



- **Municipality of Sanikiluaq**

Operation and Maintenance Manual

Volume II

Type of Document

Final

Project Name

Water Truck Fill Station

Project Number

OTCD00020127A

Prepared By: Matt Berrigan

Reviewed By: Steven Burden, P.Eng

exp Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 7H6
Canada

Date Submitted

15.07.11

Operations and Maintenance Manual

**Sanikiluaq Truck Fill Station
Project Number: 08-2019**

OWNER:

**Government of Nunavut
P.O. Box 379
Pond Inlet, Nunavut X0A 0S0
Project Officer: Pat Fuentes**

ENGINEER CONSULTANT:

**Trow Associates Inc.
154 Colonnade Road South,
Ottawa, Ontario,
K2E 7J5**

**PH: (613) 225-9940
FX: (613) 225-7337**

Project Manager: Stephen Douglas

GENERAL CONTRACTOR:

**Inkushuk Construction Limited
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Rankin Inlet NU
X0C 0G0**

Contact: David Mosher

**PH: (867) 645-4030
FX: (902) 429-7762**

**Submitted by: Inukshuk Construction Limited
Date Submitted: _____**

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Section 01 11 00 1.2.3.2.1 Mechanical Fuel and Water Piping Schematic

FUEL SYSTEM SCHEMATICS

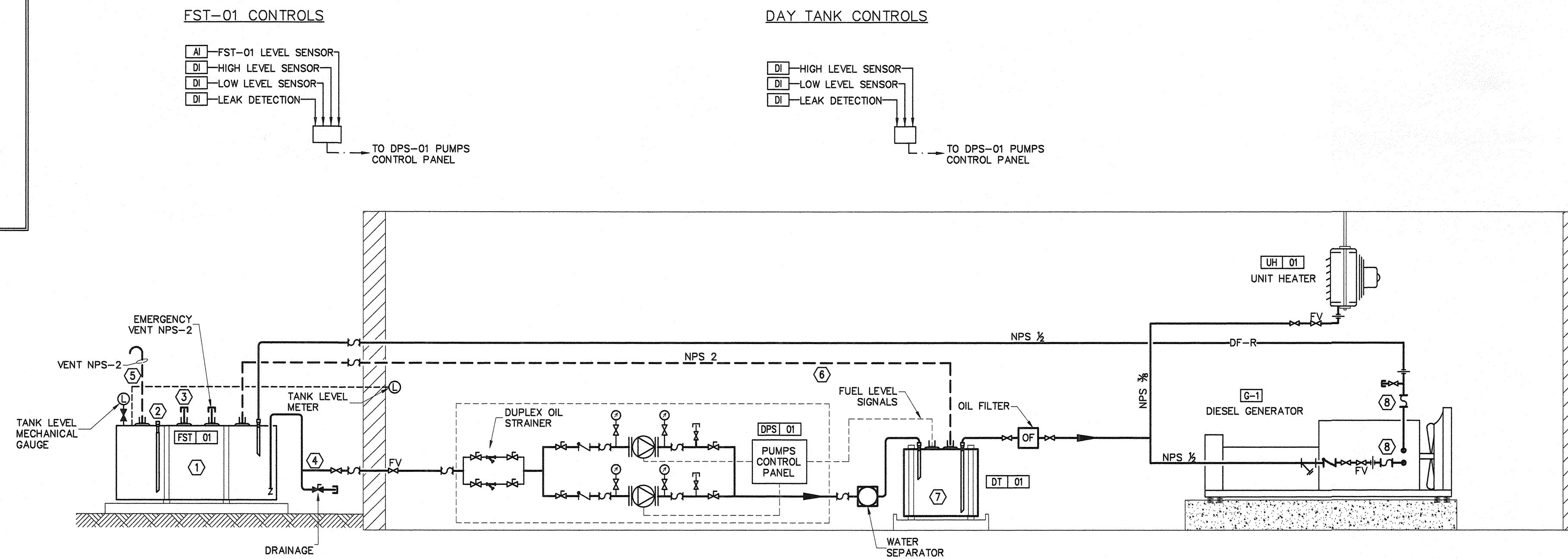
PIPING AND CONTROLS SCHEMATICS

NOTES:

- ① DOUBLE WALL MAIN FUEL STORAGE TANK
- ② FST-01 FILL/VENT CONNECTION C/W LOCKING CAP (NPS-2)
- ③ FST-01 INSPECTION PORT
- ④ FUEL SUPPLY LINE TO GENERATOR'S DAY TANK (ALL NPS-2)
- ⑤ FUEL TANK VENT C/W VENT WHISTLE (NPS-2)
- ⑥ FUEL VENT LINE FROM GENERATOR'S DAY TANK (ALL NPS-1)
- ⑦ GENERATOR'S DAY TANK
- ⑧ STAINLESS STEEL FLEXIBLE CONNECTION. CONNECT TO FUEL SUPPLY AND RETURN CONNECTIONS ON ENGINE.

GENERAL NOTE:

THE SCHEMATIC DRAWING SHOWS DETAILS OF THE CONTROLS LAYOUT, EQUIPMENT CONNECTIONS AND PIPING COMPONENTS OF THE SYSTEM. REFER TO DRAWING M3 FOR DETAILS ON THE PIPING LAYOUT AND LOCATION OF EQUIPMENT.

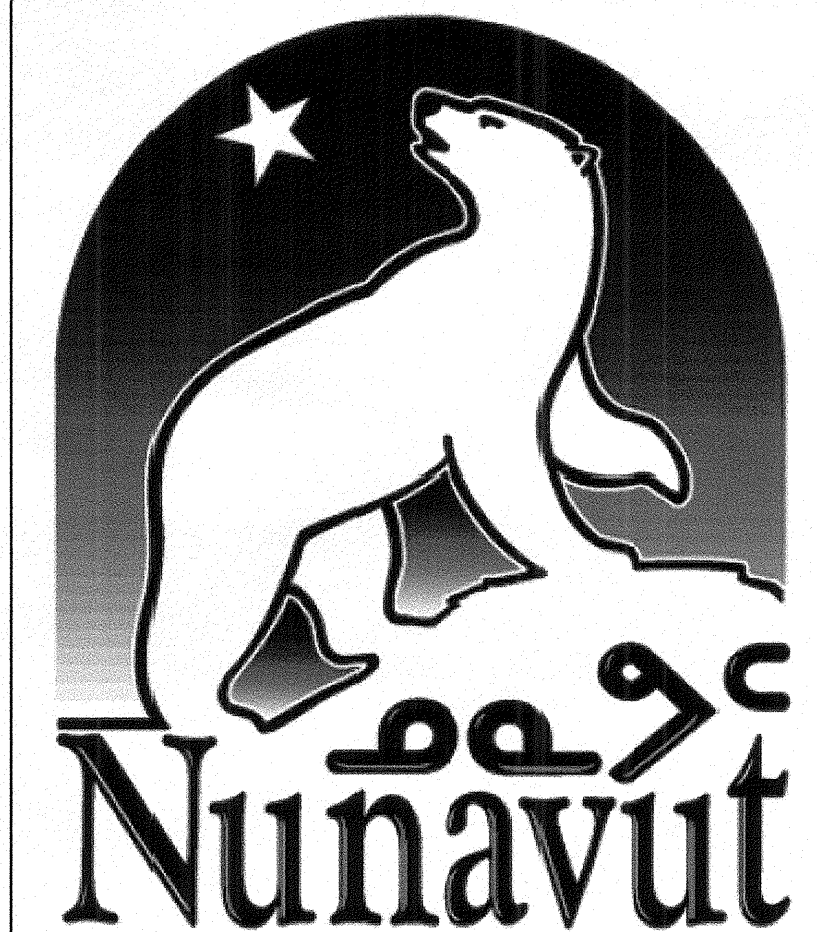
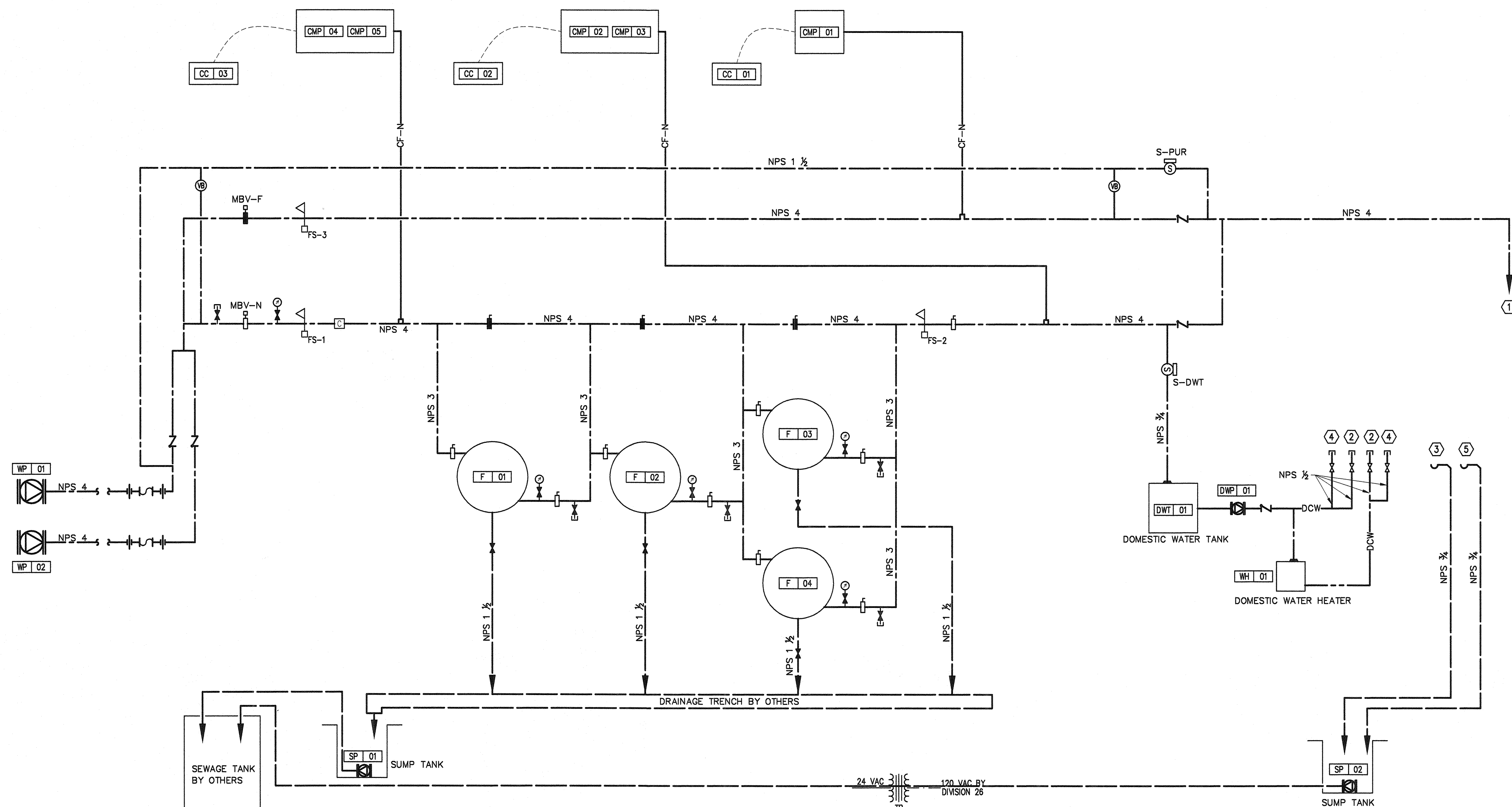


WATER SYSTEM

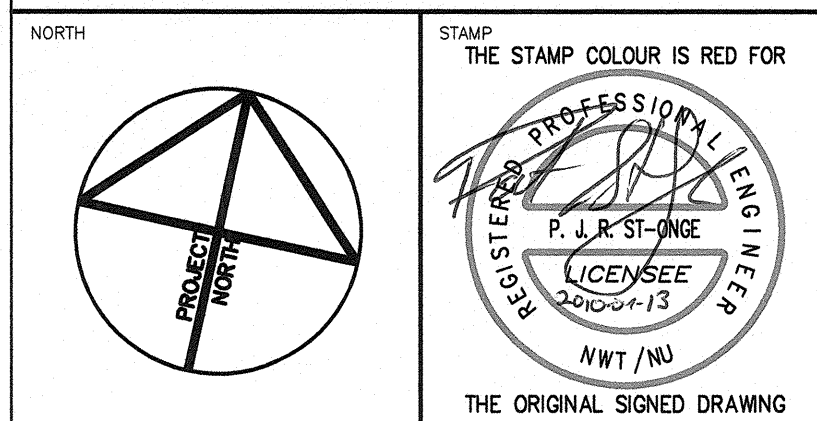
HYDRAULIC DIAGRAM

NOTES:

- ① TO TRUCKFILL ARM
- ② CONNECTION FOR WATER FAUCET
- ③ SINK DRAIN
- ④ CONNECTION FOR EMERGENCY EYEWASH STATION
- ⑤ EYEWASH STATION DRAIN



PERMIT TO PRACTICE
WOOD BANAAN BOUTALETTE PARIZEAU INC.
Signature: [Signature]
Date: 13-APR-2010
PERMIT NUMBER: P657
The Association of Professional Engineers,
Geologists and Geophysicists of the NWT/NU



NOTES: GENERAL CONTRACTOR TO VERIFY ALL DIMENSIONS WITH FINAL ARCHITECTURAL AND MECHANICAL DRAWINGS. NOTIFY THE ENGINEERS OF ANY ERRORS AND /OR OMISSIONS PRIOR TO CONSTRUCTION FOR DIRECTION. DO NOT SCALE THIS DRAWING.

REVISIONS				
No.	DESCRIPTION	DATE	BY	APP'D
0	ISSUED FOR TENDER	04/13/2010	C.B.	P.S.O.

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3740 Richmond Road, Suite 100, K2H 5B9
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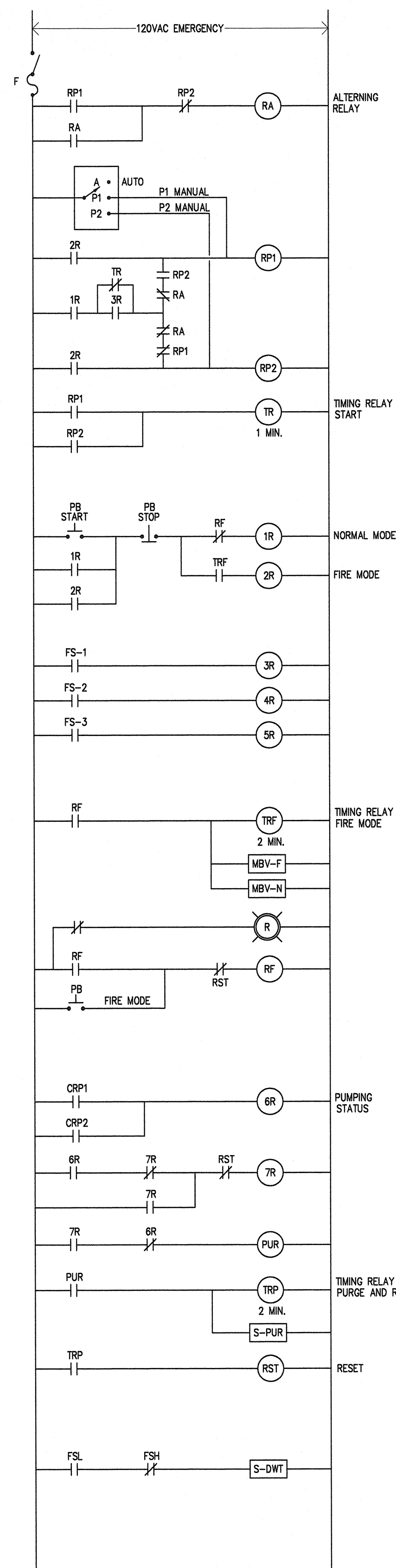
CLIENT
**GOVERNMENT OF NUNAVUT
DEPARTMENT OF COMMUNITY
AND GOVERNMENT SERVICES**

PROJECT
**SANIKILUAQ, NUNAVUT
WATER TRUCK FILL STATION**

TITLE
**MECHANICAL
FUEL AND WATER
PIPING SCHEMATIC**

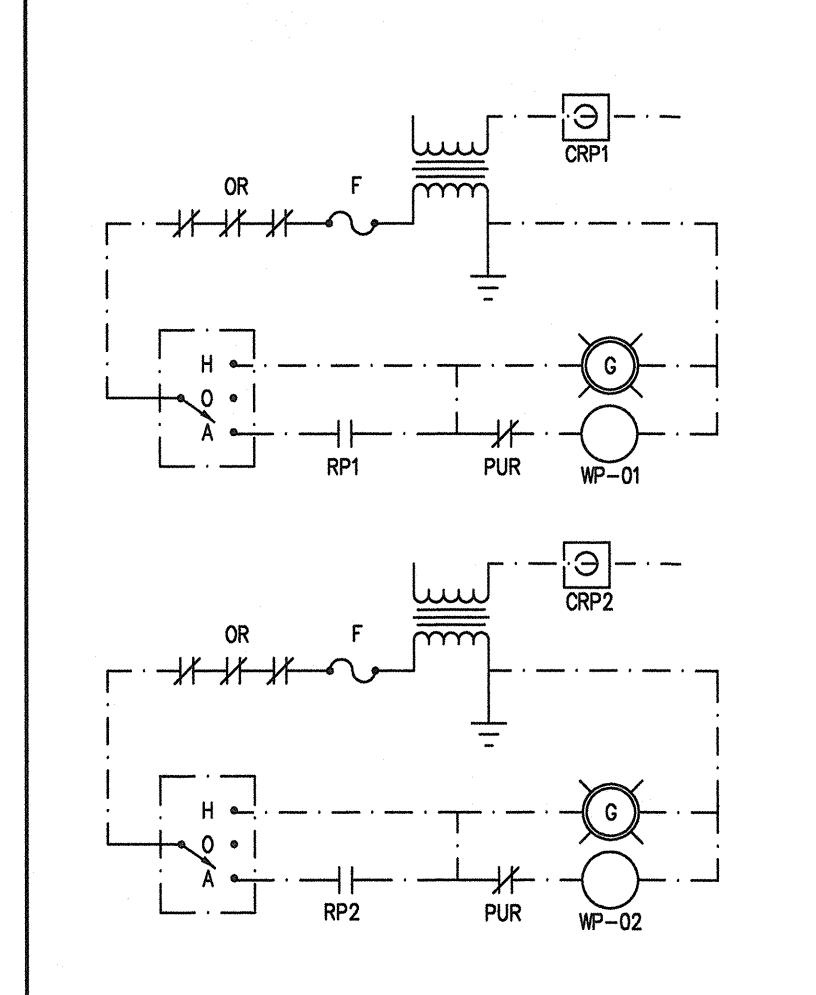
design by	C.BOURGOONE	project no.	08-2019
drawn by	C.BOURGOONE	drawing no.	M6
checked by	P.ST-ONGE		
date	APRIL 2010		
scale	AS SHOWN		

WATER SYSTEM – CONTROL SCHEMATICS

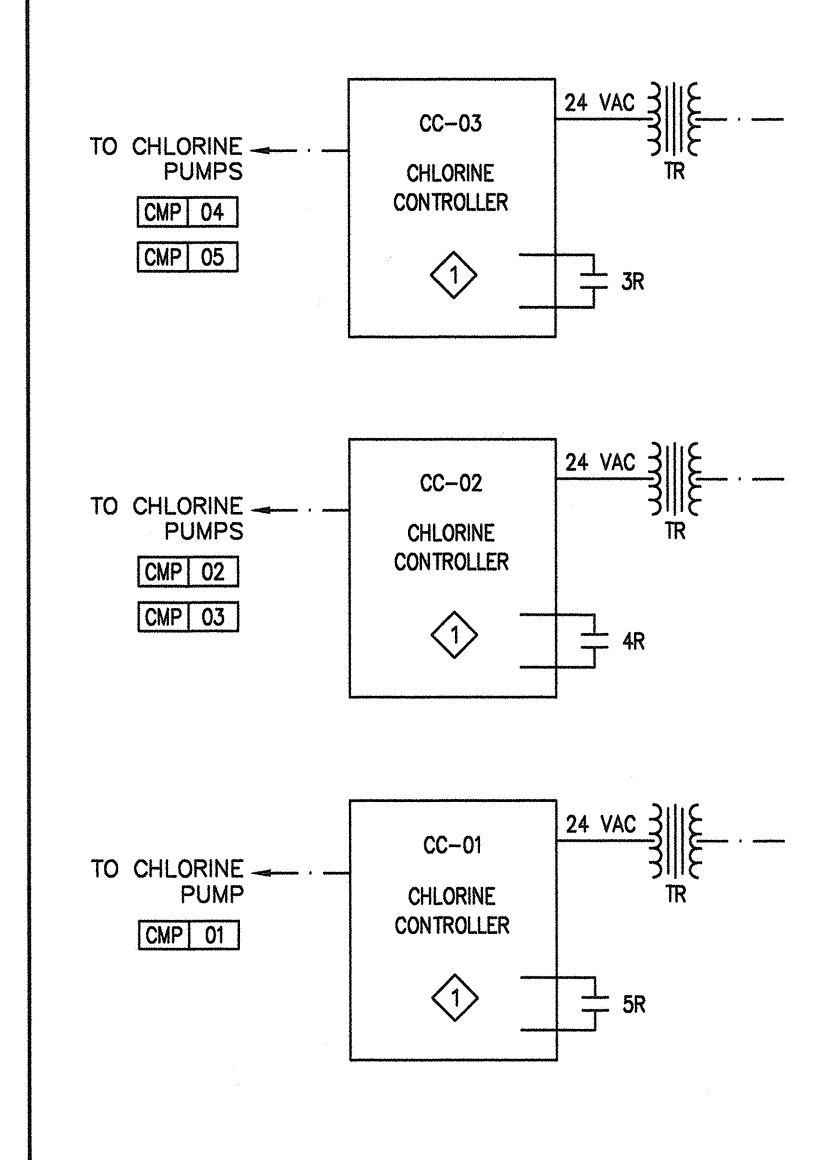


PANEL CP-01

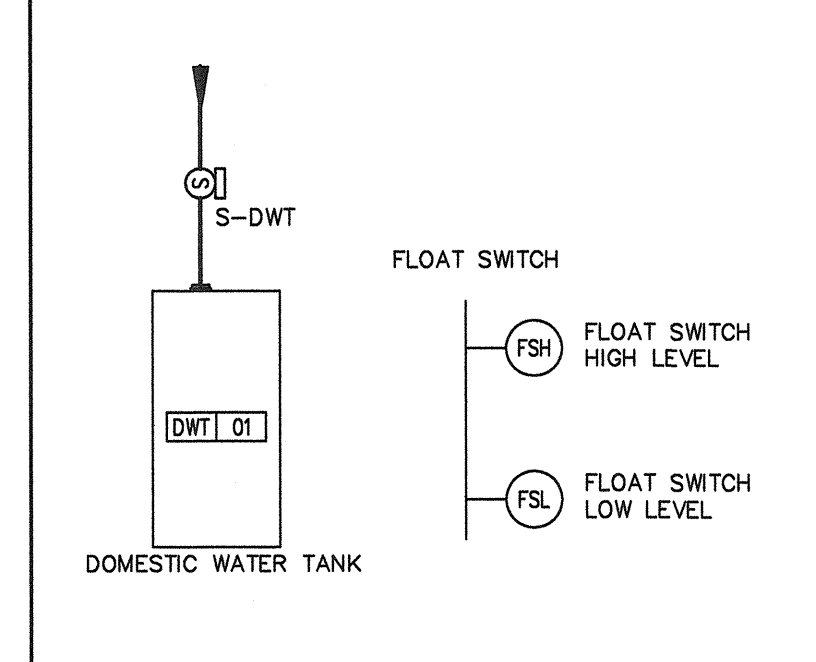
CONTROLS – WATER PUMPS



CHLORINE CONTROLLERS

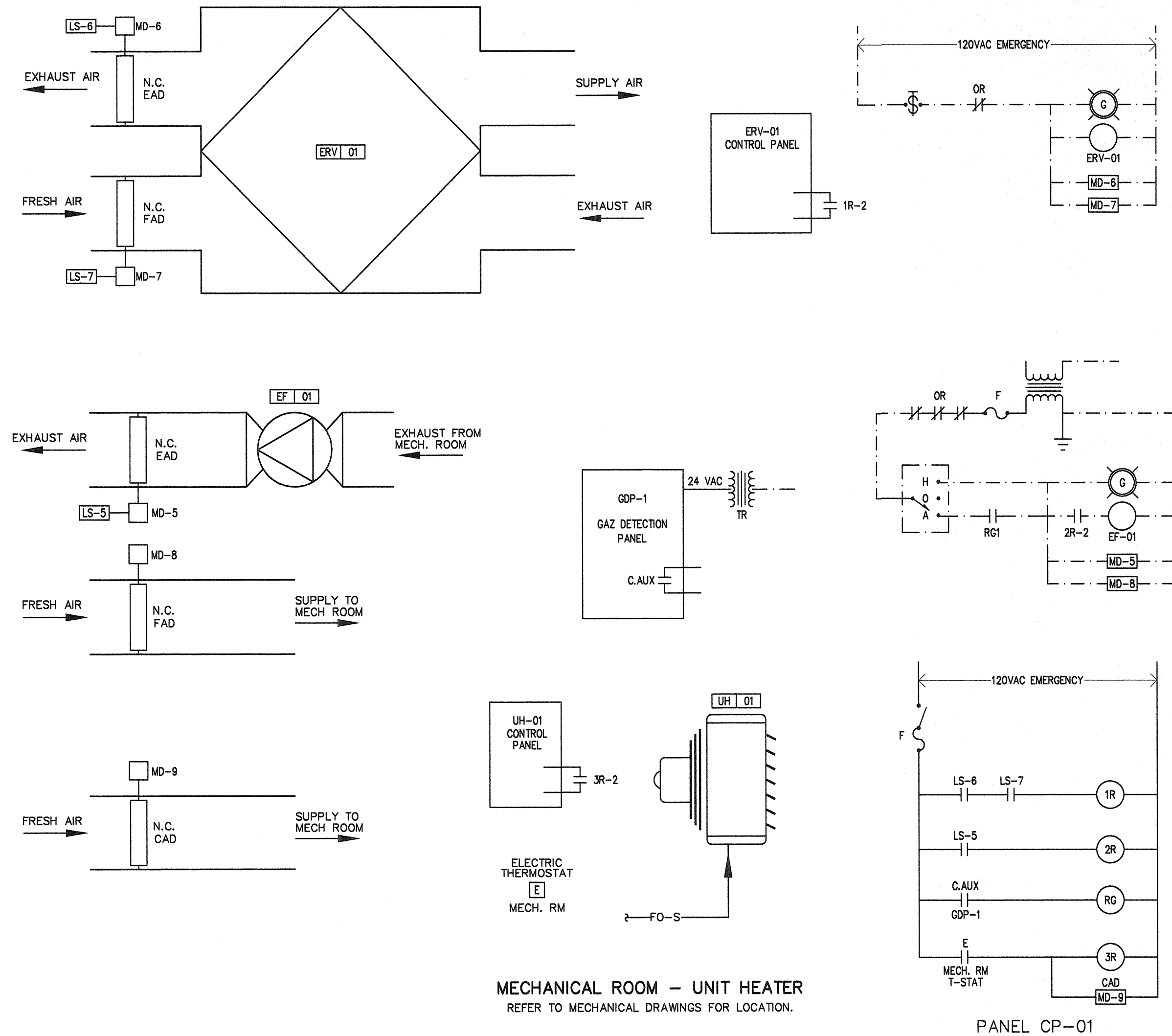


CONTROLS – DOM. WATER TANK

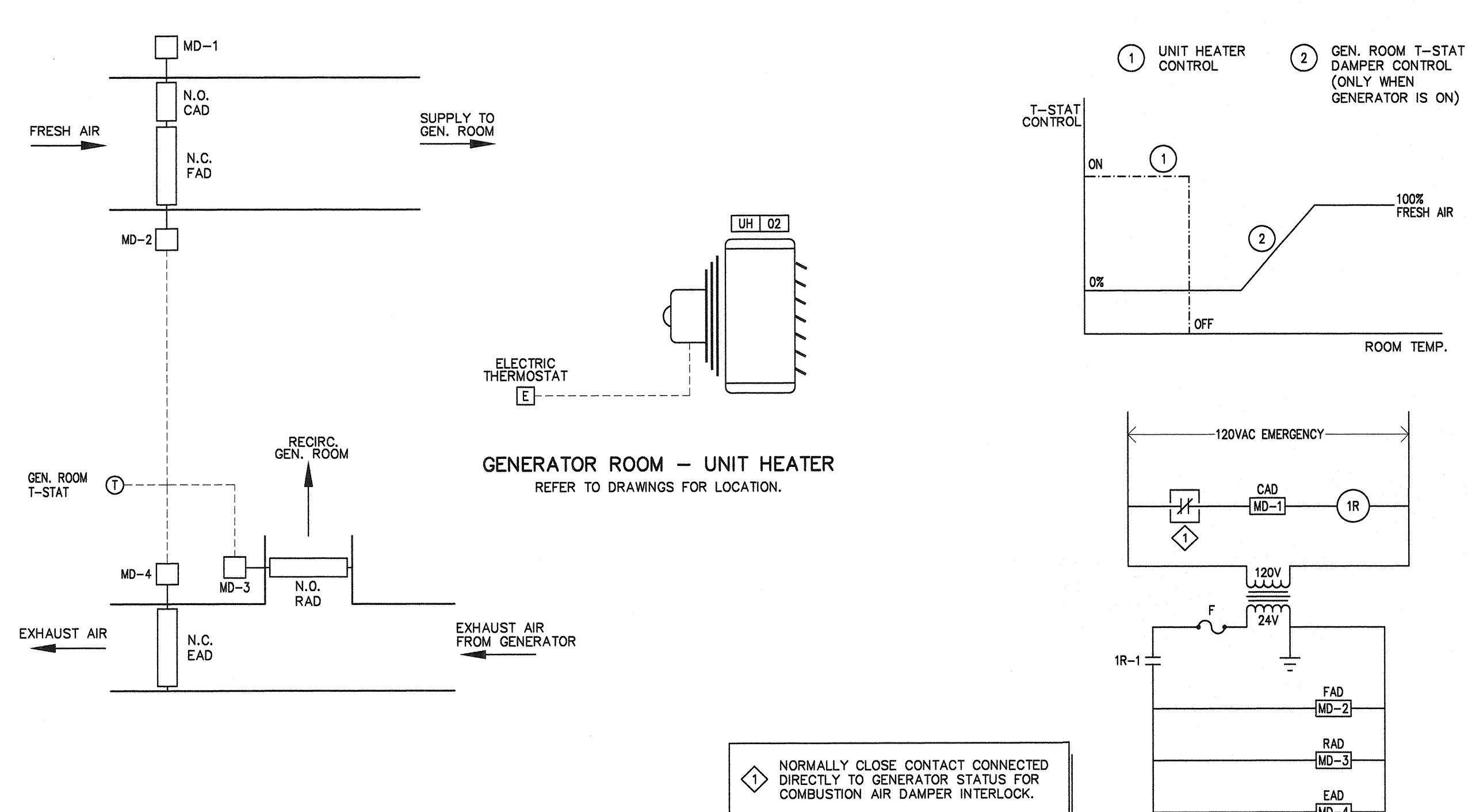


CHLORINE CONTROLLER BY DIVISION 23, DIVISION 25 TO PROVIDE 24V POWER SUPPLY AND START/STOP CONTACT TO CONTROLLER.

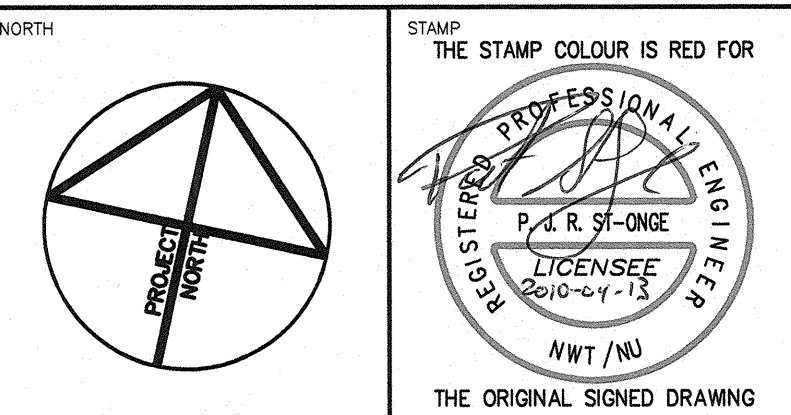
MECHANICAL ROOM – VENTILATION



GENERATOR ROOM – VENTILATION



PERMIT TO PRACTICE
WOOD BARNUM BOUTHALETTE PARIZEAU INC.
Signature
Date 13-APR-2010
PERMIT NUMBER: P657
The Association of Professional Engineers,
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CLIENT
GOVERNMENT OF NUNAVUT
DEPARTMENT OF COMMUNITY
AND GOVERNMENT SERVICES

PROJECT
SANIKILUAQ, NUNAVUT
WATER TRUCK FILL STATION
TITLE
MECHANICAL
CONTROL SCHEMATICS

design by L.PELLERIN project no. 08-2019
drawn by L.PELLERIN drawing no.
checked by P.ST-ONGE
date FEBRUARY 2010
scale NTS

Section 01 11 00 1.2.3.2.2

Description of systems and their controls

Section 01 11 00 1.2.3.2.3 Description of operation of systems at various loads together with reset schedules and seasonal variances

Section 01 11 00 1.2.3.2.4 Operation instruction for systems and component

Section 01 11 00 1.2.3.2.5 Description of actions to be taken in event of
equipment failure

Sanikiluaq Truck Fill Station Identification Tag Schedule

TAG	SYSTEM	DESCRIPTION
MBV-F	PROCESS WATER	MOTORIZED BUTTERFLY VALVE, 4"NS
MBV-N	PROCESS WATER	MOTORIZED BUTTERFLY VALVE, 4"NS
FS-1	PROCESS WATER	FLOW SWITCH, 1"NPT
FS-2	PROCESS WATER	FLOW SWITCH, 1"NPT
FS-3	PROCESS WATER	FLOW SWITCH, 1"NPT
S-PUR	PROCESS WATER	SOLENOID VALVE, 1 1/2"NS
S-DWT	PROCESS WATER	SOLENOID VALVE, 3/4"NS
DWP-01	DOMESTIC WATER	DOMESTIC WATER PUMP, 1/2"
DWT-01	DOMESTIC WATER	DOMESTIC WATER TANK
WH-01	DOMESTIC WATER	DOMESTIC WATER HEATER
SP-01	WASTE WATER	SUMP PUMP 01
SP-02	WASTE WATER	SUMP PUMP 02
F-01	PROCESS WATER	FILTER HOUSING
F-02	PROCESS WATER	FILTER HOUSING
F-03	PROCESS WATER	FILTER HOUSING
F-04	PROCESS WATER	FILTER HOUSING
CC-01	CHEMICAL FEED	CHLORINE CONTROLLER NO. 1
CC-02	CHEMICAL FEED	CHLORINE CONTROLLER NO. 2
CC-03	CHEMICAL FEED	CHLORINE CONTROLLER NO. 3
CMP-01	CHEMICAL FEED	CHEMICAL METERING PUMP NO. 1
CMP-02	CHEMICAL FEED	CHEMICAL METERING PUMP NO. 2
CMP-03	CHEMICAL FEED	CHEMICAL METERING PUMP NO. 3
CMP-04	CHEMICAL FEED	CHEMICAL METERING PUMP NO. 4
CMP-05	CHEMICAL FEED	CHEMICAL METERING PUMP NO. 5
CST-01	CHEMICAL FEED	CHEMICAL STORAGE TANK
CMT-01	CHEMICAL FEED	CHEMICAL MIXING TANK
FP-01	FUEL	FUEL PUMP NO. 1
FP-02	FUEL	FUEL PUMP NO. 2
FST-01	FUEL	FUEL STORAGE TANK
DT-01	FUEL	FUEL DAY TANK
DPS-01	FUEL	FUEL CONTROL PANEL
GDP-01	GAS DETECTION	GAS DETECTION PANEL
EH-01	UNIT HEATER	GENERATOR ROOM UNIT HEATER
ERV-01	VENTILATION	ENERGY RECOVERY VENTILATOR
EF-01	VENTILATION	EXHAUST AIR FAN
UH-01	UNIT HEATER	MECHANICAL ROOM UNIT HEATER
G-1	GENERATOR	DIESEL GENERATOR
LS-01	CONTROL SENSOR	FST-01 TANK LEVEL SENSOR
LS-02	CONTROL SENSOR	DT-01 TANK LEVEL SENSOR
TLM-01	LEVEL GAUGE	FST-01 TANK LEVEL GAUGE
TLG-01	LEVEL GAUGE	FST-01 TANK LEVEL GAUGE ON TANK
TLG-02	LEVEL GAUGE	DT-01 TANK LEVEL GAUGE
LD-01	LEAK DETECTION SENSOR	FST-01 TANK LEAK DETECTION SENSOR
LD-02	LEAK DETECTION SENSOR	DT-01 TANK LEAK DETECTION SENSOR

Note: Plastic tags with 12 mm stamped code lettering and numbers filled with black paint.

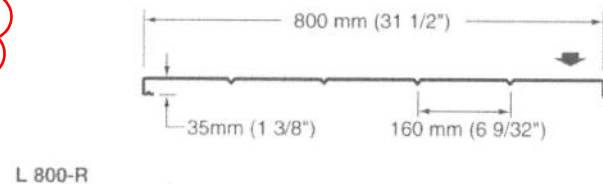
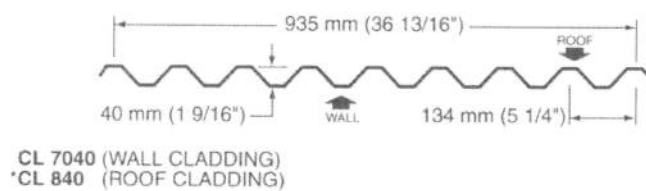
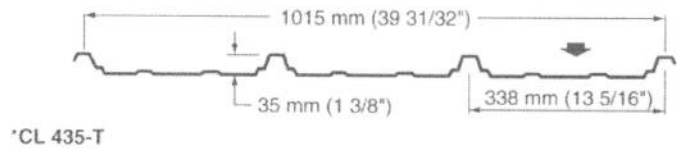
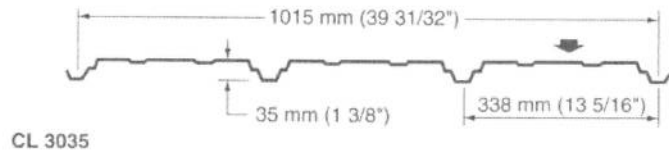
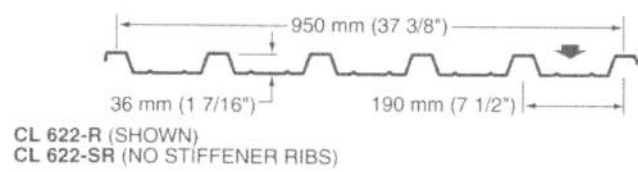
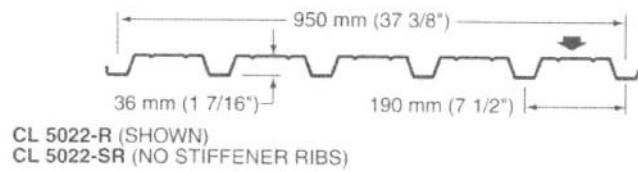
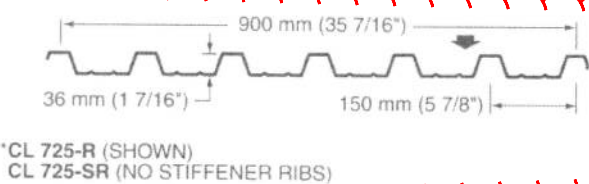
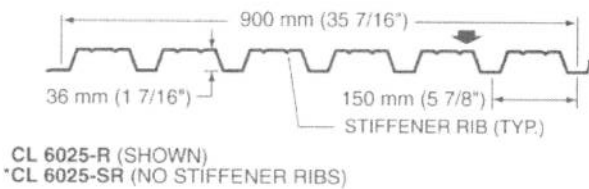
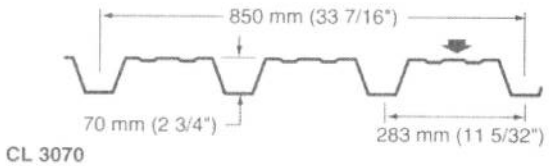
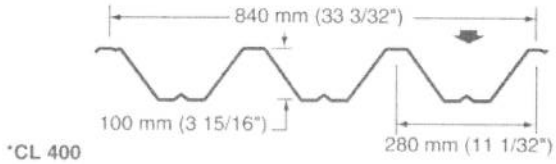
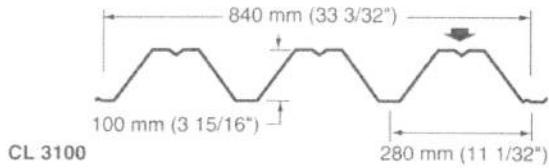
Sanikiluaq Truck Fill Station Pipe Marker Schedule

<i>PIPE MARKERS</i>							
System	Letter Height	Color	Pipe Size	Brady No.	Style	Qty	Unit
RAW WATER	2"	GREEN	3" & 4"	7230	1	12	CARD
FILTERED WATER	2"	GREEN	3" & 4"	7105	1	4	CARD
DRAIN	3/4"	GREEN	1 1/2"	7090	4	1	CARD
FILTERED WATER	3/4"	GREEN	3/4"	7230	4	1	CARD
DOMESTIC COLD WATER	5/16"	GREEN	1/2"	7086	3C	1	CARD
DOMESTIC HOT WATER	5/16"	YELLOW	1/2"	7087	3C	1	CARD
WASTE WATER	2"	GREEN	3"	7301	1	2	CARD
WASTE WATER	3/4"	GREEN	1 1/2"	7301	4	1	CARD
CHLORINE	5/16"	YELLOW	1/2"	7048	3C	6	CARD
<i>ARROW</i>							
System	Arrow Height	Color	Pipe Size	Brady No.	Qty	Unit	
PROCESS, FW, WASTE	2"	WHITE/GREEN	1 1/2", 3", 4"	91421	1	ROLL	
PROCESS, FW, WASTE	12"	WHITE/GREEN	1/2" & 3/4"	91425	1	ROLL	
FUEL	2"	BLACK/YELLOW	1 1/2" & 2"	91420	1	ROLL	
FUEL	1"	BLACK/YELLOW	1/2", 3/4", 1"	91424	1	ROLL	

Section 01 11 00 1.2.3.3 A s Built Drawings

Section 07 46 50 2.1 Cladding Profiles

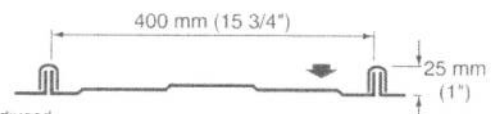
ROOF & WALL CLADDING PROFILES



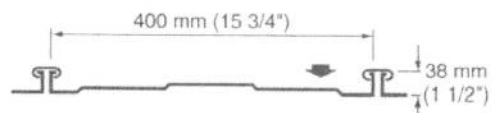
ROOF SYSTEMS



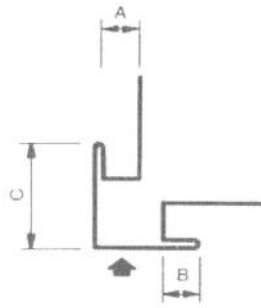
TRADITION
100-4
N.B.: 100-4 can be radiused.

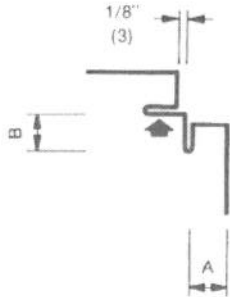


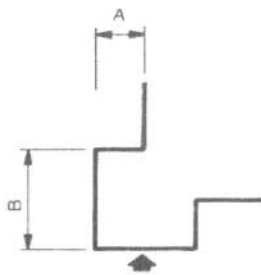
TRADITION
150-4




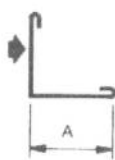
FLASHINGS & TRIMS


OUTSIDE CORNER	NO.	DIMENSION		
		A	B	C
	204	5/8" (16)	3/4" (19)	2-3/4" (70)
	504	15/16" (24)	1" (25)	2-3/4" (70)
	1104	1-5/8" (41)	1" (25)	3-1/4" (83)
	1404	2-7/8" (73)	1" (25)	5" (127)
	1804	4-1/16" (103)	1-1/2" (38)	5" (127)

INSIDE CORNER	NO.	DIMENSION		
		A	B	C
	201	5/8" (16)	3/4" (19)	
	501	15/16" (24)	1" (25)	
	1101	1-5/8" (41)	1" (25)	
	1401	2-7/8" (73)	1-1/2" (38)	
	1801	4-1/16" (103)	1-1/2" (38)	

OUTSIDE CORNER	NO.	DIMENSION		
		A	B	C
	206	5/8" (16)	2-3/4" (70)	
	506	1" (25)	2-3/4" (70)	
	1106	1-3/4" (44)	3-1/4" (83)	
	1406	3" (76)	5" (127)	
	1806	4-3/16" (106)	5-1/2" (140)	

INSIDE CORNER	NO.	DIMENSION		
		A	B	C
	208	5/8" (16)		
	508	1" (25)		
	1108	1-3/4" (44)		
	1408	3" (76)		
	1808	4-3/16" (106)		

OUTSIDE CORNER	NO.	DIMENSION		
		A	B	C
	EX-1	2-1/2" (64)		
	EX-2	4" (102)		

INSIDE CORNER	NO.	DIMENSION		
		A	B	C
	IN-1	2-1/2" (64)		
	IN-2	4" (102)		

200 Series - CL 508/CHANNEL WALL, CL 7015/815 and 1/2" Corrugated

500 Series - SUPER VIC, DR 762, 7/8" Corrugated

1100 Series - CL 7040/840, CL 6025/725, CL 5022/622
CL 3035/435 and AD 150/200/275/300

1400 Series - CL 3070/470

1800 Series - CL 3100/400

All flashings/trims are available 10' - 0" long.

