of the UV chamber.
- If accidental exposure occurs, immediately cool affected area and consult physician.

Contamination Hazard

- If UV lamp breaks, avoid inhalation, ingestion, or exposure to eyes and skin. Wear appropriate clothing and personal protective equipment.
- NEVER use a vacuum cleaner to clean up broken UV lamps as this will scatter the mercury. Obey local regulations and guidelines for the removal and disposal of mercury waste.

⚠ CAUTION

Failure to follow these instructions could result in minor or moderate injury.

Thermal Hazard

- Allow UV lamps, UV chamber to cool for a minimum of 10 (ten) minutes before handling.
- When there is no water flow, the water in the chamber will become hot. To prevent scalding, allow the system to cool for 10 minutes before draining the system.

Personal Injury Hazard

- UV lamps and quartz sleeves are fragile. Do not strike, bend or apply pressure, or they will break.
- DO NOT handle UV lamps or quartz sleeves with bare hands. Wear rubber or latex gloves to handle previously installed UV lamps and soiled quartz sleeves to protect against contaminants. Wear cotton gloves to handle new UV lamps and clean quartz sleeves.

NOTICE

System Protection

- To protect the Controller, a UL 1449 certified (or equivalent) transient voltage surge suppressor is strongly recommended.

Avoid Injury

- Read and understand this Instruction Sheet before operating and performing any maintenance on this equipment.

Warning: *This product may contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.*

Sección 2 Mantenimiento

⚠ ADVERTENCIA

- Desconecte siempre la corriente antes de llevar a cabo cualquier trabajo en el sistema de desinfección.
- Corte siempre el flujo de agua y libere la presión del agua antes de realizar el servicio.
- Examine con frecuencia el sistema de desinfección para asegurar que los indicadores de corriente estén encendidos y que no hay ninguna alarma.
- Drene siempre la cámara al cerrar la temporada o al dejar la unidad en un área sujeta a temperaturas de congelación.

2.1 Instalación y sustitución de la válvula solenoide

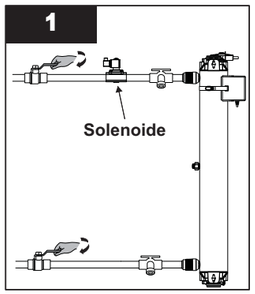
AVISO

No utilice agua durante la instalación y sustitución de la válvula solenoide.

Nota: *Si instala una nueva válvula solenoide, asegúrese de que el suministro de agua esté cerrado y continúe en el paso 6. Si sustituye una válvula solenoide, empiece por el paso 1.*

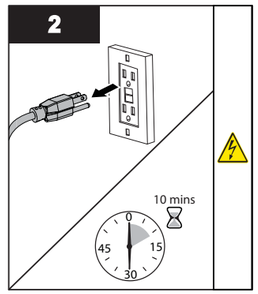
Procedimiento:

1



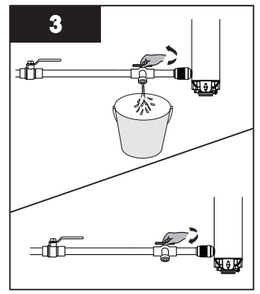
- Cierre todos los grifos y suministros de agua.

2



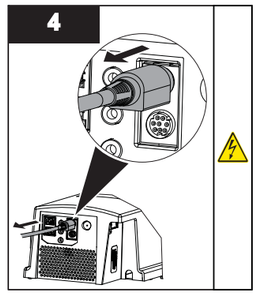
- Desconecte la fuente de alimentación principal y deje que la unidad se enfríe durante 10 minutos.

3



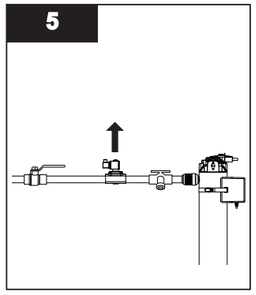
- Drene el agua del sistema UV.
- Cuando se haya drenado toda el agua, cierre la entrada de agua.

4



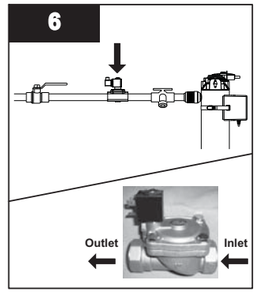
- Desconecte el cable de la válvula solenoide (verde).

5



- Retire la válvula solenoide actual del sistema UV.

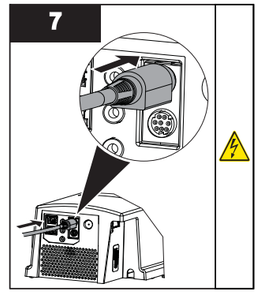
6



- Instale la nueva válvula solenoide.

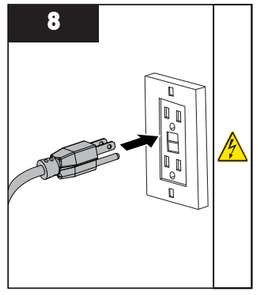
  Nota: *Tome nota de la etiqueta de la dirección "IN" en la entrada y de la dirección "OUT" en la salida.*

7



- Conecte el cable de la nueva válvula solenoide a la toma verde.
- Abra todos los grifos y el suministro de agua.

8



- Restaure la energía.

Nota: *Tras instalar o sustituir el solenoide, realice el procedimiento de desinfección (Consulte el* Manual del propietario).

⚠PRECAUCIÓN

El incumplimiento de estas instrucciones puede ocasionar lesiones leves o moderadas.

Peligro térmico

- Deje enfriar las lámparas UV y la cámara UV durante un mínimo de 10 (diez) minutos antes de su manipulación.
- Cuando no haya flujo de agua, el agua de la cámara se calentará. Para evitar quemaduras, deje que el sistema se enfríe durante 10 minutos antes de su drenaje.

Peligro de lesiones personales

- Las lámparas UV y las vainas tubulares de cuarzo son frágiles. No los golpe, ni los doble ni aplique presión o se romperán.
- NO manipule las lámparas UV o las vainas de cuarzo con las manos al descubierto. Use guantes de goma o de látex para manipular las lámparas UV y las vainas tubulares de cuarzo instaladas anteriormente para protegerse contra las sustancias contaminantes. Use guantes de algodón para manipular lámparas UV nuevas y vainas tubulares de cuarzo limpias.

AVISO

Protección del sistema

- Para proteger el controlador, se recomienda el uso de un supresor transitorio de sobretensión de voltaje transitorio certificado por UL 1449 o equivalente.

Evitar lesiones

- Lea y comprenda esta hoja de instrucciones antes de empezar a manejar y de realizar cualquier tipo de mantenimiento en este equipo.

Advertencia: *Este producto puede contener sustancias químicas que el Estado de California reconoce que pueden causar cáncer y malformación congénita u otros daños reproductivos.*

Section 2 Maintenance

⚠WARNING

- Always disconnect power before performing any work on the disinfection system.
- Always shut-off water flow and release water pressure before servicing.
- Regularly inspect your disinfection system to ensure that the power indicators are on and no alarms are present.
- Always drain the chamber when closing a seasonal home or leaving the unit in an area subject to freezing temperatures.

2.1 Installing and Replacing Solenoid Valve

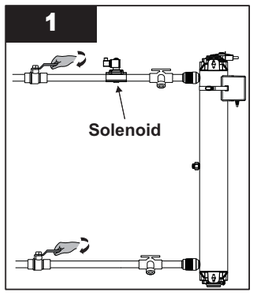
NOTICE

Do not use water during installing and replacing the Solenoid Valve.

Note: *If installing a new solenoid valve, ensure water supply is closed then proceed to step 6. If replacing a solenoid valve, begin at step 1.*

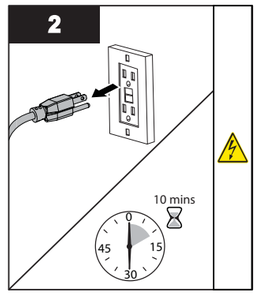
Procedure:

1



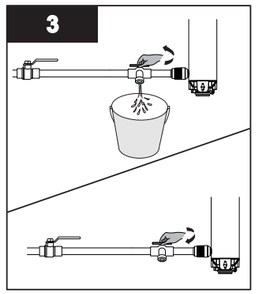
- Close all faucets and water supply.