Custom flashings to specific requirements are available upon request.

Please consult your VICWEST representative.

 EXPOSED SIDE PREPAINED
(DIM.) = mm

FLASHINGS & TRIMS

CLOSURE	NO.	DIMENSION		
		A	B	C
	3003	*		

38 (1-1/2") MINIMUM

★ TO BE SPECIFIED

JAMB	NO.	DIMENSION		
		A	B	C
	211	5/8" (16)	5/8" (16)	*
	511	15/16" (24)	1" (25)	*
	1111	1-5/8" (41)	1" (25)	*
	1411	2-7/8" (73)	1-1/2" (38)	*
	1811	4-1/16" (103)	1-1/2" (38)	*

* 3/4" (19), 1-1/2" (38), 2" (51), 3" (76), 4" (102), 5" (127), 6" (152), 9" (229)

CLIP	NO.	DIMENSION		
		A	B	C
	3024			

60 (2-3/8")

16 (5/8")

SILL	NO.	DIMENSION		
		A	B	C
	3002	*		

64 (2-1/2")

95°

19 (3/4")

★ TO BE SPECIFIED

ROOF FLASHING	NO.	DIMENSION		
		A	B	C
	3022	*		

4-1/2" (114)

3/4" (19)

* 9" (229), 12" (305)

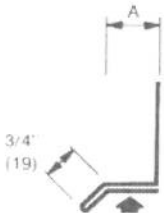
ROOF FLASHING	NO.	DIMENSION		
		A	B	C
	3023	*		

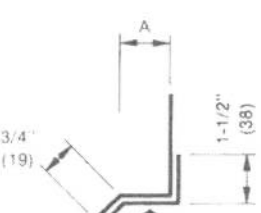
5-1/2" (140)

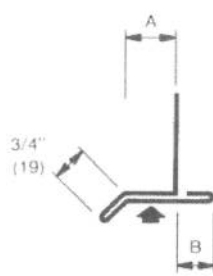
★ TO BE SPECIFIED

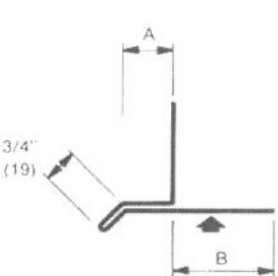
▲ EXPOSED SIDE PREPAINTED
(DIM.) = mm

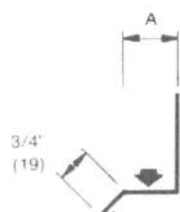
FLASHINGS & TRIMS


DRIP	NO.	DIMENSION		
		A	B	C
 <p>3/4" (19)</p> <p>* TO SPECIFY</p>	216	3/4" (19)		
	516	1-1/8" (29)		
	1116	2" (51)		
	1416	3-1/4" (83)		
	1816	4-7/16" (113)		
	016	*		

DRIP	NO.	DIMENSION		
		A	B	C
 <p>3/4" (19)</p> <p>1-1/2" (38)</p> <p>* TO SPECIFY</p>	222	3/4" (19)		
	522	1-1/8" (29)		
	1122	2" (51)		
	1422	3-1/4" (83)		
	1822	4-7/16" (113)		
	022	*		

DRIP	NO.	DIMENSION		
		A	B	C
 <p>3/4" (19)</p> <p>** TO SPECIFY</p> <p>* 3/4" (19), 1" (25), 1-1/2" (38), 2" (51), 2-1/2" (64), 3" (76), 3-1/2" (89), 4" (102), 4-1/2" (114), 5" (127)</p>	217	3/4" (19)	*	
	517	1-1/8" (29)	*	
	1117	2" (51)	*	
	1417	3-1/4" (83)	*	
	1817	4-7/16" (113)	*	
	017	**	*	

DRIP	NO.	DIMENSION		
		A	B	C
 <p>3/4" (19)</p> <p>** TO SPECIFY</p> <p>* 3/4" (19), 1-1/2" (38), 2" (51), 3" (76), 4" (102), 5" (127), 6" (152), 9" (229)</p>	218	3/4" (19)	*	
	518	1-1/8" (29)	*	
	1118	2" (51)	*	
	1418	3-1/4" (83)	*	
	1818	4-7/16" (113)	*	
	018	**	*	

DRIP	NO.	DIMENSION		
		A	B	C
 <p>3/4" (19)</p> <p>* TO SPECIFY</p>	219	3/4" (19)		
	519	1-1/8" (29)		
	1119	2" (51)		
	1419	3-1/4" (83)		
	1819	4-7/16" (113)		
	019	*		

STARTER STRIP	NO.	DIMENSION		
		A	B	C
 <p>A</p>	223	3/4" (19)		
	523	1-1/8" (29)		
	1123	2" (51)		
	1423	3-1/4" (83)		
	1823	4-7/16" (113)		

200 Series - CL 508/CHANNEL WALL, CL 7015/815 and 1/2" Corrugated
 500 Series - SUPER VIC, DR 762, 7/8" Corrugated
 1100 Series - CL 7040/840, CL 6025/725, CL 5022/622
 CL 3035/435 and AD 150/200/275/300

1400 Series - CL 3070/470

1800 Series - CL 3100/400

All flashings/trims are available 10' - 0" long.

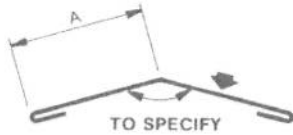
Custom flashings to specific requirements are available upon request.

Please consult your VICWEST representative.

 EXPOSED SIDE PREPAINED
 (DIM.) = mm

FLASHINGS & TRIMS

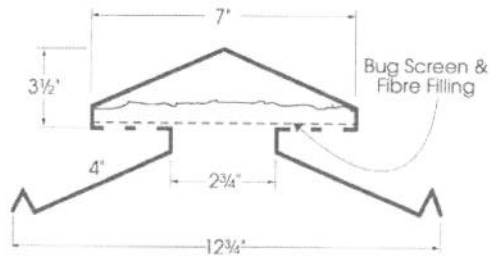
RIDGE CAP



NO.	DIMENSION		
	A	B	C
FA-6	5 1/2" (140)		
FA-8	8" (203)		
FA-12	11" (279)		

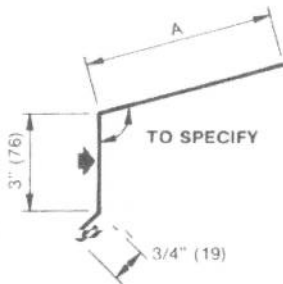
VENTED RIDGE (MODEL 1200)

OPENING CAPACITIES	
Rows of Perforations	Total Opening Area per 10' 0" Section
4	68.88 sq. ins.



VICWEST VENTED RIDGE allows damp warm air to circulate out of attics that would otherwise assist in the deterioration of insulation and roof structures

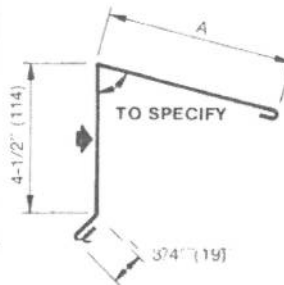
ROOF FLASHING



* 4-5/8" (117), 7-5/8" (194), 10-5/8" (270), 13-5/8" (346)

NO.	DIMENSION		
	A	B	C
3020	*		

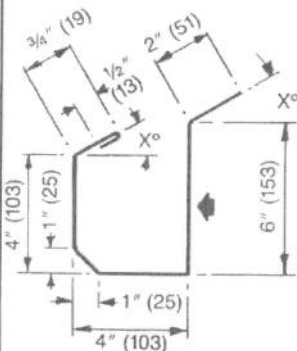
ROOF FLASHING



* 5-1/2" (140), 8" (203)

NO.	DIMENSION		
	A	B	C
3021	*		

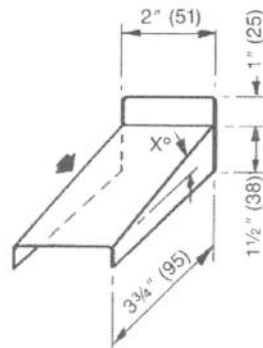
EAVESTROUGH



* Specify Angle 'X'

NO.	DIMENSION		
	A	B	C
To Specify			

EAVESTROUGH CLIP



* Specify Angle 'X' (Req'd. 2'-0" C/Cs)

NO.	DIMENSION		
	A	B	C

▲ EXPOSED SIDE PREPAINTED
(DIM.) = mm

Section 15 10 00

Flex Connector

ORIGINAL 002524/02145701B9

CLEMENT BOURGOGNE

WOOD BARNI BOUTHILLETTE PARIZEAU INC.

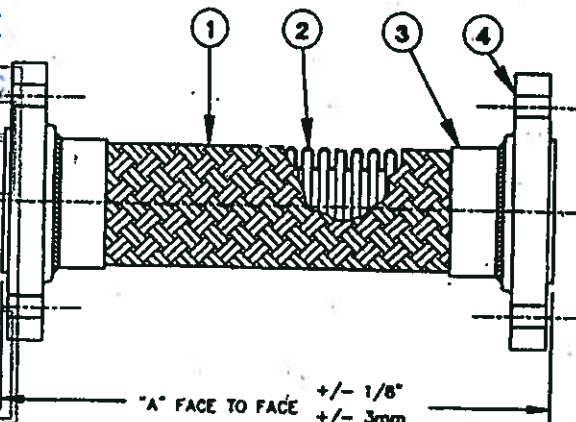
Reviewed

Reviewed with
Comments

Resubmit
See Comments

AUG 03 2010

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QTY	MODEL NUMBER	NOMINAL SIZE		"A" OVERALL LENGTH		MAXIMUM OPERATING PRESSURE @ 70°F (21°C)	
		INCHES	mm	INCHES	mm	PSIG	KPaG
	BSFS-0200-12	2	50	12	305	285	1,965
	BSFS-0250-12	2-1/2	63	12	305	285	1,965
	BSFS-0300-12	3	75	12	305	256	1,765
	BSFS-0400-18	3	75	18	457	256	1,765
	BSFS-0400-12	4	100	12	305	250	1,724
	BSFS-0400-18	4	100	18	457	250	1,724
	BSFS-0400-24	4	100	24	610	250	1,724
	BSFS-0500-18	5	125	18	457	200	1,379
	BSFS-0800-12	6	150	12	305	170	1,172
	BSFS-0600-18	6	150	18	457	170	1,172
	BSFS-0800-12	8	200	12	305	212	1,462
	BSFS-0800-18	8	200	18	457	212	1,462
	BSFS-1000-18	10	250	18	457	175	1,207
	BSFS-1200-18	12	300	18	457	160	1,103
	BSFS-1400-18	14	350	18	457	150	1,034

NOTES:

1) Maximum test pressure @ 70°F (21°C) is 1-1/2 times the maximum operating pressure at 70°F (21°C).
2) For operating temperatures in excess of 70°F (21°C), the tabulated pressures must be decreased in accordance with the "Conversion Factors" listed in the table below. Since the pressure ratings are based on annealed material properties, no reduction in pressure ratings is necessary for fitting attachment by TIG welding.

COMMENTS:

4	2	150# RAISED FACE SLIP ON FLANGE	FORGED STEEL
3	2	BRAID SLEEVE	STAINLESS STEEL SERIES 300
2	1	ANNULAR CORRUGATED METAL HOSE	STAINLESS STEEL SERIES 300
1	1	BRAID	STAINLESS STEEL SERIES 300
ITEM	QTY	DESCRIPTION	MATERIAL

BILL OF MATERIAL

THIS DOCUMENT IS THE PROPERTY OF SENIOR FLEXONICS (CANADA) LIMITED AND THE DATA HERE IN IS NOT TO BE DISCLOSED IN ANY FORM TO ANYONE WITHOUT THE WRITTEN PERMISSION OF SENIOR FLEXONICS OF (CANADA) LTD.

Customer:

Senior Flexonics

134 Nelson Street West
Brampton Ontario L6X 1C9
Tel: (905) 451-1250
Fax: (905) 451-1315
e-mail: sales@flexonics.ca

Reference/Project:

Drawing Title

MODEL BSFS
BRAIDED STAINLESS STEEL FLEXIBLE CONNECTOR
WITH 150# FORGED STEEL SLIP ON FLANGED ENDS

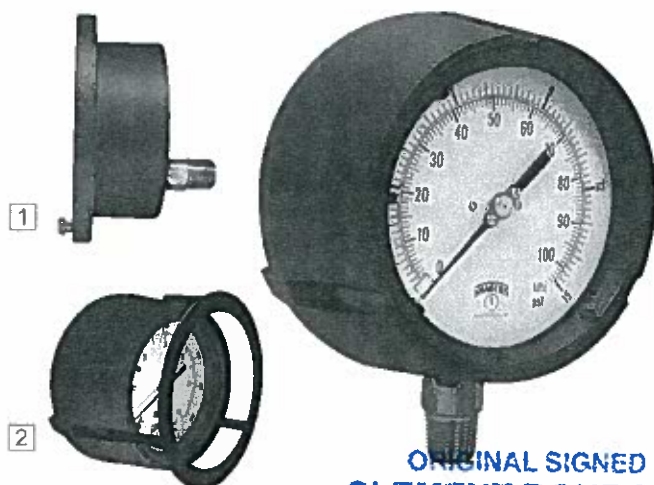
Customer PO #:

Drawing No.

1007086

Rev.
8

Section 15 10 00 2.5 Pressure Gauge and Needle Valve



1. Optional Hinged Case
2. Optional Flush Mounting Ring

Description & Features:

- Field liquid-fillable, phenolic solid front blowout back safety case
- $\pm 0.5\%$ accuracy
- Stainless steel full rotary movement for longer life
- Micrometer pointer for ease in calibration
- Under and overload stops
- 316L stainless steel, brass, Monel® or carbon steel wetted parts
- CRN registered
- 5 year warranty

Applications:

- Used where operator safety is a must
- Ideally suited for process, chemical and petroleum industries
- Highly corrosive media

Specifications	Stainless Steel Internals	Brass Internals
Dial	4.5" (115mm) white aluminum with black and red markings	4.5" (115mm) white aluminum with black and red markings
Case	Black phenolic, with safety blowout back, solid front, integral back flange	Black phenolic, with safety blowout back, solid front, integral back flange
Solid Wall	Phenolic	Phenolic
Lens	Polycarbonate	Polycarbonate
Ring	Phenolic	Phenolic
Pointer	Aluminum, anodized black, micrometer adjustable	Aluminum, anodized black, micrometer adjustable
Socket	316L SS	OT 58 brass
Connection	1/4" NPT or 1/2" NPT standard, bottom	1/4" NPT or 1/2" NPT standard, bottom
Bourdon Tube	316L SS, drawn seamless	Phosphor bronze
Movement	304 SS with over/under stops	304 SS with over/under stops
Gasket Materials	Silicone	Silicone
Welding	TIG	Silver alloy
Over-pressure Limit	25% for pressures up to 1500 psi/kPa, 15% for pressures 1501 to 8700 psi/kPa, 10% for pressures above 8701 psi/kPa	25% for pressures up to 1500 psi/kPa, 15% for pressures 1501 to 8700 psi/kPa, 10% for pressures above 8701 psi/kPa
Working Pressure	Maximum 75% of full scale value	Maximum 75% of full scale value
Ambient/Process Temperature	-40°F to 200°F (-40°C to 93°C) dry / -4°F to 150°F (-20°C to 65°C) glycerin-filled	-40°F to 200°F (-40°C to 93°C) dry / -4°F to 150°F (-20°C to 65°C) glycerin-filled
Accuracy	$\pm 0.5\%$ ANSI/ASME Grade 2A	$\pm 0.5\%$ ANSI/ASME Grade 2A
Enclosure Rating	IP65	IP65

Monel® is a registered trademark of Inco Alloys International

Order Codes (products in bold are normally in stock)

Connection	1/4" Bottom	1/4" Back (LB)	1/4" Bottom	1/4" Back (LB)	1/2" Bottom	1/2" Back (LB)
Socket, Tube	Brass	Brass	SS	SS	SS	SS
30" Hg Vacuum/kPa	PPC5080	PPC5280	PPC5040	PPC5340	PPC5060	PPC5460
30"-0-15 psi/kPa	PPC5120	PPC5220	PPC5130	PPC5330	PPC5140	PPC5440
30"-0-30 psi/kPa	PPC5121	PPC5221	PPC5131	PPC5331	PPC5141	PPC5441
30"-0-60 psi/kPa	PPC5122	PPC5222	PPC5132	PPC5332	PPC5142	PPC5442
30"-0-100 psi/kPa	PPC5123	PPC5223	PPC5133	PPC5333	PPC5143	PPC5443
30"-0-160 psi/kPa	PPC5124	PPC5224	PPC5134	PPC5334	PPC5144	PPC5444
30"-0-200 psi/kPa	PPC5125	PPC5225	PPC5135	PPC5335	PPC5145	PPC5445
30"-0-300 psi/kPa	PPC5126	PPC5226	PPC5136	PPC5336	PPC5146	PPC5446
0-15 psi/kPa	PPC5081	PPC5281	PPC5041	PPC5341	PPC5061	PPC5461
0-30 psi/kPa	PPC5082	PPC5282	PPC5042	PPC5342	PPC5062	PPC5462
0-60 psi/kPa	PPC5083	PPC5283	PPC5043	PPC5343	PPC5063	PPC5463
0-100 psi/kPa	PPC5084	PPC5284	PPC5044	PPC5344	PPC5064	PPC5464
0-160 psi/kPa	PPC5085	PPC5285	PPC5045	PPC5345	PPC5065	PPC5465
0-200 psi/kPa	PPC5086	PPC5286	PPC5046	PPC5346	PPC5066	PPC5466
0-300 psi/kPa	PPC5087	PPC5287	PPC5047	PPC5347	PPC5067	PPC5467
0-400 psi/kPa	PPC5088	PPC5288	PPC5048	PPC5348	PPC5068	PPC5468
0-600 psi/kPa	PPC5089	PPC5289	PPC5049	PPC5349	PPC5069	PPC5469
0-1,000 psi/kPa	PPC5098	PPC5298	-	-	-	-
Connection Size	1/2"	1/2"	1/4"	1/4"	1/2"	1/2"
0-1,000 psi/kPa	PPC5090	PPC5290	PPC5050	PPC5350	PPC5070	PPC5470
0-1,500 psi/kPa	PPC5091	PPC5291	PPC5051	PPC5351	PPC5071	PPC5471
0-2,000 psi/kPa	PPC5092	PPC5292	PPC5052	PPC5352	PPC5072	PPC5472
0-3,000 psi/kPa	PPC5093	PPC5293	PPC5053	PPC5353	PPC5073	PPC5473
0-5,000 psi/kPa	PPC5094	PPC5294	PPC5054	PPC5354	PPC5074	PPC5474
0-10,000 psi/kPa	PPC5095	PPC5295	PPC5055	PPC5355	PPC5075	PPC5475
0-15,000 psi/kPa	PPC5096	PPC5296	PPC5056	PPC5356	PPC5076	PPC5476
0-20,000 psi/kPa	PPC5097	PPC5297	PPC5057	PPC5357	PPC5077	PPC5477

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CLEMENT BOURGONE

above order codes only:

G = Glycerin (bottom connect only)

SG-45 = Safety glass

MS = Monel® tube and socket

FMR = Flush mounting ring

6HCS = 6" Solid front hinged case (back connection only)

CS = Carbon steel socket

SF45 = Silicone fill

HCSF = Solid front hinged case (back connection only)

WOOD BANANI EQUIPMENT

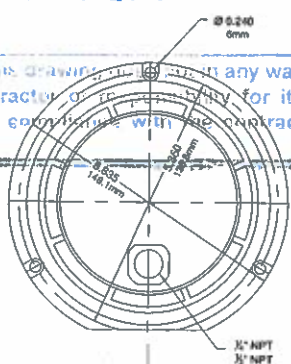
Reviewed ☒ Approved ☐

Comments

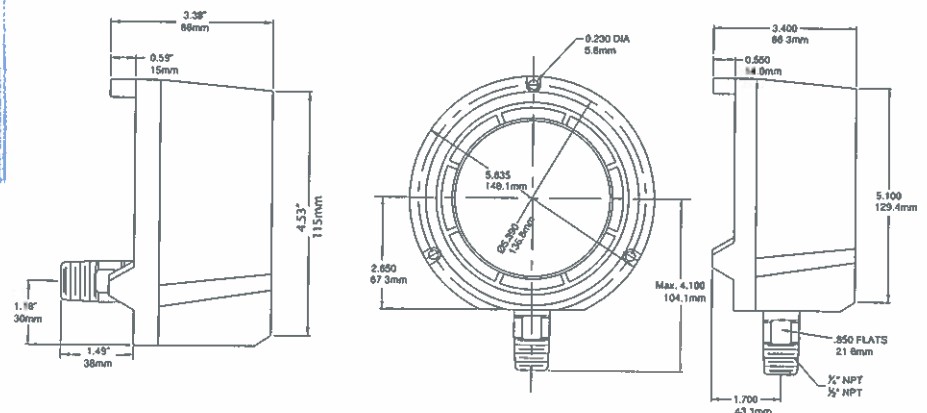
4.5" Back Connection

AUG 17 2010

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4.5" Bottom Connection with Integral Back Flange

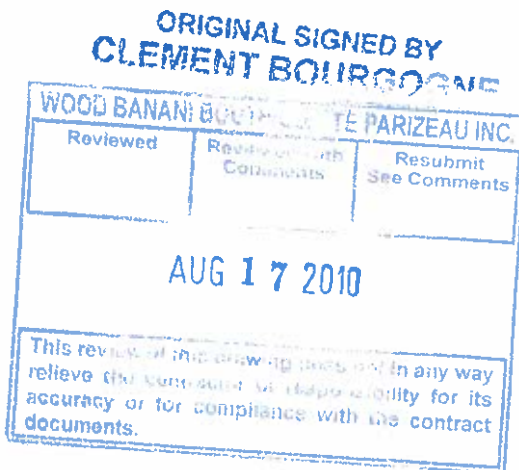


Monel® is a registered trademark of Inco Alloys International

Series Number (for custom, non-standard product)

SERIES	P	P	C	-			-			-			-			-			-		
DIAL SIZE																					
4.5" (115mm)																					
CASE MATERIALS																					
Phenolic																					
WETTED PARTS																					
Brass																					
316SS																					
Monel																					
Special																					
CONFIGURATION																					
Bottom Connection, Back Flange, Surface Mounting																					
Back Connection, Back Flange, Surface Mounting																					
Special																					
CONNECTION SIZE																					
1/4"																					
1/2"																					
THREAD																					
NPT																					
BSP (G)																					
BSPT (R)																					
Special																					
PRIMARY SCALE																					
UNITS - See Page 13																					
RANGE - See Page 13																					
SECONDARY SCALE																					
UNITS - See Page 13																					

- OPTIONS**
- Fluorolube Filled
 - Flush Mounting Ring
 - Glycerin Filled
 - Halocarbon Filled
 - Hinged Case
 - Maximum Adjustable Pointer
 - Monel Socket and Tube
 - NACE-MR0175-2002
 - Oxygen Cleaning
 - Silicone Filled
 - Safety Glass
 - Stainless Steel Tag Plate
 - StabilIZR™ Movement
 - Test Certificate
 - Glycerin Filled + Safety Glass
 - Glycerin/Water Filled
 - Safety Glass + Hinged Case
 - Safety Glass + Monel Socket and Tube
 - Safety Glass + Maximum Adjustable Pointer
 - Hinged Case + Monel Socket and Tube
 - Safety Glass + Maximum Adjustable Pointer + Hinged Case
 - No Options



S R
S P
S E
S Q
S T
S J
S W
S 5
S L
S D
S A
S M
S 3
S O
D K
S F
D J
D O
D Q
D R
T E
X X

SNV

Needle Valve



Description & Features:

- An isolation valve for pressure gauges and transmitters
- For mild applications, this valve can be used to throttle pulsation. Please see NVA Stainless Steel Needle Valve for more demanding applications
- CRN registered
- 1 year warranty

Applications:

- Provides precision flow control for any non-corrosive application up to 400 psi (2,758 kPa)

WOOD BANANI BOUTHILLETTE PARIZEAU INC		
Reviewed ✓	Reviewed with Comments	Resubmit See Comments
AUG 17 2010		
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CLEMENT BOURGOGNE

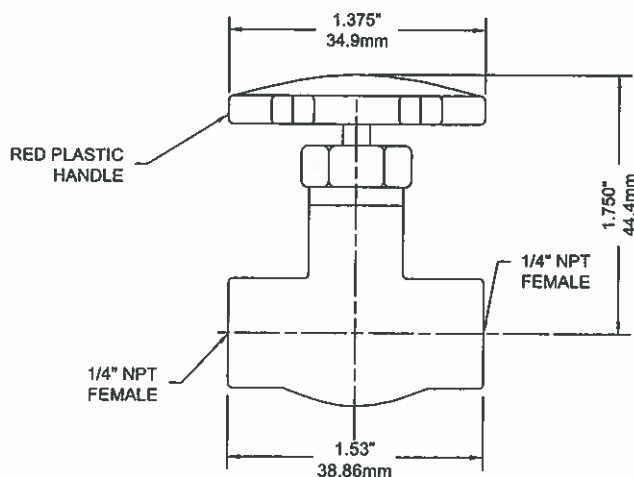
Specifications

Body	#59-1 forged brass
Handle	ABS plastic, dyed red
O-ring	Rubber
Shaft	#59-1 brass
Nut	#59-1 brass
Process Temperature	-9°F to 212°F (-23°C to 100°C)
Maximum Operating Pressure	400 psi (2,758 kPa)
Connection	1/4" NPT female

Order Codes (products in bold are normally in stock)

Code	SNV510
------	---------------

Note: Other configurations and materials available upon request



Series Number (for custom, non-standard product)

S	N	V	-		-	
---	---	---	---	--	---	--

SERIES

CONNECTION SIZE

1/4"

3/8"

1/2"

CONNECTION THREAD

NPT

BSP

BSPT

4

3

2

N

B

T

Section 15 68 00

Chemical Feed System



SUBMITTAL DRAWINGS

Job Name	Sanikiluaq Nunavut Truck Fill Station
Job Number	10-S005414
Date	June 18, 2010

Joe Zhou
Project Engineer

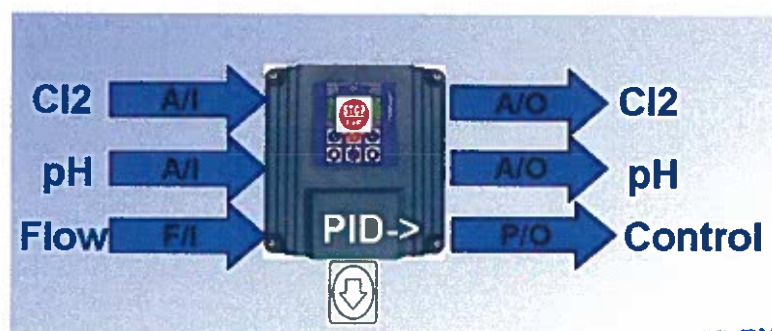
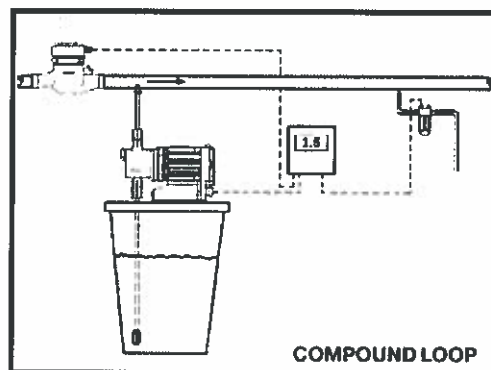
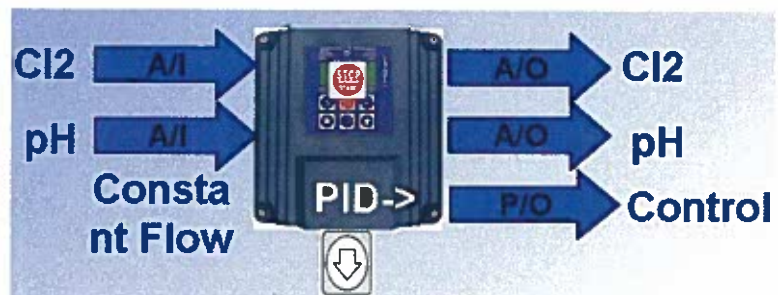
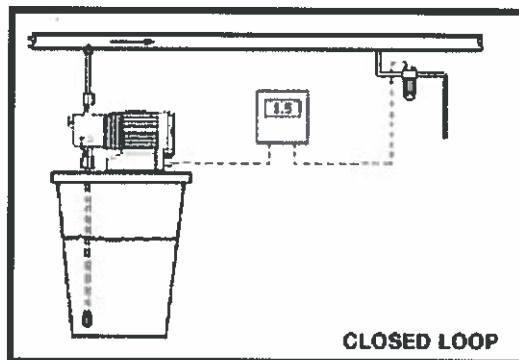
T 905.738.2355 x 300 □ F 905.738.5520 • E JoeZ@metconeng.com • W www.metconeng.com

CHLORINATION SYSTEM PROCESS NARRATIVE

The Sodium Hypochlorite feed system includes *Two (2)* duplex metering pump panel, *One (1)* simplex metering pump panel and *Three (3)* Free Chlorine analytical panel (as per dwg. #F1 & F2).

Each analytical panel controls one metering pump panel. Each free chlorine analyzer has Pause Contact option. The pause contact allows the analyzer to continue monitoring measured value, but stops control outputs when the NC contact is opened. This is used to stop metering when a main water pump is stopped in the water line as signaled by flow switch.

In order to maintain the residual level, the PID control action is applied to the analyzer / controller output signals. Closed loop control is used in this proposal since the flow rate is constant (assumed). In case the flow rate is vary, the analyzer / controller can be upgraded to receive a pulse signal from flow meter to reflect flow changes, and a compound loop control can be achieved (flow and signal variation will reflect to output signals).



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Please advice if the Closed Loop Control is acceptable.

Water flow rate is constant.
closed loop is acceptable

2

WOOD BANANI BOUTHILLETTE PARIZEAU INC.		
Reviewed with Comments	Resubmit See Comments	
JUN 30 2010		
This review of this drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.		

The metering pump system is capable to control pumps in local or remote mode. Auto-switchover is applied to the duplex system in both modes in case duty pump fails. When duplex metering pump system is in remote mode, pumps are running in alternative duty to ensure both pumps are used equal amounts of time. All the metering pump systems can be turned on and off in remote mode based on the signal from building control panel (provided by others).

D1c Free Chlorine Analytical Panel

- Inputs:

- Free chlorine analyzer Pause signal from Flow Switch (Provided by others)
- Power: 120 VAC / 1 phase / 60Hz

- Outputs:

- One 4-20mA signal for pump dosing speed to Metering Pump Panel
- One 4-20mA signal proportional liner to measured free chlorine level
- General Alarm – Dry contact 2 Amp @ 120VAC

Metering Pump Panel

- Inputs:

- One 4-20mA signal for pump dosing speed from Free Chlorine Analytical Panel
- One Remote ON/OFF signal from Building Control Panel (Provided by others)
- Power: 120 VAC / 1 phase / 60Hz

Metering Pump Capacity Required:

- 20 L/hr at 3Bar (43.5psi)

WOOD BANANI BOUTHILLETTE PARIZEAU		
Reviewed ✓	Reviewed with Comments	Resubmit See Comments
JUN 30 2010		
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2.3

CHEMICAL METERING PUMPS

Item #1

Simplex Metering Pump System

WOOD BANANI BOUTIN LLETTE PARIZEAU INC.		
Reviewed	Reviewed with Comments	Resubmitted See Comments
JUN 30 2010		
This review of this drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.		

The specifications call for a packaged system capable of operating as specified. The packaged system will be turned on and off by the building control system. Contractor and supplier are responsible to ensure that packaged controls enable the system to operate as needed.

SYSTEM DESCRIPTION

One (1) High Density Polyethylene Metering Pump Panel for Sodium Hypochlorite (as per dwg. #1), pre-mounted, pre-piped, pre-wired and pressure tested (24 hrs.), with one chemical pump and one chemical outlet.

The Delta pump has an Integrated injection control optoGuard® detects blocked dosing points, broken dosing lines and air or gas bubbles trapped in the dosing head.

Feed rate is determined by stroke length and stroke rate.

Stroke length is manually adjustable from 1 to 100% in increments of 1% via the stroke length knob.

Stroke rate can be set to a maximum of 200 strokes per minute.

In the "Manual" mode, stroke rate is controlled by pump.

In the "Analogue" Mode, the stroking rate of the pump is directly proportional to an analogue signal

Pump control mode select through 3-position selector switch (LOC/OFF/REM)

Pump operation mode (MANUAL/ANALOG) select through pump's keypad

Switch in LOC MODE, Pump in MANUAL mode:

- Pump Start / Stop control through pump's keypad
- Manually adjust required stroke frequency through pumps' keypad
- Manually adjust required stroke length through pump's knob

Switch in LOC MODE, Pump in ANALOG mode:

- Pump Start / Stop control through pump's keypad
- Pump stroke frequency is proportional linear to 4-20mA signal from Flow meter
- Manually adjust required stroke length through pump's knob

Switch in REM MODE, Pump in ANALOG mode:

- Remote Start / Stop from building control panel
- Pump stroke frequency is proportional linear to 4-20mA signal from chlorine controller (CC-01)
- Manually adjust required stroke length through pump's knob

Inputs for Control Panel

- Remote Start signal from building control panel
- 4-20mA signal from chlorine controller (CC-01)

Power Requirements:

- One receptacle (provided by others) for 120VAC/1ph/60Hz –1.5Amps for pump (Provide by others)
- 120VAC/1ph/60Hz – 1.5 Amps - for Control Panel

Pump Capacity Required: 20 LPH at 300 KPa (43.5 psi)

BILL OF MATERIALS

Qty. One (1)

ProMinent DELTA Pumps, Model: DELTA 0730PVT2000UDG130EN0

TAG: CMP-01

- Diaphragm-type with OptoDrive
- PTFE coated dosing diaphragm
- Microprocessor based electronics
- LCD display of operating status and parameters.
- IP 65 enclosure rating
- Capacity: 30 LPH @ Back Pressure: 700KPa (102psi)
- Max stroking rate: 200 SPM and 100% stroke length
- Operational status displayed via three LED lights indicating normal, low flow warning or lack of chemical/operational error
- Direct calibration function and build-in warning indicator
- Direct display of selected feed rate: liters/hour
- Manual + External 1:1 with analog control (Pump speed can be adjusted from pump's keypad as well)
- Fault Annunciating Relay
- C/w degassing solenoid valve (pre-wired to the control panel)
- CSA approved
- Power requirements: 120VAC/60 Hz
- Includes Control Cable

Material of Construction

Version - PVT

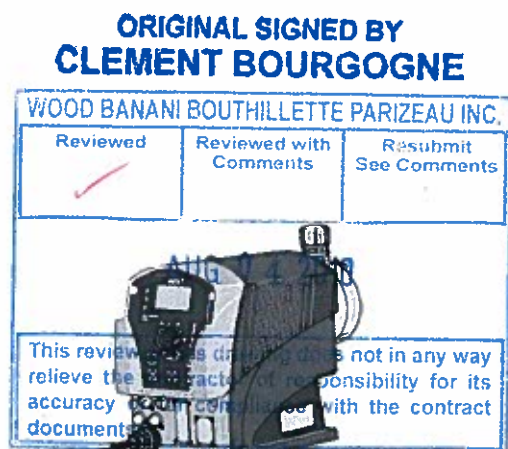
Dosing Head - PVDF

Suction/Discharge Connectors - PVDF

Seals - PTFE

Valve Balls - Ceramic

Diaphragm - PTFE



Qty. Two (2)

Back Pressure/Relief Valve, Chemline type SB11A005VU



- Size: 12mm (1/2")
- Material: PVC
- Elastomers: Viton
- Ends: Union Socket

Qty. Five (5)

Isolation Ball Valves, Chemline type 21A005VS



- Size: 12mm (1/2")
- Material: PVC
- Ball seats: Viton
- Ends: Socket

Qty. One (1)

Calibration Column PV#2-500



- Material: Clear PVC
- Size: 500 mL
- Fitting: 1/2" FNPT
- Threaded both ends

Qty. One (1)



Chemline Gauge Isolator + Pressure gauge Model MGA005-002VG200

- Material: PVC
- Diaphragm: Viton
- Inlet Size: 12 mm (1/2")

c/w Pressure Gauge

- Nominal Size: 62mm (2-1/2")
- Instrument connection: 6 mm (1/4")

Qty. One (1)

Control Panel (dwg #5)

- Enclosure: Fiber Glass NEMA 4X
200mm [8"] x 150mm [6"] x 100mm [4"]

Pump Controls:

Pump control mode select through 3-position selector switch (LOC/OFF/REM)

Pump operation mode (MANUAL/ANALOG) select through pump's keypad

Switch in LOC MODE, Pump in MANUAL mode:

- Pump Start / Stop control through pump's keypad
- Manually adjust required stroke frequency through pumps' keypad
- Manually adjust required stroke length through pump's knob

Switch in LOC MODE, Pump in ANALOG mode:

- Pump Start / Stop control through pump's keypad
- Pump stroke frequency is proportional linear to 4-20mA signal from Flow meter

- Manually adjust required stroke length through pump's knob

Switch in REM MODE, Pump in ANALOG mode:

- Remote Start / Stop from building control panel
- Pump stroke frequency is proportional linear to 4-20mA signal from chlorine controller (CC-01)
- Manually adjust required stroke length through pump's knob

Inputs for Control Panel

- Remote Start signal from building control panel
- 4-20mA signal from chlorine controller (CC-01)

Power Requirements:

- 120VAC/1ph/60Hz – 1.5 Amps - for Control Panel

Qty. One (1)

HDPE Panels 1220mm x 915mm (48" x 36")

Item #2 Duplex Metering Pump System

SYSTEM DESCRIPTION

Two (2) High Density Polyethylene Metering Pump Panel for Sodium Hypochlorite (as per dwg. #1), pre-mounted, pre-piped, pre-wired and pressure tested (24 hrs.), with one chemical pump and one chemical outlet.

The Delta pump has an Integrated injection control optoGuard® detects blocked dosing points, broken dosing lines and air or gas bubbles trapped in the dosing head.

Feed rate is determined by stroke length and stroke rate.

Stroke length is manually adjustable from 1 to 100% in increments of 1% via the stroke length knob.

Stroke rate can be set to a maximum of 200 strokes per minute.

In the "Manual" mode, stroke rate is controlled by pump.

In the "Analogue" Mode, the stroking rate of the pump is directly proportional to an analogue signal

Sure-Feed Control Panel with the following features:

- Local / Remote Selector from Keypad
- Duty and stand-by pumps selectable from Keypad
- Alternating start for pumps
- Automatic Switchover Feature in case of duty pump failure

- Inputs:

- 4-20 mA Analogue Signal (from Plant PLC)
- Remote ON/OFF (from Plant PLC)
- 120 VAC / 1 phase / 60Hz

- Outputs (Dry Contact rated@120VAC):

- Duty Pump Failed
- Pumps System Failed
- Remote Status
- Run Status

Power Requirements:

- One receptacle (provided by others) for 120VAC/1ph/60Hz –1.5Amps for pump (Provide by others)
- 120VAC/1ph/60Hz – 1.5 Amps - for Control Panel

Pump Capacity Required: 20 LPH at 300 KPa (43.5 psi)

BILL OF MATERIALS

Qty. Four (4)

ProMinent DELTA Pumps, Model: DELTA 0730PVT2000UDG130EN0

TAG: CMP-02, CMP-03, CMP-04 & CMP-05

- Diaphragm-type with OptoDrive
- PTFE coated dosing diaphragm
- Microprocessor based electronics

See comment
on item #1

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- LCD display of operating status and parameters.
- IP 65 enclosure rating
- Capacity: 30 LPH @ Back Pressure: 700KPa (102psi)
- Max stroking rate: 200 SPM and 100% stroke length
- Operational status displayed via three LED lights indicating normal, low flow warning or lack of chemical/operational error
- Direct calibration function and build-in warning indicator
- Direct display of selected feed rate: liters/hour
- Manual + External 1:1 with analog control (Pump speed can be adjusted from pump's keypad as well)
- Fault Annunciating Relay
- C/w degassing solenoid valve (pre-wired to the control panel)
- CSA approved
- Power requirements: 120VAC/60 Hz
- Includes Control Cable

Material of Construction

Version - PVT

Dosing Head - PVDF

Suction/Discharge Connectors - PVDF

Seals - PTFE

Valve Balls - Ceramic

Diaphragm - PTFE

Qty. Six (6)



Back Pressure/Relief Valve, Chemline type SB11A005VU

- Size: 12mm (1/2")
- Material: PVC
- Elastomers: Viton
- Ends: Union Socket

Qty. Twelve (12)



Isolation Ball Valves, Chemline type 21A005VS

- Size: 12mm (1/2")
- Material: PVC
- Ball seats: Viton
- Ends: Socket

Qty. Two (2)



Calibration Column PV#2-500

- Material: Clear PVC
- Size: 500 mL
- Fitting: 1/2" FNPT
- Threaded both ends

Qty. Two (2)



Chemline Gauge Isolator + Pressure gauge Model MGA005-002VG200

- Material: PVC
- Diaphragm: Viton
- Inlet Size: 12 mm (1/2")

C/w Pressure Gauge

- Nominal Size: 62mm (2-1/2")
- Instrument connection: 6 mm (1/4")

Qty. Two (2)



Surefeed Control Panel (dwg #4)

- Enclosure: Fiber Glass NEMA 4X
300mm [12"] x 250mm [10"] x 150mm [6"]
- Local / Remote Selector From Keypad
- Duty and stand-by pumps selectable from Keypad
- Alternating start for pumps
- Automatic Switchover Feature in case of duty pump failure
- Inputs:
 - 4-20 mA Analogue Signal (from Plant PLC)
 - Remote ON/OFF (from Plant PLC)
 - 120 VAC / 1 phase / 60Hz

Power Requirements:

- 120VAC/1ph/60Hz – 1.5 Amps - for Control Panel

Qty. One (1)

HDPE Panels 1220mm x 1220mm (48" x 48")

Shipped loose:

Qty. Five (5)

Foot Valves



Qty. Three (3)

*Metcon Corporation stop (CS-50-PVC), to be installed at injection point
Suitable for Sodium Hypochlorite solution*



Qty. Three (3)

12mm (1/2") Injection Valve



15 m (45 feet)

1/2" PVC Discharge Tubing

25 m (75 feet)

1/2" PE Suction Tubing

SYSTEM DESCRIPTION

Two (2) HDPE Panel, Prepiped, Prewired & Configured by Metcon Sales and Engineering (As per dwg. #2) C/w:

- One DIC Analyser for Free Chlorine with pH compensation
- Probe holder for: free chlorine sensor, pH sensor and flow indicator

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BILL OF MATERIALS

Qty. Two (2)

D1CAW1C11014G020E, ProMinent Chlorine Analyser for Free Chlorine
(Tags: CC-01, CC-02 & CC-03)

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- Microprocessor based technology
- Continuous measuring membrane-covered amperometric sensor for determining free chlorine
- Wall mounted unit in NEMA-4X enclosure
- Measured variable: Free Chlorine
- Measurement range: 0-5mg/L(ppm)
- Low Limit Alarm: Field Programmable
- High Limit Alarm: Field Programmable
- 4-20 mA connection for sensor input
- Correcting Value: pH for Free Chlorine
- 1 malfunction + 2 limit relays
- One Current (4-20mA) Output to duplex metering pump system as pumps speed reference
- One Current (4-20mA) Output proportional liner to Free Chlorine Level
- PID Control Action
- LCD display
- No reagents or Buffer required
- CSA approved
- Power requirements: 115 VAC, 60 HZ, single phase
- Dimensions: 200mm (H) x 200mm (W) x 76mm (D)

Qty. Two (2)

DGMA111T010 Probe Holder



- In-line probe housing
- Flow control (l/h)
- One 25 mm threaded module for Free probe
- One PG13.5 module for pH probe
- Connection type: PVC half-union with 1/4" MNPT adapters
- PVC with Viton seals
- Flow Rate: min. 30 LPH
- Maximum Pressure: 29 psi

Qty. Two (2)



Sensor CLE-3.1- mA, 0 to 5 ppm (PT #1019398) for Free Chlorine

- 4-20 mA output
- Two wire Dulcomarine Cable (3m long) to be used with the probe
- Integrated temperature compensator
- PH compensation between 5.5-8.5 pH

Qty. Two (2)



Sensor PHED 112 SE (PT #741036) for pH

- Comes with Signal Converter 4-20 mA (PT #809126) and 3m cable
- Range 1-12 pH
- Operating Pressure 14.5 psi

Qty. Two (2)



Pressure Reducing Valve with Pressure Gauge SR50A005VU

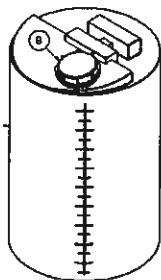
- Size: 12mm (1/2")
- Material: PVC
- Elastomers: Viton

Qty. Two (2)

HDPE Panel 510 mm x 610 mm (20" x 24")

2.3 CHEMICAL TANKS

Qty. One (1)

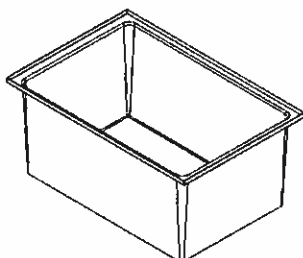


ACO TOTE Barrel Model# PTB-300 (dwg. #PTB-300)

- Construction: UV-stabilized High Density Polyethylene (HDPE)
- Capacity: 300 Litres
- Dimensions: 661mm (26") Diameter, 1118mm (44") Height
- Colour: Natural/Transparent
- Lid Size: 140mm (5.5")
- Fitting: One (1) 50mm (2") welded boss on top of the tank for transfer pump

2.4 ECONDARY CONTAINMENT TANKS

Qty. One (1)

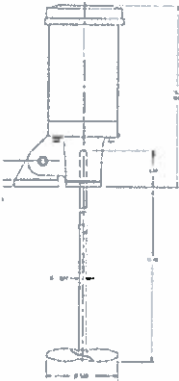


ACO Containment Basin Model# IRD-90 (dwg. #IRD-90)

- Construction: UV-stabilized High Density Polyethylene (HDPE)
- Capacity: 430 Litres
- Dimensions: 1169mm (46") x 788mm (31") x 534mm (21")
- Maximum diameter of primary tank: 661mm (26")

2.5 ELECTRIC MIXER

Qty. One (1) *Lighntin electric mixer Model# EV1P25 (dwg. No-1)*



- Motor: ¼ HP, 115/208-230VAC, 1-phase, 60Hz, 1725RPM with switch cord and plug
- Impeller: Single 3.6" diameter A100
- Shaft: 33" (from Mounting Base), 316 S.S, Kynar coated.
- Mounting: 4 Holes mounting bracket, Offset 0-20 deg. Horizontally (Adjustable)
- Weight: 44 Lbs (less shaft and impeller)

2.6 ELECTRIC TRANSFER PUMP

Qty. One (1)



Lutz Polypropylene sealless pump tube (MMS-PP) Modle# LZ0110-205

- Material: Polypropylene (Suitable for Sodium Hypochlorite)
- Bearings: PTFE
- Drive Shaft: HC-4 (2.4610)
- Immersion Length: 990mm (39")
- Tube Diameter: 41mm
- Discharge Connection: Hose Barb, 19mm (¾")
- Weight:

C/w: Lutz B36SC/MI4E drum pump motor Model# LZ0030-010



- Motor: Universal motor 120VAC/1-phase/60Hz, 640 watt c/w speed controller and bipolar on/off switch with single pole thermal over current release, open drip-proof.
- Application: Thin-bodied, slightly viscous, aggressive and non-flammable liquids
- Operating Quantity: Up to 54.5gpm
- Delivery Head: Up to 21mt (69')
- Temp. of medium: Up to 120 C (248 F)
- Viscosity: Up to 1400cps
- Combined Weight (Tube + Motor): 7.4 lbs

2.7

CARTRIDGE FILTER SYSTEM

Qty. One (1)	Harmsco® Model #: HUR 3X170FL utilizes three (3) Harmsco Hurricane HC/170-20, 20 micron filter cartridge (TAG: F-01)
Qty. One (1)	Harmsco® Model #: HUR 3X170FL utilizes three (3) Harmsco Hurricane HC/170-5, 5 micron filter cartridge (TAG: F-02)
Qty. One (1)	Harmsco® Model #: HUR 3X170FL utilizes three (3) Harmsco Hurricane HC/170-1, 1 micron filter cartridge (TAG: F-03)
Qty. One (1)	Harmsco® Model #: HUR 3X170FL utilizes three (3) Harmsco Hurricane HC/170-1, 1 micron filter cartridge (TAG: F-04)

Description:

Tangential Entry, Up-Flow Cartridge Filter Housing with; Swing Bolt Closure, Davit Cover Lift, and Flanged Connections.