2



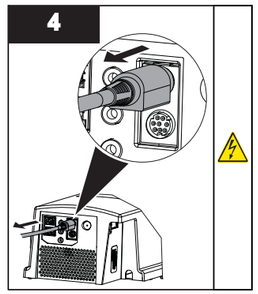
- Disconnect main power source and allow the unit to cool for 10 minutes.

3



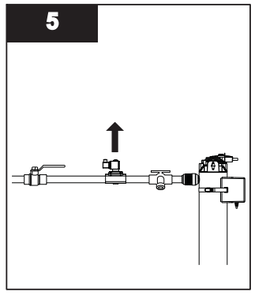
- Drain the water from the UV system.
- Close the water inlet after the water is drained.

4



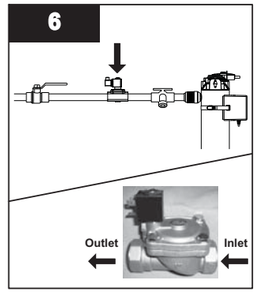
- Unplug the solenoid valve cable (green).

5



- Remove the current solenoid valve from UV system.

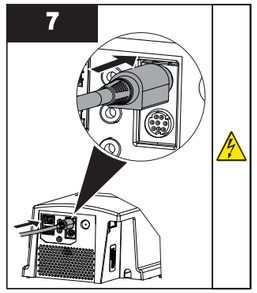
6



- Install the new solenoid valve.

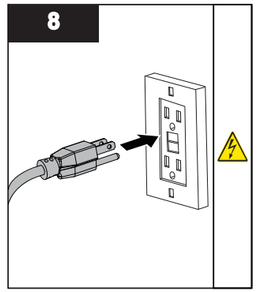
  Note: *Make a note of directional label "IN" on the inlet and "OUT" on the outlet.*

7



- Plug the new solenoid valve cable into green receptacle.
- Open all faucets and water supply.

8



- Restore Power.

Note: *After installing or replacing the Solenoid perform the disinfection procedure, refer to your Owner's Manual.*

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Hoja de instrucciones

Instalación y sustitución de la válvula solenoide de VIQUA

Modelos: G+, H+, J+, K+, PRO10, PRO20, PRO30, PRO50

Sección 1 Información de seguridad

Lea esta hoja de instrucciones en su totalidad antes de usar este equipo. Preste atención a todas las declaraciones de peligro, advertencia y precaución que figuran en esta hoja de instrucciones. No hacerlo podría resultar en lesiones graves o daños al equipo.

Asegúrese de no dañar la protección que proporciona el equipo. No use ni instale este equipo de manera distinta de la especificada en la hoja de instrucciones.

1.1 Precauciones de seguridad

⚠ PELIGRO



El incumplimiento de estas instrucciones puede ocasionar lesiones graves o la muerte.

Peligro de descarga: energía almacenada

- Desconecte la corriente del sistema antes de llevar a cabo cualquier tipo de mantenimiento o reparación.
- Es posible que exista más de una fuente de alimentación. Conectar solo a un GFCI.
- Conexión a tierra con protección
- NO tocar con las manos húmedas.

Dispositivo presurizado: peligro de empalamiento

- No realice NUNCA una inspección física, reparación o trabajo de mantenimiento en la cámara ultravioleta a menos que esté aislada y despresurizada.
- No realice NUNCA trabajos de servicio en lámparas UV, vainas tubulares de cuarzo ni aparatos asociados hasta confirmar la despresurización de la cámara UV.
- NO almacene materiales combustibles o inflamables cerca del sistema.

⚠ ADVERTENCIA



El incumplimiento de estas instrucciones puede ocasionar lesiones graves o la muerte.

Peligro de luz UV

- Use SIEMPRE equipos de protección, incluyendo guantes y gafas de seguridad UV.
- NUNCA mire directamente a una lámpara UV iluminada, incluso si usa equipos de protección.
- NUNCA encienda la lámpara UV fuera de la cámara UV.
- En caso de exposición accidental, enfríe inmediatamente el área afectada y consulte a su médico.