Construction:

1. Stainless steel construction, all wetted metallic components meet, or exceed ASTM A- 240

Construction:

1. Inlet & Outlet are NPS 3 Flanges ANSI/AMSE B16.5 Class 150
2. Drains (Qty 2) are 1-1/2" Female NPT (FPT) Couplings, Class 1000
3. Vent is 1/2" Female NPT (FPT) Coupling, Class 1000
4. Gage Ports (Qty 2) are 1/4" Female NPT (FPT) Couplings, Class 1000

Note: 1/2" FNPT Vent coupling is the standard design on Harmsco model HUR 3X170FL system. Please advice if this size is acceptable. *dh*

Details:

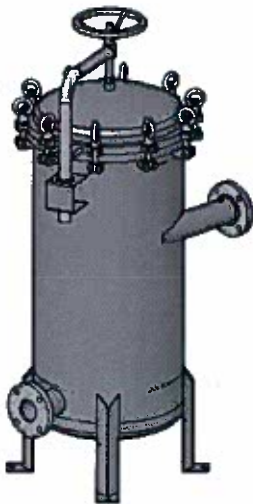
1. Swing bolt style housing closure. Swing bolts meet, or exceed ASTM A-193 B8.
2. NSF Certified using Genuine Harmsco® Hurricane™ replacement filter cartridges.
3. Tangential inlet, along with the integral inner can, creates a centrifugal flow that induces pre-filtration by heavy particulate separation.
4. Patented "Up-Flow" design that;
 - a. Self purges housing of air,
 - b. Eliminates by-pass contamination during servicing,
 - c. Improves efficiency by creating an even flow distribution across filtering media.
5. Closure Gasket is EPDM 70 Durometer O-ring.
6. Electro-polish finish.
7. Pressure Rating - 200 P.S.I.G. Maximum
8. Temperature Rating - Up to 140°F
9. Flow Rate - 450 GPM Maximum (optimal 315 GPM).
10. One person can perform maintenance.

Requirements:

Floor Load: Dry weight = 420 lbs.

Volume = 61 US gallons x 8.337 lbs./US gallon (water) = 509 lbs.

Total weight = 420 + 509 = 929 lbs. (housing + water)



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Floor contact area = .292 ft²

Floor Load = 929 lbs. divided by .292 ft² = 3,200 pounds per square foot (approx.)

Installation Note:

Piping is to conform to all applicable codes and be independently supported. If floor strength is suspect, use appropriate measures to adequately distribute load. Floor Space: 4.5 ft² (does not include Cover/Davit swing position), See Installation Diagram (dwg. #3)

Service Height: 98-1/2", See Installation Diagram (dwg. #3)

Bonding: Housing is to be bonded in accordance with all applicable codes. A grounding lug is provided on a leg.

Spare Parts:

2x Qty. Three (3) Harmsco Model# HC/170-20, 20 micron filter cartridge

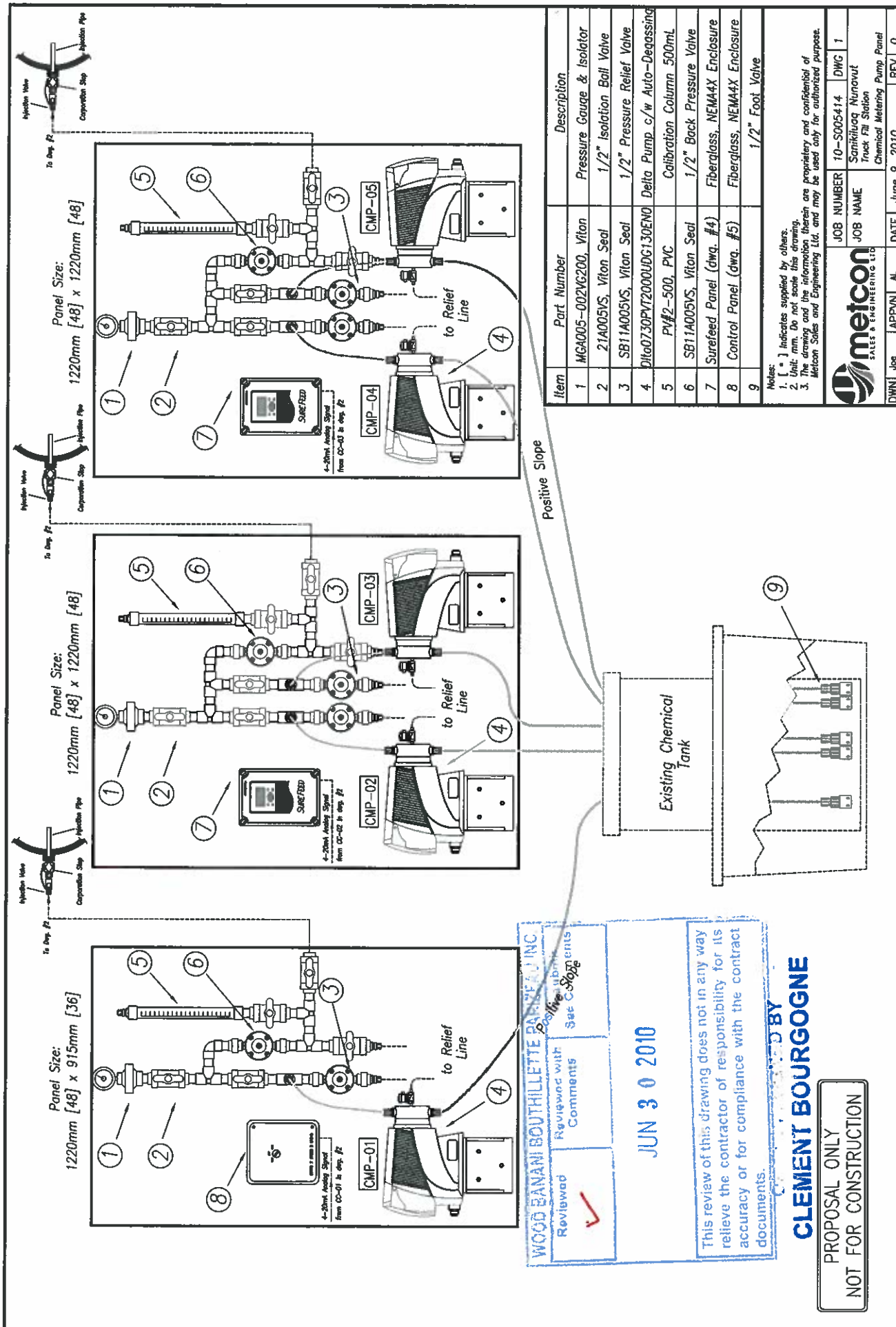
2x Qty. Three (3) Harmsco Model# HC/170-5, 5 micron filter cartridge

2x Qty. Six (6) Harmsco Model# HC/170-1, 1 micron filter cartridge

Three sets of cartridges must be provided. Each filter housing uses 3 cartridges. A total of 3 - 20µ cartridges, 9 - 5µ cartridges and 18 - 1µ cartridges must be supplied.

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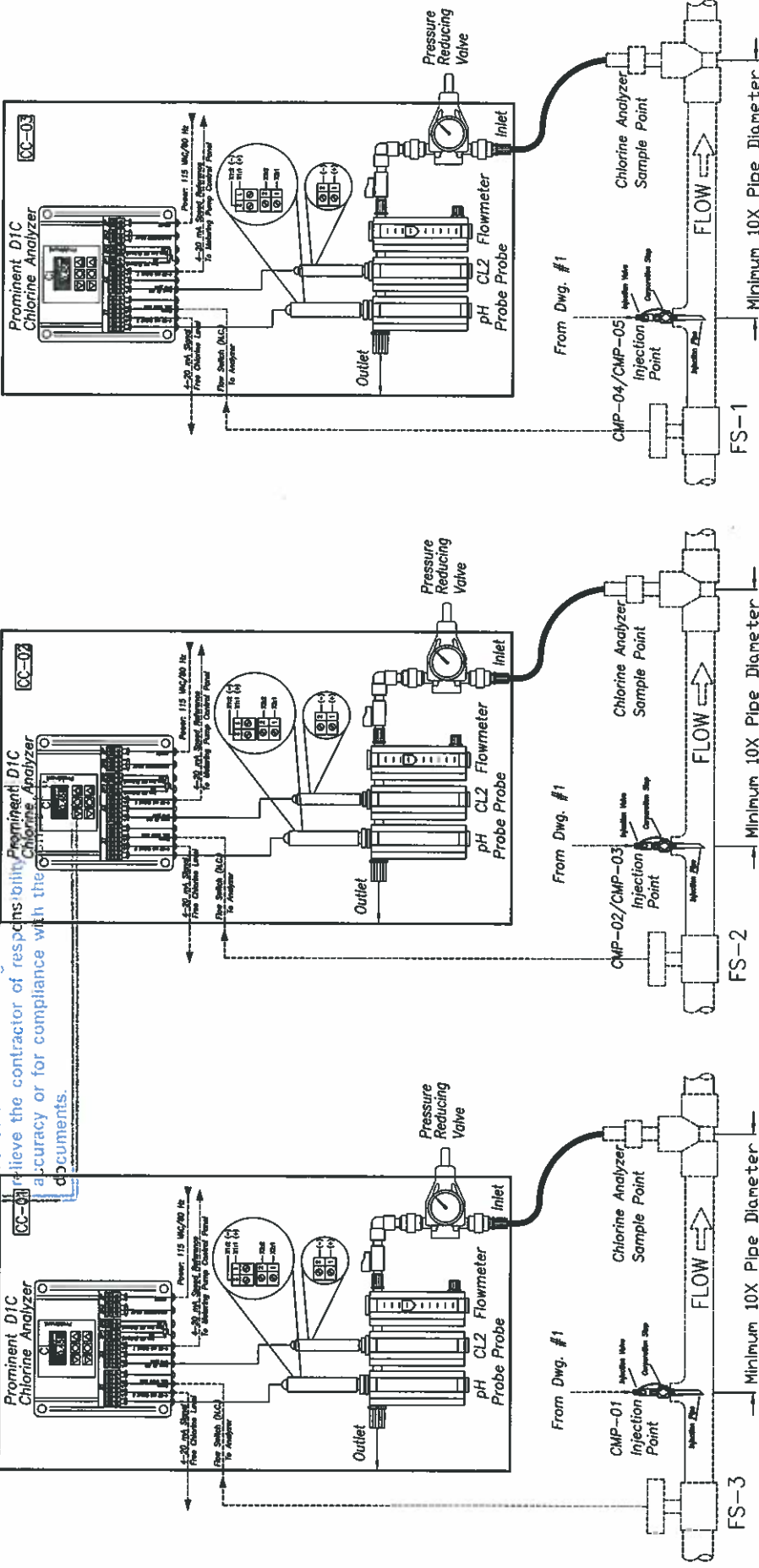
Comments

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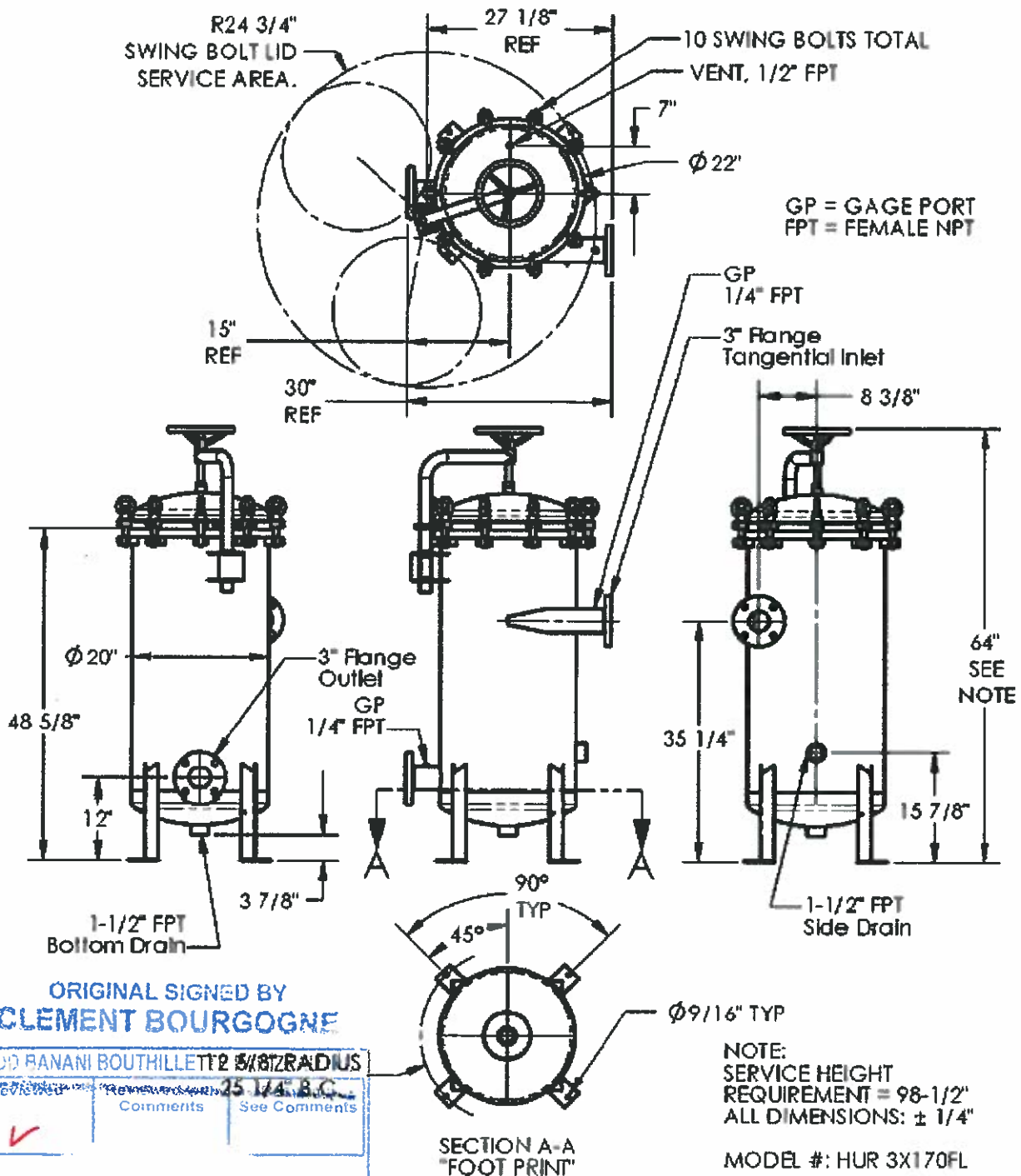


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2. Unit: mm. Do not scale this drawing.
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		metcon		JOB NUMBER		10-S005414		DWG		2	
SALES & ENGINEERING LTD				JOB NAME		Sanikiluaq Nunavut Truck Fill Station Chlorine Analyzer Panel					
DWN	Joe	APPVN	AL	DATE	June 9, 2010		REV		0		

Harmsco® Filtration Products Installation Diagram Hurricane™ 3 X 170 Swing Bolt Housing



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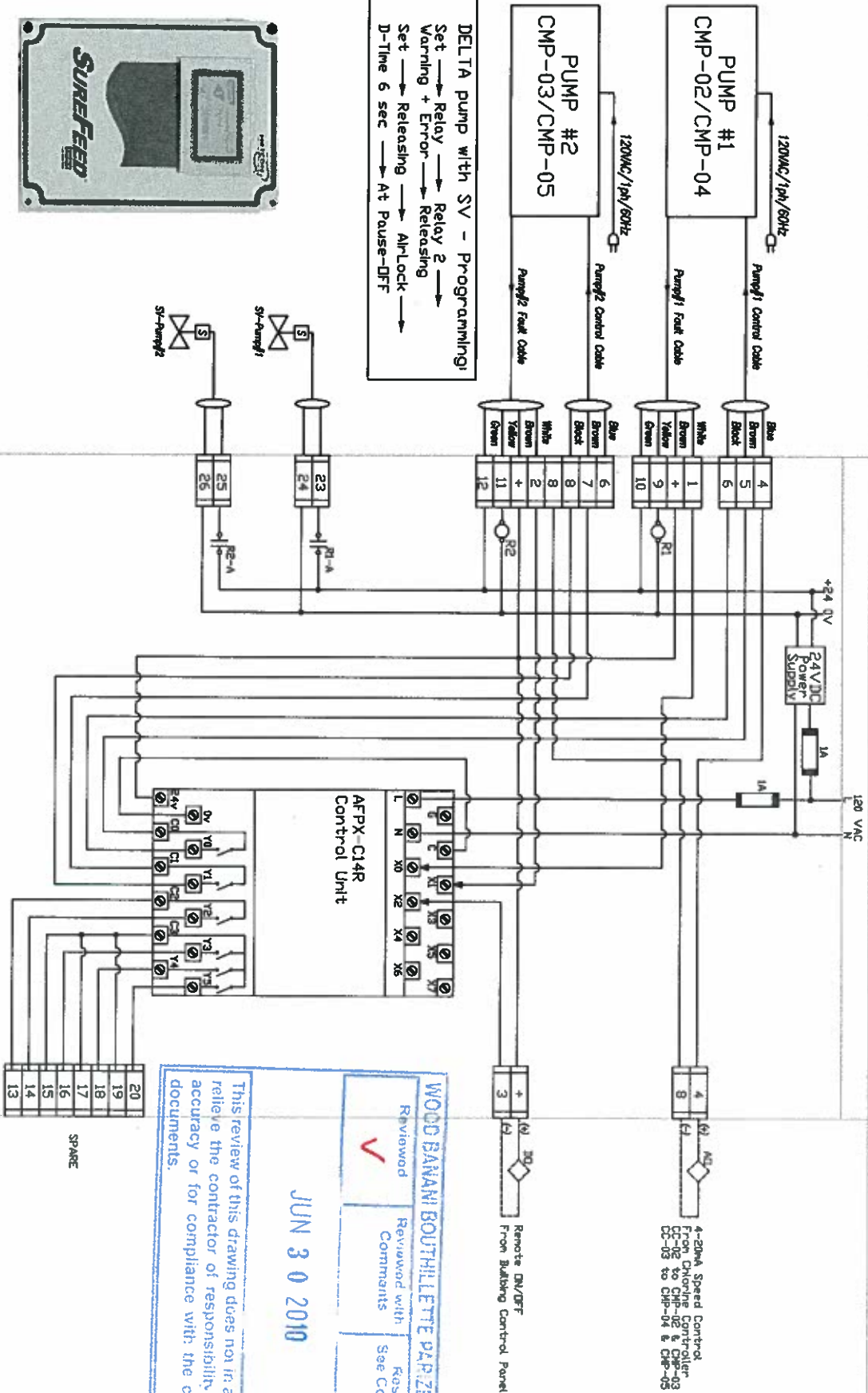


JOB NUMBER	10-S005414	DWG	3
JOB NAME	Sanikiluaq Nunavut Truck Fill Station Cartridge Filter System		
DATE	June 9, 2010	REV	0

CHEMICAL PANEL

SUREFEED-CONTROL BOX

FIELD WIRING



1. (a) Includes supplied by others.
2. (b) (a) (b) (c) (d) (e) (f) (g) (h) (i) (j) (k) (l) (m) (n) (o) (p) (q) (r) (s) (t) (u) (v) (w) (x) (y) (z) (aa) (ab) (ac) (ad) (ae) (af) (ag) (ah) (ai) (aj) (ak) (al) (am) (an) (ao) (ap) (aq) (ar) (as) (at) (au) (av) (aw) (ax) (ay) (az) (ba) (bb) (bc) (bd) (be) (bf) (bg) (bh) (bi) (bj) (bk) (bl) (bm) (bn) (bo) (bp) (bq) (br) (bs) (bt) (bu) (bv) (bw) (bx) (by) (bz) (ca) (cb) (cc) (cd) (ce) (cf) (cg) (ch) (ci) (cj) (ck) (cl) (cm) (cn) (co) (cp) (cq) (cr) (cs) (ct) (cu) (cv) (cw) (cx) (cy) (cz) (da) (db) (dc) (dd) (de) (df) (dg) (dh) (di) (dj) (dk) (dl) (dm) (dn) (do) (dp) (dq) (dr) (ds) (dt) (du) (dv) (dw) (dx) (dy) (dz) (ea) (eb) (ec) (ed) (ee) (ef) (eg) (eh) (ei) (ej) (ek) (el) (em) (en) (eo) (ep) (eq) (er) (es) (et) (eu) (ev) (ew) (ex) (ey) (ez) (fa) (fb) (fc) (fd) (fe) (ff) (fg) (fh) (fi) (fj) (fk) (fl) (fm) (fn) (fo) (fp) (fq) (fr) (fs) (ft) (fu) (fv) (fw) (fx) (fy) (fz) (ga) (gb) (gc) (gd) (ge) (gf) (gg) (gh) (gi) (gj) (gk) (gl) (gm) (gn) (go) (gp) (gq) (gr) (gs) (gt) (gu) (gv) (gw) (gx) (gy) (gz) (ha) (hb) (hc) (hd) (he) (hf) (hg) (hh) (hi) (hj) (hk) (hl) (hm) (hn) (ho) (hp) (hq) (hr) (hs) (ht) (hu) (hv) (hw) (hx) (hy) (hz) (ia) (ib) (ic) (id) (ie) (if) (ig) (ih) (ii) (ij) (ik) (il) (im) (in) (io) (ip) (iq) (ir) (is) (it) (iu) (iv) (iw) (ix) (iy) (iz) (ja) (jb) (jc) (jd) (je) (jf) (jg) (jh) (ji) (jj) (jk) (jl) (jm) (jn) (jo) (jp) (jq) (jr) (js) (jt) (ju) (jv) (jw) (jx) (jy) (jz) (ka) (kb) (kc) (kd) (ke) (kf) (kg) (kh) (ki) (kj) (kk) (kl) (km) (kn) (ko) (kp) (kq) (kr) (ks) (kt) (ku) (kv) (kw) (kx) (ky) (kz) (la) (lb) (lc) (ld) (le) (lf) (lg) (lh) (li) (lj) (lk) (ll) (lm) (ln) (lo) (lp) (lq) (lr) (ls) (lt) (lu) (lv) (lw) (lx) (ly) (lz) (ma) (mb) (mc) (md) (me) (mf) (mg) (mh) (mi) (mj) (mk) (ml) (mm) (mn) (mo) (mp) (mq) (mr) (ms) (mt) (mu) (mv) (mw) (mx) (my) (mz) (na) (nb) (nc) (nd) (ne) (nf) (ng) (nh) (ni) (nj) (nk) (nl) (nm) (nn) (no) (np) (nq) (nr) (ns) (nt) (nu) (nv) (nw) (nx) (ny) (nz) (oa) (ob) (oc) (od) (oe) (of) (og) (oh) (oi) (oj) (ok) (ol) (om) (on) (oo) (op) (oq) (or) (os) (ot) (ou) (ov) (ow) (ox) (oy) (oz) (pa) (pb) (pc) (pd) (pe) (pf) (pg) (ph) (pi) (pj) (pk) (pl) (pm) (pn) (po) (pp) (pq) (pr) (ps) (pt) (pu) (pv) (pw) (px) (py) (pz) (qa) (qb) (qc) (qd) (qe) (qf) (qg) (qh) (qi) (qj) (qk) (ql) (qm) (qn) (qo) (qp) (qq) (qr) (qs) (qt) (qu) (qv) (qw) (qx) (qy) (qz) (ra) (rb) (rc) (rd) (re) (rf) (rg) (rh) (ri) (rj) (rk) (rl) (rm) (rn) (ro) (rp) (rq) (rr) (rs) (rt) (ru) (rv) (rw) (rx) (ry) (rz) (sa) (sb) (sc) (sd) (se) (sf) (sg) (sh) (si) (sj) (sk) (sl) (sm) (sn) (so) (sp) (sq) (sr) (ss) (st) (su) (sv) (sw) (sx) (sy) (sz) (ta) (tb) (tc) (td) (te) (tf) (tg) (th) (ti) (tj) (tk) (tl) (tm) (tn) (to) (tp) (tq) (tr) (ts) (tt) (tu) (tv) (tw) (tx) (ty) (tz) (ua) (ub) (uc) (ud) (ue) (uf) (ug) (uh) (ui) (uj) (uk) (ul) (um) (un) (uo) (up) (uq) (ur) (us) (ut) (uu) (uv) (uw) (ux) (uy) (uz) (va) (vb) (vc) (vd) (ve) (vf) (vg) (vh) (vi) (vj) (vk) (vl) (vm) (vn) (vo) (vp) (vq) (vr) (vs) (vt) (vu) (vv) (vw) (vx) (vy) (vz) (wa) (wb) (wc) (wd) (we) (wf) (wg) (wh) (wi) (wj) (wk) (wl) (wm) (wn) (wo) (wp) (wq) (wr) (ws) (wt) (wu) (wv) (ww) (wx) (wy) (wz) (xa) (xb) (xc) (xd) (xe) (xf) (xg) (xh) (xi) (xj) (xk) (xl) (xm) (xn) (xo) (xp) (xq) (xr) (xs) (xt) (xu) (xv) (xw) (xx) (xy) (xz) (ya) (yb) (yc) (yd) (ye) (yf) (yg) (yh) (yi) (yj) (yk) (yl) (ym) (yn) (yo) (yp) (yq) (yr) (ys) (yt) (yu) (yv) (yw) (yx) (yz) (za) (zb) (zc) (zd) (ze) (zf) (zg) (zh) (zi) (zj) (zk) (zl) (zm) (zn) (zo) (zp) (zq) (zr) (zs) (zt) (zu) (zv) (zw) (zx) (zy) (zz)

- Duty Selectable for pumps
- Alternating Start for pumps
- Automatic Switchover if Duty fails
- Inputs
- 4-20mA Control Signal
- Relay Drive/DTF for System
- 115VAC / 1ph / 60Hz

PROPOSAL ONLY
NOT FOR CONSTRUCTION



JOB NUMBER 10-S005414
JOB NAME Sunking Nurest Truck Fill Station
SUREFEED Control Panel

DATE June 14, 2010
REV. 0

This review of this drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.

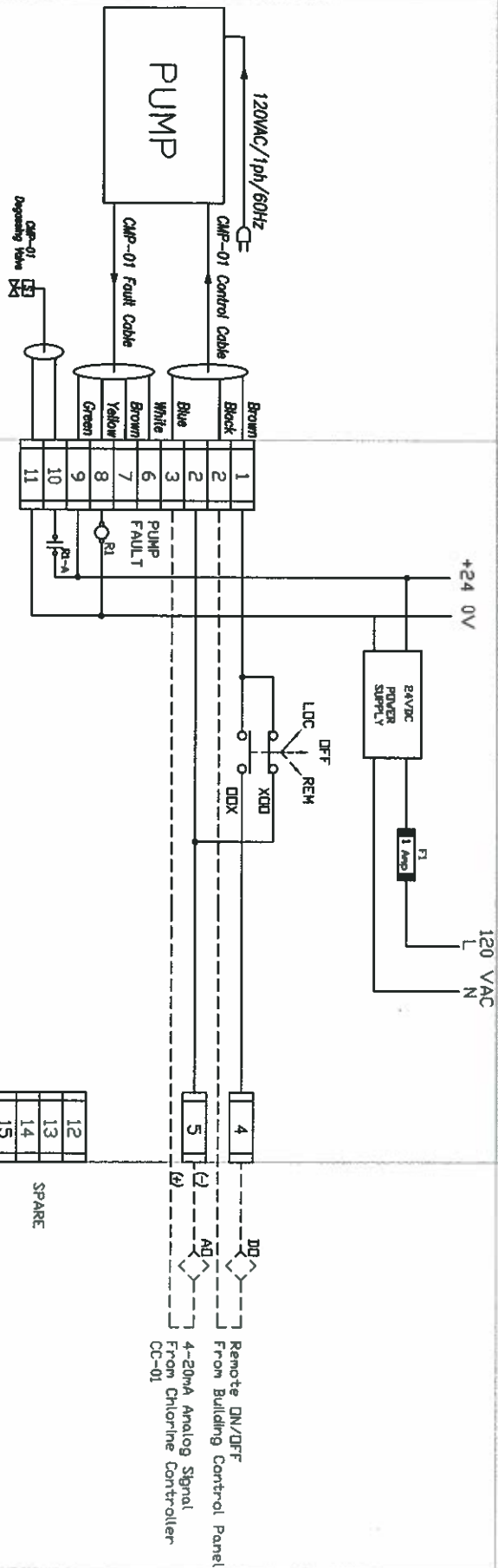
JUN 30 2010

Reviewed	Reviewed with Comments	Resubmit
✓		

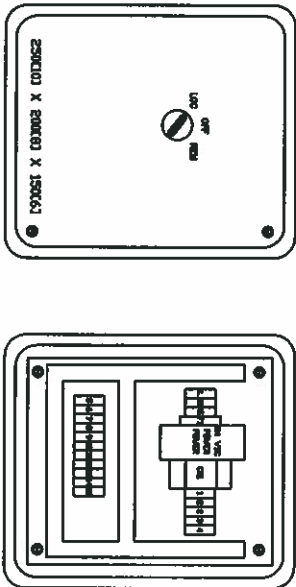
CHEMICAL PANEL

CONTROL PANEL

FIELD WIRING




- Pump control mode select through 3-position selector switch (LOC/OFF/REM) Switch to LOC MODE. Pump in MANUAL mode.
- Manually adjust required stroke length through pump's keypad
 - Manually adjust required stroke length through pump's knob
 - Switch to LOC MODE. Pump in MANUAL mode.
 - Pump Start / Stop control through pump's keypad
 - Pump stroke frequency is proportional linear to 4-20mA signal from Flow meter
 - Manually adjust required stroke length through pump's knob
 - Switch to OFF MODE. Pump in OFF mode.
 - Pump Start / Stop control through pump's keypad
 - Pump stroke frequency is proportional linear to 4-20mA signal from chlorine controller (CC-01)
 - Manually adjust required stroke length through pump's knob
 - Remove Start signal from building control panel
 - 4-20mA signal from chlorine controller (CC-01)



- Notes:
1. [*] Indication supplied by others.
 2. Unit: mm. Do not scale this drawing.
 3. The drawing and the information therein are proprietary and confidential of Metcon Sales and Engineering Ltd. and may be used only for authorized purposes.

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NOT FOR CONSTRUCTION

 melcon SALES & ENGINEERING LTD.	JOB NUMBER	10-S005414	DWG	5
	JOB NAME	Sanikiluaq New Truck Fill Station Control Panel		
	DATE	June 14, 2010	REV	0
	JOB	APPVN	AL	DWN

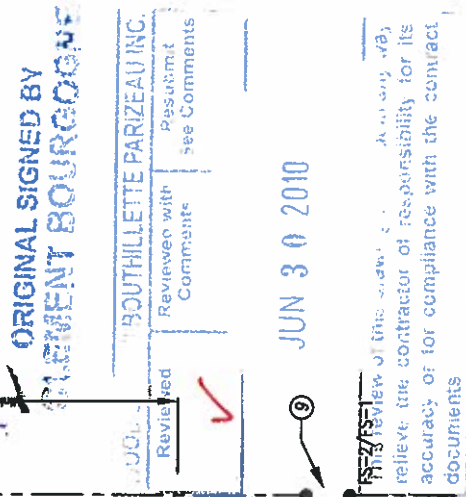
WOOD BANANI BOUTILLETTE PARIZEAU INC.

Reviewed with Comments See Comments


JUN 30 2010

This review of this drawing does not in any way relieve the contractor of responsibility for the accuracy or for compliance with the contract documents.

1. The flow switch contact closes when the water flow presents in the water line (assume the flow rate is constant).
2. The free chlorine analyzer remain control output signal when the flow switch contact closes.
3. Based on the free chlorine set point and current free chlorine level, the analyzer will control the metering pump dosing speed in PID control action.
4. The duplex metering pump system has one duty pump and one standby pump. The system is capable to control pumps in local or remote mode. Auto-switchover is applied to the duplex system in case duty pump fails. When duplex metering pump system is in remote mode, pumps are running in alternative duty mode to ensure both pumps are used equal amounts of time.



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 metcon SALES & ENGINEERING LTD	JOB NUMBER	10-S005414	DWG	F1
	JOB NAME	Sanitization Manual		
		Track F1 Station Floor Diagram 1		
DWN	JOB	APPROV	DATE	REV
		AL	June 28, 2010	0

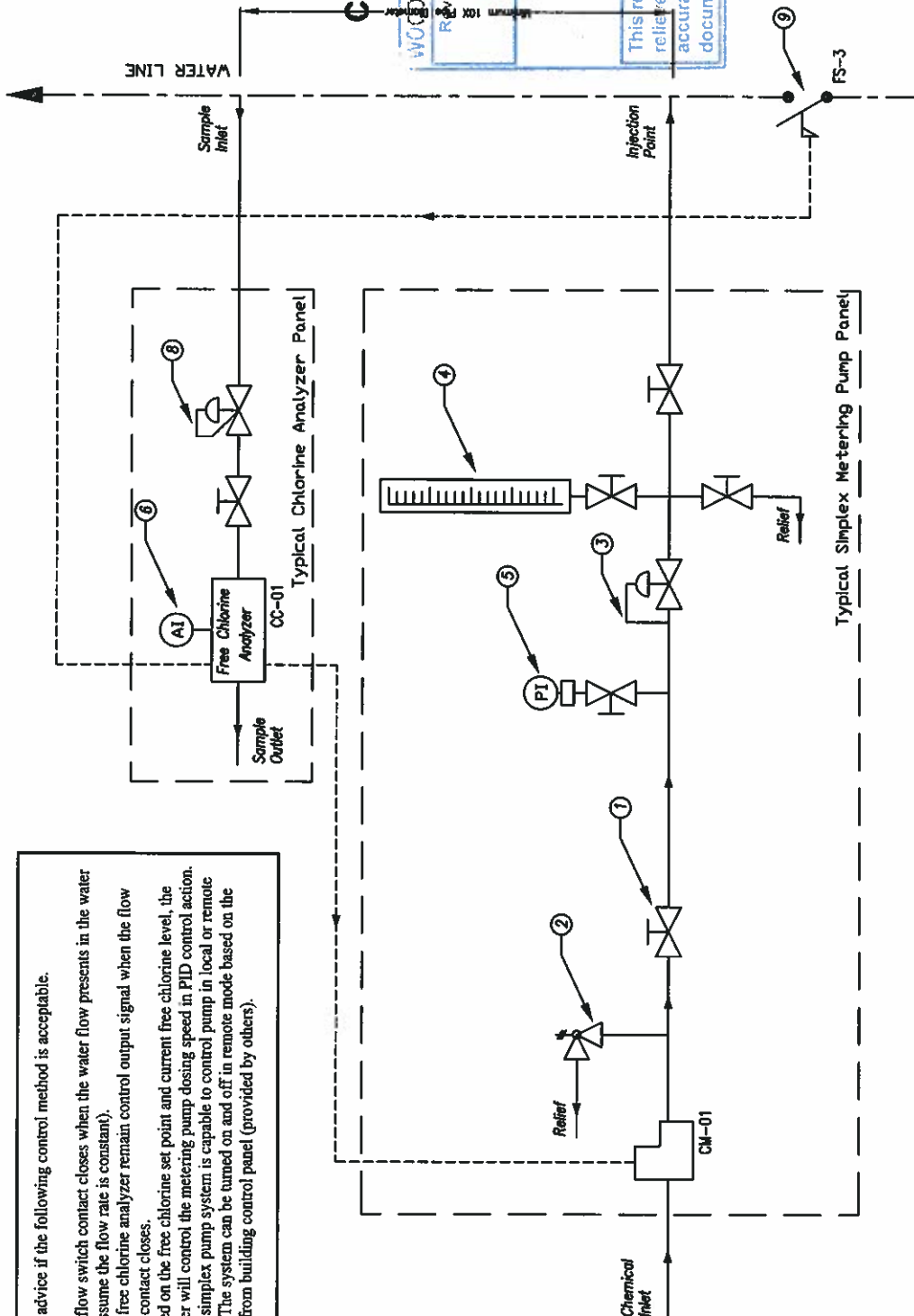
- 1 Isolation Ball Valve
- 2 Pressure Relief Valve
- 3 Back Pressure Valve
- 4 Calibration Column
- 5 Pressure Gauge
- 6 Analyzer Transmitter
- 7 Metering Pump
- 8 Pressure Reducing Valve
- 9 Flow Switch (N.C.)

ORIGINAL SIGNED BY
CLEMENT BOURGOGNE

WOOD BANANI BOUTILLETTE PARIZEAU INC.
Reviewed ☒ Resubmit ☐
Comments See Comments

JUN 30 2010

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relieve the contractor of responsibility for its
accuracy or for compliance with the contract
documents.



Please advise if the following control method is acceptable.

1. The flow switch contact closes when the water flow presents in the water line (assume the flow rate is constant).
2. The free chlorine analyzer remain control output signal when the flow switch contact closes.
3. Based on the free chlorine set point and current free chlorine level, the analyzer will control the metering pump dosing speed in PID control action.
4. The simplex pump system is capable to control pump in local or remote mode. The system can be turned on and off in remote mode based on the signal from building control panel (provided by others).



JOB NUMBER	10-S005414	DWG	F2
JOB NAME	Sanikiluaq New Truck Fill Station		
DATE	June 28, 2010	REV	0

PROPOSAL ONLY
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NOTES:

1. TANK IS MANUFACTURED FROM HDPE.
2. TANK IS MANUFACTURED TO ASTM-D-1998 STANDARD.
3. TANK CAPACITY: 90 I.G. (430 L).
4. ALL DIMENSIONS ARE APPROXIMATE.

ORIGINAL SIGNED BY
CLEMENT BOURGOINE

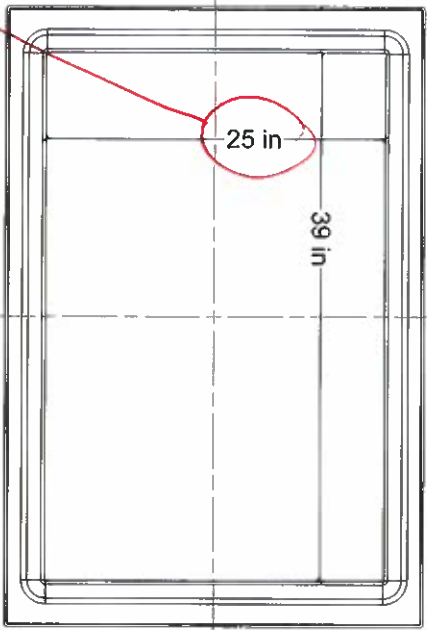
WOOD BANANI BOUTILLETTE PARIZEAU INC.

Reviewed	Reviewed with Comments	Resubmit/See Comments
		✓

JUN 3 0 2010

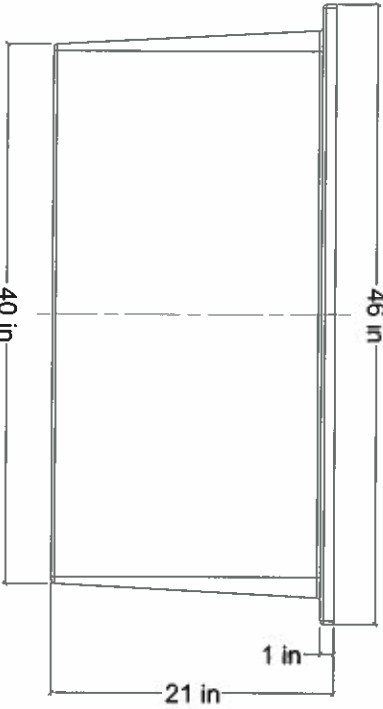
This review of this drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.

TOP VIEW

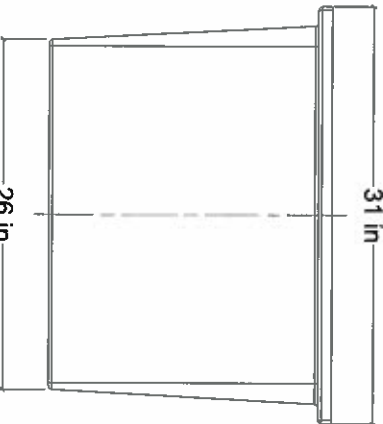


*External diameter of derrick tank is 26".
Please resubmit secondary or primary tank accordingly*

FRONT VIEW

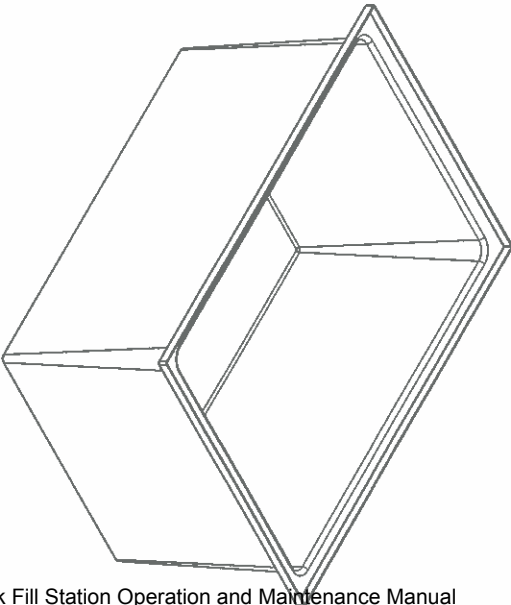


SIDE VIEW



MATERIALS LIST

ITEMS	DESCRIPTION	NOTES
A	IRD-90 SECONDARY CONTAINMENT BASIN	

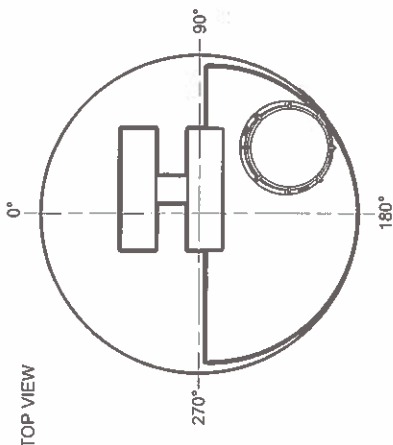


REV	DATE	DESCRIPTION	BY	APPROV
		REVISIONS		

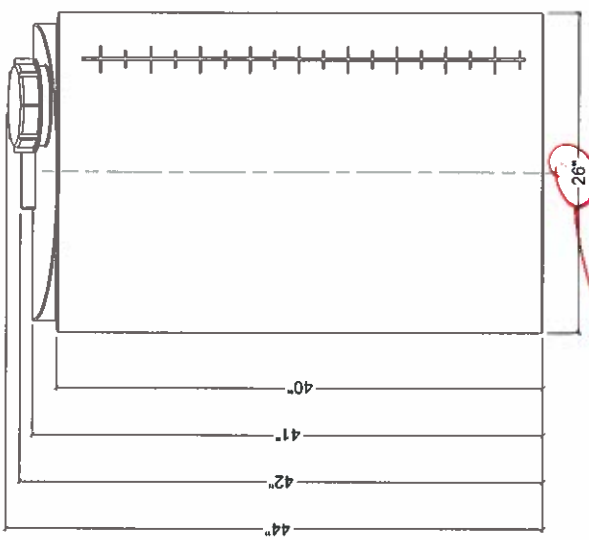
TITLE	ACO JOB NO.
90 I.G. SECONDARY CONTAINMENT BASIN	PURCHASE ORDER NO.
PURCHASERS EQUIP. NO.	

ACO CONTAINER SYSTEMS LTD.

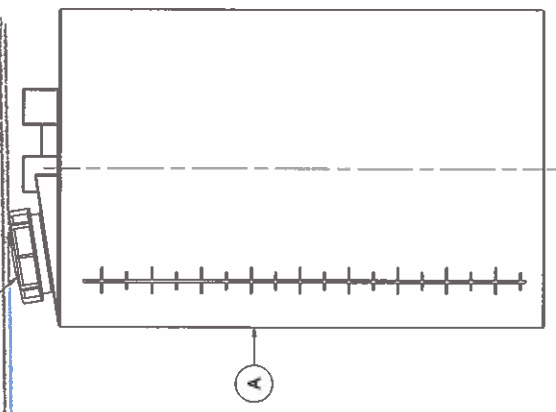
ACO CONTAINER SYSTEMS LTD.	ACO CONTAINER SYSTEMS LTD.
774 MONROE RD.	774 MONROE RD.
PO BOX 900, ONTARIO, CANADA	PO BOX 900, ONTARIO, CANADA
TEL: 905-463-2222	TEL: 905-463-2222
FAX: 905-463-2069	FAX: 905-463-2069
DATE	DATE
21-01-09	21-01-09
REV	REV
0	0



TOP VIEW



FRONT VIEW



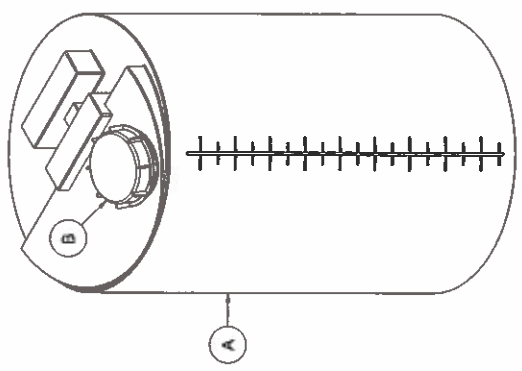
SIDE VIEW

- NOTES:
1. TANK IS MANUFACTURED TO ASTM-D-1998 STANDARD.
 2. ALL DIMENSIONS ARE APPROXIMATE.

ORIGINAL SIGNED BY
CLIENT SOURCE

B. COO SANANI BOUTHILLETTE PARIZEAU INC.	
Reviewed	Reviewed with Comments
Revised	See Comments
JUN 3 0 2010	
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MATERIALS LIST		
ITEMS	DESCRIPTION	NOTES
A	PTB-300 TOTE BARREL	
B	5 1/2" THREADED LID	



REV	DATE	DESCRIPTION	BY	APPD	REV'D
CUSTOMER					
TITLE					
300 LITRE TOTE BARREL					
PURCHASE ORDER NO.					
PURCHASER'S EQUIP. NO.					
THIS DRAWING IS THE PROPERTY OF ACO CONTAINER SYSTEMS LTD. AND SHALL NOT BE COPIED OR TRANSFERRED WITHOUT THE WRITTEN CONSENT OF ACO CONTAINER SYSTEMS LTD.					
ENGINEER'S SEAL					
ACO CONTAINER SYSTEMS LTD.					
ACO CONTAINER SYSTEMS LTD.					
1111 274					
P.O. BOX 883 827					
SCALE					
DATE					
REV 0					

External diameter of tank is larger than internal width of secondary tank. Please resubmit accordingly

1.4.a Solenoid-drive Diaphragm Metering Pumps delta®

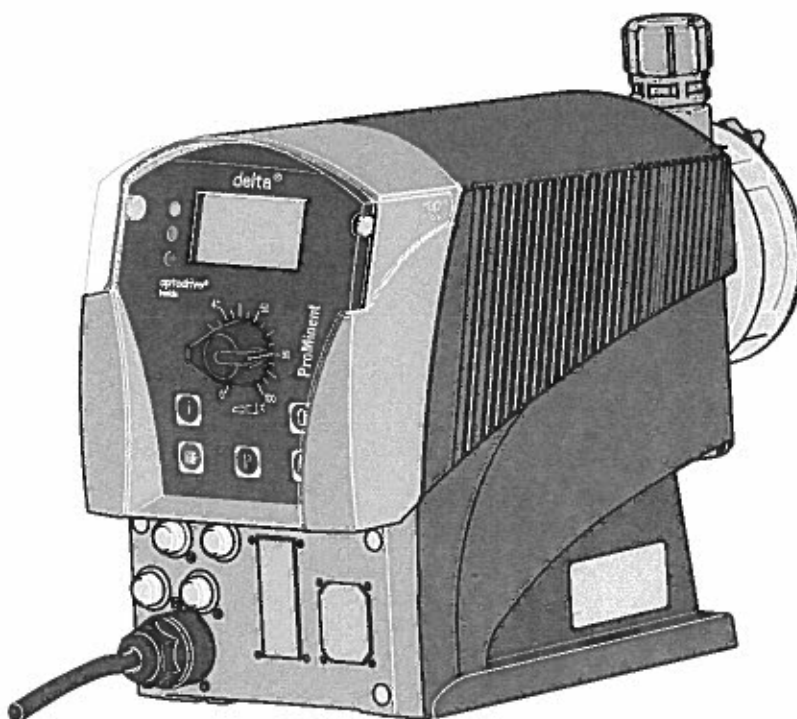
1.4.a.1

Diaphragm Metering Pumps delta® with Controlled Solenoid Drive

optoDrive®
inside

- Continuous or pulsating dosing
- Programmable suction and delivery stroke duration
- Pump can be adapted to the dosing media
- Integrated injection control optoGuard® detects blocked dosing points, broken dosing lines and air or gas bubbles trapped in the dosing head
- Capacity range 12-80 l/h, 16-2 bar
- Stroke length infinitely adjustable from 0 - 100% (recommended range 30 - 100%)
- PVDF and stainless steel material versions
- Patented coarse/fine ventilation
- Detection and indication of diaphragm failure
- Adjustment and display of pump delivery from the keypad with choice of display in l/h or strokes/min
- Large backlit graphic display
- External control options via volt-free contacts with optional increase/reduce speed pulse
- Optional external control via standard 0/4-20 mA signal
- Interfaces for PROFIBUS® or CANopen
- 14-day process timer option* for time and event-dependent dosing duties
- Connection for 2-stage level switch
- Power relay, for use especially in conjunction with the process timer to switch higher powers (230 V – 8 A)
- 3 LED displays for operation and warning and error message in plain text
- Optional concentration input for volume-proportional dosing

* available from last quarter of 2006



pk_1_131

1.4.a Solenoid-drive Diaphragm Metering Pumps delta®

Technical Data

Pump type delta®	Pressure bar	Capacity l/h	Stroke capacity ml/stroke	Stroke frequency strokes/min	Connector size mm	Suction lift* m WG	Shipping weight PVT/SST in kg
DLTA 1612	16	12	1.0	200	8x5	6	10 / 11
DLTA 1020	10	20	1.7	200	12x9	5	10 / 11
DLTA 0730	7	30	2.5	200	12x9	5	10 / 11
DLTA 0450	4	50	4.2	200	DN10	3	10 / 11
DLTA 0280	2	80	6.7	200	DN10	2	10 / 11

* suction lift with primed dosing head and suction line

Materials in Contact with Chemicals

Version	Dosing head	Suction/discharge connector	Seals	Ball valves
PVT	PVDF	PVDF	PTFE	Ceramic
SST	Stainless steel Mat. No. 1.4404	Stainless steel Mat. No. 1.4404	PTFE	Ceramic

PTFE-coated dosing diaphragm

Dosing repeatability $\pm 2\%$ when used in accordance with the operating instructions

Permissible ambient temperature -10°C to $+45^{\circ}\text{C}$


Average power consumption 78 W

Protection IP65, insulation class F

Delivery package: metering pump with mains cord (2m) and plug, connection kit for hose/pipe connectors as per table.

**ORIGINAL SIGNED BY
CLEMENT BOURGOGNE**

WCC BANANI GOUTHILLETTE PARIZEAU INC.

Reviewed 	Reviewed with Comments	Resubmit See Comments
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JUN 30 2010

This review of this drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.

1.4.a Solenoid-drive Diaphragm Metering Pumps delta®

1.4.a.2 Identcode Ordering System – Basic Type	
DLTA	delta® series
	Pump type 1612 Capacity: 16 bar; 12 l/h 1020 10 bar; 20 l/h 0730 7 bar; 30 l/h 0450 4 bar; 50 l/h 0280 2 bar; 80 l/h
	Dosing head material SS Stainless steel PV PVDF
	Seals/diaphragm material T PTFE/PTFE coated S PTFE/diaphragm additionally with FPM coating for silica-laden media
	Dosing head version 0 Without ventilation, without valve spring 1 Without ventilation, with valve spring 2 With ventilation, without valve spring 3 With ventilation, with valve spring
	Hydraulic connector 0 Standard connectors as per technical data 5 Discharge-side connector for 12/6 hose, suction-side standard
	Version 0 Without diaphragm failure indication 1 Visual diaphragm failure indication 2 Diaphragm failure indication
	Supply U Universal controller 100-240 V
	Cord and plug A 2m Europe B 2m Switzerland C 2m Australia D 2m USA / 115 V 1 2 m without plug
	Relay 0 Without relay 1 1 alarm relay normally energised 1 x C/O contact 230 V – 2 A 3 3 alarm relay normally de-energised 1 x C/O contact 230 V – 2 A 4 as 1 + timing relay 2 x N.O. contacts 24 V – 100 mA 5 as 3 + timing relay 2 x N.O. contacts 24 V – 100 mA A Shutdown and alarm relay normally energised 2 x N.O. contacts 24 V – 100 mA C as 1 + 4-20 mA output 1 x N.O. contact 24 V – 100 mA Power relay normally de-energised 1 x C/O contact 230 V – 8 A
	Accessories 0 Without accessories 1 With foot valve and dosing valve, 2 m suction line and 5 m discharge line 2 as 0 + measuring beaker 3 as 1 + measuring beaker
	Control variants 0 Manual + external contact 1:1 + analogue 0/4-20 mA 3 Manual + external contact with pulse control + analog 0/4-20 mA expansion 4 as 0 + 14-day process timer 5 as 3 + 14-day process timer C CANopen P As 3 + PROFIBUS® interface, 9-way sub-D R As 3 + PROFIBUS® interface, M12
	Access code 0 Without access code 1 With access code
	Language DE German EN English FR French ES Spanish
	Pause/Level 0 Pause N.C. contact level, N.C. contact
DLTA 1612 SS T 0 0 0 U A 0 0 0 0 EN 0	

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CLEMENT BOURGOGNE

V. J. J. BANANI BOUTHILLETTE PARIS-TEAUR INC

Reviewed	Reviewed with Comments	Resubmit See Comments
✓		

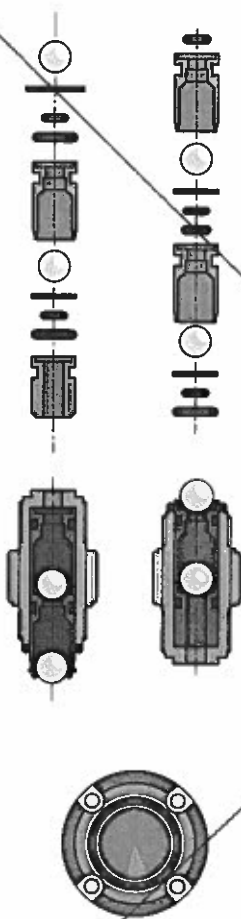
JUN 30 2010

This review of this drawing is not intended in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.

G: as1 + 24VDC Purging Relay

1.4.a Solenoid-drive Diaphragm Metering Pumps delta®

1.4.a.3 Spare Parts Kits, Replacement Diaphragms



pk_1_008

Spare parts kits for delta®, consisting of:

- 1 dosing diaphragm
- 1 suction valve set
- 1 discharge valve set
- 2 ball valves
- 1 set of seals
- 1 connection kit

Stainless steel version without suction and discharge valve sets

Spare parts kits for delta®

			Order No.
Type 1612	PVT		1027081
	SST		1027086
Type 1020	PVT		1027082
	SST		1027087
Type 0730	PVT		1027083
	SST		1027088
Type 0450	PVT		1027084
	SST		1027089
Type 0280	PVT		1027085
	SST		1027090

Replacement diaphragms for delta® series

Type 1612	all materials	1000248
Type 1020	all materials	1000249
Type 0730	all materials	1000250
Type 0450	all materials	1000251
Type 0280	all materials	1025075

SB 10/11 Series Back Pressure/ Relief Valves

The Chemline SB Series Back Pressure/Relief Valve has two functions. As a Back Pressure Valve, installed in-line downstream of a pump, the back pressure below the metering pump is maintained. When installed in the branch of a tee it is a Pressure Relief Valve. The valve stays closed until inlet pressure reaches the set pressure which is adjusted by turning the spring tensioning bolt. Inlet pressure acts on the Teflon® control diaphragm opening the valve, allowing excess pressure to flow downwards through the orifice.

The SB10/11 Series is very sensitive to pressure changes and requires low overpressure to fully open.

True Union Ends

Designed for Long Life

Sensitive and Reliable

Features

- Low overpressure to fully open
- Sensitive to pressure changes
- For clean fluids only – For dirty fluids use SB12 Series

Set Pressure Ranges:

- SB10 – 3 to 60 psi
- SB11 – 7 to 150 psi

– The only difference between SB10 and SB11 is the strength of spring

Long Cycling Life

- Dynamic seal is Teflon® bonded EPDM for high chemical resistance
- This moulded diaphragm is designed for superior sealing and flex life

Designed for Superior Performance

- Valves are hydraulically designed for minimum hysteresis ("backlash") and to eliminate chatter



CHEMLINE
Plastics Limited

Your Pipeline To Quality

PVC, PP, PVDF

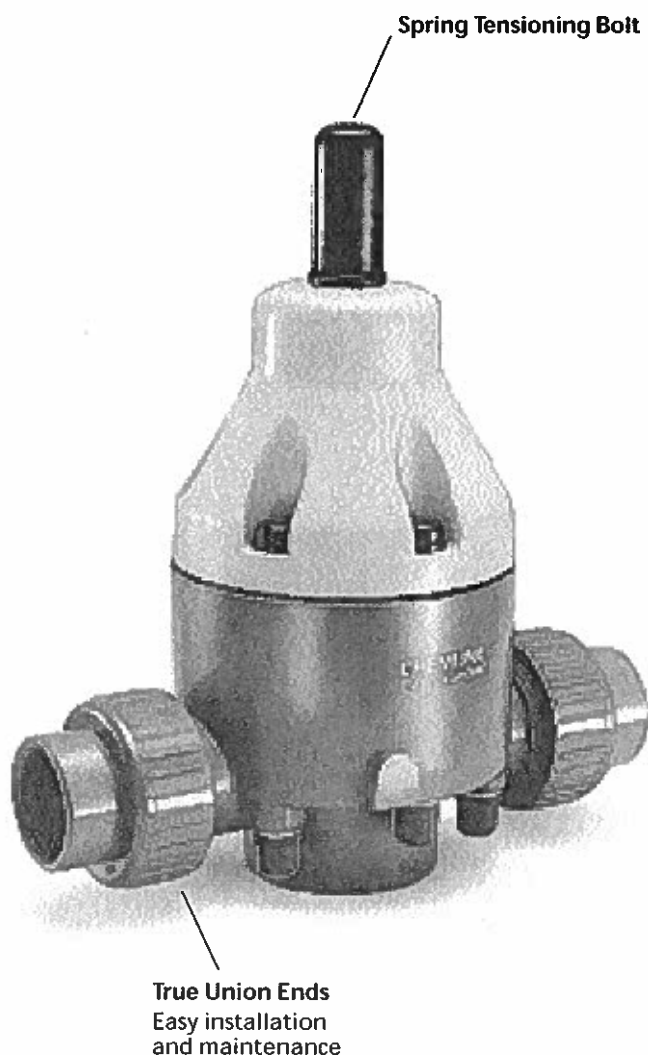
SERIES: SB10 and SB11

SIZES: 3/8" – 2"

ENDS: True Union Socket or Threaded
Non Union Socket, Threaded,
Flanged or Butt (Spigot)†

CONTROL DIAPHRAGM: Teflon® Bonded
EPDM

SEALS: Viton (standard), EPDM or CPE*



† PP and PVDF spigot ends have DIN dimensions and will butt fuse directly to Chemline PP and PVDF piping systems.

* CPE = Chlorinated Polyethylene. Sanikiluaq New Truck Fill Station Operation and Maintenance Manual

SB 10/11 Back Pressure/Relief Valves



SET PRESSURE RANGES

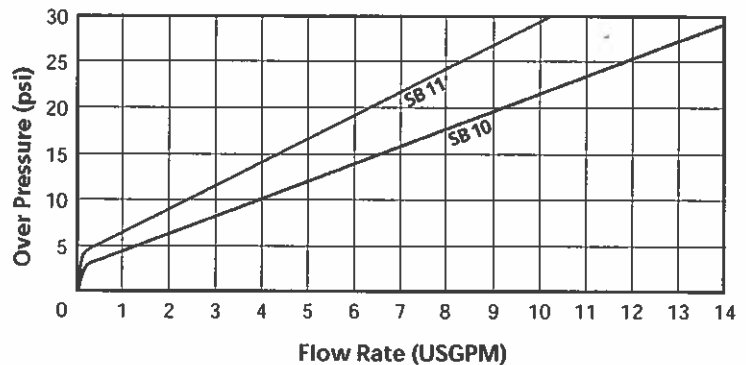
- SB10 – 3 to 60 psi
- SB11 – 7 to 150 psi

OVER PRESSURE VS. FLOW RATE

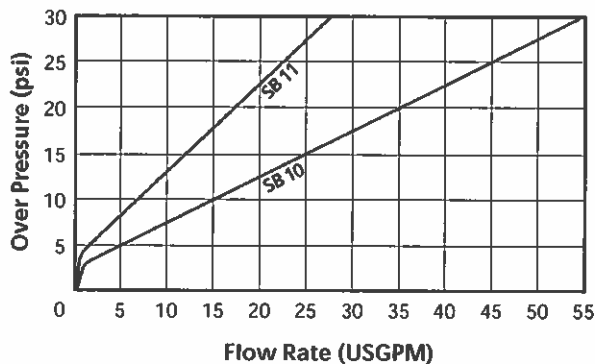
The curves show the relationship between the over pressure (inlet pressure above the set pressure) and the approximate flow rate through the valve for water at 20°C. These values will vary depending on:

- The configuration of the piping and the pressure losses associated with it.
- The fluid if not water at 20°C.
- Whether the pressure is rising or falling. Hysteresis is approximately 4 psi.

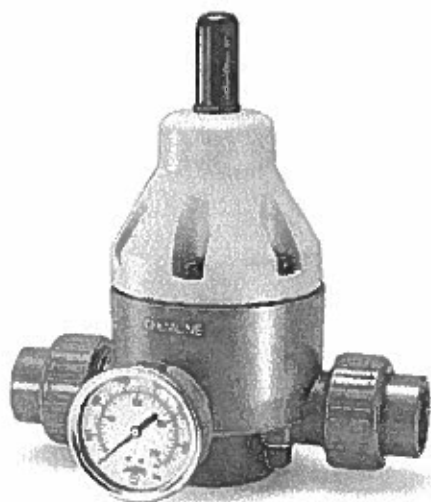
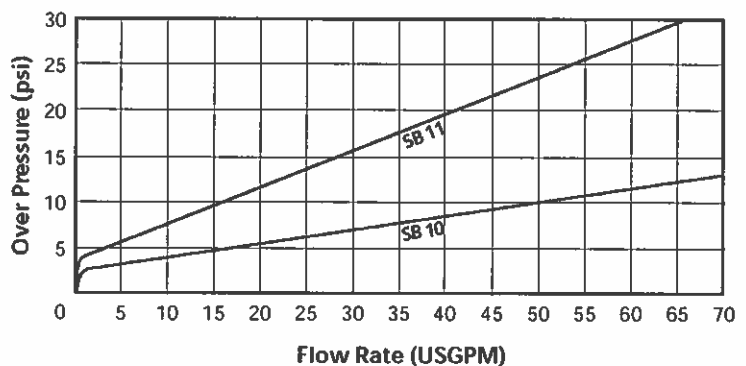
VALVE SIZES 3/8" and 1/2"



VALVE SIZES 3/4" and 1"



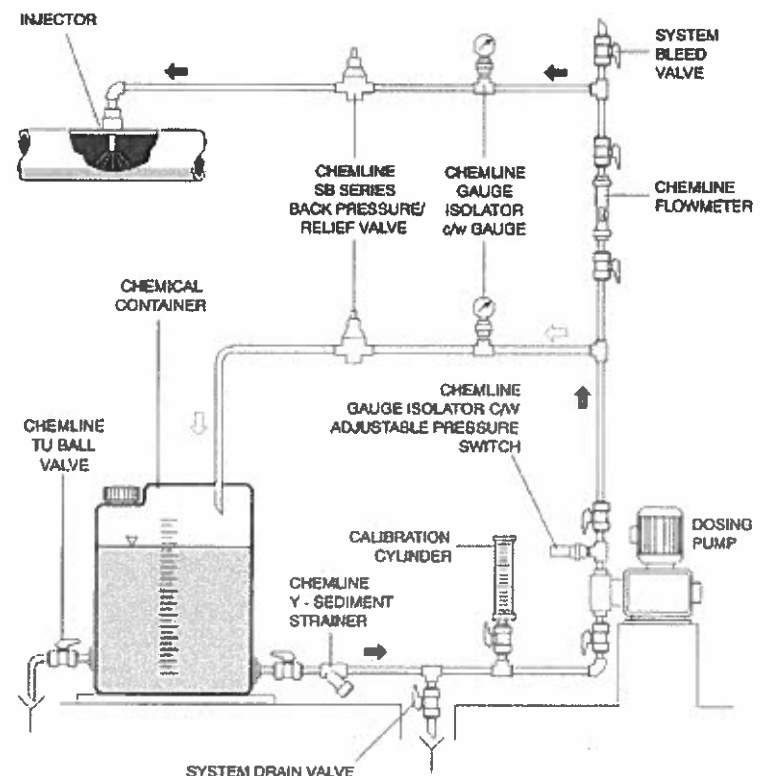
VALVE SIZES 1-1/4", 1-1/2" and 2"



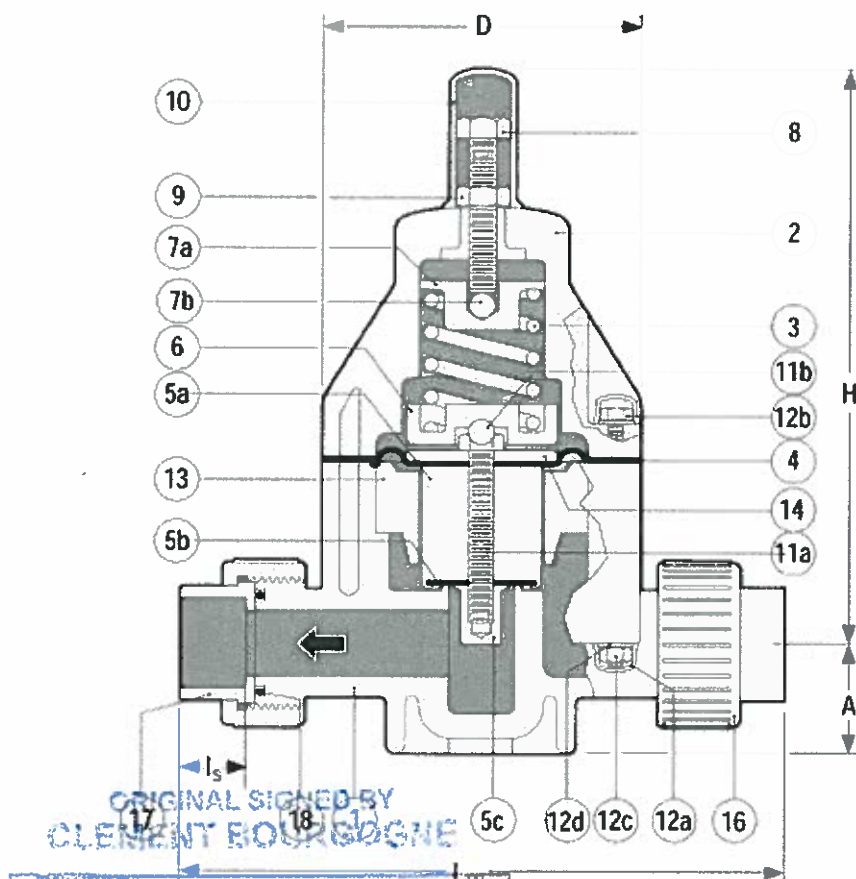
OPTIONAL PRESSURE GAUGE

- For inlet and/or outlet

TYPICAL DOSING SYSTEM SCHEMATIC



SB 10/11 Back Pressure/Relief Valves



WOOD BANANI BOUTHILLETTE PARIZEAU INC.

Reviewed	Reviewed with Comments	Resubmitted
✓		See

JUN 30 2010

This review of this drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.

PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
1	Body	1	PVC, PP, PVDF
2	Bonnet	1	PPG
3	Spring	1	304 SS
4▲	Control Diaphragm	1	Teflon® PTFE bonded EPDM
5a▲	Piston	1	PVC, PP, PVDF
5b▲	Seat	1	Viton, EPDM, CPE
5c	Seat Retainer	1	PVC, PP, PVDF
6	Lower Spring Retainer	1	Cad Plated Steel
7a	Upper Spring Retainer	1	Cad Plated Steel
7b	Ball	1	304 SS
8	Spring Tensioning Bolt	1	304 SS
9	Lock Nut	1	304 SS
10	Cap	1	PE
11a▲	Piston Bolt	1	304 SS
11b	Ball	1	304 SS
12a	Bolt/Nut Caps	8/12	PE
12b	Bolt	4/6	304 SS
12c	Nut	4/6	304 SS
12d	Washer	4/6	304 SS
13	Spacer Disc	1	PVC, PP, PVDF
14	Pressure Plate	1	Cad Plated Steel
16	Union Nut	2	PVC, PP, PVDF
17	End Connector	2	PVC, PP, PVDF
18▲	Face O-Ring	2	Viton, EPDM

NON UNION ENDS

Spigot Body

Socket

Threaded

Flanged

DIMENSIONS INCHES

WEIGHTS LB

C_v VALUES

Size	H	D	PVC							PP and PVDF			PVC PP PVDF			USGPM Flow at 1 psi ΔP
			A	L _s	L _{TU} †	L _{SPIG}	L _s	L _T	L _F	A	L _{SPIG} *	L _{TU} †				
3/8"	6.9	3.2	1.0	0.6	6.5	5.7	7.4	7.2	4.5	0.9	5.7	**	1.8	1.5	2.2	2.1
1/2"	6.9	3.2	1.0	0.6	6.8	5.7	8.0	7.8	6.3	0.9	5.7	7.1	1.9	1.6	2.4	3.0
3/4"	8.0	4.2	1.5	0.7	8.3	6.9	9.3	8.9	7.4	1.4	6.9	8.4	4.1	3.5	4.6	6.6
1"	8.0	4.2	1.5	0.9	8.5	6.9	9.6	9.3	7.4	1.4	6.9	8.7	4.2	3.5	4.7	8.7
1-1/4"	10.3	5.8	2.2	1.0	10.9	8.8	11.6	11.2	9.2	2.1	8.8	10.9	11.0	9.0	12.0	18.0
1-1/2"	10.3	5.8	2.2	1.2	11.1	8.8	12.2	11.5	9.5	2.1	8.8	11.2	11.2	9.2	12.2	20.0
2"	10.3	5.8	2.2	1.5	11.3	9.6	12.9	12.0	10.0	2.1	9.6	13.2	11.4	9.4	12.4	21.4

† True Union Bodies come standard with socket ends. Threaded union ends are available.

* Spigot bodies are used for non union socket, threaded or flanged ends. All spigot ends have DIN dimensions and the PP and PVDF spigots butt fuse directly to Chemline PP and PVDF piping. ** Consult Chemline.

SB 10/11 Back Pressure/Relief Valves

MAXIMUM PRESSURES PSI

Size	PVC				PP					PVDF					
	20°C 68°F	30°C 86°F	40°C 104°F	50°C 122°F	30°C 86°F	40°C 104°F	50°C 122°F	60°C 140°F	70°C 158°F	30°C 86°F	50°C 122°F	70°C 158°F	80°C 176°F	90°C 194°F	100°C 212°F
3/8"	150	105	60	15	150	90	60	37	15	150	100	60	45	30	15
1/2"	150	105	60	15	150	90	60	37	15	150	100	60	45	30	15
3/4"	150	105	60	15	150	90	60	37	15	150	100	60	45	30	15
1"	150	105	60	15	150	90	60	37	15	150	100	60	45	30	15
1-1/4"	150	105	60	15	150	90	60	37	15	150	100	60	45	30	15
1-1/2"	150	105	60	15	150	90	60	37	15	150	100	60	45	30	15
2"	150	105	60	15	150	90	60	37	15	150	100	60	45	30	15

Temperature Ranges: PVC 0 to 50°C (32 to 122°F), PP -20 to 70°C (-4 to 158°F), PVDF -40 to 100°C (-40 to 212°F).

SAMPLE SPECIFICATION

- All Back Pressure/Relief Valves in PVC, PP or PVDF shall be Chemline SB10 or SB11 Series or equal in sizes 1/2" to 2". SB10 shall have inlet set pressure range of 3 to 60 psi and SB11 shall have an inlet set pressure range of 7 to 150 psi. All valves shall have a maximum inlet pressure rating of 150 psi. Valves shall be suitable for aggressive clean non scaling chemicals.
- Internal spring, spring adjusting bolt and lock nut shall be 304 SS. Adjusting bolt shall be protected with a plastic cap.
- Body fasteners shall be 304 stainless steel with plastic caps.
- All valves shall have a large Teflon coated control diaphragm to fully open at 10-15% over pressure, provide low hysteresis ("backlash") and no flutter.
- Static seals shall be Viton or EPDM.
- Socket ends 1/2" to 2" shall be Schedule 80 and conform to ASTM D-2467.
- Threaded ends 1/2" to 2" shall be Schedule 80 and conform to ASTM D-2467.
- Butt fusion ends in PP and PVDF shall be compatible with Chemline polypropylene and PVDF piping systems.
- Flanged ends shall be ANSI Class 150.
- PVC compound shall have an ASTM cell classification 13463-A, with minimum suffix "A" designation for chemical resistance as per ASTM D-1784.
- All polypropylene material shall conform to ASTM D-4101 PP 0211B67272 material requirements.
- All PVDF material shall be unpigmented conforming to ASTM D-3222 Type 2 suspension resin material requirements and also with USDA Title 21, Chapter I, Part 177.2510 requirements for contact with food.
- All valves shall be custom tagged to provide traceability.

ORDERING EXAMPLE

Chemline Back Pressure/Relief Valve		SB11		A		005		V		U	
Valve Type	SB 10 - 3 to 60 psi SB 11 - 7 to 150 psi										
Body Material	A - PVC B - PP K - PVDF										
Size	003 - 3/8" 005 - 1/2" 007 - 3/4" 010 - 1" 012 - 1-1/4" 015 - 1-1/2" 020 - 2"										
Elastomers	V - Viton E - EPDM C - CPE										
Ends	S - Socket T - Threaded F - Flanged U - Union Socket Blank - Spigot (Butt)										


Example: Chemline SB 11 Series, PVC, 1/2" diameter, Viton seals, Union socket ends.

OPTION

- Integral Pressure Gauge – for inlet and/or outlet

ORIGINAL SIGNED BY
CLEMENT BOURGOIS

WOLF BANANI BOUTILLETTE PARIZEAU INC

Reviewed	Reviewed with Comments	Responsible
		

JUN 30 2010

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Sanikiluaq New Truck Fill Station Operation and Maintenance Manual



Established in 1968

Type 21 ISOLATOR Ball Valves

The Chemline *Type 21 ISOLATOR* True Union Ball valve incorporates state of the art features and performance. This is a full port, full blocking True Union valve pressure rated at 16 bar (230 psi)*. Double stem o-rings are provided for safety. Pneumatic or electric actuator mounting is easily accomplished in the field – Just pull off the handle to reveal an integral ISO mounting platform. The valve base is designed to easily accept bolts for full support if desired.



CHEMLINE
Plastics Limited

Your Pipeline To Quality

PVC, CPVC, PP, PVDF

SERIES: Type 21

SIZES: 1/2" – 4"

ENDS: Socket, Threaded, Flanged, Butt

SEATS: Teflon® PTFE

SEALS: EPDM, Viton†

230 psi Working Pressure

Easy to Actuate in the Field

Double Stem O-Rings for Safety

Features

Pressure rated to 230 psi

- Provides a high factor of safety

Integral Actuator Mounting Platform

- Actuation is easy. Electric or pneumatic actuators may be mounted in the field

Full Port

- High capacity and low pressure drops

Fully Blocking

- Downstream union nut may be safely disassembled for piping maintenance while valve is closed off under full system pressure

Built-In Spanner Wrench

- Top of the handle is designed to be used as a tool for accessing internal parts

Base Mounting Pad

- The valve base incorporates a mounting pad, enabling the valve with an actuator to be bolted securely to a support

High Chemical Resistant Material

- PVC and CPVC compounds have an "A" chemical resistance rating as per ASTM D-1784. They have outperformed other PVC and CPVC compounds on aggressive chemicals.



* PVC, CPVC and PVDF 1/2" to 2" are rated at 230 psi;
2-1/2" to 4" and all size PP valves are rated at 150 psi at 20°C.

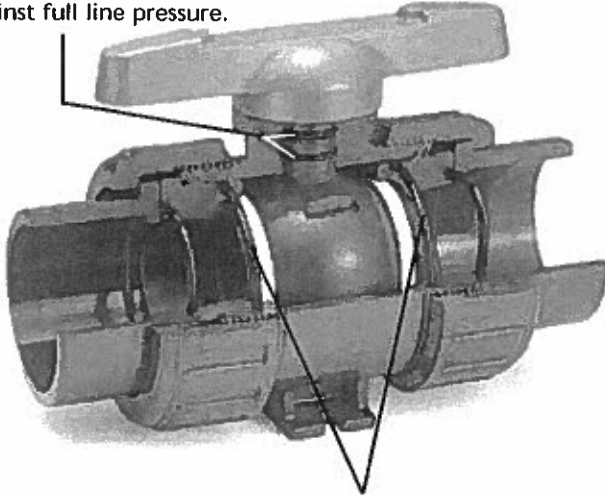
† Other materials are available special order.

Type 21 ISOLATOR Ball Valves



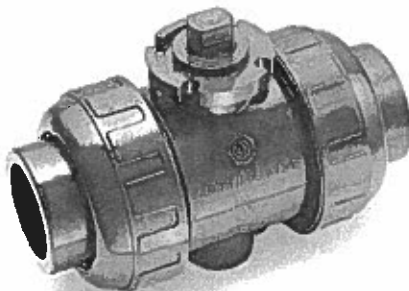
Double Stem O-Rings for Safety

- Upper o-ring groove is deeper than lower. In case of excessive stem torque, stem will shear at the upper groove, leaving the inner o-ring intact to seal against full line pressure.



Teflon® Seats have Elastomer Cushions

- Improved sealing while lowering stem torques.
- Self adjusts for seat wear



Integral Actuator Mounting Platform

- Actuation is easy. Electric or pneumatic actuators may be mounted in the field. Simply pull off the handle to reveal an ISO standard mounting platform which accepts bolt-on hardware.



Fully Blocking

- Downstream pipe may be removed while upstream side is still pressurized. This may be done with valve installed in either direction.



Built in Spanner Wrench

- For tightening and loosening the seat carrier
- All parts are replaceable



Pneumatic and Electric Actuators

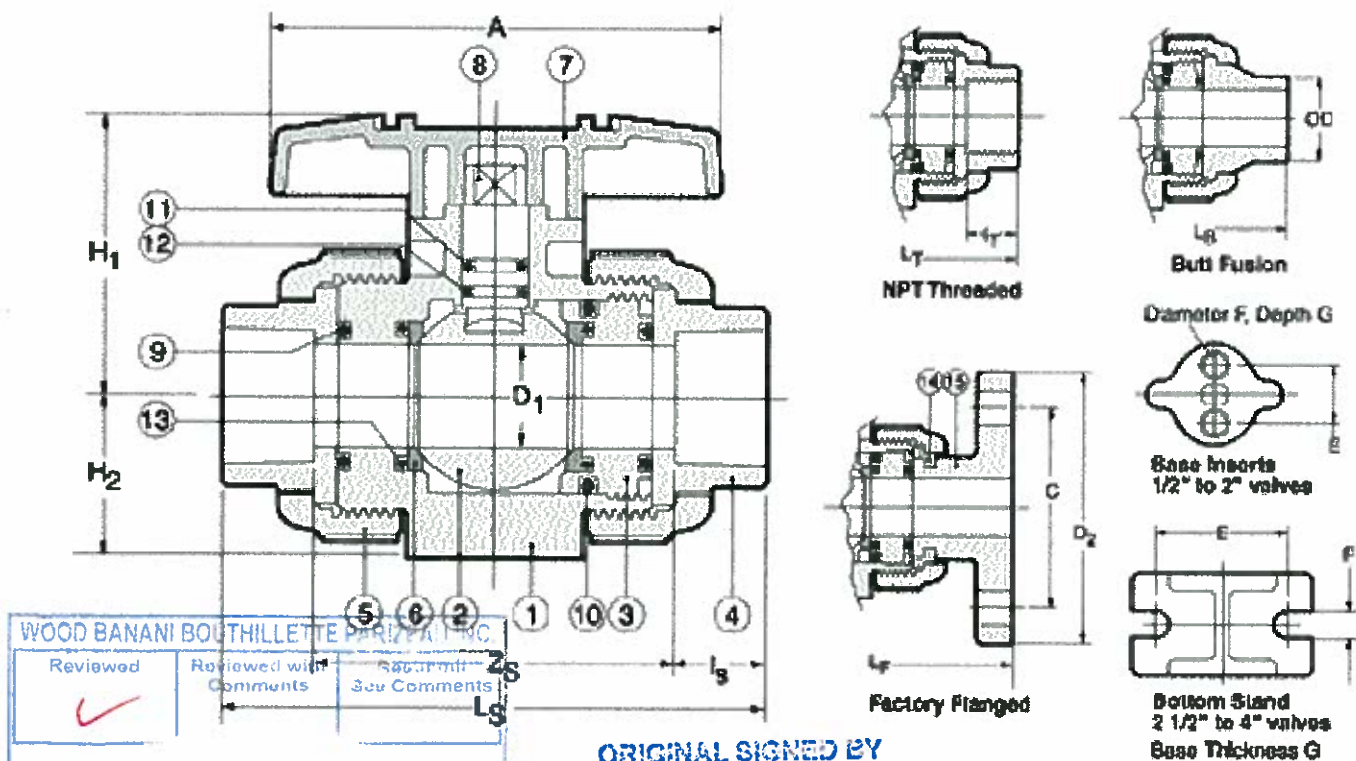
- Limits switches, positioners and other accessories are available



Base Mounting Pad

- Permits actuated valves to be securely anchored
- Valves may be used as fixation points in the piping system

Type 21 ISOLATOR Ball Valves



WOOD BANANI BOUILLLETTE PARIFA INC
Reviewed
Reviewed with Comments
Submitted
See Comments

JUN 3 0 2010

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CLEMENT BOURGOGNE

PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
1	Body	1	PVC, CPVC, PP, PVDF
2	Ball	1	PVC, CPVC, PP, PVDF
3	Carrier	**	PVC, CPVC, PP, PVDF
4	End Connector	2	PVC, CPVC, PP, PVDF
5	Union Nut	2	PVC, CPVC, PP, PVDF
6	Ball Seat	2	PTFE
7	Handle	1	ABS

* EPDM seals standard with PVC, CPVC, PP; Viton with PVDF valves.

** 1 carrier 1/2" - 2", 2 carriers 2-1/2" - 4".

† 2 pcs 1/2" - 2", 6 pcs 2-1/2" - 4".

PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
8	Stem	1	PVC, CPVC, PP, PVDF
9	Face O-Ring*	2	EPDM, Viton
10	Carrier O-Ring*	2	EPDM, Viton
11	Upper Thicker Stem O-Ring*	1	EPDM, Viton
12	Lower Thinner Stem O-Ring*	1	EPDM, Viton
13	Seat Cushion*	2	EPDM, Viton
14	Flange Retainer	2†	PVDF
15	Flange	2	PVC, CPVC, PP, PVDF

DIMENSIONS INCHES

Size	D				End Connections										Valve Base		
					Socket			Threaded		Factory Flanged			Butt				
	Bore	A	H ₁	H ₂	L _s	Z _s	I _s	I _T	L _T	L _F	D ₂	C	L _B	OD	E	F*	G
1/2"	.59	3.6	2.03	1.14	4.45	2.70	.875	.64	4.02	5.63	3.50	2.38	4.88	.79	.75	.29	.43
3/4"	.79	3.9	2.34	1.38	5.08	3.08	1.00	.65	4.72	6.77	3.88	2.75	5.67	.98	.75	.29	.43
1"	.98	4.3	2.68	1.54	5.75	3.50	1.13	.81	5.16	7.36	4.25	3.12	6.06	1.26	.75	.29	.43
1-1/4"	1.22	4.8	3.17	1.85	6.46	5.21	1.25	.85	5.91	7.48	4.62	3.50	6.85	1.57	1.18	.35	.59
1-1/2"	1.57	5.2	3.50	2.17	7.24	4.49	1.38	.85	6.42	8.35	5.00	3.88	7.64	1.97	1.18	.35	.59
2"	2.01	6.3	4.02	2.60	8.23	5.23	1.50	1.90	7.76	9.21	6.00	4.75	8.82	2.48	1.18	.35	.59
2-1/2"	2.28	7.87	4.96	2.83	9.45	5.95	1.75	1.21	8.46	10.20	7.00	5.49	9.72	2.95	1.89	.35	.23
3"	2.70	9.45	5.51	3.35	11.10	7.35	1.88	1.30	10.39	11.97	7.50	6.00	11.61	3.54	2.17	.43	.28
4"	3.54	11.81	7.01	4.33	13.88	9.87	2.00	1.38	14.17	14.65	9.00	7.50	14.76	4.33	2.56	.43	.32

* Optional threaded inserts: 1/2" to 1" valves - UNC 5/16-18; 1-1/4" to 2" valves - UNC 5/16-16.

† "Recoil" brand inserts require drilling before insertion.