Peligro de contaminación

- Si se rompe la lámpara UV, evite la inhalación, la ingestión o la exposición a los ojos y a la piel. Vista ropas adecuadas y utilice su equipo de protección personal.
- NUNCA use una aspiradora para limpiar lámparas UV rotas ya que podría esparcir el mercurio. Cumpla las normas y directrices locales, así como el desecho de residuos de mercurio.

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Fiche d'instructions

Installation et remplacement de l'électrovanne de VIQUA

Modèles : G+, H+, J+, K+, PRO10, PRO20, PRO30, PRO50

Section 1 Informations de sécurité

Veuillez lire la totalité de cette fiche d'instructions avant d'utiliser cet équipement. Prêtez attention à toutes les mentions de danger, d'avertissement et d'attention dans cette fiche d'instructions. Le non-respect de ces mentions pourrait conduire à des blessures graves de l'opérateur ou à des dommages sur l'équipement.
Assurez-vous que la protection fournie par cet équipement ne soit pas compromise. Ne pas utiliser ou installer cet équipement autrement que comme spécifié dans la fiche d'instructions.

1.1 Précautions de sécurité

⚠ DANGER

Le non-respect de ces instructions conduira à des blessures graves ou mortelles.

Risque de choc électrique - Énergie stockée

- Débrancher l'alimentation du système avant tout entretien ou réparation.
- Il peut y avoir plus d'une source d'alimentation. Connexion uniquement à un DFT.
- Mise à la terre
- NE PAS toucher pas avec les mains humides.

Appareil sous pression - risque d'empalement

- NE JAMAIS effectuer de contrôle physique, de réparation ou d'entretien sur la chambre à UV avant d'avoir isolé et dépressurisé cette chambre.
- NE JAMAIS intervenir sur les lampes UV, manchons en quartz ou matériel associé avant d'avoir vérifié la dépressurisation de la chambre à UV.
- NE PAS stocker de matière combustible ou inflammable à proximité du système.

⚠ AVERTISSEMENT

Le non-respect de ces instructions peut conduire à des blessures graves ou mortelles.

Risque dû à la lumière UV

- TOUJOURS utiliser des équipements de protection, notamment gants et lunettes de sécurité UV.
- Ne JAMAIS regarder directement la lampe UV allumée, même avec des lunettes de protection.
- NE JAMAIS allumer la lampe UV en dehors de la chambre UV.
- En cas d'exposition accidentelle, refroidissez immédiatement la zone concernée et consultez un médecin.

Risque de contamination

- En cas de rupture de la lampe UV, éviter l'inhalation, l'ingestion ou l'exposition des yeux et de la peau. Portez des vêtements et un équipement de protection individuelle appropriés.
- NE JAMAIS utiliser un aspirateur pour le nettoyage des débris de lampe UV car cela disperserait le mercure. Respectez les réglementations et recommandations locales pour l'enlèvement et l'élimination des déchets de mercure.

⚠ ATTENTION

Le non-respect de ces instructions peut conduire à des blessures mineures voire modérées.

Risque thermique

- Laisser refroidir les lampes UV, la chambre UV pendant au moins 10 (dix) minutes avant de les manipuler.
- Lorsqu'il n'y a aucun débit d'eau, l'eau de la chambre va devenir chaude. Pour éviter des brûlures, laisser le système refroidir pendant 10 minutes avant de vidanger le système.

Risque de blessure

- Les lampes UV et les manchons en quartz sont fragiles. Ne pas les soumettre à des chocs, flexions ou pressions sous peine de les briser.
- NE PAS manipuler les lampes UV ni les manchons en quartz à mains nues. Portez des gants en caoutchouc ou en latex pour manipuler les lampes UV installées précédemment et les manchons en quartz souillés pour assurer la protection contre les contaminations. Portez des gants en coton pour manipuler les lampes UV neuves et les manchons en quartz propres.

AVIS

Protection du système

- Un suppresseur de tension transitoire certifié UL 1449 (ou équivalent) est fortement recommandé pour protéger le dispositif de commande.

Éviter les blessures

- S'assurer d'avoir lu et bien compris le Manuel d'instructions avant utilisation et avant toute intervention d'entretien sur cet équipement.