Type 21 ISOLATOR Ball Valves



WORKING PRESSURES PSI, Water, Non-Shock

VACUUM RATING • 29.9 inches mercury

Size	PVC			CPVC						PP			PVDF				
	20°C 68°F	40°C 104°F	50°C 122°F	20°C 68°F	40°C 104°F	50°C 122°F	60°C 140°F	80°C 176°F	90°C 194°F	20°C 68°F	60°C 140°F	80°C 176°F	20°C 68°F	40°C 104°F	60°C 140°F	80°C 176°F	100°C 212°F
1/2" - 2"	230	165	150	230	165	150	120	75	55	150	85	55	230	185	150	110	85
2-1/2" - 4"	150	150	150	150	150	150	120	75	55	150	70	40	150	150	150	110	85

Temperature Ranges: PVC 0 to 60°C (32 to 140°F), CPVC 0 to 95°C (32 to 203°F), PP -20 to 90°C (-4 to 194°F), PVDF -40 to 100°C (-40 to 212°F).

WEIGHTS LB. THREADED or SOCKET **WEIGHTS** LB. FLANGED

Size	PVC	CPVC	PP	PVDF	PVC	CPVC	PP	PVDF
1/2"	0.37	0.41	0.26	0.43	0.81	0.87	0.69	0.98
3/4"	0.65	0.69	0.45	0.74	1.2	1.3	0.94	1.4
1"	1.00	1.08	0.66	1.19	1.8	1.9	1.4	2.0
1-1/4"	1.4	1.5	0.92	1.7	2.5	2.7	1.9	2.8
1-1/2"	2.2	2.4	1.5	2.5	3.4	3.6	2.8	4.0
2"	3.0	3.3	1.9	3.4	4.7	4.9	3.7	4.4
2-1/2"	5.2	5.6	3.1	6.3	7.4	8.0	6.4	9.3
3"	8.1	8.8	6.1	-	10.9	11.8	9.3	13.5
4"	20.4	22.0	13.4	-	24.0	25.1	22.0	32.0

Cv VALUES VS. BALL ANGLE

Size	0%	25%	50%	75%	100%
1/2"	0	0.35	1.3	5.5	14.
3/4"	0	0.73	2.8	11.5	29.
1"	0	1.2	4.5	18.6	47.
1-1/4"	0	1.8	6.8	28.4	72.
1-1/2"	0	3.9	14.7	61.2	155.
2"	0	4.8	18.0	75.0	190.
2-1/2"	0	9.1	34.7	144.0	365.
3"	0	10.2	39.0	162.0	410.
4"	0	17.0	64.6	269.0	680.

SAMPLE SPECIFICATION

- All True Union Ball Valves in PVC, CPVC, PP or PVDF shall be specified *Chemline Type 21* or equal sizes 1/2" to 2" in PVC, CPVC, and PVDF rated at 230 psi and in PP 150 psi maximum working pressure. Sizes 2-1/2", 3" and 4" rated at 150 psi maximum working pressure with EPDM, Viton, CPE, Hypalon, or Nitrile seals. Cushioned Teflon® PTFE ball seats shall be provided for positive closure with minimum stem torques.
- All valve sizes 1/2" to 4" shall be supplied with double stem blowout-proof stem o-rings for safety. The top o-ring groove shall be deeper so that if excessive force is applied it would shear and the lower o-ring would remain intact and the valve will continue to hold pressure.
- All valves shall be full port and two-way blocking.
- Socket ends in PVC and CPVC shall be Schedule 80 and conform to ASTM D-2467.
- Threaded ends shall be Schedule 80 and conform to ASTM D-2464. PP threaded ends shall have stainless steel reinforcing bands to prevent creep.
- Butt fusion ends in PP or PVDF will be compatible with *Chemline PP or PVDF piping systems*.
- Flanged ends shall be ANSI Class 150 one-piece factory molded using no nipples or fabrication to ensure maximum strength and close tolerance end to end dimensions and eliminating the possibility of joint failures.
- PVC compound shall have an ASTM cell classification 12454-A with a minimum suffix "A" designation for chemical resistance as per ASTM D-1784 (CSA report LO 4000-172).
- All CPVC compound shall have an ASTM cell classification 23567-A with a minimum suffix "A" designation for chemical resistance as per ASTM D-1784.
- PVC and CPVC compound and EPDM seals shall be CSA Standard B137.0 para 5.2.1. environmental requirements for toxicity (CSA Report LO 4000-1459).
- All PP materials are conformed ASTM D-4101 PP 021 B 67272 material requirements.
- All PVDF material shall be unpigmented conforming to ASTM D-3222 Type 2 suspension resin material requirements and also will be USDA Title 21 Chapter 1 Part 177. 2510 requirements for contact with food.
- All valves shall be custom tagged with manufacturers' inspection number to provide traceability.

CLEMENT ROUSSEAU
MANUFACTURING COMPANY, INC.

Reviewed ✓	Reviewed with Comments	Resubmit See Comments
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JUN 30 2010

This review is for chemical resistance as per ASTM D-1784 (CSA report LO 4000-172).

This review is for chemical resistance as per ASTM D-1784 (CSA report LO 4000-172).

accuracy or for compliance with the contract

environmental requirements for toxicity

ORDERING EXAMPLE

Chemline Type 21 ISOLATOR 21		A	-020	E	S
True Union Ball Valve			005	V	
Body Material	A - PVC B - PP	C - CPVC K - PVDF			
Size ¹	002 - 1/4"	003 - 3/8"	005 - 1/2"	007 - 3/4"	
	010 - 1"	012 - 1-1/4"	015 - 1-1/2"	020 - 2"	
	025 - 2-1/2"	030 - 3"	040 - 4"	060 - 6"	
Seals	E - EPDM	V - Viton	C - CPE ²	B - Nitrile ³	A - Aflas
Ends	S - Socket	T - Threaded	F - Flanged	B - Butt	

¹ 1/4" and 3/8" are 1/2" valves reduced. 6" is 4" valve with 6" end connections.

Example: Chemline Type 21 True Union Ball Valve, PVC, 2", with EPDM seals, socket ends.

² CPE = Chlorinated Polyethylene. ³ Nitrile is also called "Buna-N".

OPTIONS & ACCESSORIES

- Alternate O-Ring Seals – Nitrile, Teflon®, CPE, etc.
- Electrically Actuated – Refer to separate data sheets
- Pneumatically Actuated – Refer to separate data sheets
- Stem Extension made to any length
- Limit Switches – For open and/or closed position indication
- Handle Lockout – Field mountable
- Municipal Operating Nut
- Lubrication-free Valves – Factory clean room assembled



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Sales: 905-889-7021 email: info@chemline.com www.chemline.com

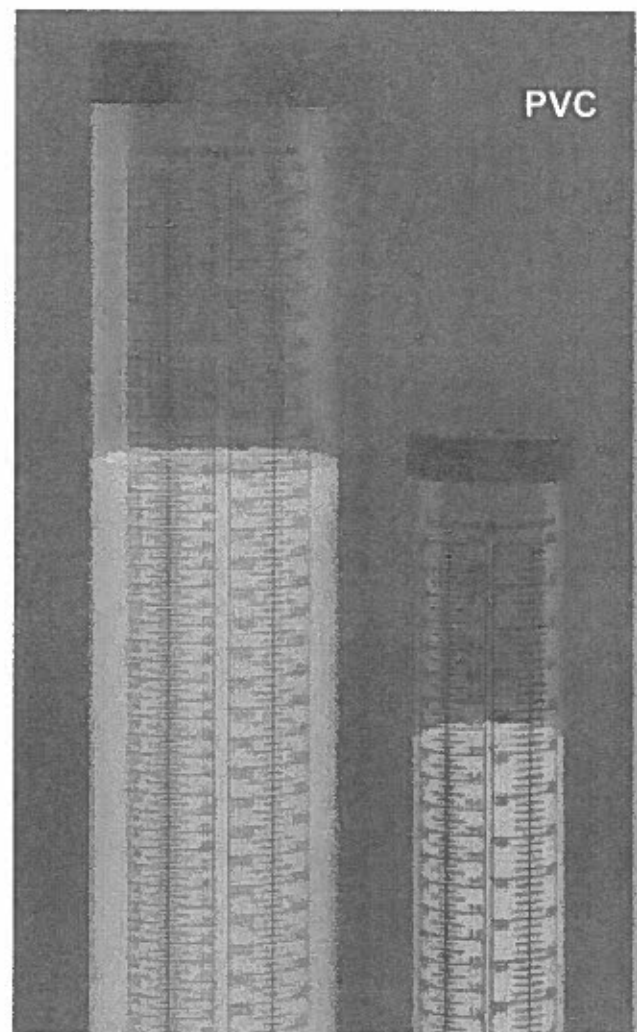
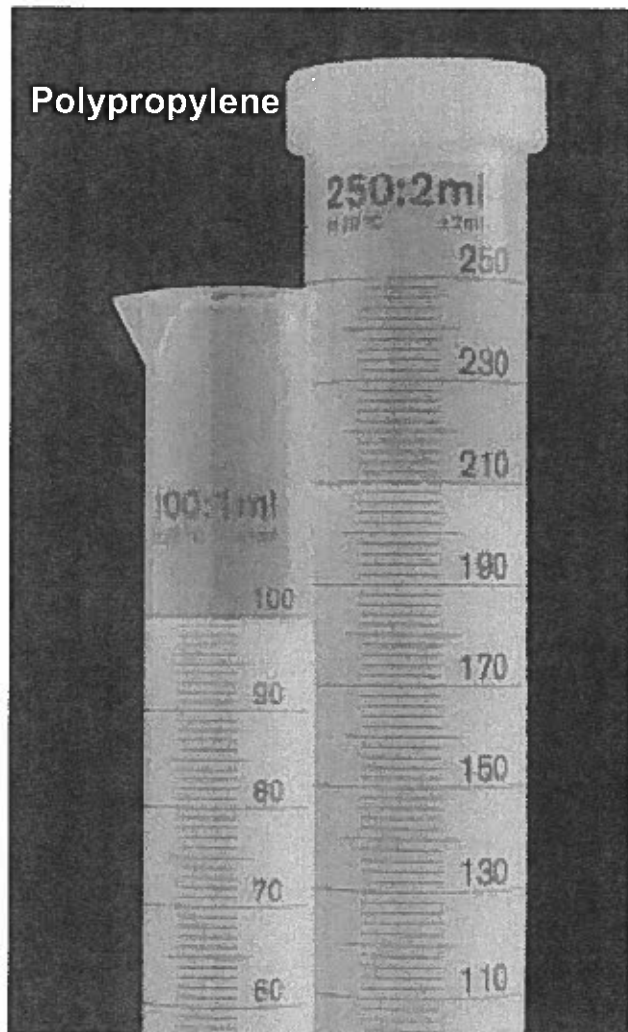
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Established 1964 ORR



ACCUDRAW® Calibration Cylinders



ACCUDRAW® has been developed for the accurate calibration of metering pumps. Standard features include:

- translucent
- chemical resistant
- break resistant
- threaded or socket
- colored graduations and lettering
- PVC has dual scale USGPH & ml
- PVC sizes 100 - 20000 ml
- POLY sizes 100 - 4000 ml
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- see our literature on glass cylinders

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www.primaryfluid.com



ACCUDRAW® Calibration Cylinders

"For Accuracy That Counts"

For complete product information visit our website: primaryfluid.com

Sizing and Ordering Information

ACCUDRAW Standard Materials of Construction

AC = All polypropylene construction (see below for options)
PV = All polyvinylchloride construction (see below for options)

Note: Cylinders are NOT pressure vessels

Example: AC#1-1000B

AC = PP (polypropylene)
#1 = Bottom threaded connection only
1000 = 1000 ml
B = BSP Thread

e.g. Part #

PV #2 - 500

AC #1 - 1000 B

Type:

AC = Polypropylene
PV = PVC

Style:

1 = Bottom threaded conn. only
2 = Top and Bottom threaded conn.
3 = Bottom threaded conn. c/w removable vented dust cap

Size Range:

PP 100 - 4,000 ml
PVC 100 - 20,000 ml

Graduation Scale:

PP - ml only
PVC - ml and GPH

Std. connection is NPT thread

Optional: add suffix as follows

S = Socket weld connection
(PVC only)

B = BSP Thread

ORIGINAL SIGNED BY
CLEMENT BOURGOINE

WOOD SANANI BOUTHILLETTE PARIZEAU INC.
Reviewed Reviewed with Resubmit
✓ Comments See Comments

JUN 30 2010

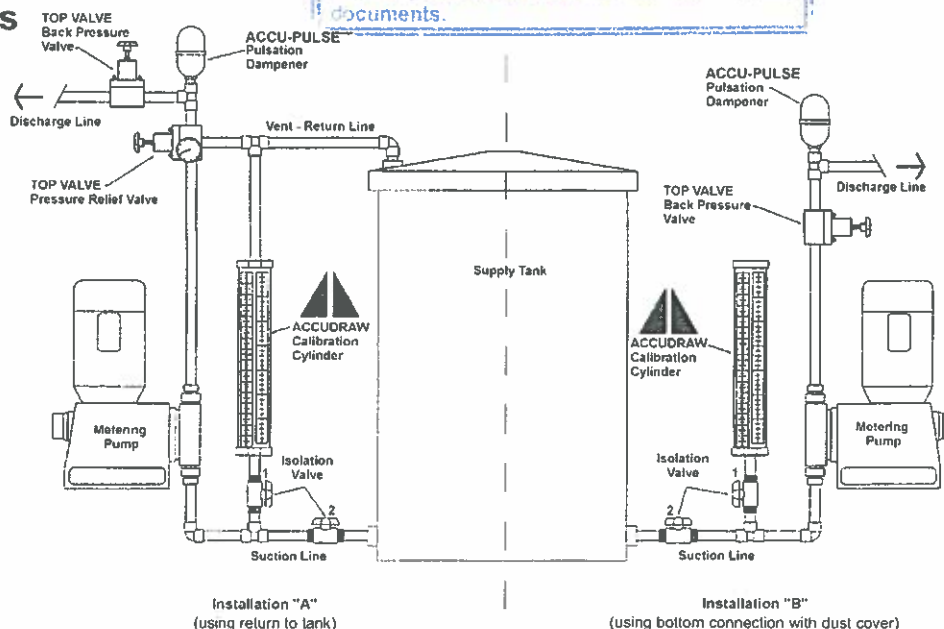
This review of this drawing does not in any way
relieve the contractor of responsibility for
accuracy or for compliance with the contract
documents.

Sizes:

100	= 100 ml	(1.6 GPH)
250	= 250 ml	(4 GPH)
500	= 500 ml	(8 GPH)
1000	= 1000 ml	(16 GPH)
2000	= 2000 ml	(32 GPH)
4000	= 4000 ml	(64 GPH)
10000	= 10000 ml	(160 GPH)
20000	= 20000 ml	(320 GPH)

Note: Glass cylinders available to 20,000 ml size

Installations



Conversion Factors

1 ml = 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

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66

DULCOMETER®

Measurement and control systems

An Introduction to Process Measurement and Control

Process control in water treatment involves measurement of a variable related to water quality, combined with automation of chemical feed equipment or other physical/chemical processes to keep the measured value as close as possible to the desired setpoint or between high and low control limits.

ProMinent's approach combines the functions of an analyzer and a controller into one instrument, dedicated to a specific water quality parameter to simplify calibration and operation.

Each ProMinent DULCOTEST® sensor measures a specific water quality parameter and sends an electronic signal back to a DULCOMETER® controller. The operator calibrates that sensor to a known standard. It then displays any changes that are measured in that parameter within the sensor's range.

Measured Value Outputs

Up to two outputs are available. DULCOMETER® controllers offer the ability to continuously record measured values to document water quality or to send to another control device. Analog 4-20 mA or 0-20 mA measured value outputs are proportional to the measuring range of the sensor or spannable to provide greater detail within a smaller range, for connection to a chart recorder, datalogger or distributed control system [D1C/ D2C controllers and DULCOMETER® transmitters (monitor only)]

Control Outputs

Different control outputs are available to control virtually any type of actuating device.

Setpoint relays change state (open or close contact) when the measured value drops below or exceeds the setpoint to start a process control device or alarm, and shut it off when the setpoint is reached (D1C or D2C).

Analog control outputs (4-20 or 0-20 mA) can drive a variable speed analog control device, such as a DC SCR drive or AC inverter, according to the control action used (D1C or D2C).

Pulse outputs are brief contact closures to pace pulse-input metering pumps corresponding to the control action used (D1C).

Modulating relay outputs cause a relay to open and close according to the control action used. These are used with solenoid

valves or constant-speed motor-driven metering pumps. Minimum on-times may be set to prevent overheating of motors (D1C or D2C).

3P relays provide two relay outputs to control a bi-directional actuator (such as a stroke length controller on a metering pump) with provision for feedback potentiometer from the actuator to display the position according to the control action used (D1C or D2C).

Control Actions

A variety of control actions are available to suit the application and budget. Any variable control output listed above may be used with any of the control actions listed below.

Setpoint Control

Setpoint control uses a setpoint relay to start a constant output pump or open a solenoid valve when the measured value drops below (or exceeds) the setpoint. Once the measured value reaches setpoint again, the pump stops or the valve closes. This always results in overshooting the setpoint because of the lag time between the point of chemical addition and the point of measurement. This can waste chemicals and cause excessive variation on either side of the setpoint. It is suited only for closed systems or batch applications where tight control is not required (D1C or D2C).

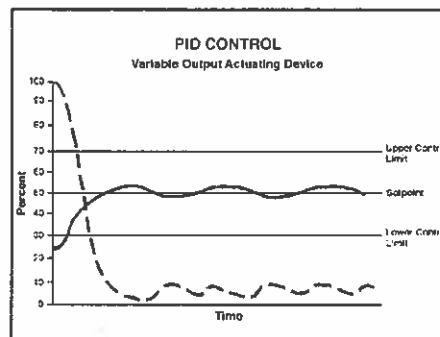
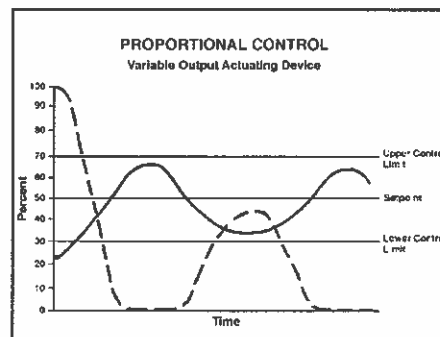
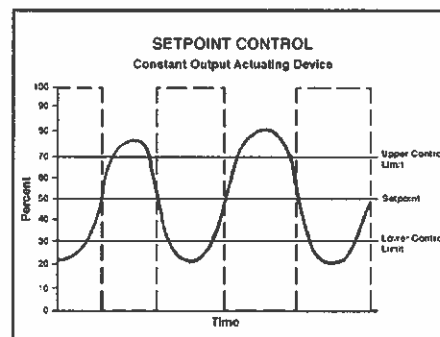
Proportional Control

Proportional control gives an output that is directly proportional to the measured value's deviation from the setpoint. The farther from setpoint, the greater the output of the actuating device, and the closer to setpoint, the lesser the

CONTROL ACTION RESPONSE IN ONCE-THROUGH SYSTEMS

Note: Actuating device output increases measured value in example (e.g. chlorine feed)

— Measured value (as percent of measurement range)
- - - Actuating device output (as percent)



DULCOMETER® Measurement and control systems

output. Proportional control is suitable for closed systems or batch applications where more precise control is required. The proportional bandwidth may be spanned to set the distance from setpoint at which the actuating device is operating at maximum output. A small bandwidth results in maximum output at a measured value close to setpoint, and may cause overshooting. A large bandwidth may result in long time periods required until the setpoint is reached (D1C or D2C).

PID Control

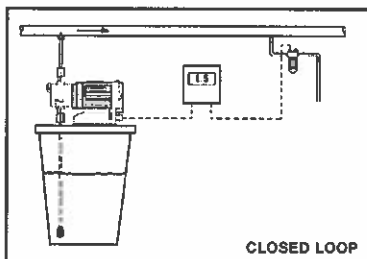
PID control combines proportional, integral and derivative control actions, or any combination thereof.

Integral control considers the time interval of deviation and increases output when the deviation exceeds a programmed time interval. Derivative control considers the rate of change of deviation and increases the output when the rate of deviation exceeds a programmed rate. PID control ensures the least deviation from setpoint possible (D1C, D2C).

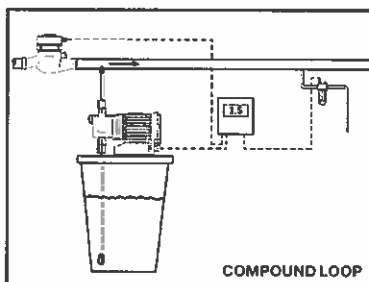
Control Techniques

The control technique used depends on the location of the sensor in relation to the actuating device, the presence of other inputs which may effect the measured value, or the requirement for secondary actuating devices to handle large swings. Some common control techniques are described below.

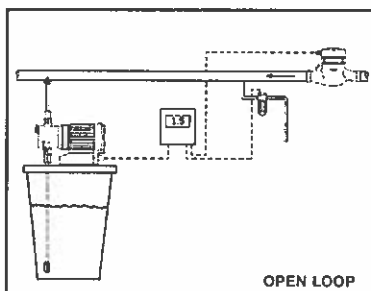
Closed loop control is where the sensor is located downstream of the actuating device and measures changes caused by the device. The controller varies the device's output to maintain the desired setpoint. This is usually used in recirculating or batch applications, or once-through systems with constant flow rate. The sensor must be located far enough downstream to ensure that any physical/chemical changes are complete, whether measuring pH, oxidant residuals or other variables (D1C or D2C).



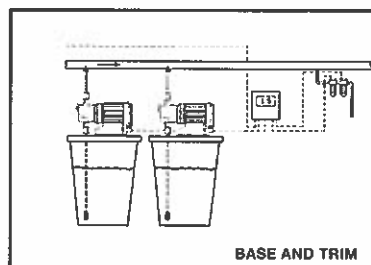
Compound loop control combines the closed loop signal from the sensor with a second (disturbance) input, normally water flow rate, and changes the actuating device's output in response to both variables. This is typically used in once-through applications with varying flow rates (D1C).



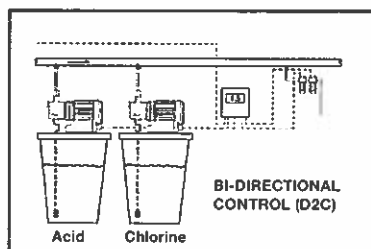
With *open loop control*, the sensor is upstream of the actuating device and a control signal changes the actuating device's output. Usually, this is only used when the resulting measured value would be outside of the sensor's measuring range (D1C or D2C).



Base and trim control uses two actuating devices to bring large fluctuations into control very quickly, yet provide tight control under normal operation. A variable output actuating device is normally used with proportional or PID control for the trim or fine tuning. A constant output device would be started by a setpoint relay for the base load to make fast changes in the event of large fluctuations that the trim device cannot handle (D1C or D2C).



Bi-directional control of two opposing actuating devices, such as pumps for acid and base in a pH control application, is possible with one controller (D1C or D2C). To prevent repeated corrections caused by overshooting on both sides, a deadband may be programmed (between two setpoints) in which both actuating devices are stopped (D1C or D2C).



PROPORTIONAL CONTROL ONLY (BATCH LINE)

DULCOMETER®

Measurement and control systems

System Components

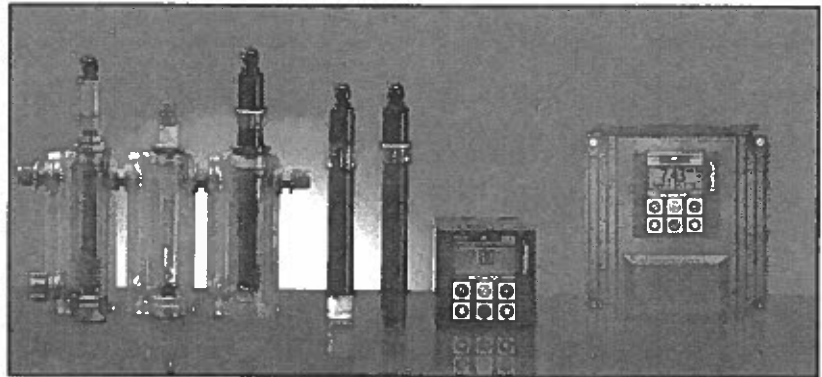
The ProMinent catalog lists a variety of components that must be combined to create a functional control system. *Please ensure that you select all required components, as follows:*

Minimum Requirements

- ✓ Controller
- ✓ Sensor(s)
- ✓ Sensor holder(s) (to mount sensor in process)
- ✓ Sensor cable(s) (to connect sensor to controller)
- ✓ Standardizing solution(s) (for pH or ORP, others use the sample water analyzed on site for calibration)
- ✓ Metering pump(s) with control input matched to controller's output

Optional Equipment

1. Impedance converter (millivolt) to minimize interference and maximize sensor life when distances between pH, ORP or temperature sensors and the controller are between 30 and 300 feet. Provides low impedance mV output.
2. 4-20 mA Signal Converters for pH, ORP or temperature sensors when distances between the sensor and controller is up to 300 feet, or where required by the controller (e.g. pH correction for chlorine). Provides 4-20 mA output.
3. Chart recorder
4. Spare membrane caps and electrolyte for membrane style sensors.
5. 2-wire shielded cable for transmission of 4-20 mA signals.



DGMa in-line sensor housings, DULCOTEST® instrumentation and DULCOMETER® D1C panel/wall mount controllers

What do I need to order with a D1C?

Chlorine

D1C Controller
Power cord
Chlorine sensor
25 mm DGMA
2-wire cable

Optional (free Chlorine)

pH sensor for comp. (free)
pH transducer/2-wire cable
13.5 mm DGMA
pH buffers
extra 2-wire cable

pH

D1C controller
Power cord
pH sensor
13.5 mm DGMA
pH buffers
2xSN6 cable or
pH transducer/ 2-wire cable

Opt. (temperature comp.)

temp. sensor for comp.
SN6 cable w/ extension wire
Temp. transducer if long cable
2-wire cable for transducer
extra 2-wire cable
13.5 mm DGMA

ORP

D1C controller
Power cord
ORP sensor
13.5 mm DGMA
ORP standard
2xSN6 cable or
pH transducer/ 2-wire cable

Opt. (temperature comp.)

temp. sensor for comp.
SN6 cable w/ extension wire
Temp. transducer if long cable
2-wire cable for transducer
extra 2-wire cable
13.5 mm DGMA

What do I need to order with a D2C?

pH/ Chlorine

D2C Controller
Power cord
pH sensor
Chlorine sensor
2-wire cable
2xSN6 connector or
pH transducer/ 2-wire cable
pH buffers
25 mm DGMA
13.5 mm DGMA

Optional

extra 2-wire cable
Temp. sensor for pH temp. comp.
13.5 mm DGMA
SN6 cable w/ extension wire
Temp. transducer if long cable
2-wire cable for transducer

pH/ ORP

D2C controller
Power cord
pH sensor
ORP sensor
ORP transducer
2-wire cable
2xSN6 connector or
pH transducer/ 2-wire cable
pH buffers
ORP standard
2x13.5 mm DGMA

Optional

extra 2-wire cable
Temp. sensor for pH temp. comp.
13.5 mm DGMA
SN6 cable w/ extension wire
Temp. transducer if long cable
2-wire cable for transducer

pH/ pH

D2C controller
Power cord
2xpH sensors
pH transducer
2xSN6 connector or
pH transducer/ 2-wire cable
pH buffers
2x13.5 mm DGMA
2-wire cable

Optional

extra 2-wire cable
Temp. sensor for pH temp. comp.
13.5 mm DGMA
SN6 cable w/ extension wire
Temp. transducer if long cable
2-wire cable for transducer

DULCOMETER® and D2C Series Process Controller

D1C

Description

Part no.

Single Variable Controllers (D1C) and Dual Variable Controllers (D2C) for Water and Wastewater Treatment or Industrial Process Control

The D1C/D2C integrates process monitoring and control into a single, easy-to-use device, replacing separate and multiple monitors and controllers: ProMinent DULCOTEST® sensors measure the process; and the controller displays the value on a large LCD screen; control outputs can operate various control devices (e.g. metering pumps) to keep the process within control limits using proportional or PID control action; alarm relays are available for fault annunciation and analog outputs are available for recording the measured value. Features/options are selectable by identity code.

Features:

- Microprocessor based technology
- Large, clear, backlit display of measured and correcting values, status, error annunciation
- Menu-driven calibration, limit and control settings
- Control opposing functions with one unit (e.g. both acid and base to set pH) with or without deadband
- Sensor diagnostics monitor alarms upon sensor failure
- Five available voltages, including DC capability
- Limit values may be exceeded for adjustable time periods before relays change state (hysteresis)
- Programmable access code prevents unauthorized setting changes, yet allows calibration by operators
- Non-volatile memory retains all settings, including calibration, when power is lost; with automatic restart when power is restored
- Retains last measured value in memory during calibration to allow time for sample analysis so that the exact concentration in the sample becomes the standard
- Fault text on the LCD describes the nature of the fault, allowing fast diagnostics and correction
- Electrically isolated signal outputs
- Two current analog signal outputs (optional)
- Spannable outputs offer greater detail for recording and optimization of control
- Controller can revert to pre-set basic load output during calibration or in the event of a fault

ORIGINAL SIGNED BY
CLEMENT BOURGOISE

WOOD BANANI ROUTHILLETTE PARIZEAU INC

Reviewed ☒ Reviewed with Comments ☐ Resubmit ☐ See Comments ☐

JUN 30 2010

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Wall Mount

Mounting

- Wall mount: Nonmetallic enclosure with protective gland-style strain relief cable sockets

Dimensions: 7.87"H x 7.87"W x 3.00"D (200 mm x 200 mm x 76 mm)

Cable glands: Five Pg11, Five Pg7

Weight: Approx. 2.6 lbs. (1.2 kg) Shipping Weight: 4.4 lbs. (2.0 kg)

Mounting: Detachable wall mount bracket

Protection class: NEMA 4X (IP 65)

Control panel assembly kit for installation

792908



Panel Mount

- Panel mount:

Dimensions: 3.78"H x 3.78"W x 5.50"D (96 mm x 96 mm x 140 mm)

Weight: Approximately 1.87 lbs. (850 g); 2.6 lbs. (1200 g) shipping weight

Protection class: NEMA 3 (IP 54) when mounted in panel

DULCOMETER® D1C/D2C Series (cont.)

Measured Value Ranges Available
(from ProMinent DULCOTEST® sensors or other devices)

- pH value: 0 to 14 pH
- Oxidation Reduction Potential (ORP): -1000 to 1000 mV
- Free Chlorine Concentration: 0 to 50 mg/L (D1C) (sensor dependent); 0 to 20 mg/L (D2C) (sensor dependent)
- Total Chlorine Concentration: 0 to 10 mg/L (sensor dependent)
- Bromine Concentration: 0 -10 mg/L (sensor dependant)
- Conductivity (from conductometric sensors): 0 to 20,000 µS/cm
- Dissolved Ozone Concentration: 0 to 2 mg/L
- Dissolved Oxygen Concentration: 0 to 20 mg/L
- Dissolved Oxygen Concentration: 0 to 10 mg/L
- Chlorine Dioxide Concentration: 0 to 10 mg/L (sensor dependent)
- Temperature: 32° to 212°F (0° to 100°C)
- Standard analog (mA) signal inputs from other devices: 0/4 to 20 mA
- Hydrogen Peroxide: 1 to 20, 10 to 200, 100 to 2000 mg/L
- Peracetic Acid: 10 to 200, 100 to 2000 mg/L (selectable on transducer)

Other Inputs

- Feed Forward (disturbance variable) from flow meter for compound loop control (D1C only)
- Pause contact to stop/maintain control output based on external interlock
- Correcting variables: temperature for pH and conductivity; pH for free chlorine
- Solution ground for pH

Control Capabilities

- Monitoring only
- Setpoint (on/off) control based on high and low limit relays
- Proportional control for batch processes
- PID (Proportional-Integral-Derivative) control for once-through processes
- Compound loop PID for once-through processes with varying flow (D1C only)

Outputs

- Analog (mA) control output (s) or measured value output to recorder
- Pulse control outputs for metering pumps (adjustable from 1 to 500 pulses/minute)
- Relay control outputs for solenoid valves or constant speed pumps with adjustable minimum on-time
- Actuator relay control output with feedback for stroke positioners or control valves
- General fault annunciation relay changes state on internal faults, loss of sensor signal, exceeding either high or low limit
- High and low limit relays

DULCOMETER® D1C/D2C Series (cont.)

Typical Applications

pH - Control acid and/or base feed via metering pumps or valves to adjust pH

ORP - Control hypochlorite metering pump to maintain oxidant residual; or control sulfonator or bisulfite metering pump for dechlorination

Free Chlorine - Control chlorination or hypochlorite metering pump to maintain residual

Total Chlorine - Control chlorination or hypochlorite metering pump to maintain residual; or control sulfonator or bisulfite metering pump for dechlorination

Bromine - Control tablet brominator via solenoid valve; or bromine solution metering pump to maintain residual

Conductivity - Control conductivity through valve on blowdown/makeup for rinse bath, boiler or cooling tower

Dissolved Ozone - Control ozone generator output to maintain residual

Dissolved Oxygen - Control aeration units to limit energy usage or for nitrification/dentrification

Chlorine Dioxide Concentration - Control chlorine dioxide generator output to maintain residual

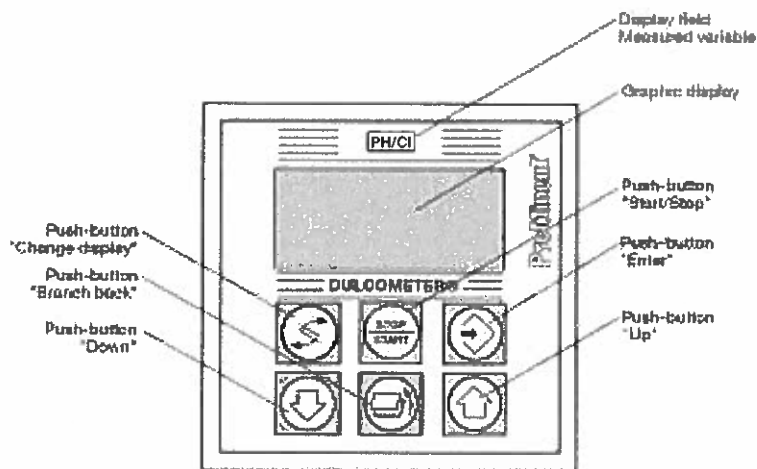
Temperature - Control heater or heat exchanger to maintain bath temperature or process cooling

Analog Signal Inputs - Control virtually any measureable and adjustable process where the measuring device has an analog output and the adjusting device may be controlled by one of the D1C's available control outputs

Peracetic Acid - Monitor or control concentration to ensure disinfection

Hydrogen Peroxide - Control peroxide metering pump for oxidation or advanced oxidation (AOX) systems

User Interface



	CHANGE DISPLAY menu button To change over within a menu level and to change from one variable to another within a menu point.		UP menu button To increase a displayed numerical value and to change variables (flashing display).
	START/STOP menu button Start/stop of control function.		BRANCH BACK menu button To exit operating menu (back to start of relevant setting).
	ENTER menu button To accept, confirm or save a displayed value or status. For alarm acknowledgement.		DOWN menu button To decrease a displayed numerical value and to change variables (flashing display).

Identity Code: DULCOMETER® D1C Controller

ProMinent®

Series: D1C DULCOMETER one-variable		D1CAW1C11012G020E	
Series version: A Standard			
Type of mounting: W Wall mounting D Panel mounting			
Operating voltage: 0 230 VAC, 50/60 Hz, 1 ph. 1 115 VAC, 50/60 Hz, 1 ph. 4 24 V AC/DC			
Note: Power cord not included with unit. For 115 V US & Canada power cord, see PN. 741203			
Measured variables: P pH R Redox/ORP C Chlorine B Bromine L Conductivity Z Ozone X Dissolved oxygen D Chlorine dioxide T Temperature S Standard process signal (0/4-20 mA) A Peracetic acid H Hydrogen peroxide			
Connection for sensor input: 1 Standard signal 0/4-20 mA 2 SN6 plug (From pH or ORP sensor cable) 3 Terminal for standard conductivity cell (L) 4 Terminal for PT 100 temperature sensor (T) 5 Terminal for mV signal (From pH or ORP sensor cable)			
Correcting value: (* Not available for measured variables A & H) 0 None** 1 pH for free chlorine via 4-20 mA signal 2 Temperature correction terminal for P or L (Temperature monitoring only for other variables) 3 Temperature correction terminal for 4-20 mA signal for P or L (Temperature monitoring only for other variables) 4 Manual temperature setting for P or L			
Feed forward control: 0 None 1 0/4-20 mA signal 2 0-500 Hz signal 3 0-10 Hz signal			
Pause contact: 0 None 1 Pause contact			
Analog signal output (0/4-20 mA): (* Not available for measured variables A & H) 0 None 1 Measured value (For recording) 2 Control action 3 Measured correcting value 4 Two current outputs **			
Relay outputs: G Alarm + 2 limit relays M Alarm + 2 control relays R Alarm + positioner relays w/ position feedback potentiometer			
Pump pacing: 0 None 2 Two pulse control outputs			
Control action: 0 None 1 Proportional control 2 PID control			
Interface: 0 None			
Language: (Other Languages available) D German E English F French S Spanish I Italian			

WOOD BANANI BOUTHILLIETTE PARIZSAI INC.

Reviewed: ☒ Reviewed with Comments: ☐ Recommended: ☐ See Comments: ☐

JUN 30 2010

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D1C A W 1 P 2 2 1 1 1 G 2 2 0 E

Identity Code: DULCOMETER® D2C Controller

D2C

Series:
DULCOMETER® two-variable

Series version:
Standard

Type of mounting:
W Wall mounting
D Panel mounting

Operating voltage:

0 230 VAC, 50/60 Hz, 1 ph.
1 115 VAC, 50/60 Hz, 1 ph.
4 24 V AC/DC

Note: Power cord not included with unit. For 115 V US & Canada power cord, see PN. 741203

Measured variables:

PC pH/Chlorine
PR pH/Redox*
PP pH/pH* (variable 1 can be controlled, variable 2 is for monitoring)

* Requires Signal Converter

ORP 809127 (for PR option)

PH 809126 (for PP option)

Measurement variable 1 connection (Variable 2 connection: 4-20 mA):

1 Standard signal 0/4-20 mA
2 SN6 plug (From pH or ORP sensor cable)
5 Terminal for mV signal (From pH or ORP sensor cable)

Correcting value:

0 None
2 Temperature correction terminal
4 Manual temperature setting

Pause contact:

0 Standard, with pause contact

Analog signal output (0/4-20 mA):

0 None
4 Two current outputs

Relay outputs:

G Alarm + 2 limit relays
M Alarm + 2 control relays

Control action:

1 Proportional control
2 PID control

Interface:

0 None

Language: (Other Languages available)

D German
E English
F French
S Spanish

D2C A W 1 PR 1 0 0 4 G 1 0 E

Identity Code Options for D1C / D2C Controllers

NOTE: OPTIONS ARE NOT IDENTICAL FOR THE D1C / D2C CONTROLLERS. REFER TO THE IDENTITY CODE.

SERIES:

D1C = Single variable controller

D2C = Dual variable controller

SERIES VERSION:

A = Standard

MOUNTING:

W = Wall mount enclosed in NEMA 4X non-metallic housing. Includes detachable mounting plate in back to allow easy removal from wall. Features five Pg11 and five Pg7 glands for wiring power cord, relays, SN6 connectors, etc.

D = Panel mount (no enclosure). Fits 3-7/8" x 3-7/8" (9.6 cm x 9.6 cm) opening, 5-5/8" (14 cm) depth. The unit must be mounted in an enclosure suitable for the environment. The controllers's membrane switch face and gasketed frame provide NEMA 3 (IP 54) protection; mounting hardware included. For optional wall mount enclosure for the panel mount controller, see PN 799235.

OPERATING VOLTAGE:

0 = 230 VAC, 50/60 Hz, 1 phase

1 = 115 VAC, 50/60 Hz, 1 phase

4 = 24 VAC/DC

Note: Power cord not included with unit. For 115 V US power cord, see PN 741203.

D1C MEASURED VARIABLES:

P = pH: For wall mount, use connection 2 (SN6) for push-and-twist connectors with pH sensors. For panel mount, use terminal connection 5 for same sensors. For distances between 30 and 300 feet from sensor to controller, add impedance converter, PN 305350. For distances > 300 feet from sensor to controller or with stray currents, use connection 1 with signal converter pH-V1 (PN 809126) giving 4-20 mA output.

R = Oxidation-Reduction Potential: For wall mount, use connection 2 (SN6) for push-and-twist connectors with ORP sensors. For panel mount, use terminal connection 5 for same sensors. For distances between 30 and 300 feet from sensor to D1C, add impedance converter, PN 305350. For distances > 300 feet from sensor to D1C or with stray currents, use connection 1 with signal converter RH-V1 (PN 809127) giving 4-20 mA output.

C = Chlorine; use connection 1. For free chlorine (hypochlorous acid) measurement, use CLE-3.1 sensors. See "correcting value" for optional pH correction on free chlorine. For total chlorine, use CTE-mA sensors.

B = Bromine; use connection 1 and bromine BRE 1 mA-10 ppm sensor.

L = Conductivity; use connection 1 for conductivity cells with transducer giving 4-20 mA output. Use connection 3 for standard conductivity cells.

Z = Ozone; use connection 1 and OZE 3-mA 2-ppm sensor.

X = Dissolved Oxygen; Use connection 1 and DO1-mA-20-ppm sensor.

D = Chlorine Dioxide; use connection 1 and CDE 2-mA -0.5 ppm, 2-ppm or 10 ppm sensors, or the GDP with PT-100.

T = Temperature; use connection 4, terminal, with PT100 sensor. For distances > 30 feet from sensor to D1C, use connection 1 with signal converter PT-100-V1 (PN 809128) giving 4-20 mA output.

S = Standard signal 0/4-20 mA. Use connection 1 with any measuring device that outputs a 0-20 or 4-20 mA signal corresponding to the measured value. Display is as a percent of input current.

A = Peracetic Acid; use connection 1 with PAA transducer (PN 741128).

H = Hydrogen Peroxide; use connection 1 with Perox transducer (PN 741129).

D2C MEASURED VARIABLES:

PC = pH/chlorine: See above descriptions for each variable.

PR = pH/Oxidation-Reduction-Potential: See above descriptions for each variable. (Requires Signal Converter PN 809127)

PP = pH/pH: See above descriptions for each variable. (Requires Signal Converter PN 809126) Variable 1 can be controlled, Variable 2 is for monitoring.

CONNECTION FOR SENSOR INPUT (FOR VARIABLE 1 CONNECTION ON D2C CONTROLLERS):

1 = Standard signal 0/4-20 mA

2 = SN6 plug connector for pH (P) or ORP (R). Usually, this is only used with the wall mount since SN6 plugs cannot pass through cable glands on a panel mount enclosure.

3 = Terminal for standard conductivity cell (L)

4 = Terminal for PT-100 temperature sensor (T)

5 = Terminal for mV input on standard pH (P) or ORP (R) sensors

CORRECTING VALUE:

0 = None

1 = pH for free chlorine; corrects CLE sensor's hypochlorous acid (HOCl) measurement by chlorine dissociation curve to display free chlorine (HOCl + OCl⁻). The correcting pH input must be a 4-20 mA signal, requiring signal converter PH-V1 (PN 809126).

2 = Temperature for P or L via terminal for PT-100 sensor. Required for accurate pH measurement when operating at extreme pH values and high temperatures. Required for accurate conductivity measurement at varied temperatures. (Temperature monitoring only for other variables)

Identity Code Options for D1C/D2C Controller (cont.)

~~3 = Temperature for P or L via 0/4-20 mA signal; used with signal converter PT-100-V1 (PN-809-128) and PT-100 sensor. Feed Forward control is not possible with this option. (Temperature monitoring only for other variables)~~

~~4 = Manual temperature entry for P or L (no sensor); used where temperature is constant.~~

FEED FORWARD CONTROL - The D1C's control output is based on measured value; however, with feed forward control, a signal from a flow meter proportions the control output considering both the measured value and process flow rate. This eliminates the need for both variable speed drives and stroke positioners on compound loop control metering pumps. Several types of signals may be accepted proportional to process flow:

0 = None

~~1 = 0/4-20 mA signal (such as from a magmeter or open channel flow meter) Note: cannot be used for chlorine measurement with pH compensation (D1C)~~

~~2 = 0-500 Hz signal (such as from a paddlewheel sensor)~~

~~3 = 0-10 Hz (0-600 pulses/min.) signal (such as from a pulse-type water meter)~~

PAUSE CONTACT - The pause contact allows the controller to continue monitoring measured value, but stops control outputs when the NC contact is opened. This may be used to stop metering when a main water pump is stopped, or when water flow in the sample line to the sensor is blocked as signaled by the DGMa rotameter:

~~0 = None (D1C); Pause contact (D2C)~~

1 = Pause contact (D1C)

ANALOG OUTPUTS (0/4-20 mA) - Analog outputs can be programmed as a control output or a measured value output for recording. Up to 2 analog outputs are possible except for Hydrogen Peroxide and Peracetic Acid controllers.

~~0 = None~~

~~1 = Measured value; normally used for chart recorder, datalogger or DGS.~~

2 = Control action; normally used to control a variable speed drive or actuator.

~~3 = Measured correcting value; normally used for recording or as input to a second D1C.~~

~~4 = Two current outputs (Not for measured variables - A and I)~~

RELAY OUTPUTS:

G = Alarm + 2 limit relays: limits may be on either side of setpoint, or both limits may alarm on one side, such as low limit and low, low limit. May be used to start a constant rate feeder for simple setpoint control, or a baseline feeder to handle large swings with trim pump on the control output.

M = Alarm + 2 control relays: used to start and stop constant speed pumps or to open and close solenoid valves for opposing functions. Modulating output corresponds to the control action selected (proportional or PID). The minimum "on time" period may be adjusted from 1 to 9,999 seconds.

R = Alarm + 2 positioner relays with positioner feedback from 1 kOhm feedback potentiometer. Positioner status displayed on LCD. Used for ProMinent 3P stroke-positioning meters or valve positioners. Output corresponds to the control action selected (proportional or PID).

PUMP PACING - gives pulse outputs for controlling 1 or 2 metering pumps:

0 = None

~~2 = Outputs for one or two pulse-control metering pumps (spannable from 0-500 pulses per minute); for opposing functions. Pulse (dry contact) output corresponds to the control action selected (proportional or PID).~~

CONTROL ACTION:

~~0 = None; for use as monitor or setpoint relay controller only.~~

1 = Proportional control; used for batch processes, where output signal is proportional to the measured variable such that the farther from setpoint the greater the output; the closer to setpoint the lesser the output.

2 = PID control; used for once-through or difficult to control processes, providing proportional, integral and derivative control actions, or a combination thereof.

INTERFACE:

0 = None (Future versions will have RS interface available)

LANGUAGE - Note that it is possible to change among other languages in the field, as indicated in parentheses:

¹E = English (D, F, N) ¹D = German (E, F, N)

¹F = French (D, E, N) ¹H = German (F, I, S)

¹S = Spanish (D, I, F) ¹I = Italian (D, F, S)

Call for other available languages.

¹Languages available for measured variables A and H

NOTE: Power cord not included.

Power cord, 6 ft. (2 m) 115 VAC	741203
Power cord, 6 ft. (2 m) 230 VAC	7724015

Specifications for Wall and Panel Mount D1C/D2C

Temperature data (Panel Mount)

Permissible ambient temperature

Basic version:

Extended version (with status feed-back or with correction value via mA or with disturbance variable via mA:

Permissible storage temperature:

Material data/chemical resistance:

Control panel installation: 32° to 122°F (0° to 50°C)

Installation in wall-mounted housing: 23° to 113°F (-5° to 45°C)

Control panel installation: 32° to 113°F (0° to 45°C)

Installation in wall-mounted housing: 23° to 104°F (-5° to 40°C)

Control panel installation: 14° to 158°F (-10° to 70°C)

Part

Housing and frame

Rear panel

Membrane keypad

Seal, outside

Seal, inside

Retaining clip and screws

Material

PPO GF 10

PPE GF 20

Polyester film PET

Cellular rubber CR

Silicon-based sealing compound

Galvanized steel

Temperature data (Wall Mount)

Permissible ambient temperature

Basic version:

Extended version (with status feed-back or with correction value via mA or with disturbance variable via mA:

Permissible storage temperature:

Material data/chemical resistance:

23° to 122°F (-5° to 50°C)

Installation in wall-mounted housing: 23° to 113°F (-5° to 45°C)

23° to 104°F (-5° to 40°C)

14° to 158°F (-10° to 70°C)

Part

Housing

Membrane keypad

Housing seal

Outer seal

Retaining bracket

M5 screws

Material

Luranyl PPE GF 10

Polyester film PET

Cellular rubber CR

Cellular rubber CR

Galvanized steel

A2

Supply voltage in accordance with DIN IEC 38

Electrical safety in accordance with EN 61010-1

Electromagnetic emitted interference in accordance with EN 55011 Gr.1/C1.A
CSA special inspection

Panel Mount

115/230 VAC, 50/60 Hz

140 mA at 115 V

70 mA at 230 V

Fine-wire fuse 5 x 20 mm

250 V slow-blow

100-115 V = 315 mA

200-230 V = 160 mA

Wall Mount

115/230 VAC, 50/60 Hz

120 mA at 115 V

60 mA at 230 V

Fine-wire fuse 5 x 20 mm

250 V slow-blow

100-115 V = 315 mA

200-230 V = 160 mA

Rated voltage:

Max. power input:

Internal fuse protection:

100/200 VAC, 50/60 Hz

150 mA at 100 V

75 mA at 200 V

Fine-wire fuse 5 x 20 mm

250V slow-blow

100-115 V = 315 mA

200-230 V = 160 mA

Electrical data for both wall mount and panel mount D1C's

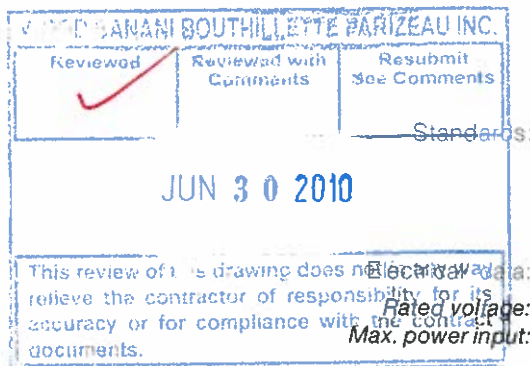
Rated voltage:

Internal fuse protection:

24 VDC or 24 VAC, 50/60 Hz (low voltage operation only)

Fine-wire fuse 5 x 20 mm

250 V slow-blow, 100-115 V = 315 mA, 200-230 V = 160 mA



Electrical data:

Rated voltage:

Max. power input:

Internal fuse protection:

Specifications (cont.)

Sensor input via SN6 socket:	Input impedance > 10 ¹² Ω Input impedance with reference electrode with respect to: Device ground: <1 kΩ Input range: ±1 V Accuracy: ±0.5% of input range Resolution: 0.0625% of input range Connection facility for one potential equalization electrode (solution ground). As an alternative, two connection terminals can be connected with a wire jumper.
Sensor input via terminals:	Input impedance: >5 x 10 ¹¹ Ω Input impedance with reference electrode with respect to: Device ground: <1 kΩ Input range: ±1 V Accuracy: ±0.5% of input range Resolution: 0.0625% of input range Connection facility for one potential equalization electrode (solution ground). As an alternative, two connection terminals can be connected with a wire jumper.
Standard signal input for measured variable:	Input range: 0/4...20 mA (programmable) Input impedance: 50 Ω (Panel Mount); -50 Ω (Wall Mount) Accuracy: 0.5% of input range Resolution: 0.014/0.012 mA Supply voltage and current for external electronics: 20 V ±0.5 V, 20 mA
Standard signal input for correction measured value or disturbance variable mA:	Galvanically isolated from remaining inputs and outputs Insulation voltage: 500 V Input range: 0/4...20 mA (programmable) Input resistance: 50 Ω Accuracy: 0.5% of input range Resolution: 0.014/0.012 mA Supply voltage and current for external electronics: 23 V ±1 V, 20 mA (Panel) 19 V ±1.5 V, 20 mA (Wall)
Pt100 input:	Input range: 32° to 212°F (0° to 100°C) Accuracy: ±0.5°C Resolution: 0.1°C
Digital inputs:	Common reference potential with respect to each other and with the RS 232 interface, but galvanically isolated from remaining inputs and outputs Insulation voltage: 500 V (Wall Mount only) Disturbance variable: Up to 10 Hz or up to 500 Hz (as per identity code/programmable)
Status signaling input:	Galvanically isolated from remaining inputs and outputs Insulation voltage: 500 V Potentiometer to be connected: 800 Ω ...10 kΩ Accuracy (without potentiometer error): 1% of input range Resolution: 0.5% of input range
Current output:	Galvanically isolated from remaining inputs and outputs Insulation voltage: 500 V (Wall Mount only) Output range: 0/4...20 mA (programmable) Maximum load: 600 Ω Accuracy: 0.5% of output range with respect to displayed value
Frequency outputs (Reed relay)	Type of contact: n/o contact, interference suppressed with varistors Load capacity: 100 V peak, 0.5 A switching current (Panel Mount) 25 V peak, 0.5 A switching current (Wall Mount)
for pump control:	Contact service life: >50 x 10 ⁶ switching operations at contact load 10 V, 10 mA Max. frequency: 8.33 Hz (500 strokes/min) Closing time: 100 ms
Power relay output for alarm signaling:	Type of contact: Changeover contact, interference suppressed with varistors Load capacity: 250 VAC, 3 A, 700 VA Contact service life: >50 x 10 ⁶ switching operations (Panel Mount) >20 x 10 ⁶ switching operations (Wall Mount)

Specifications (cont.)

*Power relay output for
for control variable output
or limit value signaling:*

Type of contact: n/o contact, interference suppressed with varistors
Load capacity: 250 VAC, 3 A, 700 VA
Contact service life: >20 x 10⁶ switching operations

Electrotechnical Safety/Radio Interference Protection:

EC low voltage directive (73/23/EEC) subsequently 93/44/EEC
EC EMC directive (89/336/EEC) subsequently 92/31/EEC
Supply voltage in accordance with DIN IEC 38
Electrical safety in accordance with EN 61010-1
Electromagnetic emitted interference in accordance with EN 55011 Gr. 1/CI B
Noise immunity in accordance with IEC 801-2, -3, -4 or DIN VDE 0843, Part 2,
Part 3, Part 4 or EN 50082-2

EN 60335-1: Safety of electrical devices for domestic use
EN 50081-1: EMC, emitted interference, residential
EN 50082-2: EMC, noise immunity, industrial
EN 60555-2: EMC, reactions in power supply networks, harmonics
EN 60555-3: EMC, reactions in power supply networks, voltage fluctuations

Operating Instructions In-Line Sensor Housing DGMA

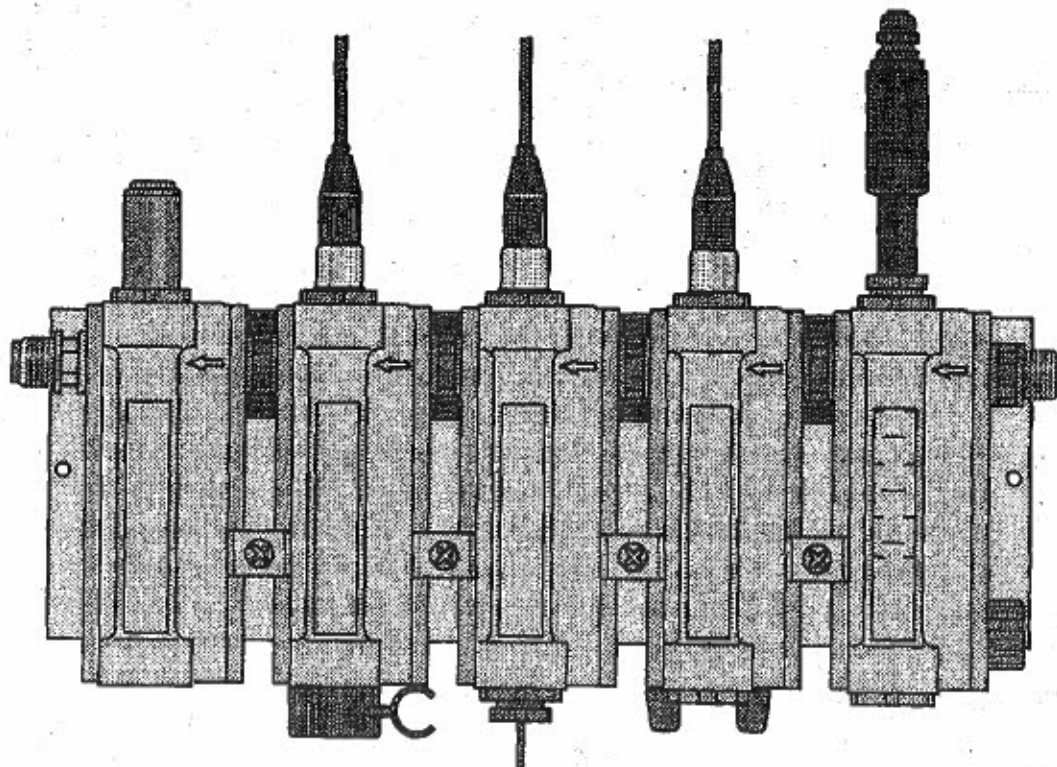


ProMinent®

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5 Old Part Disposal	6
6 Troubleshooting	6
7 Technical Data	7



pk_5_080

Free Chlorine-DGMA 111T010

Operating Instructions
In-Line Sensor Housing DGMA

Identcode

Please check that delivery is complete and accurate according to the following Identcode

DGMA In-line probe housing module	
Flow meter module	
0	without flow meter
1	with l/h scale
2	with gph (us) scale
3	with flow sensor, l/h scale
4	with flow sensor, gph (us) scale
Number of PG 13.5 modules (each module comes with 100 ml)	
0	without PG 13.5 module
1	one PG 13.5 module
2	two PG 13.5 modules
3	three PG 13.5 modules
4	four PG 13.5 modules
Number of 25 mm modules (each module comes with 100 ml)	
0	without 25 mm module
1	one 25 mm module*
2	two 25 mm modules*
* mounting kit required	
Main material	
1	transparent PVC
Seal material	
0	Viton® A
Connectors	
0	8 x 5 hose
1	PVC-threaded connector DN 10
9	connector nipple/extension module
Module	
0	with logo
1	without logo

Viton® is a registered trademark of DuPont Dow Elastomers.

DGMA 1 1 1 T 0 1 0

Please enter Identcode for your equipment here!

accessories included:

- wall mounting brackets
- for PG 13.5 module:
calibration cups
mounting kits for PG 13.5 probes

recommended accessories:

- | | |
|---------------------------------|------------------|
| 25 mm probe mounting kit: | part no. 791818 |
| for equipotential bonding: | |
| potential plug | part no. 791683 |
| flow sensor | part no. 791635 |
| additional calibration cup | part no. 791229 |
| sampling tap for module 25 mm | part no. 1004739 |
| sampling tap for module PG 13.5 | part no. 1004737 |

Please refer to relevant operating instructions for your equipment!

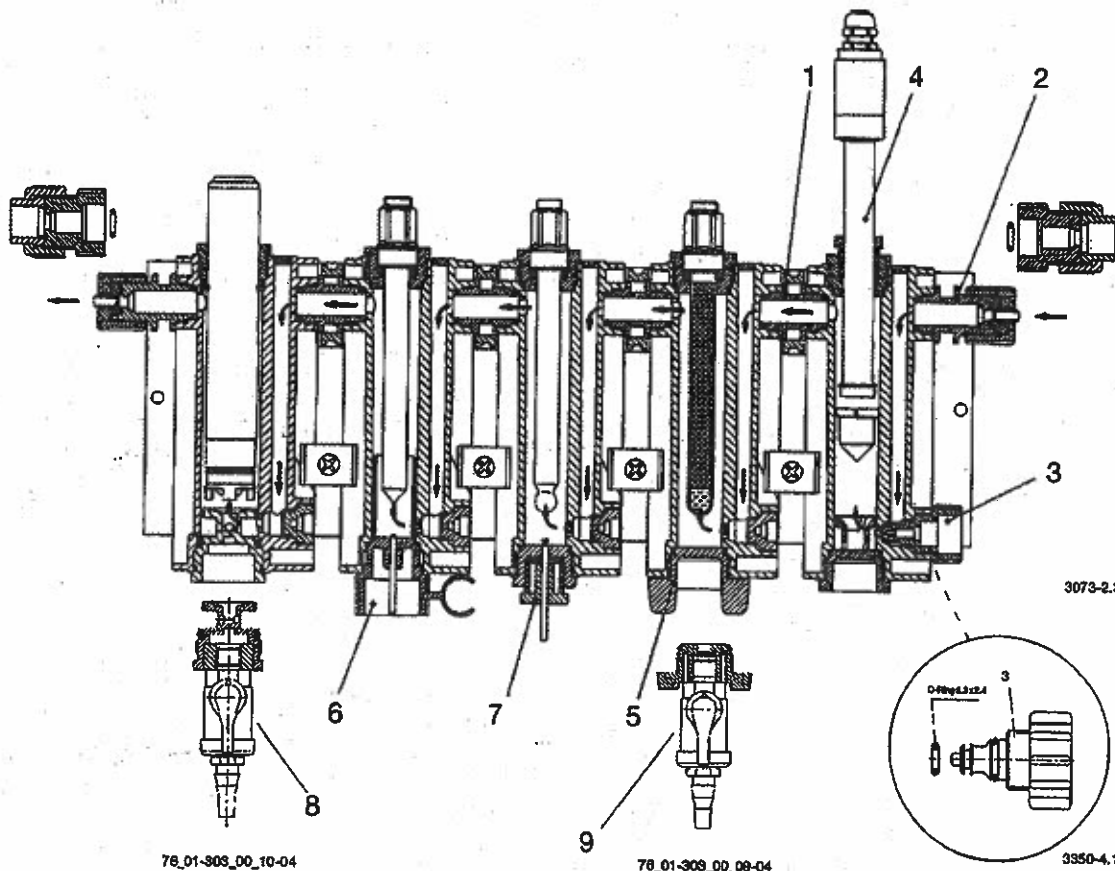
1 Functional Description

The in-line sensor housing based on a modular design is used to accept sensors for measuring e.g. pH, Redox, temperature, conductivity, Cl_2 , ClO_2 and O_3 . A separate module is used for each sensor. The in-line modules are mounted on a plate.

The following modules are available:

- Module for sensors with PG 13.5 mounting thread (e.g. pH, Redox, temperature)
- Modules for plug-in sensors with $\varnothing 25$ mm (e.g. free chlorine, organically bound chlorine, chlorine dioxide, ozone)
- Module for flow measurement with scale and flow sensor (option)

When the water line is opened, the medium flows through the entire module block in the direction indicated by arrows. The medium flows past the sensors from below. The required flow rate can be set within the range from 0-80 l/h (40 l/h recommended) with the regulating screw (normally on flow module).



2 Mounting / Installation

2.1 Notes on Safety



IMPORTANT:

The permissible operating pressure is based on the lowest maximum permissible operating pressure of the integrated sensors/flow monitors.



IMPORTANT:

Installation in fixed piping systems must be completely free of mechanical stress.



IMPORTANT:

Appropriate shut-off elements should be provided before and, in the case of delivery lines, also after the in-line probe housing.



IMPORTANT:

The in-line probe housing must be installed such that the modules cannot run dry or be filled with air even when the measurement water is stationary.



IMPORTANT:

Dirt particles can clog the in-line probe housing. Suitable line filters should be installed to avoid housing clogging of the in-line probe.

2.2 Mounting

2.2.1 Installation of a Preassembled Module Block

- Measure hole spacing on mounting plates (see dimensions).
- Mark mounting holes such that they are aligned horizontally on a vertical wall and drill.
- Use the wall mounting kit to secure the mounting plate together with the modules on the wall.
- Connect measuring water inlet and outlet line.
- The enclosed O-ring must be fitted if the regulating screw (3) is to be used as a shut-off element.

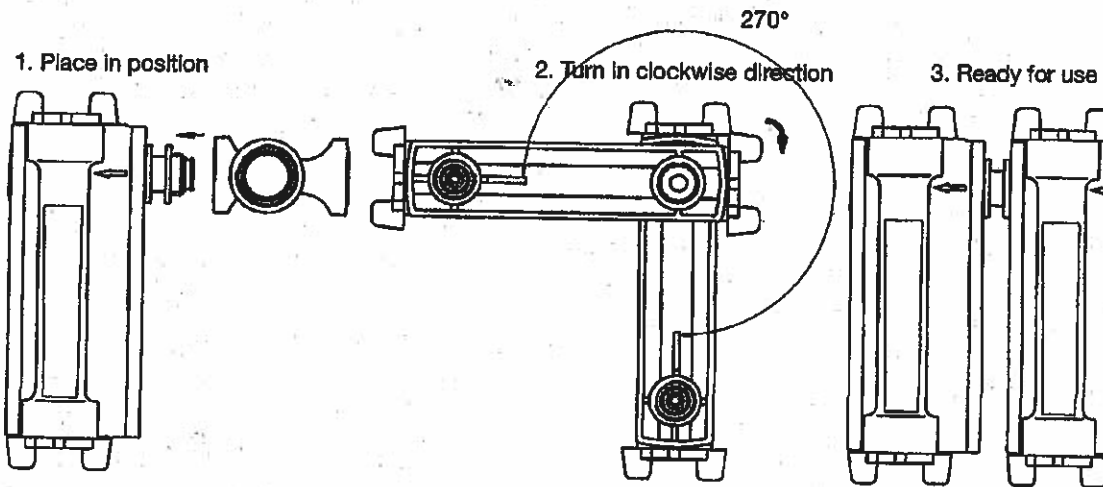


CAUTION:

Exact flow adjustment can no longer be guaranteed with the O-ring fitted.

2.2.2 Installation of Two or Several Modules if not Supplied Complete Ex-Factory

Screw connecting nipple (1) or connection nipple (2) into module as required. Hold one of the modules to be connected in vertical position. Hold the other against it offset by 90°. When plugging modules together ensure correct direction of flow (arrows); they are connected by turning 270° in clockwise direction. Moisten O-rings to ease installation.



IMPORTANT:

The modules are connected by smooth-turning, multi-stage thread. Do not twist when fitting. Only hand-tighten tightly.



IMPORTANT:

The seals in the modules are rotary shaft seals. They must only be hand-tightened lightly.



IMPORTANT:

A part is twisted if it cannot be screwed in easily. Refit!

Install regulating screw (3) in first module. Continue as described under 2.2.1.

2.3 Electrical Connection Flow Sensor

The terminals of the flow sensor are assigned as follows:

Terminal X1 1 normally closed contact (reed contact)
X1 2 root
X1 3 normally open contact

2.4 Installation of Sensors

- Remove dummy plugs at top.
- Use installation kits for 25 mm \varnothing and 15 mm \varnothing sensors.
- Screw in sensors.

3 Operation

3.1 Operation and Adjustment

3.1.1 Flow Adjustment

- Open measuring water line.
- Adjust required flow rate with regulating screw (3).
- When using the flow sensor (4), insert the sensor, with the flow set, such that the sensor stem lightly presses down the float.

- Restrict flow at regulating screw (3), the flow sensor should cut out at a reduction by approx. 20 %.
- Readjust flow rate to required value, sensor cuts in again.
- The in-line sensor housing module is now ready for operation and measurement.



IMPORTANT:

The operating pressure of the supply of water to be measured must be constant when using the flow sensor. The flow sensor does not register when the set flow rate is exceeded.

3.1.2 Calibration

- Cut off flow at regulator plug (3) in order to calibrate/check pH/Redox sensors.
- If installed in pressurized system, switch off shut-off valves before and after the sensor module.
- Unscrew dummy plug (5) at bottom.
- Fill calibration cup (6) with standardizing solution up to marking and screw into module from below.
- Carry out calibration procedure. On completion, remove calibration cup and screw in dummy plug.
- Re-open water line or adjust required flow rate.

4 Replacement Parts / Accessories

Recommended accessories

Installation kit for 25 mm sensor
Potential plug, complete (for equipotential bonding connection) (Item 7)
Flow sensor (Item 4)
Calibration cup (Item 6)
Sampling tap (Item 8 and 9)

5 Old Part Disposal

Before disposal, the modules and screw fittings must be disassembled and the seals removed. The plastic parts (PVC) should be returned to a suitable recycling system. The seals (Viton®) should also be disposed of accordingly. Viton® is a registered trademark of DuPont Dow Elastomers.

6 Troubleshooting

- The float shows incorrect indication or is stuck:
Check mounting.
The flow meter module must be mounted in a **perfectly vertical** position in order for the flow meter to function correctly.
Remove dirt (connect filter upstream if necessary).



CAUTION:

The pressure must be kept constant to ensure the flow indicator functions correctly.

Air extraction: open valves completely and raise flow volume to 150 l/h.

- Flow sensor does not switch:
Exceeding the maximum voltage and current values (μ s - ms range) even for a short period of time, due to cable inductance and cable capacitance in longer cable connection, can cause the reed contact to stick. Corrective measure: Lower voltage and current values, e.g. by series resistor.

7 Technical Data

7.1 Technical Data of Module

Dimensions: See dimensions sheet



IMPORTANT:

Approx. 200 mm space should be left above and below the modules to facilitate installation of sensors, adjustment of flow monitor and to screw in the calibration cup.

Weight:	approx. 245 g (13.5 mm module) approx. 475 g (25 mm module)
Material:	PVC (all modules, mounting plates) Viton® A (seals) Transparent PP (calibration cup)
max. operating temp.:	60 °C
max. operating pressure:	6 bar (30 °C) 1 bar (60 °C) 2 bar (for use of flow monitor)

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IMPORTANT:

The operating pressure of the water line must not be higher than the lowest permissible operating pressure of the sensor/flow monitor used.

Flow rate:	up to 80 l/h (Indication 30 - 80 l/h / 7.5 - 20 gph) recommended 40 l/h
Measurement accuracy of flow module:	± 15 %
Pressure loss of modules:	Module for flow measurement 12 mbar (12 cm water column) Module PG 13.5 2 mbar (2 cm water column) Module 25 mm 20 mbar (20 cm water column)

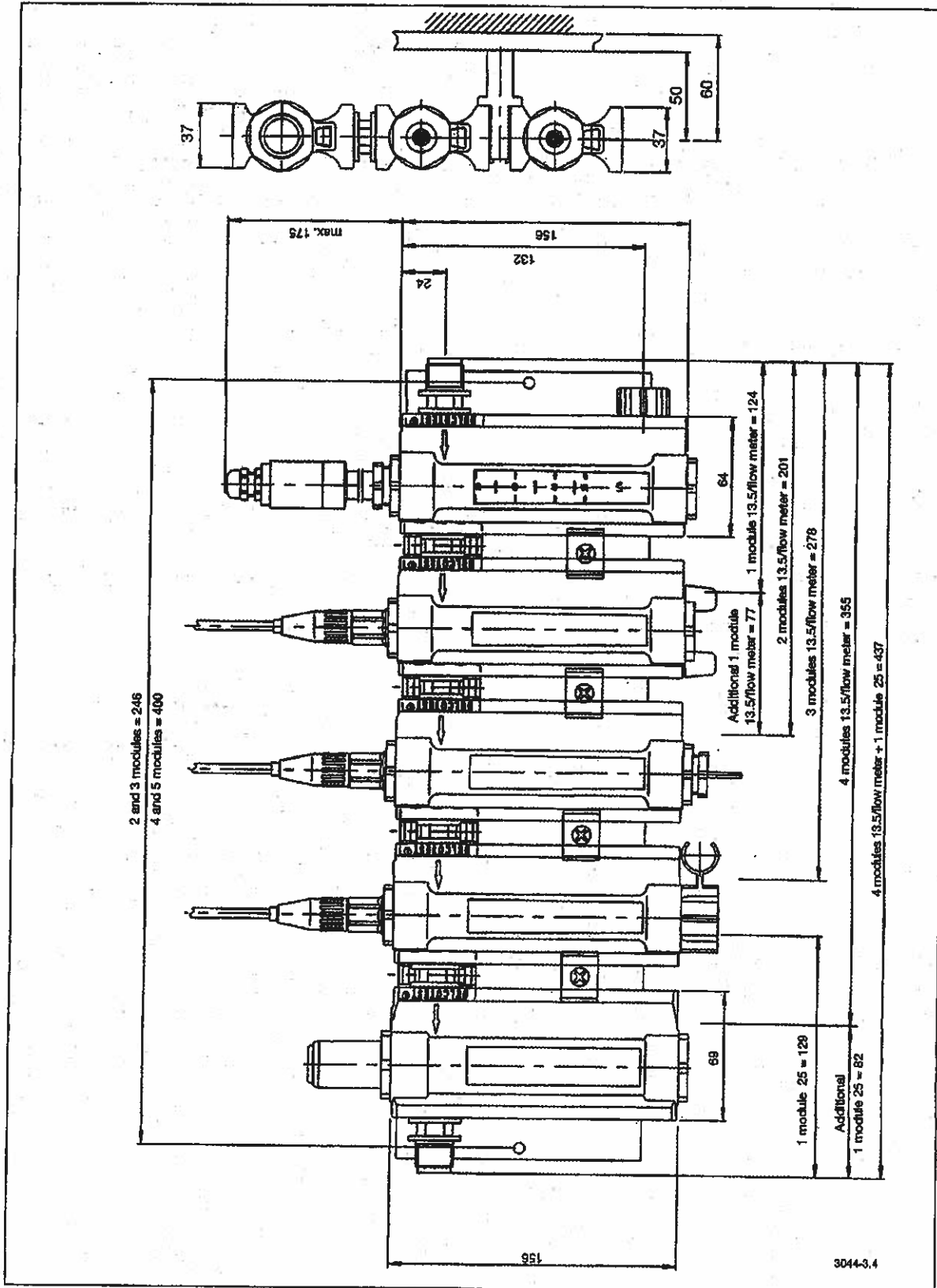
7.2 Technical Data of Flow Sensor

Switching hysteresis for flow monitoring: approx. 20 %

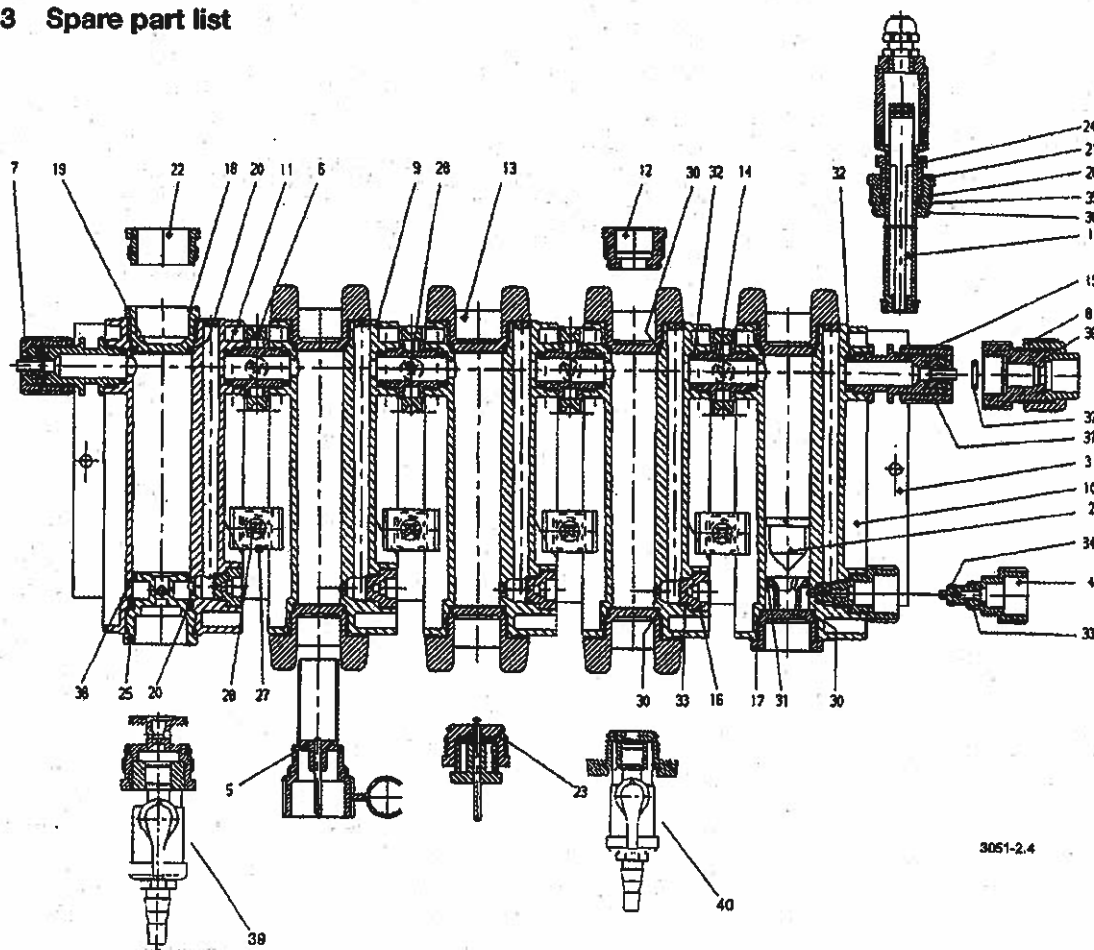
Flow sensor features type of enclosure IP 65.

The switch in the flow sensor is a floating reed switch, changeover contact.

1. Reed contact:	max. making and breaking capacity 3 W max. switching voltage 175 V max. switching current 0.25 A max. permanent current 1.2 A max. contact resistance 150 mΩ Cross section of 0.1 mm² - 1 mm²
2. Terminal:	
3. Ambient temperature (operating and storage temp.):	-40 - +100 °C
4. Humidity:	Non-condensing
5. Tolerances:	The flow sensor can be pulled by up to 175 mm out of the flow module (without cable).



7.3 Spare part list



3051-2.4

Pos. Typ Pos. Type	Anz. No. of	Artikel	Description	Best.Nr. Code No.
DGMA Durchlaufgeber				
1	1	Durchflusssensor kpl. PC	Flow sensor cpl. PC	791635
2	1	Schwimmer kpl. PC	Floating cpl. PC	791634
3	1	Montageplatte 258x10x135 (2/3 Module)	Mount. plate 258x10x135 (2/3 mod.)	1001853
	1	Montageplatte 412x10x135 (4/5 Module)	Mount. plate 412x10x135 (4/5 mod.)	1001855
4	1	Regulierschraube M20x1.5 P	Control screw M20x1.5 P	791234
5	1	Abgleichtasse PE	Calibration cup PE	791228
6	1	Wandbefestigungsset	Wall fastening	791228
7	1	Anschluß-Set 8x5-1 PC3	Connect. set 8x5-1 PC3	790886
8	2	Verschraubungsset kpl. DN10 PC1	Screwing set cpl. DN10 PC1	791665
9	1	DLG-Modul ohne Logo PVC-transp.	DLG-module without logo PVC-transp.	791667
9	1	DLG-Modul mit Logo PVC-transp.	DLG-module with logo PVC-transp.	791217
10	1	Ström.Modul gph.ohne Logo PVC-tra.	Fl.met.mod.gph.without logo PVC-tra.	791672
10	1	Ström.Modul gph.mit Logo PVC-tra.	Fl.meter mod.gph.with logo PVC-tra.	791671
10	1	Ström.Modul l/h ohne Logo PVC-tra.	Fl.met.mod.l/h without logo PVC-tra.	791670
10	1	Ström.Modul l/h mit Logo PVC-tra.	Fl.meter mod.l/h with logo PVC-tra.	791637
11	1	DLG-Modul 25mm ohne Logo PVC-tran.	DLG-mod. 25mm without logo PVC-tran.	791674
11	1	DLG-Modul 25mm mit Logo PVC-tran.	DLG-module 25mm with logo PVC-tran.	791673
12	1	Übergangsnippel M30/Pg13.5-d14,5	Red.nipple M30/Pg13.5-d14.5	791219
DGMA in-line probe housing				

Operating Instructions
In-Line Sensor Housing DGMA

Pos. Typ Pos. Type	Anz. No. of	Artikel	Description	Best.Nr. Code No.
DGMA Durchlaufgeber			DGMA in-line probe housing	
13	2	Blindstopfen M30x4 P2 P	Welsh plug M30x4 P2 P	791220
14	1	Verbindungsniessel M20x6 P2 P	Connection nipple M20x6 P2 P	791226
15	2	Anschlußniessel M20x6P2-M20x1.5 P	Connec. nipple M20x6P2-M20x1.5 P	791227
16	1	Blindstopfen M20x1.5 P	Welsh plug M20x1.5 P	791235
17	1	Anströmstopfen M30x4 P2 P	Flow plug M30x4 P2 P	791703
18	1	Blindstopfen M34x1.5 P	Welsh plug M34x1.5 P	791734
19	1	Klemmscheibe d31.3/25.5x1.5 P	Clamped disk d31.3/25.5x1.5 P	791733
20	2	O-Ring 25.00 - 3.50 83FPM592	O-ring 25.00 - 3.50 83FPM592	1002722
21	1	Übergangsniessel M30/Pg13.5-d16	Red.nipple M30/Pg13.5-d16	791688
22	1	Klemmschraube M34x1.5-d25.5 P	Attachment screw M34x1.5-d25.5 P	791732
23	1	Potentialstopfen m.Stab kpl. PC1	Equipotential plug w. rod PC1	791663
24	1	Klemmniessel Pg 13.5-d15.5 P	Clamped nipple Pg 13.5-d15.5 P	791223
25	1	Anströmstopfen M34x1.5 P	Flow plug M34x1.5 P	740207
26	1	Klemmscheibe d18.5/d15.5x2 P	Clamped disk d18.5/d15.5x2 P	791225
27	1	Halterung f. Montageplatte DGMA PP	Holding nut for mount. plate PP	1001856
28	1	PT-Schraube KB 50x20 verz.	PT-screw KB 50x20 galv.	468445
30	2	O-Ring/M 20.00 - 2.50 83FPM59	O-ring/m 20.00 - 2.50 83FPM59	481020
31	1	O-Ring/M 17.17 - 1.78 83FPM59	O-ring/m 17.17 - 1.78 83FPM59	791989
32	2	O-Ring/M 14.00 - 2.00 83FPM59	O-ring/m 14.00 - 2.00 83FPM59	791639
33	1	O-Ring/M 10.00 - 2.00 83FPM59	O-ring/m 10.00 - 2.00 83FPM59	481027
34	1	O-Ring/M 5.30 - 2.40 67FPM58	O-ring/m 5.30 - 2.40 67FPM58	481005
35	1	O-Ring/M 15.00 - 2.00 83FPM59	O-ring/m 15.00 - 2.00 83FPM59	481017
36	2	O-Ring/K 13.00 - 2.50 67FPM58	O-ring/K 13.00 - 2.50 67FPM58	481013
37	2	O-Ring/M 9.00 - 2.50 83FPM59	O-ring/m 9.00 - 2.50 83FPM59	791496
38	1	O-Ring/M 24.00 - 2.00 83FPM59	O-ring/m 24.00 - 2.00 83FPM59	481034
39	1	Probeentnahmehahn Modul 25 mm	Sampling tap for 25 mm module	1004739
40	1	Probeentnahmehahn Modul PG 13,5	Sampling tap for PG 13.5 module	1004737

Table of Contents

**Please read the operating instructions through completely before commissioning this equipment!
Do not discard!
Any part which has been subject to misuse is excluded from the warranty!**

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User guidelines

User guidelines

This operating instructions manual contains the product information in the main text,

- enumerated points
- highlighted points

and safety guidelines identified with symbols:



CAUTION

Non-observance of the safety instructions could result in injury to persons or property.



IMPORTANT

Non-observance of the safety instructions could result in injury to property.

NOTE

Working guidelines.

1 About this sensor

The CLE chlorine sensor is a membrane covered, amperometric, two-electrode sensor. The chlorine sensor is used to determine the concentration of free chlorine in water not containing surfactants. The water can also be seawater. The measuring cell CLE 3.1 is characterized by substantially reduced cross sensitivity to combined chlorine (monochloramine and dichloramine). Typical applications include:

- 1) The chlorination of swimming pool water with high nitrogen load (e.g. private swimming pool).
 - 2) The chlorination of drinking water with the presence of ammonium (e.g. surface water) or the treatment of water of comparable quality.
- The measuring cell is available with a 2-conductor interface (mA).

2 Safety

Correct use

The sensor may be used to determine and control only concentrations of free chlorine.

The sensor may not be used in water or solutions containing surfactants.

The sensor may not be used in connection with organic chlorine preparations (e.g. trichloroisocyanuric acid) or stabilisers (e.g. cyanuric acid).

All other uses and modifications are prohibited.

The sensor is not a safety component.



CAUTION

- *In order to guarantee flow parameters, this sensor may be installed only in ProMinent DLG III or DGM in-line probe housings. (See section 15 "Technical data").*
- *The outlet of the in-line probe housing must be subject to atmospheric pressure or a minimum of 1 bar back pressure.*
- *The power supply to the measuring device and thereby to the sensor must not be interrupted. After long power interruptions (longer than 2 hours) you should run-in and calibrate the probe once more. (See 7.1 "Run-in period" and 7.2 "Calibration").*



IMPORTANT

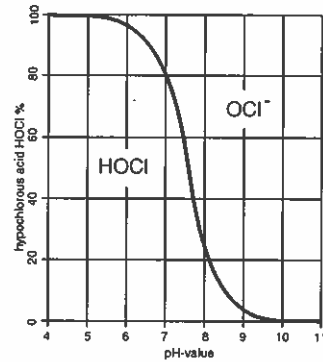
- *The sensor must be assembled, installed, maintained and operated by suitably trained and authorised personnel only.*
- *Check the sensor regularly for dirt and deposits. Check that there are no air bubbles clinging to the membrane cap. (See section 8 "Troubleshooting").*
- *Observe the relevant national directives for care, maintenance and calibration intervals.*

Design and function

3 Design and function

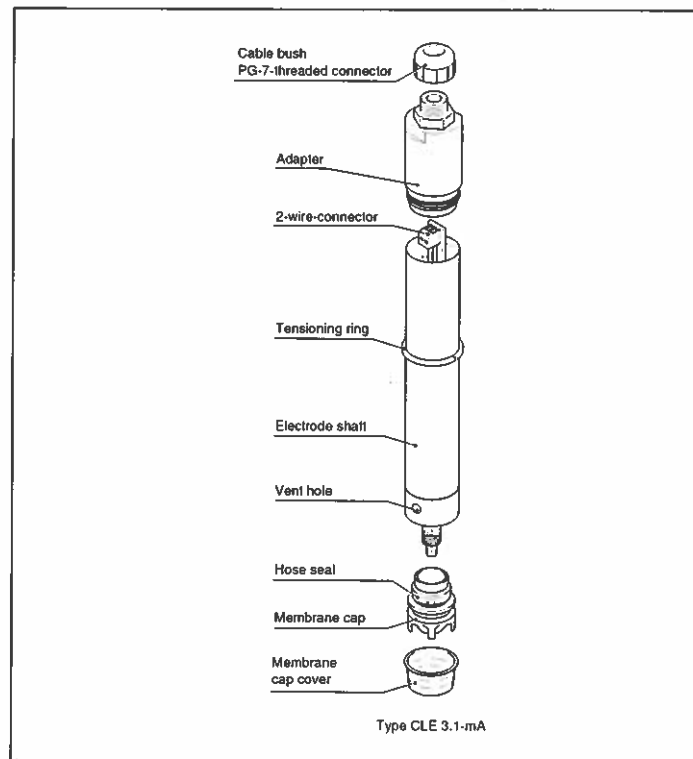
<i>Design</i>	<p>The CLE chlorine sensor is a membrane-covered, two-electrode sensor. It consists essentially of the membrane cap and the electrode shaft. The electrolyte-filled membrane cap forms the measurement chamber. A micro-porous membrane in the membrane cap allows gases in the sample water to pass into the membrane chamber. The electrodes in the electrode shaft project into the measurement chamber. The amplification electronics are located above the electrodes in the electrode shaft. The electrical connector is located above the electronics.</p> <p>The measurement gauge for temperature compensation is integrated into the lower end of the electrode shaft</p>
<i>Measured variable</i>	<p>Free chlorine (HOCl, OCl^-, Cl_2). The sum of the chlorine gas (Cl_2), hypochlorous acid (HOCl) and hypochlorite (OCl^-) is described as free active chlorine. In the operating range of the CLE probe (pH 5.5...8) disinfection is carried out almost entirely by the hypochlorous acid. The chlorine sensor detects only the hypochlorous acid (HOCl) as a proportion of the free active chlorine. The hypochlorite (OCl^-), which is 100 times less effective as a disinfectant, is not measured.</p>
<i>Function</i>	<p>The CLE chlorine sensor is a membrane-covered amperometric two-electrode sensor. A platinum cathode acts as a working electrode and a silver chloride anode is the counter electrode. After connecting the probe to the controller a constant polarisation voltage is passed to the electrodes. The hypochlorous acid diffuses through the membrane and depolarises the working electrode. The resulting current flow (depolarisation current), which under constant conditions is proportional to the concentration of the hypochlorous acid, is converted by the probe electronics into a standard output signal (4...20 mA) and is displayed by the measuring device/controller. The equilibrium of the system HOCl/OCl^- is strongly pH-dependent. As you can see from Fig. 1, the HOCl concentration falls rapidly as the pH increases. At pH 7, for example, the proportion of hypochlorous acid (HOCl) in the free chlorine is approx. 77 % but only 25 % at pH 8.</p> <p>As the CLE measures only the hypochlorous acid, the measurement signal is equally dependent on the pH value. With the measuring cell CLE 3.1, the cross sensitivity of combined chlorine (monochloramine, dichloramine) is distinctly reduced making it possible to reliably determine free active chlorine in small concentrations even at high pH-values (up to 8.0 and up to 8.5 if the measuring instrument features integrated pH-compensation).</p>

Fig. 1



DPD-1 reagent is normally used to calibrate the CLE chlorine sensor. However, this measuring method always detects the sum of HOCl and OCl⁻. Therefore the pH value must be kept constant after calibration. If the pH value has altered by more than ± 0.2 since the previous calibration the probe must be recalibrated. If the pH value of the sample liquid cannot be kept constant you should use a controller which can automatically correct the pH value of the chlorine signal.

Fig. 2
Sensor
designs



Transport and storage

4 Transport and storage

NOTE

Transport, send and store the sensor in the original packaging. Retain the packaging complete with styropor parts.