Avertissement : *ce produit peut contenir des produits chimiques connus par l'État de Californie pour causer des cancers, des anomalies congénitales et autres problèmes reproductifs.*

Section 2 Maintenance

⚠ AVERTISSEMENT

- Toujours débrancher l'alimentation avant d'effectuer tout travail sur le système de désinfection.
- Toujours arrêter l'écoulement d'eau et relâcher la pression d'eau avant de procéder à l'entretien.
- Inspecter régulièrement votre système de désinfection pour s'assurer que les indicateurs d'alimentation sont sous tension et qu'aucune alarme n'est présente.
- Toujours vidanger la chambre UV lors de la fermeture d'une résidence secondaire ou lorsque l'unité est laissée dans une zone soumise à des températures glaciales.

2.1 Installation et remplacement de l'électrovanne

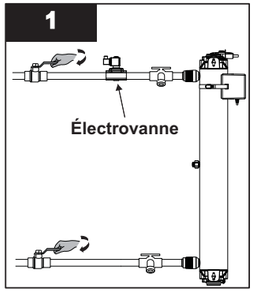
AVIS

Ne pas utiliser d'eau pendant l'installation et le remplacement de l'électrovanne.

Remarque : *lors de l'installation d'une nouvelle électrovanne, s'assurer que l'approvisionnement en eau est fermé puis procéder à l'étape 6. En cas de remplacement d'une électrovanne, commencer par l'étape 1.*

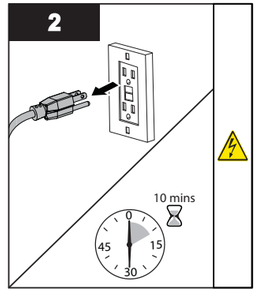
Procédure :

1



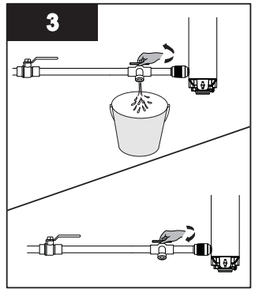
- Fermer tous les robinets et l'alimentation en eau.

2



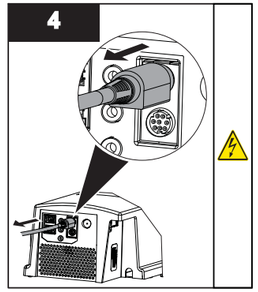
- Débrancher la source d'alimentation principale et laisser l'unité refroidir pendant 10 minutes.

3



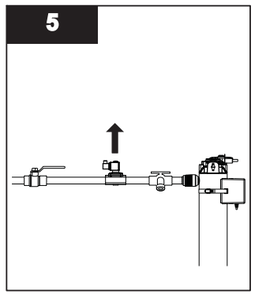
- Vidanger l'eau du système UV.
- Fermer l'entrée d'eau après la vidange de l'eau.

4



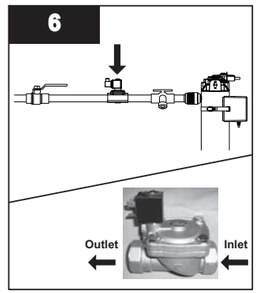
- Débrancher le câble de l'électrovanne (vert).

5



- Déposer l'électrovanne actuelle du système UV.

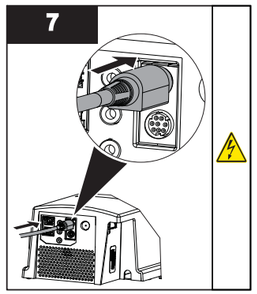
6



- Installer la nouvelle électrovanne.

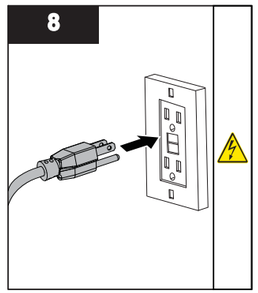
  Remarque : *prendre note de l'étiquette directionnelle « IN » à l'entrée et « OUT » à la sortie.*

7



- Brancher le câble de la nouvelle électrovanne dans la prise verte.
- Ouvrir tous les robinets et l'alimentation en eau.

8



- Rétablir le courant.

Remarque : *après avoir installé ou remplacé l'électrovanne, effectuez la procédure de désinfection, Consultez le manuel* de l'utilisateur.

11.25 - W1 – WIKA PRESSURE GAUGE

Installation and Operating Instructions
for Mechanical Pressure Gauges

Technical Information

Pressure range selection
To insure proper operation and long service life, the proper pressure range should be selected. For applications with constant, steady pressure, the measured pressure should be no more than 75% of the full scale range of the gauge. For applications with fluctuating pressure, the measured pressure should be no more than two-thirds of the full scale range of the gauge.

In general, it is best to choose a range that is roughly 2X the average measured pressure. This gives good over pressure protection and the highest accuracy.



Installation
The pressure gauge should be installed where exposure to heat and vibration are minimal and where the dial can be easily read. It is also important to install the gauge in a location with undisturbed and continuous flow of the pressure medium.

It is recommended that an isolating device, such as a needle valve or gauge cock, be installed between the process and the pressure gauges. This allows the gauge to be taken out of service without interruption of the process.

Connections with tapered threads, such as NPT, should be sealed by using PTFE tape (or an equivalent sealing compound) on the thread. Metric threads such as G1/4A or 1/4BSP should be sealed by using the appropriate sealing washer.

The gauge should be tightened and loosened using the wrench flats on the gauge socket. Never grasp the case to thread the gauge into the pressure system fitting. Doing so may cause irreparable damage to the gauge.

For pressure gauges with flanged connections, care must be taken not to accidentally loosen the bolts that hold the upper and lower housings together.

A pressure gauge should never be removed when it is pressurized. Make sure the pressure system has been fully vented prior to removing a gauge.

Residues from the pressure medium may remain inside the pressure gauge after it has been removed from service. If these residues are hazardous or toxic, take the necessary precautions when handling and storing used gauges.

Isolating devices
The isolating device may be either a pressure gauge cock or a needle valve, depending on operating conditions and requirements.

Pressure gauge cocks
Pressure gauge cocks have three handle positions:

OFF	The pressure medium is blocked and the pressure gauge system is open to the atmosphere.
ON	The pressure gauge is open to the pressure medium.
VENT	The pressure gauge is isolated but the pressure system is vented and the medium can escape into the atmosphere.

Pressure gauge cocks should be installed so that when vented, the pressure medium is directed away from the operator.

Needle valves
Needle valves also isolate the pressure gauge from the pressure medium, but they usually do not have any venting capabilities. Needle valves do have the advantage of restricting the flow of the pressure into the gauge which helps reduce damage by pressure spikes.

Mounting options
If the pressure system or tee-extension cannot support the weight of the instrument, then surface or wall mounting brackets or mounting flanges (front flange or rear flange) should be used.

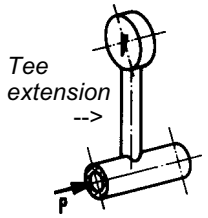
Vibration protection
If the pressure gauge is exposed to vibration or pulsating pressure or both, then a liquid filled pressure gauge is recommended. The liquid dampens the effects of vibration making the pointer easier to read.

Temperature limits
The pressure gauge should not be used outside of its rated temperature limits as noted on the Data Sheet specific to that gauge. At temperatures above or below these limits, the gauge accuracy will be significantly reduced and the possibility of gauge failure may exist.

Overpressure limits
WIKA gauges are generally designed to withstand up to a 130% overpressure without damage to the pressure system. For applications with overpressure spikes, a snubber or restrictor should be used. Snubbers and restrictors reduce the inlet size of the pressure gauge which causes the pressure to increase or decrease more slowly into the gauge. For applications with periods of constant overpressure, an overpressure protector should be used. The overpressure protector isolates the gauge when the pressure reaches a preset pressure value.

Tee extensions

Tee extensions should have a diameter of at least 0.24 in. (6mm) to avoid clogging from solids in the pressure medium. WIKA recommends that long, horizontal tee extensions be sloped to about 1:15.



With a gaseous pressure medium, the extension should having a drain plug at its lowest point, while a line with a liquid medium should have an air bleeding valve at its highest point. A filter or separator should be used when the pressure medium contains suspended matter.

If a static head of liquid is acting on the gauge, then this causes a zero offset which affects the reading of the gauge.

The corresponding indication will be lower by the value of Δp if the gauge is mounted above, but higher by the value of Δp if the gauge is mounted below the pressure tapping point.