Storage	Storage and transport temperature	5 - 50 °C
	Humidity	max. 90 % rel. humidity, non condensing
	Shelf life of sensor and electrolytes in original packaging	1 year

NOTE

When sensor is stored for longer than the shelf life period, send it to ProMinent for checking or reconditioning. Safe function and accuracy of measurement cannot otherwise be guaranteed.

- Contents
- 1 CLE sensor with membrane cap and tensioning ring
 - 1 bottle electrolyte (100 ml)
 - 1 set of operating instructions
 - 1 screwdriver

5 Assembly

*Pouring
Electrolyte*



IMPORTANT

Do not touch, damage or bring into contact with greasy substances the white membrane or the electrodes on the electrode shaft. The sensor will not, in such cases, work accurately.

Replace the membrane cap or send the sensor to ProMinent to have the electrodes cleaned.

NOTE

Carry out the following actions over a washbasin.

- ▶ Remove the red cap completely from the nozzle and cut the nozzle at the marked position to open the nozzle canal.
- ▶ Remove the membrane cap cover and unscrew the membrane cap from the electrode shaft.
- ▶ Rinse the membrane cap and the electrode with a little electrolyte.
- ▶ Fill the membrane cap up to the rim with electrolyte.
- ▶ Remove air bubbles by lightly tapping the membrane cap on an even surface.

*Assembling
membrane cap*

- ▶ Place the electrode shaft upright onto the filled membrane cap and twist until the thread bites.
- ▶ Rotate the electrode shaft until the vent hole is pointing upwards.
- ▶ **Slowly** screw in the membrane cap by hand up to the stop. Excess electrolyte will seep out of the vent hole as you screw the parts together.
- ▶ Rinse away the excess electrolyte from your fingers and from the sensor under running water.
- ▶ There should be no air left in the membrane cap/electrolyte. Repeat the above steps if there is still air present.

*Assembling
sensor*



IMPORTANT

- *When removing and inserting the sensor from or into the in-line probe housing, do so slowly to prevent damaging the membrane.*
- *The sensor must be kept damp after commissioning, e.g. the in-line probe housing should never be allowed to run dry.*

Assemble the sensor as described in the operating instructions manual for the in-line probe housing.

6 Installation



IMPORTANT

Do not switch the measuring system off when using intermittently. If necessary, use a timer to switch on metering equipment.

*When connecting
to an external
device*



IMPORTANT

- *The probe is not electrically isolated from the sample water. Ensure you electrically isolate from all other consumers. The connected controller must be isolated both from the sensor and from the power supply.*
- *Power supply must be at least 16 V at all times. Power source must be able to supply 16 V DC at a min. 35 mA. A power supply that is inadequate will provide incorrect readings.*
- *Note the following when connecting to external devices:*
Power source: 16-24 V DC, min. 35 mA at 16 V DC
Max. load: 1 W

*When connecting
to a ProMinent®
device*

Safety conditions at the interface are automatically fulfilled when connecting to ProMinent® controllers (e.g. DULCOMETER® D1C).

The CLE 3.1-mA is a sensor with a passive 4-20 A two-wire interface, i.e. the power supply is external, e.g. via the controller.

Electrical installation

- ▶ Rotate the sensor adapter a quarter-turn anticlockwise and pull off (bayonet fitting).
- ▶ Unscrew the locking screw of the PG 7 threaded connector and feed through the signal cable from the controller.
- ▶ Strip the cable ends and connect to the 2-wire connector:
1 = plus, 2 = minus.
- ▶ Insert approx. 5 mm of the signal cable into the sensor and tighten the PG threaded connector locking screw.
- ▶ Push the sensor adapter right into the housing and rotate carefully clockwise until the stop. IMPORTANT not to break the tips of the bayonet fitting.

7 Operation



IMPORTANT

The sensor must not be operated in water or solutions containing surfactants.

7.1 Run-in period

To acquire a stable display value the sensor should be run in for a predetermined period.

When first commissioned: 2 - 6 h

When re-commissioned: 2 - 6 h

When membrane/electrolyte replaced: approx. 1 - 3 h

7.2 Calibration



IMPORTANT

- *A slope test must be carried out after replacing the membrane cap or electrolyte.*
- *Slope tests must be repeated at regular intervals to ensure that the sensor is working correctly! When used in the treatment of swimming pool or drinking water it is generally sufficient to re-calibrate the sensor every 3 - 4 weeks.*
- *Avoid incorrect dosing due to air bubbles in the sample water! Air bubbles clinging to the sensor membrane can result in a measured variable that is too low and thus lead to incorrect dosage.*
- *Observe applicable national directives for calibration intervals!*

Operation

- Preconditions*
- Constant flow through in-line probe housing (see 15 "Technical Data")
 - Constant sample water temperature
 - Similar sample water and sensor temperatures (wait approx. 15 min.)
 - The sensor has been run in
 - Constant pH value

Zero point calibration

If a ProMinent controller is being used to operate the sensor, zero point calibration is not usually necessary. Zero point calibration should be carried out, however, if operating the sensor at the lower measurement threshold or when using the 0.5 ppm variant.

- ▶ Immerse the sensor in a container of clean, chlorine-free tap water.
- ▶ Stir with the sensor until the measured variable displayed at the controller has remained stable for 5 min.
- ▶ Calibrate the controller to zero in accordance with the operating instructions.
- ▶ Reinstall the probe in the probe housing (DGM; DLG) as described in section 6 "Installation".

Slope test

- ▶ Determine the chlorine content in the sample water using an appropriate measurement system (e.g. DPD-1).
- ▶ Set the resulting value at the controller in accordance with the operating instructions.

Repeat calibration after 1 day!

8 Troubleshooting

Fault	Possible cause	Remedy
The sensor cannot be calibrated - measuring device/ controller display value is greater than DPD-1 measurement	Run-in period too short Membrane cap damaged	<ul style="list-style-type: none"> ▶ See 7.1 "Run-in period" ▶ Replace membrane cap. Allow sensor to run in, calibrate ▶ Identify interfering contaminant and implement remedy
	Interference from water contaminants (see 15 Technical data, "Cross-sensitivity") Short circuit in signal cable DPD-chemicals spent pH-value < pH 5.5	<ul style="list-style-type: none"> ▶ Identify short circuit and repair ▶ Use new DPD chemicals, repeat calibration ▶ Increase pH-value (pH 5.5-8.0)
The sensor cannot be calibrated - measuring device/ controller display value is smaller than DPD-1 measurement	Run-in period too short Membrane cap deposits	<ul style="list-style-type: none"> ▶ See 7.1 "Run-in period" ▶ Remove deposits (see 9 "Maintenance"). Replace membrane cap. Run-in sensor, calibrate
	Sample water flow inadequate Air bubbles on the outside of the membrane Surfactants in water (membrane is transparent!) pH-value > pH 8.0 No electrolyte in membrane cap Electrolyte displaced by gas bubbles in the sample water	<ul style="list-style-type: none"> ▶ Increase flow (see 15 "Technical data") ▶ Tap to remove air bubbles and increase flow if necessary ▶ Remove surfactants and replace membrane cap, run in sensor and recalibrate. If nec. use CDP sensor ▶ Lower pH-value (pH 5.5-8.0) ▶ Add new electrolyte (see 5 "Assembly", section 7.1 "Run-in period" and section 7.2 "Calibration") ▶ Consult ProMinent
Measured variable value is "zero"	Only bound chlorine present Chlorine content below the lower measuring range limit Sensor incorrectly connected to controller Run-in period inadequate Sensor defective	<ul style="list-style-type: none"> ▶ If chloramine is present (DPD-4 test), replace water or chlorinate ▶ Add chlorine and then repeat calibration or use appropriate sensor ▶ Connect sensor correctly to controller ▶ Run in for at least 3 h ▶ Replace sensor
Measured variable display unstable	Air bubbles on the outside of the membrane Membrane damaged Cause lies with the controller	<ul style="list-style-type: none"> ▶ Tap to remove air bubbles and increase flow if necessary ▶ Replace membrane cap. Run-in sensor, calibrate ▶ Identify cause and remedy

Troubleshooting / Maintenance

Once you have tried everything, check whether the reference electrode is brownish grey at the tip of the electrode shaft. If it is silvery white it is spent and should be reconditioned by ProMinent.

9 Maintenance



IMPORTANT

- *The sensor must be regularly serviced in order to avoid exceeding dosage due to sensor failure!*
- *Observe applicable national directives for service intervals!*
- *Do not touch the sensors or bring into contact with substances containing grease.*

Service intervals Daily/weekly depending upon application.

Maintenance tasks

- ▶ Check the sensor display value on the controller using an appropriate chlorine measuring system (e.g. DPD-1).
- ▶ If necessary recalibrate the sensor (see 7.2 "Calibration").

Cleaning the membrane

If it is no longer possible to calibrate the sensor you can try to clean the membrane.

Firstly disassemble the sensor. Observe the safety instructions.

Loose dirt clinging to the cap:

- ▶ Rinse the membrane under a gentle stream of cold tap water.

Removing deposits (scale, rust):

- ▶ Disassemble the membrane cap (see 11 "Decommissioning").
- ▶ Place the membrane cap in a bath of 5 % salt water (e.g. overnight).
- ▶ Rinse the membrane cap under plenty of water.

You should now refill the membrane cap with electrolyte, run in and recalibrate (see sections 5 "Assembly", 7.1 "Run-in period" and 7.2 "Calibration").

Replacing the membrane cap

If the sensor fails to calibrate even after cleaning the membrane, or if the membrane is damaged, you must replace the membrane cap (see sections 5 "Assembly", 7.1 "Run-in period" and 7.2 "Calibration").

10 Repairs

The sensor may only be repaired at the factory. Please return in its original packaging. Prior to return, please carry out instructions as described in 11 "Decommissioning".

11 Decommissioning

Decommissioning sensor: observe all safety guidelines as given in section 5 "Assembly"!

- ▶ Disconnect sensor from power supply (see 6 "Installation")
- ▶ Depressurise the in-line probe housing
- ▶ Loosen the locking screw
- ▶ Slowly remove the sensor from the in-line probe housing
- ▶ Unscrew the membrane cap over a wash basin or similar and empty
- ▶ Rinse the membrane and electrodes with clean water and allow to dry (do not allow dust to settle on electrodes or membrane)
- ▶ Screw on a fresh membrane cap loosely to protect the electrodes
- ▶ Fit the membrane cap cover to protect the membrane cap

12 Disposal

Electrolyte The electrolyte can be disposed of with in-house waste.

Sensor



IMPORTANT

- *Electronic waste is classified as special waste!*
- *Observe currently applicable local directives!*

Ordering guidelines / Directives and standards

13 Ordering guidelines

<i>Standard delivery</i>	<ul style="list-style-type: none">• 1 CLE sensor kit with membrane cap and tensioning ring• 1 bottle of electrolyte (100 ml)• 1 operating instructions• 1 screwdriver										
<i>Complete set</i>	<p>The sensors can only be ordered as complete kits:</p> <table><tr><td>• CLE 3.1-mA-0.5 ppm</td><td>Order no. 1020530</td></tr><tr><td>• CLE 3.1-mA-2 ppm</td><td>Order no. 1018369</td></tr><tr><td>• CLE 3.1-mA-5 ppm</td><td>Order no. 1019398</td></tr><tr><td>• CLE 3.1-mA-10 ppm</td><td>Order no. 1018368</td></tr></table>	• CLE 3.1-mA-0.5 ppm	Order no. 1020530	• CLE 3.1-mA-2 ppm	Order no. 1018369	• CLE 3.1-mA-5 ppm	Order no. 1019398	• CLE 3.1-mA-10 ppm	Order no. 1018368		
• CLE 3.1-mA-0.5 ppm	Order no. 1020530										
• CLE 3.1-mA-2 ppm	Order no. 1018369										
• CLE 3.1-mA-5 ppm	Order no. 1019398										
• CLE 3.1-mA-10 ppm	Order no. 1018368										
<i>Spare parts and accessories</i>	<table><tr><td>• 1 bottle of electrolyte (100 ml)</td><td>Order no. 506270</td></tr><tr><td>• 1 membrane cap</td><td>Order no. 790488</td></tr><tr><td>• assembly kit for DGM</td><td>Order no. 791818</td></tr><tr><td>• assembly kit for DLG III</td><td>Order no. 815079</td></tr><tr><td>• 2-wire signal cable (mA variant) (2 x 0.25 mm², Ø 4 mm)</td><td>Order no. 725122</td></tr></table>	• 1 bottle of electrolyte (100 ml)	Order no. 506270	• 1 membrane cap	Order no. 790488	• assembly kit for DGM	Order no. 791818	• assembly kit for DLG III	Order no. 815079	• 2-wire signal cable (mA variant) (2 x 0.25 mm ² , Ø 4 mm)	Order no. 725122
• 1 bottle of electrolyte (100 ml)	Order no. 506270										
• 1 membrane cap	Order no. 790488										
• assembly kit for DGM	Order no. 791818										
• assembly kit for DLG III	Order no. 815079										
• 2-wire signal cable (mA variant) (2 x 0.25 mm ² , Ø 4 mm)	Order no. 725122										

14 Compliance with directives and standards

EU directives:	EG-EMV RL 89/336/EWG 91/263/EWG i.d.F. 92/31/EWG
International standards:	EN 50 081-1/2 EN 50 082-1/2

15 Technical data

<i>Measured variable</i>	Hypochlorous acid (HOCl) Probe may not be used in connection with organic chlorine preparations (e.g. trichlorocyanuric acid) or stabilisers (e.g. isocyanuric acid)!		
<i>Application range</i>	Chlorination of swimming pool water and drinking water with the presence of combined chlorine (monochloramine, dichloramine) or water of similar quality.		
<i>Measurement range</i> (30 °C, pH 7.2)	CLE 3.1-mA-0.5 ppm: 0.01...0.50 mg/l (nominal slope: 24 mA/ppm) CLE 3.1-mA-2 ppm: 0.02...2 mg/l (nominal slope: 6 mA/ppm) CLE 3.1-mA-5 ppm: 0.01...5 mg/l (nominal slope: 2.4 mA/ppm) CLE 3.1-mA-10 ppm: 0.1...10 mg/l (nominal slope: 1.2 mA/ppm)		
<i>pH range</i>	pH 5.5...8.0 (with pH compensation of up to pH 8.5 built into the measuring instrument)		
<i>Temperature range</i>	1...45 °C (Temperature compensated) No temperature leaps! Max. temperature fluctuation speed < 0.3 °C/min.		
<i>Storage temperature</i>	5...50 °C		
<i>Conductivity water sample</i>	50 µS/cm - 10,000 µS/cm		
<i>Resolution</i>	Corresponds to lower measurement range threshold		
<i>Max. pressure</i>	DGM: 1 bar (atmospheric pressure at outlet)	No negative pressure!	
	DLG: 1 bar (atmospheric pressure at outlet)	No negative pressure!	
<i>Flow</i>	DLG III in-line probe housing A/B and/or DGM	Recommended:	40 - 60 l/h
		Minimum:	20 l/h
		Maximum:	100 l/h
<i>Crosssensitivity</i>	Di-/Trichloramine, iodine, ClO ₂ , ozone and bromine, bromamine		
<i>Operating life</i> <i>Membrane cap</i>	Typically 1 year depending upon the water quality. The presence of surfactants will considerably reduce the operating life of the equipment.		

Technical data

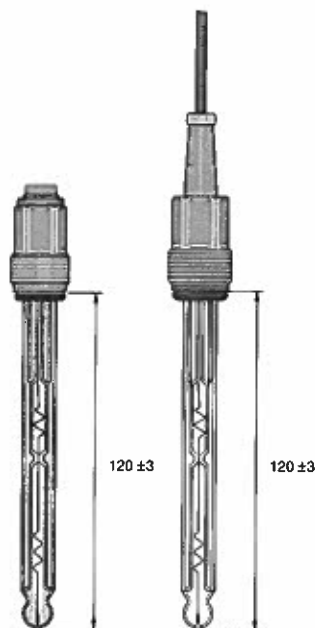
<i>Materials</i>	Membrane cap:	Clear PVC
	Electrode shaft:	Black PP and natural coloured PMMA
<i>Supply voltage</i>	16...24 V DC	
<i>Output signal</i>	4...20 mA	
<i>Enclosure rating</i>	IP 65	

Datenblatt pH-Einstabmeßketten PHED 112 SE/FE

Data Sheet pH-Combination Probes PHED 112 SE/FE



ProMinent®



3288/4

Technische Daten

pH-Bereich:	1...12
Temperatur:	0...80 °C
max. Druck:	8 bar
Leitfähigkeit:	≥ 150 µS/cm
Diaphragma:	2 Keramikdiaphragmen (Double Junction)
Ableitung:	Ag/AgCl-Vorrat (3 mol KCl/Gel)
Einbaulänge:	120 ± 3 mm
Ø Glasschaft:	12 mm
Einschraubgewinde:	PG 13,5
Elektrodenkopf:	Steckkopf SN 6 oder Festkabel (bei FE-Varianten)
typische Anwendungen:	Trink-, Brauchwasser, leicht verschmutztes Abwasser, Kühlturmwasser
Bestell-Nummer:	PHED 112 SE 741036 PHED 112 FE siehe Produktkatalog

Technical Data

pH-range:	1...12
Temperature:	0...80 °C
Max. pressure:	8 bar
Conductivity:	> 150 µS/cm
Diaphragm:	2 ceramic diaphragms (double junction)
Reference:	Ag/AgCl supply (3 mol KCl/gel)
Installed length:	120 ± 3 mm
Glass stem Ø:	12 mm
Mounting thread:	PG 13.5
Electrode head:	Push-and-twist connector SN 6 or fixed cable (FE-versions)
Typical applications:	Drinking water, industrial water, slightly contaminated waste water, cooling tower water
Order-No.:	PHED 112 SE 741036 PHED 112 FE see Equipment catalogue

Betriebsanleitung

DULCOTEST® Messumformer 4-20 mA pH V1, rH V1, Pt 100 V1

Operating Instructions

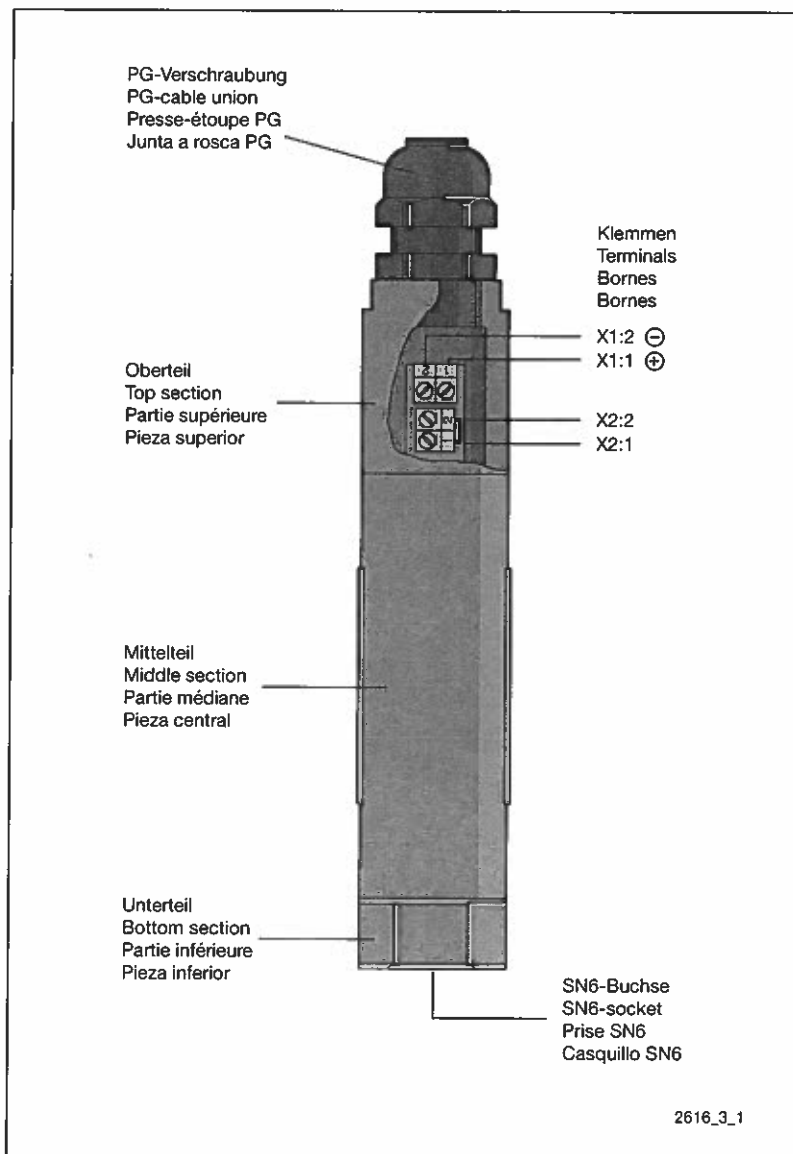
DULCOTEST® Transducer 4-20 mA pH V1, rH V1, Pt 100 V1

Mode d'emploi

Transducteur de mesure DULCOTEST® 4-20 mA pH V1, rH V1, Pt 100 V1

Instrucciones de servicio

Convertidores de medición DULCOTEST® 4-20 mA pH V1, rH V1, Pt 100 V1



T.Nr./Part No. 987467

BA DTZ 012 12/00 G/GB/F/E

The DULCOTEST® Transducer 4-20 mA in two-wire technology converts the disturbance-sensitive mV signals from pH and redox combination electrodes or Pt 100 platinum resistance thermometers into a standard 4-20 mA current signal for open and closed loop control devices (such as DULCOMETER® D1C or DULCOMARIN®) or PLC devices. The transducers are screwed directly onto the electrode/sensor. This avoids almost all kinds of disturbance otherwise caused by moisture, dirt or electric fields, and transmission is absolutely reliable even over great distances. On the output side the transducers have a two-wire connector for power supply and standard signal.



ATTENTION

- The device must not be used without further protection (outer casing, weather protection roof) in outdoor applications.
 - The interior of the transducer must be protected against moisture during installation!
 - To screw the transducer onto a measuring sensor, use only a size SW 22 fork wrench applied to the hexagonal part of its bottom section. Never screw down the transducer in any other way!
 - When screwing-on the transducer, always hold the measuring sensor by its head - never on the glass shaft!
 - Proceed cautiously when screwing the transducer onto measuring sensors made by other manufacturers, to avoid skewing the threads!
 - Incorrect connection of the transducer to the measuring sensor can lead to a falsified output signal!
 - Operate measuring sensors only within their specified measuring range, otherwise excessively large signal current can lead to voltage drop of the power supply, and the signal from the measuring probe may be falsified!
- Turn the upper part of the transducer through a quarter of a rotation in the clockwise direction and then pull it off (bayonet catch).
 - Release the terminal screws of the PG cable union (only the clamp screw) and then insert the 2-wire sensor cable (see under "accessories" for specifications). If necessary, make the cable able to slip with talcum powder or grease.
 - Bare the cable ends and connect them to the terminals 1 and 2.

Terminal	Sensor cable without potential equaliser	Sensor cable with potential equaliser
X1:1	+	+
X1:2	-	-
X2:1	Bridge	Potential equaliser
X2:2		

Additionally for liquid potential equalisation (pH/redox):

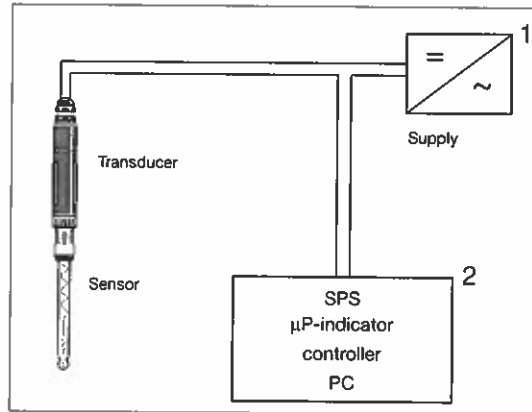
- Pierce the blind hole (1.5 mm diam.) in the sealing ring of the cable screw fitting. Pass the flexible conductor for the potential equalisation pin through the blind hole. Disconnect the jumper on the terminal X2 and connect the flexible conductor to X2-1.
- Tighten the clamping screw of the PG cable union.
- Push the top section into the centre section as far as it will go and then carefully turn it in the clockwise direction until it comes against the stop (take care not to break off the noses on the bayonet catch.)
- Screw the transducer onto the measuring sensor and tighten cautiously using a size SW 22 fork wrench.
- Only for pH-transducers: Make the zero point and slope adjustment (calibration) on the control unit (see operating instructions manual of the control unit).

Connecting to measuring/control units from other manufacturers

These transducers can be connected to any measuring or control device/instrument which is equipped with an electrically isolated 4-20 mA current input. Furthermore, the device must deliver a voltage of at least 18 V DC when loaded with the transducer.

Only for pH V1 and rH V1: when several inputs are present on the measuring instrument or control device, they must be mutually electrically isolated.

Application example



- 1 Supply unit for two-wire transducer with electrical isolation.
- 2 If several inputs are present on the unit, they must be electrically isolated.

Technical data

Type	pH V1	rH V1	Pt 100 V1
Measuring range:	pH 0...14	0...1000 mV	0...100 °C
Accuracy:	better than \pm pH 0.1 (typical \pm pH 0.07)	better than \pm 5 mV (typical \pm 3 mV)	better than \pm 0.5 °C (typical \pm 0.3 °C)
Signal output:	4-20 mA \triangle -500...+500 mV \triangle pH +15.45...-1.45 Output signal is uncalibrated. Signal output is not electrically isolated from signal input.	4-20mA \triangle 0...+1000 mV	4-20mA \triangle 0...100 °C
Input resistance:	$>10^{12} \Omega$	$>5 \times 10^{11} \Omega$	-
Connecting thread:	SN 6	SN 6	SN 6
Power supply:	24 V DC (18-28 V DC)	24 V DC (18-28 V DC)	24 V DC (18-28 V DC)
Maximum power consumption:	0.5 W	0.5 W	0.5 W
Ambient temperature:	-5...+50 °C, no condensation	-5...+50 °C, no condensation	-5...+50 °C, no condensation
Protection type:	IP 65	IP 65	IP 65
Material:	PPE	PPE	PPE
Dimensions:	141 x 25mm Ø	141 x 25mm Ø	141 x 25mm Ø
Weight:	80 g	80 g	80 g
Part Number:	809126.6	809127.4	809128.2

Accessories

2-wire sensor cable, Part No. 725122.6

External diameter:	4 mm
Conductor cross-section:	2 x 0.25 mm ²
Conductor resistance:	max. 80 Ohms/km
Capacitance conductor/conductor:	90 pF/m

Flexible lead for liquid potential equalisation, Part No. 809131.6

External diameter:	1.5 mm
Length with socket:	30 cm

Lutz Polypropylene Pump Tube

For a wide range of acids and alkalis



Sealless (MSL) or with Mechanical Seal (MMS)

Applications

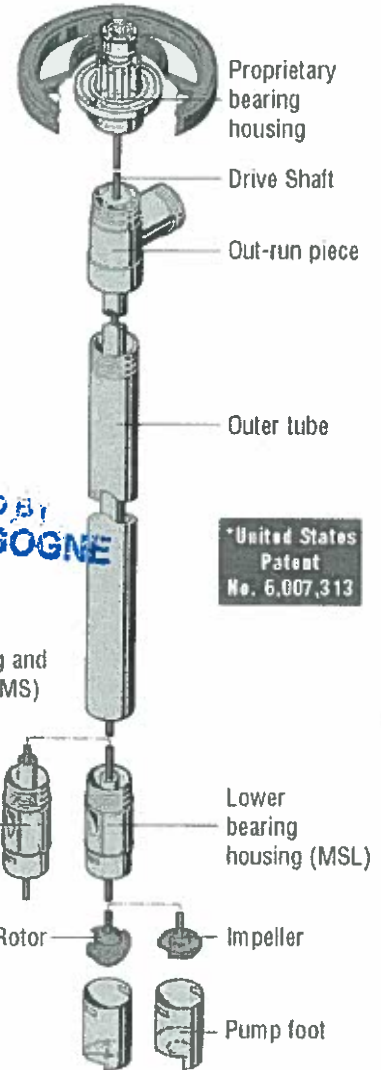
The robust Lutz pump tube with mechanical seal or sealless is suitable for pumping clean and dirty, thin-bodied and slightly viscous, aggressive and non-aggressive liquids out of drums and small or large containers. The pump tube is non-lubricated, thus preventing contamination of the liquids pumped.

Structure and function (MMS-PP)

Lutz pump tubes are immersible centrifugal pumps. The drive shaft of this pump tube is sealed by a single-acting mechanical seal (MS). The patented mechanical seal is integral with the lower bearing housing. This position guarantees the best operating conditions and ensures the long service life of the mechanical seal. The pump must not be allowed to run dry.

Structure and function (MSL-PP)

Lutz pump tubes are immersible centrifugal pumps. The drive shaft of this pump tube is not sealed. The bearing housing unit behind the impeller is designed to prevent pumped liquid from rising between the shaft and the inner tube. This device guides the liquid which penetrates between the drive shaft and the shaft bearing back into the container being drained.



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Warning: This review of this drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents. The drum and container pump must not be used for flammable liquids.

Provide dispensing nozzle as specified

Picture shows:
Pump tube with motor B 36 / MI 4

Please specify model provided.



Type	MMS-PP (Mechanical Seal)	MSL-PP (Sealless)
Wetted parts		
Housing	Polypropylene	Polypropylene
Mechanical seal	Carbon, SiC, Viton, HC-4 (2.4610)	None
Bearings:	PTFE	PTFE
Drive shaft:	HC-4 (2.4610) optional Stainless Steel (316)	HC-4 (2.4610) optional Stainless Steel (316)
Examples of liquids:	Acids, Alkalis, Vegetable Oils, Liquids, Phosphates, Sulphates, Nitrates, Chlorates, Paints and Inks, Water, Sulphites	Acids, Alkalis, Galvanic Fluids, Phosphates, Sulphates, Nitrates, Chlorates, Paints and Inks, Water, Oils, Sulphites
Type of Impeller:	axial-flow (rotor) or radial-flow (L) Material: PP	axial-flow (rotor) or radial-flow (L) Material: PP

Immersion depths:

27', 39', 47', 55', 59', 63', 67', 78'

Special immersion depths on request.

Note:

Axial-flow rotor for high delivery rate and low delivery head. Radial-flow impeller for low delivery rate and high delivery head.

For more details request literature PP-SL (Ref. no. 9000-136)

Lutz B36/36SC Drum Pump Motor

Lutz B36 Drum Pump Motor

Motor

Universal motor 120 volt, 640 watt, 60hz.
Optionally with or without speed controller.
Bipolar on/off switch with single pole
thermal over current release. Double
insulated. Open drip-proof motor.
Not suitable for hazardous duty.



Applications

A light, easily handled, high-performance
pump, for almost all types of thin-bodied,
slightly viscous, aggressive and non-
flammable liquids.

Operating Data

Quantity: up to 54.5 GPM
Delivery Head: up to 69 FT
Temp. of medium: up to 248°F
Viscosity up to 1400cps

Examples of Liquids Pumped

Hydrochloric acid, sulfuric acid, formic acid, boric acid, chromic
acid, caustic soda solution, ammonium chloride, soap solutions
etc.

Pump Tubes

For the various applications, pump tubes are available in
polypropylene (PP), polyvinylidene fluoride (PVDF), aluminum
alloy (Alu), stainless steel 316 and hastelloy C (HC).

Weight (motor and pump tube) approx. 7.4 to 14.1 lbs.

Pump should be rated to safely pump sodium hypochlorite.

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LIGHTNIN[®]

EV Series Portable Mixers

***Economy and Value
from a name you
know and trust.***



YOU AND LIGHTNIN. THE RIGHT MIX.

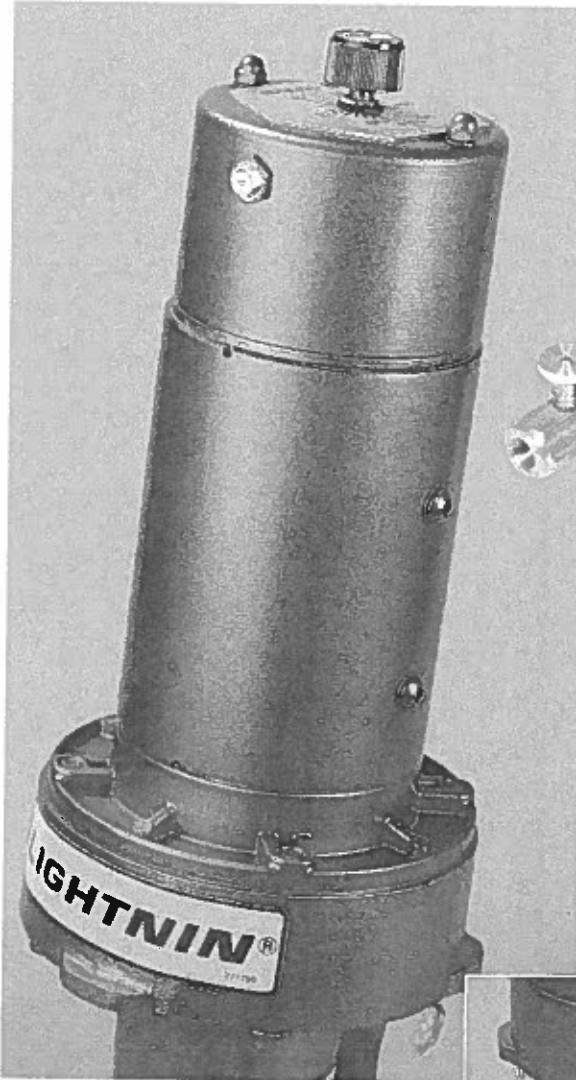
LIGHTNIN

LIGHTNIN EV Mixers.

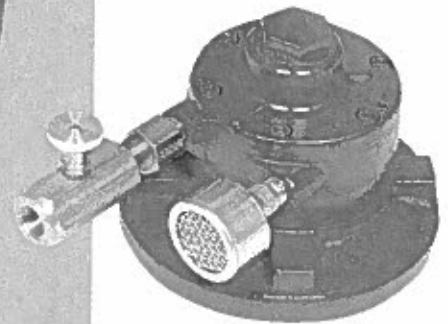
Superior economy and value for single-purpose mixing applications.

Now you can buy just as much mixer capability as you need for your specific application, without having to buy features and options that are more than you require. Plus, you get all the quality and reliability you'd expect from the world leader in fluid mixing technology.

- 280 and 350 RPM Gear Drive units feature lower speeds and higher torque for mixing large batches of low-viscosity fluids or smaller batches of high-viscosity fluids.
- Self-aligning, floating gears optimize load sharing and reduce wear.
- 1,725 RPM Direct Drive units are designed for small batch mixing plus high fluid shear applications.
- Switch, cord and plug are **standard** on all single-phase, 60 Hz, non-explosion proof units.
- Flexible motor coupling reduces mechanical starting loads for extended gear life.
- Permanently sealed lubrication reduces maintenance costs.
- Oversized bearings provide superior shaft support.
- Includes **LIGHTNIN's** 100% performance guarantee.



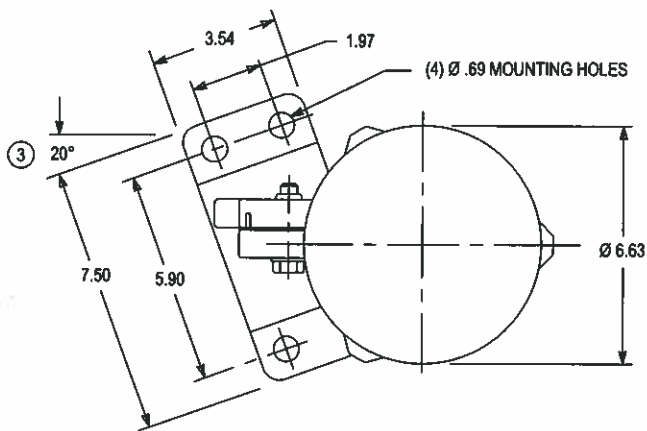
Variable Speed control is available on all electric models, except XP models.



Optional 1/4 to 3/4 hp cool-running air motors can be used in flammable or explosive environments, and in ambient temperatures up to 250°F (120°C).

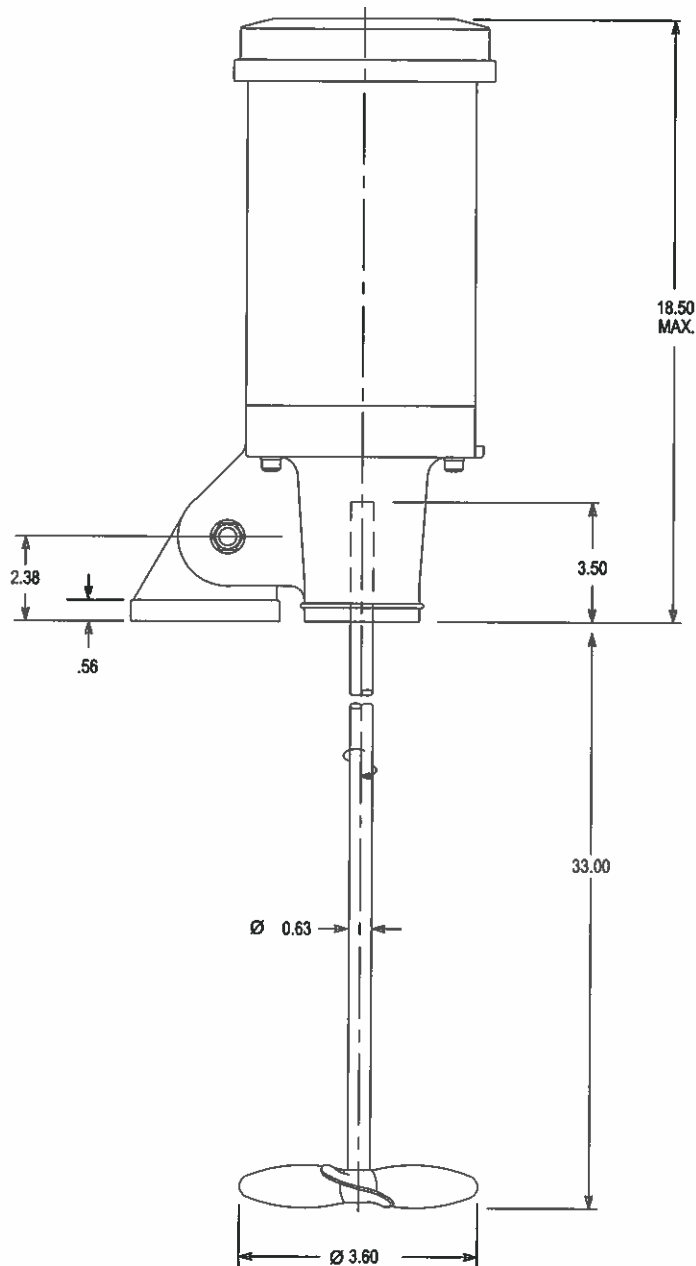


Optional flange mount (above) or plate mount (left) bases are available.



NOTES:

- ① DIMENSIONS ARE IN INCHES AND ARE MAXIMUM.
- ② WEIGHT (LESS SHAFT AND IMPELLERS): 44 LBS.
- ③ UNIT OFFSET 20° HORIZONTALLY, AND ADJUSTABLE 10° (OR MORE) VERTICALLY. UNIT ALSO AVAILABLE WITH 0° OFFSET.
- ④ MATERIAL OF MIXER PARTS IN CONTACT WITH TANK CONTENTS IS 316SS
- ⑤ MOTOR DATA:
H.P.: 25 R.P.M.: 1725 DUTY: NA
VOLTS: 115/208-230 PHASE: 1 Hz: 60
ENCLOSURE: TEFC IMPELLER R.P.M.: 1750.0



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LIGHTNIN®
MIXERS AND AERATORS

GENERAL ARRANGEMENT

FOR: **Not Available**

TAG NO.:

MIXER MODEL: EV1P25

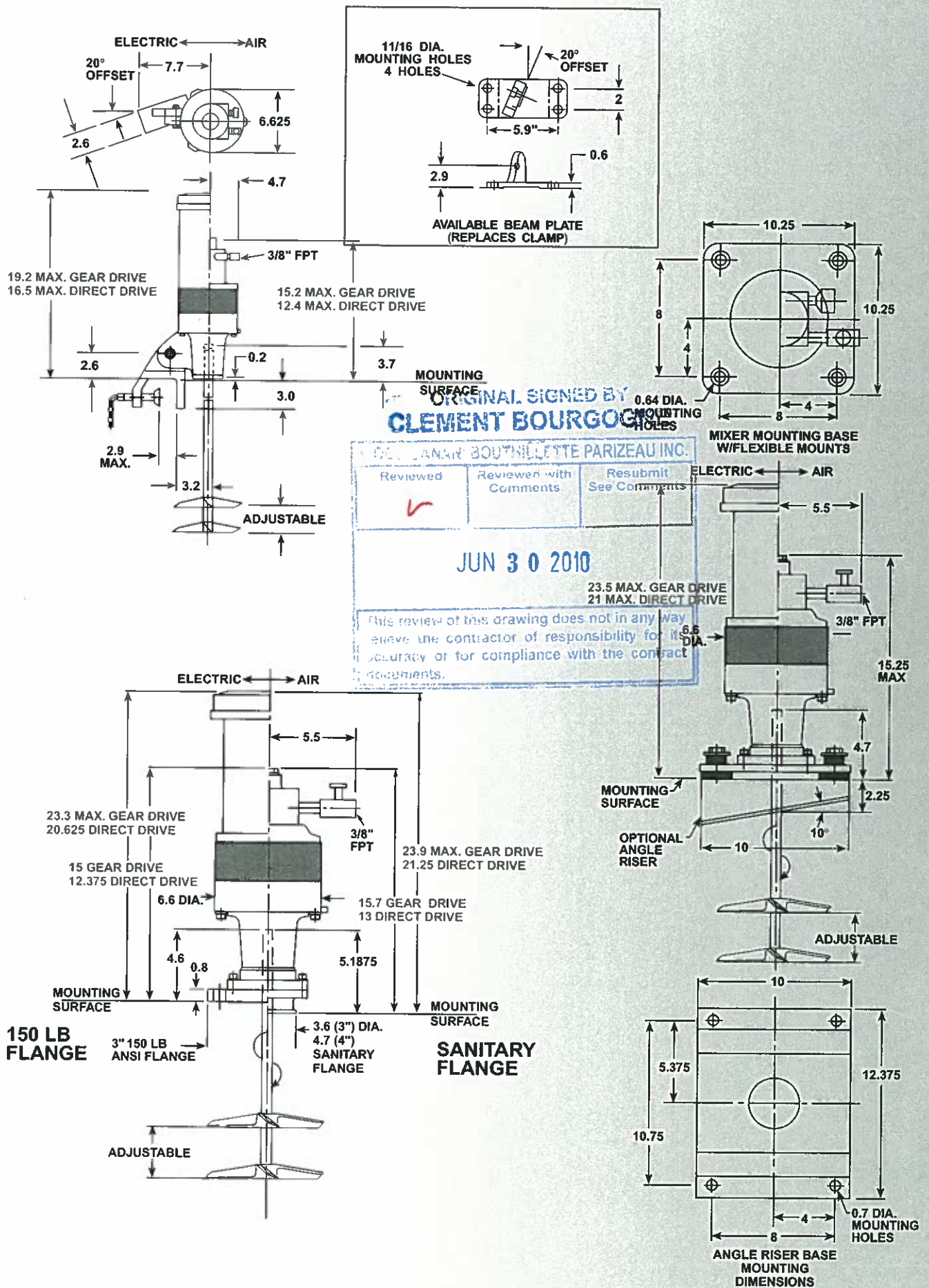
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Contact the LIGHTNIN Experts

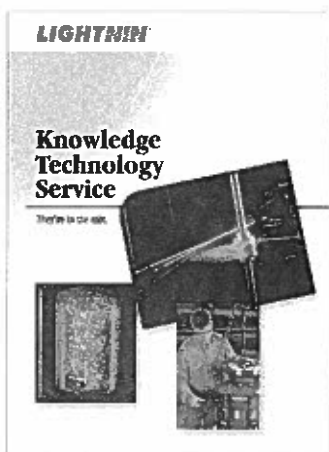
Learn more about other high-performance mixers from LIGHTNIN.

Visit our website at www.spxprocessequipment.com.

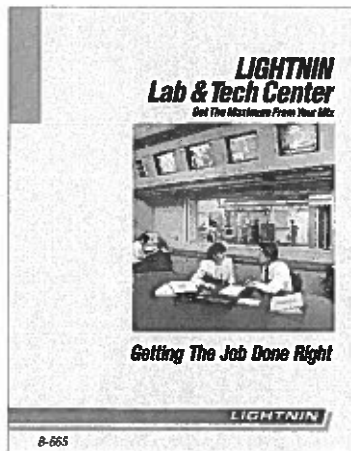
Or call 1-888-MIX-BEST (U.S. and Canada),
or +1(585) 436-5550 (Worldwide).