Pressure gauges in service

Always open isolating devices slowly. Opening them too fast may generate sudden pressure surges that could damage the gauge.

Calibration can be confirmed in larger diameter gauges ($\geq$ 4") by checking the position of the zero point. To do so, close the isolating device and vent the gauge to zero pressure. The pointer must over the zero box ✚. Unless the gauge temperature is significantly higher or lower than 68°F (20°C), a pointer not returning to zero may indicate that the gauge has been seriously damaged.

Storage

The pressure gauge should remain in its original packing until installation.

Storage temperature should not exceed -4°F (-20°C) or 140°F (60°C) unless specified otherwise. Consult the data sheet pertaining to the pressure gauge model.

Pressure gauges removed from service should be protected from dust and humidity, preferably by using the original packing material. Residue from the pressure medium may remain in the gauge and is susceptible to temperature influences (i.e. freezing). This should be considered when storing the removed pressure gauge.

Pressure gauge safety

Pressure media such as:

- Oxygen
- Acetylene
- Flammable gases or liquids
- Toxic gases or liquids
- Steam
- Ammonia and other refrigerants

as well as portable or stationary pressure systems like:

- Air compressors
- Welding equipment
- Pressure vessels and boilers
- Life support equipment

may require pressure gauges that have been tested and/or certified to national standards and/or local safety codes. Your local WIKA representative will be able to assist you in selecting the proper gauge model.

Standards for Pressure Gauges

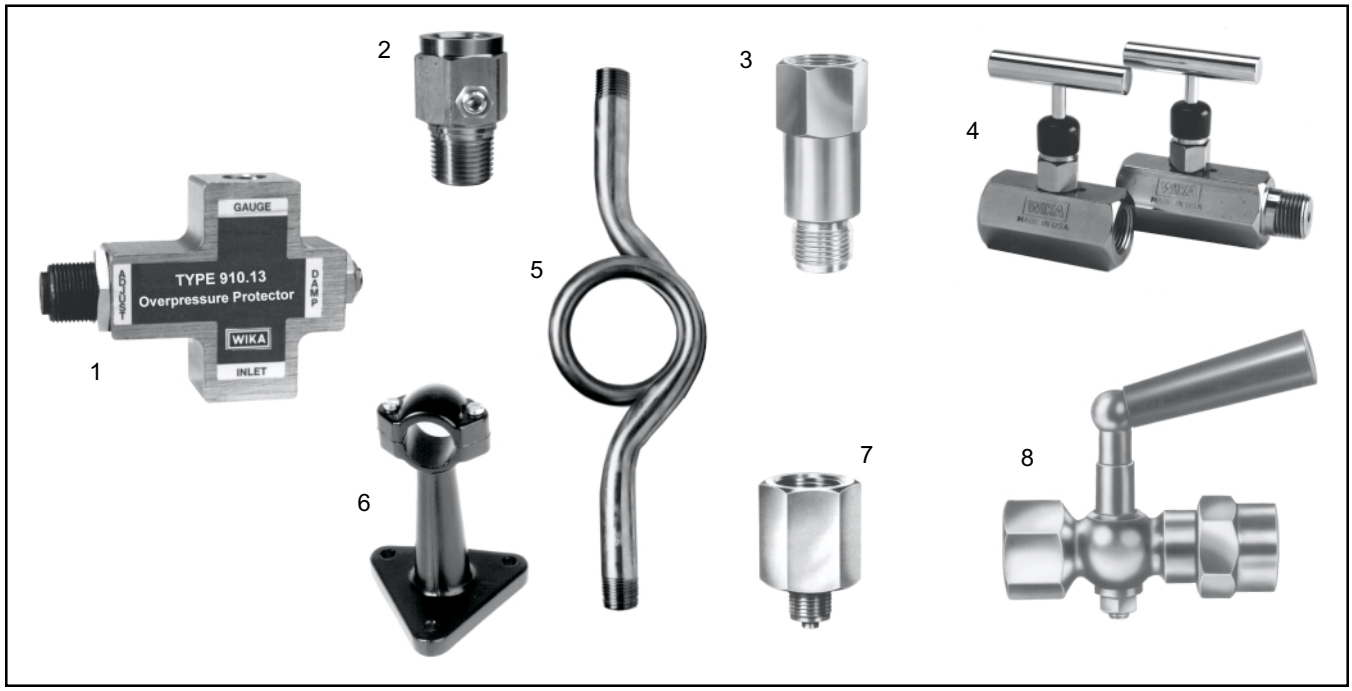
U.S. & Canadian Standards are set forth by The American Society of Mechanical Engineers, which publishes pressure gauge specifications in their document ASME B40.1. This document specifies standard pressure gauge types, sizes, materials, ranges, and accuracies. Copies of this standard can be purchased directly from ASME:

ASME
22 Law Drive, Box 2900
Fairfield, NJ 07007-2900
1-800-THE-ASME or (973) 882-1167
Fax: (973) 882-1717
E-mail: infocentral@asme.org

European Standards are developed and published by the European Committee for Standardization (CEN) and replace the individual standards formerly used in each European country (such as DIN standards in Germany). Copies of these standards can be obtained through:

Comité Européen de Normalisation (CEN)
Central Secretariat
rue de Stassart 36
B-1050 Brussels
Belgium

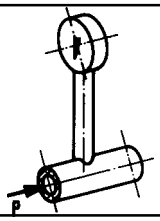
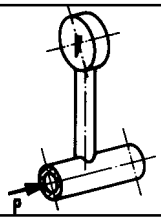
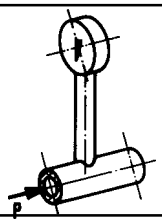
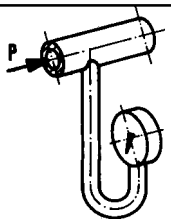
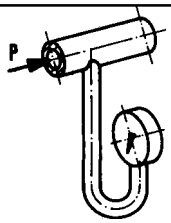
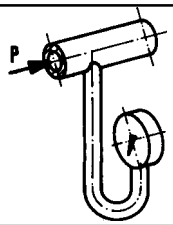
Pressure gauge accessories



1. Overpressure protector
2. Throttling (adjustable) snubber
3. Adaptor for wall mounting bracket
4. Needle valves
5. Coil siphon
6. Wall mounting bracket
7. Thread adaptor (1/4" NPT -> G1/4A)
8. Pressure gauge cock

Recommended Pressure Gauge Orientation

The table below shows the recommended position for pressure gauges in typical applications.

	Liquid media			Gaseous media		
Contents of tee extension	liquid	liquid with vapor	vapor only	Gas only	Wet gas	Liquid gas condensate
Typically	Condensate	Boiling liquid	LPG	Dry air	Moist air	Steam
Pressure instrument above the process						
Pressure instrument below the process						

THE MEASURE OF

Total Performance™

Ordering Information:
State computer part number (if available) / model number / size / range / connection size and location / options required.

Specifications given in this price list represent the state of engineering at the time of printing.
Modifications may take place and the specified materials may change without prior notice

WIKA Instrument Corporation
1000 Wiegand Boulevard
Lawrenceville, Georgia 30043-5868
Tel: 770-513-8200 Fax: 770-338-5118
http://www.wika.com e-mail: info@wika.com

02/98

SECTION 12 - APPENDICE

12.1 - DAILY DATA RECORDING SHEET

Data	Date and time								
General									
Raw Water Storage Tanks Level									
Raw Water Pumps Discharge Pressure									
Raw Water Flow									
Cartridge Filters									
5 Micron Cartridge Filter Inlet Pressure									
1 Micron Cartridge Filter Inlet Presure									
1 Micron Cartridge Filter Outlet Pressure									
Filtered Water Turbidity									
UV Reactors and Sodium Hypochlorite Dosing									
UV Intensity – Reactor #1									
UV Intensity – Reactor #2									
Sodium Hypochlorite Injection Rate									
Treated Water Chlorine Concentration									
Treated Water pH									
Distribution									
Treated Water Storage Tanks Level									
Distribution Pressure									
Distribution Flow									

12.2 - EQUIPMENT MAINTENANCE LOG

GENERAL MAINTENANCE LOG – EQUIPMENT TAG :					
Date	**Time**	**Problem[1]**	**Task Performed**	**Remarks**	**Initials**

Notes: 1. Was this repair planned or unscheduled? Is it a recurring event?