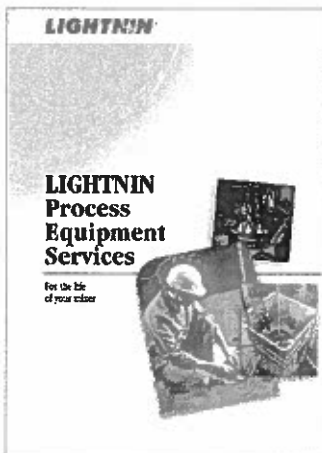
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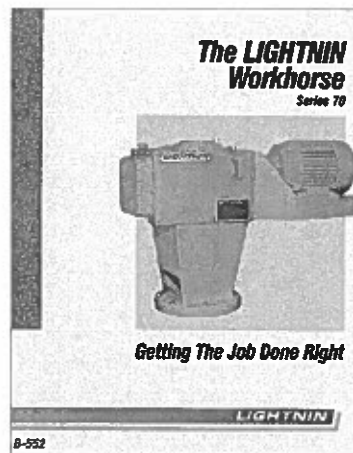
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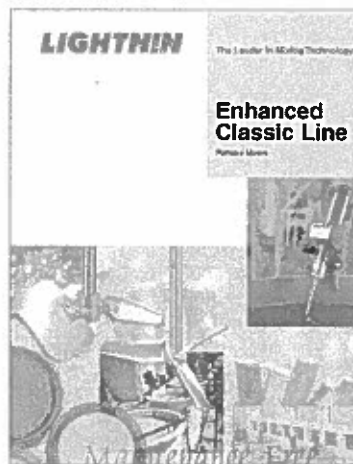
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B-773



B-552



B-799

LIGHTNIN
An SPX Process Equipment Operation

*When it comes to mixing
We never stop*

135 Mt. Read Blvd.
Rochester, NY 14611 USA
Telephone: 585-436-5550
Fax: 585-436-5589

www.spxprocessequipment.com

The trademark LIGHTNIN is owned by SPX Corporation
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B-753-L-06/05

PRODUCT SPECIFICATION

Harmsco® Model #: HUR 3X170FL

Description: Tangential Entry, Up-Flow Cartridge Filter Housing with; Swing Bolt Closure, Davit Cover Lift, and Flanged Connections.

Details:

1. Stainless steel construction, all wetted metallic components meet, or exceed ASTM A-240.
2. Swing bolt style housing closure. Swing bolts meet, or exceed ASTM A-193 B8.
3. NSF Certified using Genuine Harmsco® Hurricane™ replacement filter cartridges.*
4. Tangential inlet, along with the integral inner can, creates a centrifugal flow that induces pre-filtration by heavy particulate separation.
5. Patented "Up-Flow" design that;
 - a. Self purges housing of air,
 - b. Eliminates by-pass contamination during servicing,
 - c. Improves efficiency by creating an even flow distribution across filtering media.
6. Strong, durable construction.
7. Utilizes Genuine Harmsco® Hurricane™ HC/170 cartridges, qty 3 total.*
Note: HC/170 cartridge filters are available in a variety of micron ratings from .35 nominal to 150. Activated carbon and several high temperature cartridges are also available.
8. Inlet & Outlet are NPS 3 Flanges Class 150 SOFF
9. Drains (Qty 2) are 1-1/2" Female NPT (FPT) Couplings, Class 1000
10. Vent is 1/2" Female NPT (FPT) Coupling, Class 1000
11. Gage Ports (Qty 2) are 1/4" Female NPT (FPT) Couplings, Class 1000
12. Closure Gasket is EPDM 70 Durometer O-ring.
13. Electro-polish finish.
14. Pressure Rating - 200 P.S.I.G. Maximum
15. Temperature Rating - Up to 140°F

- Note: Higher temperatures are possible, check cartridge specifications and contact a Harmsco® sales engineer.
16. Flow Rate - 450 GPM Maximum (optimal 315 GPM). See Pressure Drop vs. Flow Rate Curve, page 2.
 17. One person can perform maintenance.

Requirements:

Floor Load: Dry weight = 420 lbs.
Volume = 61 US gallons x 8.337 lbs./US gallon (water) = 509 lbs.
Total weight = 420 + 509 = 929 lbs. (housing + water)
Floor contact area = .292 ft²
Floor Load = 929 lbs. divided by .292 ft² = **3,200 pounds per square foot (approx.)**
Note: Piping is to conform to all applicable codes and be independently supported.
If floor strength is suspect, use appropriate measures to adequately distribute load.

Floor Space: 4.5 ft² (does not include Cover/Davit swing position), See Installation Diagram, page 3.
Service Height: 98-1/2", See Installation Diagram, page 3.
Bonding: Housing is to be bonded in accordance with all applicable codes. A grounding lug is provided on a leg.

Recommended Spare Parts:

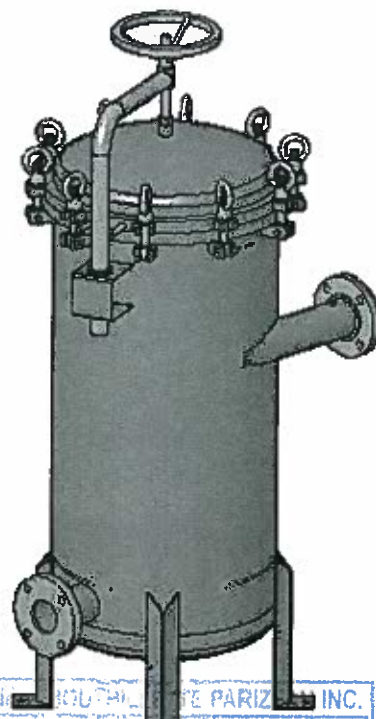
Closure Gasket O-ring: PN 363-E

Appropriate Harmsco® Hurricane™ cartridges, style HC/170_____

* The use of other than Genuine Harmsco® Hurricane™ filter cartridges in this filter housing voids certifications by NSF International.

Notice

The information contained in this publication is considered accurate, and is intended to be used as a guide. This information is subject to change without notification. Contact Harmsco® Filtration Products for the latest, most up to date, specifications. Harmsco® Filtration Products does not assume any liability for the accuracy and completeness of the data in this publication.



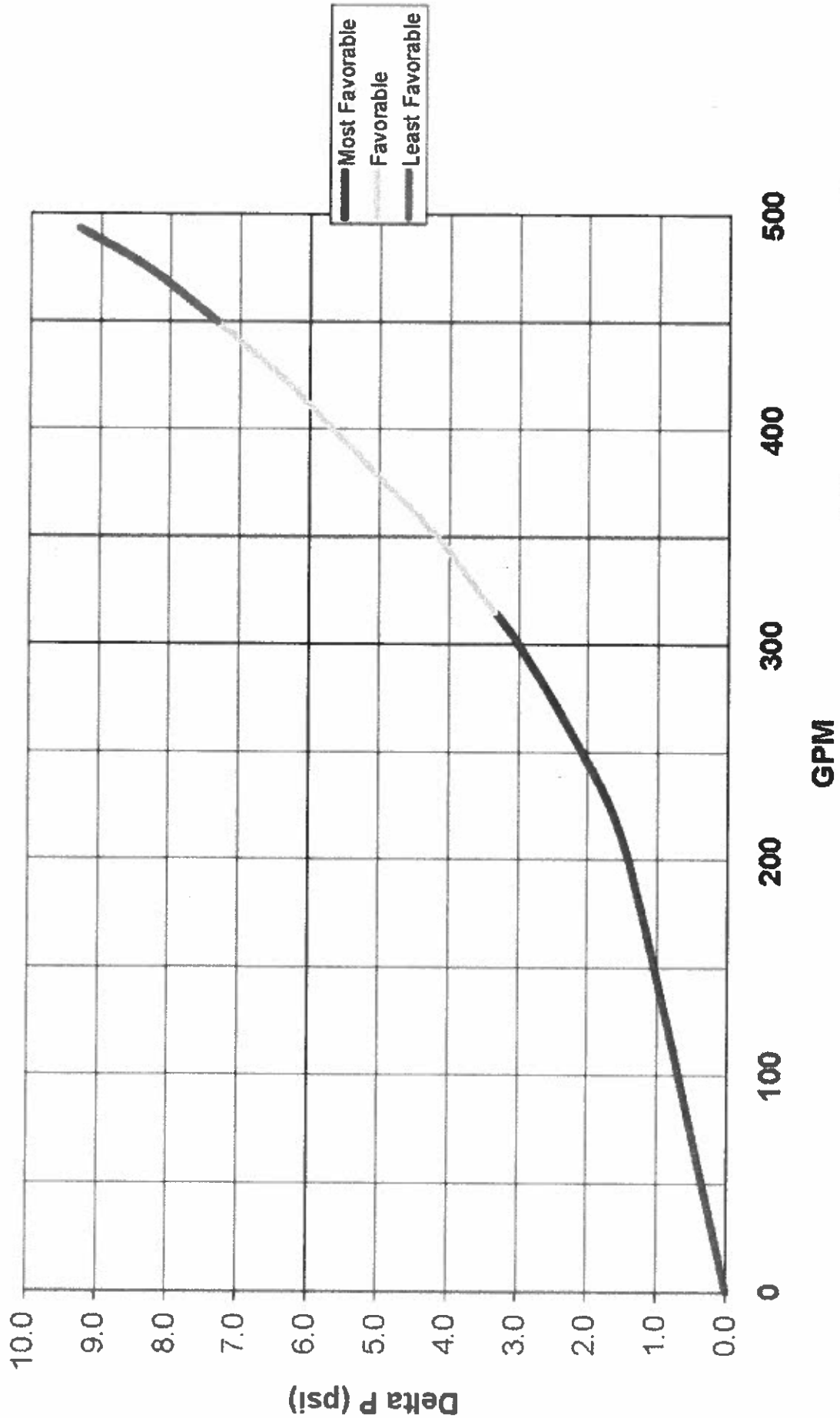
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✓	Comments	See Comments
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Revised: 7-2-07

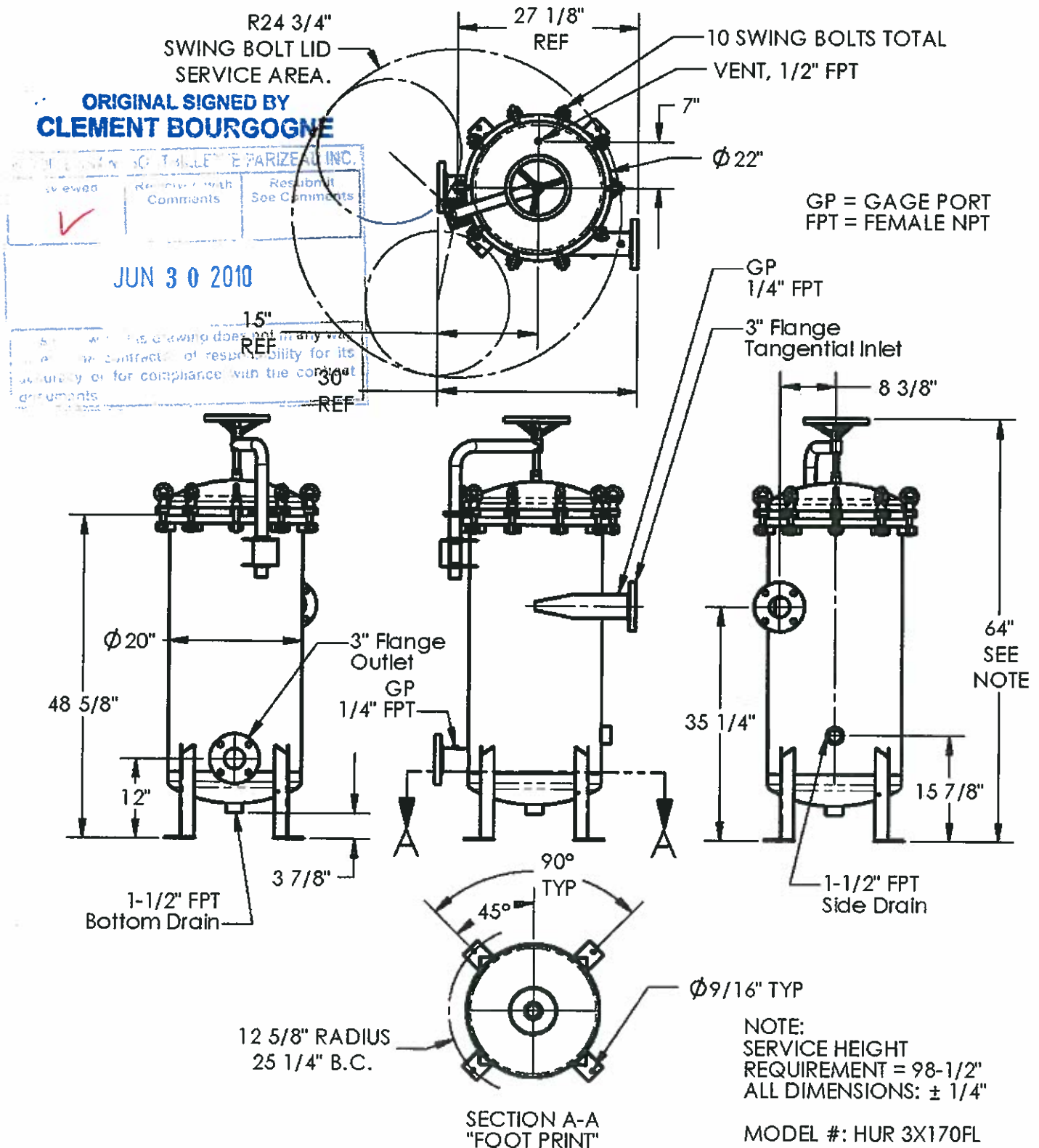
File Name: SPECIFICATION HUR 3X170FL (pg. 1 of 3)



Pressure Drop vs. Flow Rate Curve Harmsco® HUR 3X170FL Hurricane™ HC/170-20 Cartridges, Qty 3, with clean water.



Harmsco® Filtration Products Installation Diagram Hurricane™ 3 X 170 Swing Bolt Housing



Combination centrifugal separator and up-flow cartridge filter in a single compact design with one single cartridge for easy installation, removal and service.

Harmsco® Hurricane filters provide unsurpassed performance because they separate dense solids prior to cartridge filtration for extended filter life, increased dirt holding capacity and reduced maintenance costs. In many respects Harmsco® Hurricane filters are two filters in one!



Features:

- 316 stainless steel filter housings
- Electro polished for superior finish
- Optional chemical resistant coatings available
- Fail-safe lids with individual studs for security
- Brass wing nuts for easy maintenance- no tools needed
- 90° elbow and 45° sweep on outlet for staggered in-line vertical installation
- CPVC standpipe for up-flow design



Models HUR 40 HP, HUR 170 HP and HUR 90 HP

Specifications:

- 316 Stainless Steel
- Rim Gaskets - EPDM, (Buna-N, Viton available)
- Wingnuts - Brass
- Standpipe - CPVC
- - 316 Stainless Steel optional
- Pressure - 150 psi (max.)
- BSTP optional
- Temperature - 140°F (max.)
- - Up to 250°F with optional stainless steel standpipe and high temperature cartridges installed

Model	Flow rate (GPM)	Flow rate (LPM)	Flow rate (M³/HR)	Pipe Size (NPT)	Drain (NPT)	Filter height	Floor space req	Service height	Shipping weight
HUR 40 HP	Up to 50	Up to 189	Up to 12	2"	1"	21" / 54 cm	15" x 15"	31" / 79 cm	40 lbs. / 18 kg
HUR 90 HP	Up to 100	Up to 378	Up to 24	2"	1"	31" / 79 cm	15" x 15"	51" / 130 cm	51 lbs. / 23 kg
HUR 170 HP	Up to 150	Up to 568	Up to 36	2"	1"	41" / 105 cm	15" x 15"	72" / 183 cm	64 lbs. / 29 kg

* For best centrifugal separation, flow rates should exceed 35 GPM.



Harmsco® Filtration Products

P.O. Box 14066, North Palm Beach, FL 33408

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Sanikiluaq New Truck Fill Station Operation and Maintenance Manual



Section 22 10 10 2.2 Domestic Cold Fresh Pump

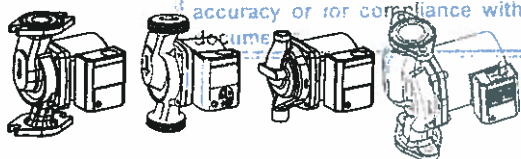


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SUBMITTAL

A-127K

JOB:	Reviewed	Reviewed with Comments	Resubmit See Comments	REPRESENTATIVE:
UNIT TAG:	AUG 10 2010			ORDER NO.
ENGINEER:				SUBMITTED BY:
CONTRACTOR:				APPROVED BY:
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Lead-Free** Bronze and Stainless Steel Bodied System Lubricated Circulators



DESCRIPTION

A series of in-line wet rotor circulation pumps designed specifically for quiet operation in open (potable) water systems. These pumps have lead-free** bronze or stainless steel bodies.

Automatic Timer and Aquastat accessories are available. (See Submittal A-128A for details).

CONSTRUCTION MATERIALS

Pump Body: NBF: Bronze
SSF: Stainless Steel
Bearings: Carbon
Impeller: Noryl
Shaft: Ceramic

OPERATING DATA

Maximum Working Pressure: 150 psi (10.3 Bar)
Minimum Operating Temperature: 40°F (5°C)
Maximum Operating Temperature
NBF-25, NBF-33, NBF-36, NBF-45: 225°F (107°C)
All Others: 230°F (110°C)

MODEL NUMBER	PART NUMBER	CONNECTION	APPROX. SHPG. WT. Lbs. (Kg)	STANDART 60 CYCLE 115 VOLT SINGLE PHASE			TAGGING INFORMATION	QUANTITY
				WATTS	F.L. AMPS	RPM		
NBF-8S/LW	103257LF	1/2" Sweat	9.0 (4.1)	39	0.38	2800		
NBF-9U/LW	103258LF	Union (See Following Page)	9.3 (4.2)	41	0.40	2800		
SSF-9U/LW	103360LF	Union (See Following Page)	9.3 (4.2)	41	0.40	2800		
NBF-10S/LW	103259LF	1/2" Sweat	9.0 (4.1)	52	0.46	2800		
NBF-12U/LW	103261LF	Union (See Following Page)	9.3 (4.2)	55	0.48	2800		
SSF-12U/LW	103361LF	Union (See Following Page)	9.3 (4.2)	55	0.48	2800		
NBF-12F/LW	103260LF	Flange 3/4, 1, 1-1/4, 1-1/2	9.5 (4.3)	55	0.48	2800		
SSF-12F/LW	103358LF	Flange 3/4, 1, 1-1/4, 1-1/2	9.5 (4.3)	55	0.48	2800		
NBF-18S	103316LF	1/2" Sweat	9.0 (4.1)	90	0.74	3000		
NBF-22U	103255LF	Union (See Following Page)	9.3 (4.2)	92	0.80	2940		
SSF-22U	103362LF	Union (See Following Page)	9.3 (4.2)	92	0.80	2940		
NBF-22	103252LF	Flange 3/4, 1, 1-1/4, 1-1/2	9.5 (4.3)	92	0.80	2940		
SSF-22	103357LF	Flange 3/4, 1, 1-1/4, 1-1/2	9.5 (4.3)	92	0.80	2940		
NBF-25*	103418LF	Flange 3/4, 1, 1-1/4, 1-1/2	10.4 (4.7)	125	1.10	2950		
NBF-33	103351LF	Flange 3/4, 1, 1-1/4, 1-1/2	10.4 (4.7)	125	1.10	2950		
NBF-36*	103401LF	Flange 3/4, 1, 1-1/4, 1-1/2	13.1 (6.0)	170	1.38	3300		
NBF-45*	103405LF	Flange 1, 1-1/4, 1-1/2	14.5 (6.6)	270	2.30	3300		

*1-speed circulators

**Contains less than 0.25% lead content on wetted surface

TYPICAL SPECIFICATIONS

The contractor shall furnish and install in-line circulating pumps as illustrated on the plans and in accordance with the following specifications:

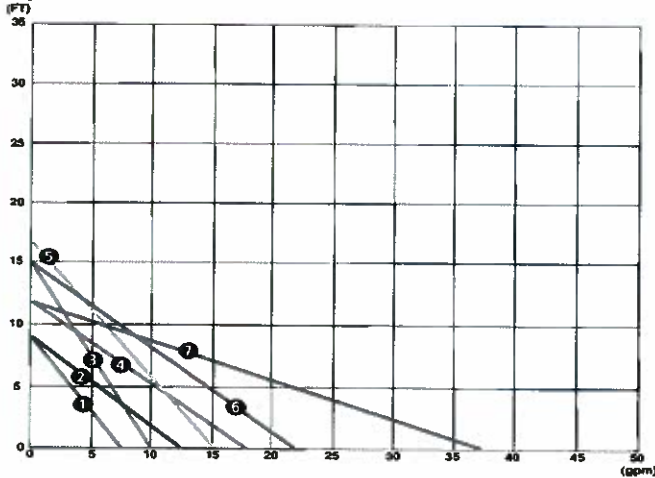
- The pumps shall be of the horizontal system lubricated type specifically designed and guaranteed for quiet operation.
- Pump to be suitable for _____°F (____°C) [choose one: 225°F (107°C) for NBF-25, NBF-33, NBF-36, NBF-45 or 230°F (110°C) for all other circulators] operation at 150 psig (10.3 Bar) working pressure.
- The pumps shall have a ceramic shaft supported by carbon bearings. Bearings are to be lubricated by the circulating fluid.

- Pump body shall be lead-free bronze for NBF circulators or stainless steel for SSF circulators.
- Motor stator to be isolated from circulating fluid through use of stainless steel can. Rotor to be sheathed in stainless steel.
- Motors shall be non-overloading at any point on the pump curve. NBF-36 & NBF-45 to have built-in thermal protection. All other motors to have built-in impedance protection.
- NBF-25 has an optional check valve.

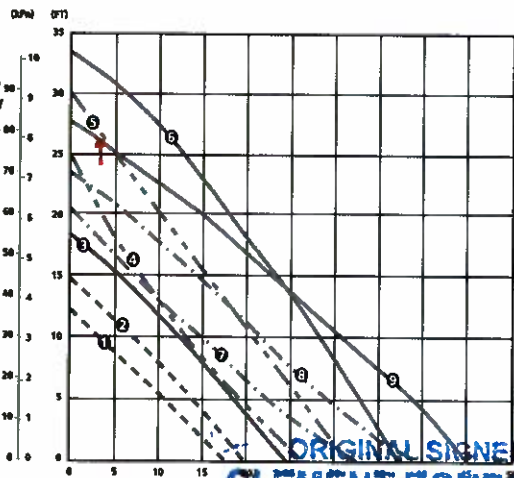
Pumps to have a capacity of _____GPM at _____ foot head when powered by 115 volt, 60 cycle single phase electrical supply.

All pumps are to be ITT Industries - Bell & Gossett Model _____.

System Lubricated Circulators



- 1 NBF-8S/LW
- 2 NBF-9U/LW
- 3 NBF-10S/LW
- 4 NBF-12U/LW
- 5 NBF-12F/LW
- 6 NBF-18S
- 7 NBF-22
- 8 NBF-22U
- 9 NBF-22U
- 10 NBF-33

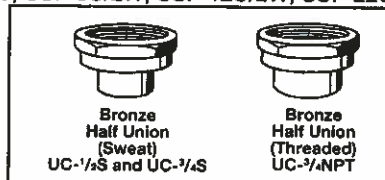


A-127K

HALF UNION CONNECTIONS

For NBF-9U/LW, NBF-12U/LW, NBF-22U, SSF-9U/LW, SSF-12U/LW, SSF-22U

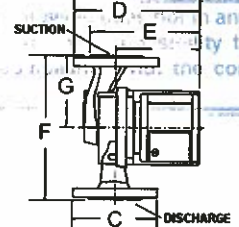
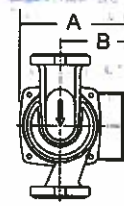
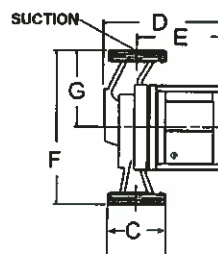
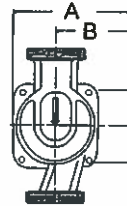
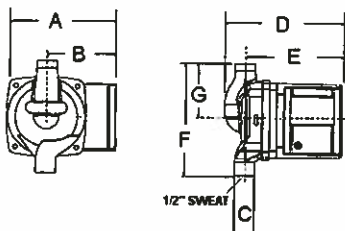
MODEL NUMBER	PART NUMBER	DESCRIPTION (SETS OF 2)
UC-1/2S	113203LF	1/2" Bronze Union Sweat
UC-3/4S	113201LF	3/4" Bronze Union Sweat
UC-3/4NPT	113202LF	3/4" Bronze Union NPT Female



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MODEL	PART NUMBER	A in (mm)	B in (mm)	C in (mm)	D in (mm)	E in (mm)	F in (mm)	G in (mm)
NBF-8S/LW	103257LF	4-7/8 (124)	3-3/16 (81)	1/2 (13)	5-7/32 (132)	4-9/32 (109)	5 (127)	2-1/2 (63)
NBF-9U/LW	103258LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	3-11/16 (93)	6-1/8 (156)	3-1/16 (78)
SSF-9U/LW	103360LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	3-11/16 (93)	6-1/8 (156)	3-1/16 (78)
NBF-10S/LW	103259LF	4-7/8 (124)	3-3/16 (81)	1/2 (13)	5-7/32 (132)	4-9/32 (109)	5 (127)	2-1/2 (63)
NBF-12U/LW	103261LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	3-11/16 (93)	6-1/8 (156)	3-1/16 (81)
SSF-12U/LW	103361LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	3-11/16 (93)	6-1/8 (156)	3-1/16 (78)
NBF-12F/LW	103260LF	4-7/8 (124)	3-3/16 (81)	3-3/16 (81)	5-9/16 (141)	3-11/16 (93)	6-3/8 (162)	3-3/16 (82)
SSF-12F/LW	103358LF	4-7/8 (124)	3-3/16 (81)	3-3/16 (81)	5-9/16 (141)	3-11/16 (93)	6-3/8 (162)	3-3/16 (82)
NBF-18S	103316LF	4-7/8 (124)	3-3/16 (81)	1/2 (13)	5-7/32 (132)	4-9/32 (109)	5 (127)	2-1/2 (63)
NBF-22U	103255LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	3-11/16 (93)	6-1/8 (156)	3-1/16 (78)
SSF-22U	103362LF	4-7/8 (124)	3-3/16 (81)	1-1/4 (32)	5-1/16 (129)	3-11/16 (93)	6-1/8 (156)	3-1/16 (78)
NBF-22	103252LF	4-7/8 (124)	3-3/16 (81)	3-3/16 (81)	5-9/16 (141)	3-11/16 (93)	6-3/8 (162)	3-3/16 (82)
NBF-25*	103418LF	5-1/8 (130)	3-3/16 (81)	3-3/16 (81)	6-3/16 (157)	4-7/8 (124)	6-3/8 (162)	2-1/2 (63)
NBF-33	103351LF	4-7/8 (124)	3-3/16 (81)	3-3/16 (81)	6-3/16 (157)	3-11/16 (94)	6-3/8 (162)	3-3/16 (82)
NBF-36	103401LF	5-3/4 (146)	3-9/16 (91)	3-3/16 (81)	6-3/16 (157)	5-8/8 (137)	6-3/8 (162)	3-3/16 (82)
NBF-45*	103405LF	5-3/4 (146)	3-9/16 (91)	3-7/16 (87)	7-3/8 (187)	5-1/2 (140)	8-1/2 (216)	4-1/4 (108)

Dimensions are subject to change. Not to be used for construction purposes unless certified.

Companion Flanges Available in Sizes: 3/4", 1", 1-1/4", and 1-1/2"

* 3-speed circulators

ITT
8200 N. Austin Avenue
Morton Grove, IL 60053
Phone (847)966-3700
Facsimile (847)966-9052
www.bellgosssett.com



cast iron submersible sump pumps



Rugged cast iron sump pumps feature a vortex impeller to provide solids-handling capability up to 1 1/2". Product is available in 1/3 or 1/2 HP, 115 Volt single phase 60 Hz. Pump discharge is 1-1/2" FNPT. Field-replaceable piggy-back float switch: vertical for minimum diameter 10" sumps, or tethered for minimum diameter 14" sumps.

APPLICATIONS

- Basement Sumps
- Dewatering
- Light Effluent
- Water Transfer

WOOD BANANI BOUTHILLETTE PARIZEA

Reviewed	Reviewed with Comments	Resubmitted
	✓	See Comments

ORDERING INFORMATION

Catalog Number	HP	Maximum Load Amps	Volts	Phase/Cycles	Cord Length	Mechanical Switch Type	Switch Setting	
							On	Off
DC233110M	1/3	9.8	115	1/60	10'	Manual	13"	4"
DC233110T	1/3	9.8	115	1/60	10'	Tethered	13"	4"
DC233110V	1/3	9.8	115	1/60	10'	Vertical	7"	2"
DC233120M	1/3	9.8	115	1/60	20'	Manual	13"	4"
DC233120T	1/3	9.8	115	1/60	20'	Tethered	13"	4"
DC233120V	1/3	9.8	115	1/60	20'	Vertical	7"	2"
DC233130T	1/3	9.8	115	1/60	30'	Tethered	13"	4"
DC250110M	1/2	12.5	115	1/60	10'	Manual	—	—
DC250110T	1/2	12.5	115	1/60	10'	Tethered	13"	4"
DC250110V	1/2	12.5	115	1/60	10'	Vertical	7"	2"
DC250120M	1/2	12.5	115	1/60	20'	Manual	—	—
DC250120T	1/2	12.5	115	1/60	20'	Tethered	13"	4"
DC250120V	1/2	12.5	115	1/60	20'	Vertical	7"	2"

Noryl® is a registered trademark of General Electric Co.

In order to provide the best products possible, specifications are subject to change.

DC233/ DC250 SERIES

SPECIFICATIONS

Motor – Oil-cooled 1/3 HP and 1/2 HP versions available, 115 Volts, single phase, 60 Hz

Motor Cover/Volute – Cast iron
Lower Volute Base – Fiberglass reinforced polypropylene

Switch – Tethered float or vertical
Power Cord – 10' or 20' grounded three-prong, water-resistant, type SJTW-A/SJTW

Discharge – 1-1/2" FNPT

Exterior Hardware – Stainless steel

Shaft Seal – Mechanical, carbon/ceramic

Impeller – Fiberglass reinforced Noryl® with threaded brass insert
Bearings – Upper sleeve and Lower ball bearings, oil lubricated

Maximum Liquid Temperature Limits – 130°F (55°C)

FEATURES

Switch – Tethered float switch operates in sump diameters of 14" or larger. Vertical switch design with guard allows for operation in sump diameters of 10" or larger.

Construction – Rugged cast iron pump body and motor cover for applications needing a durable pump.

Intake – Screened intake prevents debris from entering the pump.

Oil-Cooled Motor – Transfers heat to sump water efficiently while lubricating internal motor components.

Performance – Models range up to 62 gallons per minute at 5' of lift.

Anti Air Lock Hole – Built into base; eliminates added labor.

Solids Handling Capability – 1 1/2"

Ball Bearings and Shaft Seal – Lubricated and designed for long life.

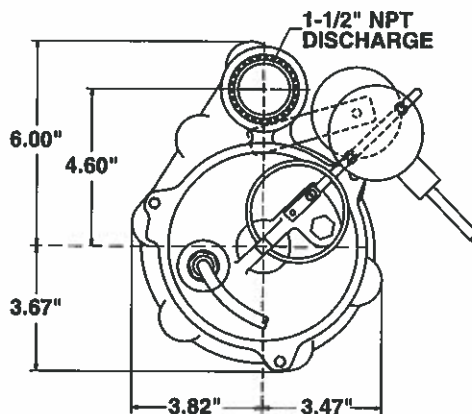
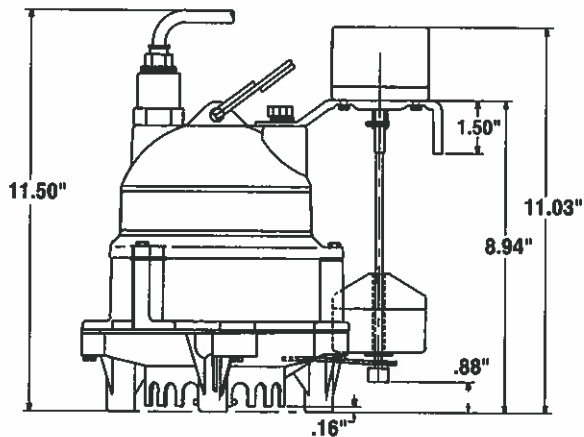
Easy Serviceability – Pump intake screen, impeller, base, switch, and power cord are serviceable.



cast iron submersible sump pumps

OUTLINE DIMENSIONS – VERTICAL FLOAT

Designed to fit 10" or larger basins.

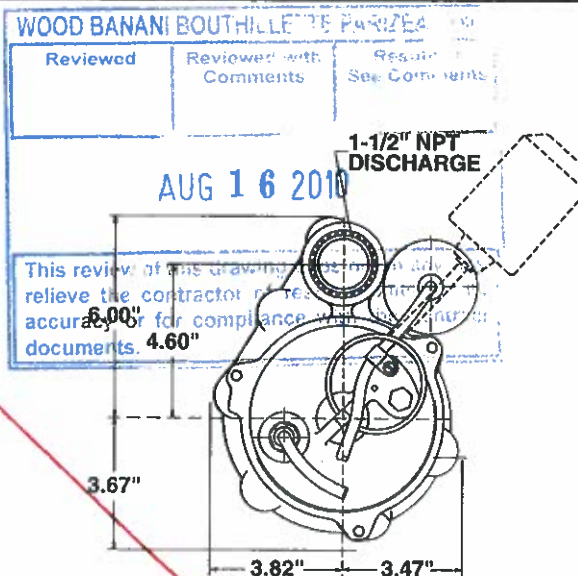
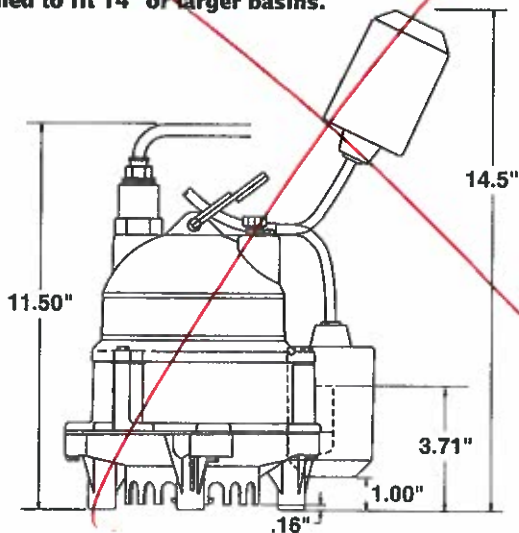


Dimensions (in inches) are for estimating purposes only.

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CLEMENT BOURGOGNE

OUTLINE DIMENSIONS – TETHERED FLOAT

Designed to fit 14" or larger basins.



Dimensions (in inches) are for estimating purposes only.



cast iron submersible sump pumps

PUMP PERFORMANCE

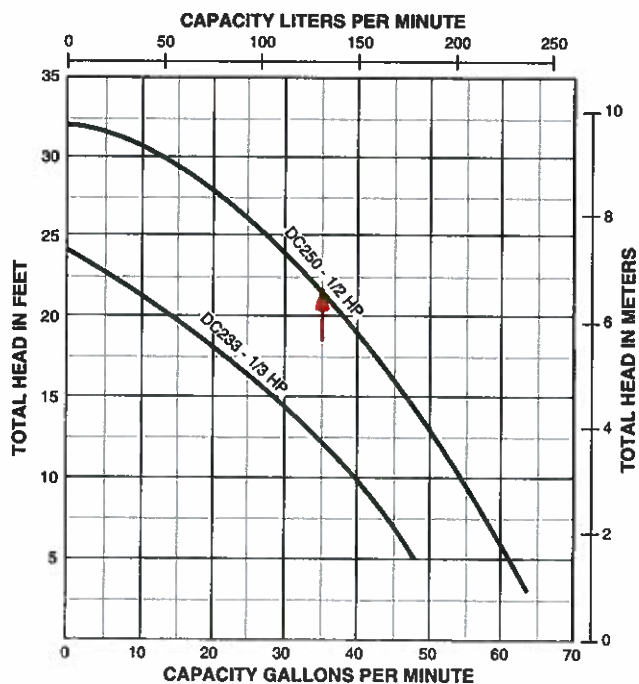
1/3 HP

Vertical Lift Feet/Meters	5/1.5	10/3	15/4.6	20/6.1	Shut-Off 24/7.3
Gallons/Liters Per Minute	48/182	40/151	29/110	15/57	No Flow

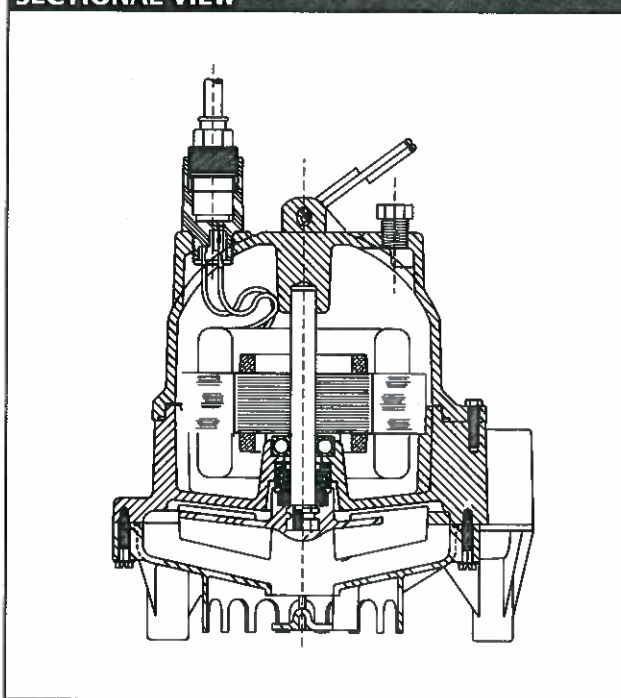
1/2 HP

Vertical Lift Feet/Meters	5/1.5	10/3	15/4.6	20/6.1	25/7.6	Shut-Off 32/9.8
Gallons/Liters Per Minute	62/235	53/201	46/174	38/144	29/110	No Flow

PUMP PERFORMANCE



SECTIONAL VIEW



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WOOD BANANI BOUTHILLETTE PARIZEAU INC.

Reviewed

Reviewed with
Comments

Resubmit
See Comments

AUG 16 2010

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cast iron submersible sump pumps

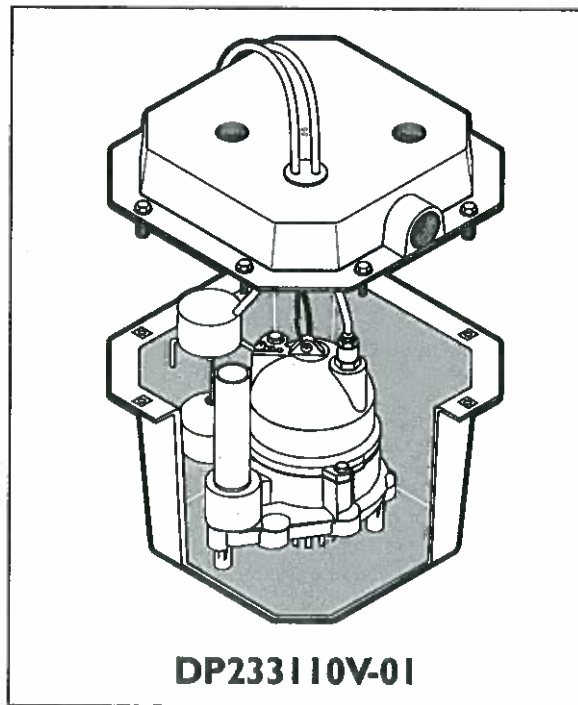


STA-RITE®

293 Wright Street • Delavan, WI 53115

OWNER'S MANUAL Sink Pump System

Sump Pump SP-02
Section 21 10 10 2.4



DP233110V-01

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Reviewed	Reviewed with Comments	Resubmit See Comments
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Installation/Operation/Parts

DESCRIPTION

The Sta-Rite Sink Pump System, Model Number DP233110V-01, is ideal for home wastewater removal from beautician or utility sinks and wet bars, and for drain water transfer from air conditioners or dehumidifiers. 1/3 HP submersible pump unit is equipped with a 3-prong grounding-type power cord. Motor is oil-filled (dielectric oil) and sealed for cooler running. Upper sleeve/lower ballbearing on motor shaft never need lubrication. Automatic reset thermal protection.

SPECIFICATIONS

Power supply required115V, 60 Hz.
Liquid temp. range.....32° to 130°F
Individual branch circuit required (minimum).....15 Amps
Discharge.....1-1/2" NPT

UNPACKING AND INSPECTION

Handle with care. Check items received against packing list to be sure that all equipment has been received. Inspect for shipping damage. If found, file claim with carrier immediately.

GENERAL SAFETY INFORMATION

Electrically powered sump pumps normally give many years of trouble-free service when correctly installed, maintained, and used. However, unusual circumstances (interruption of power to the pump, dirt/debris in the sump, flooding that exceeds the pump's capacity, electrical or mechanical failure in the pump, etc.) may prevent the pump from functioning normally. To prevent possible water damage due to flooding, consult your dealer about installing a high water alarm. See the "Troubleshooting Chart" in this manual for information about common sump pump problems and remedies. For more information, see your dealer or call customer service.

1. Know the pump application, limitations, and potential hazards.
2. Disconnect power before servicing.
3. Release all pressure within system before servicing any component.

PERFORMANCE

Model	HP	GPM of Water @ Total Feet of Head		Shutoff
		5'	10'	
DP233110V-01	1/3	48.0	40.0	24'

SPECIFICATIONS

HP	Motor Full Load Amps	Switch Setting		Height	Top Width	Bottom Width	Weight
		On	Off				
1/3	9.8	7"	2"	13-3/4"	15-1/8"	12"	32 lbs.

4. Drain all water from system before servicing.
5. Secure discharge line before starting pump. An unsecured discharge line will whip, possibly causing personal injury and/or property damage.
6. Check hoses for weak or worn condition before each use, making certain that all connections are secure.
7. Periodically inspect system components. Keep free of debris and foreign objects. Perform routine maintenance as required.
8. Provide means of pressure relief for pumps whose discharge line can be shut-off or obstructed.
9. Personal Safety:
 - a. Wear safety glasses at all times when working with pumps.
 - b. Keep work area clean, uncluttered and properly lighted – replace all unused tools and equipment.
 - c. Keep visitors at a safe distance from work area.
 - d. Make workshop child-proof – with padlocks, master switches, and by removing starter keys.
10. When wiring an electrically driven pump, follow all electrical and safety codes that apply.
11. This equipment is only for use on 115 volt (single phase) and is equipped with an approved 3-conductor cord and 3-prong, grounding-type plug.

WARNING To reduce risk of electric shock, pull plug before servicing. This pump has not been investigated for use in swimming pool areas. Pump is supplied with a grounding conductor and grounding-type attachment plug. Be sure it is connected only to a properly grounded grounding-type receptacle. Where a 2-prong wall receptacle is encountered, it must be replaced with a properly grounded 3-prong receptacle installed in accordance with codes and ordinances that apply.

12. All wiring should be performed by a qualified electrician.

13. Make certain power source conforms to requirements of your equipment.

WOOD BARN SOUTHVILLE PARIZEAU INC

Reviewed ✓	Reviewed with Comments	R-Submittal See Comments
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14. Protect electrical cord from sharp objects, hot surfaces, oil, and chemicals. Avoid kinking cord. Replace or repair damaged or worn cords immediately.
15. Do not touch an operating motor. Modern motors are designed to operate at high temperatures.

⚠ WARNING Risk of electric shock. If your basement has water or moisture on the floor, do not walk on wet area until all power has been turned off. If shut-off box is in basement, call electric company or hydro authority to shut-off service to house, or call your local fire department for instructions. Remove and replace system. Failure to follow this warning can result in fatal electrical shock.

⚠ WARNING Risk of electric shock. Do not handle pump or pump motor with wet hands or when standing on wet or damp surface, or in water. Always disconnect the pump and switch from the electrical power source before doing any maintenance.

16. Pump water only with this pump.

ASSEMBLY

Steps 1 and 2 (See Figure 1)

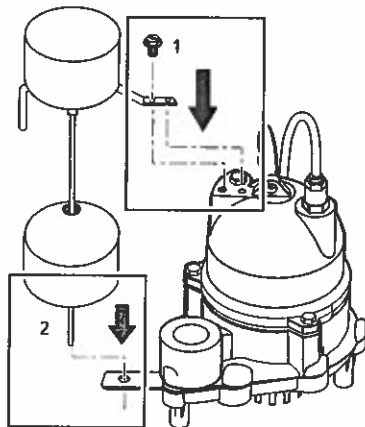


Figure 1

Step 3 (See Figure 2)

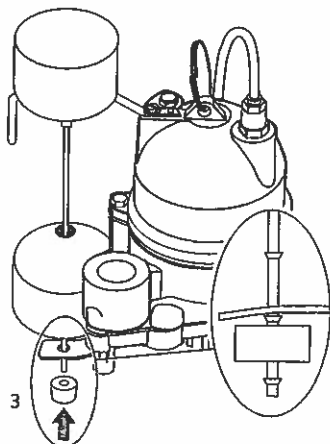


Figure 2

Step 4 (See Figure 3)

Install the discharge pipe hand-tight plus one-half turn.

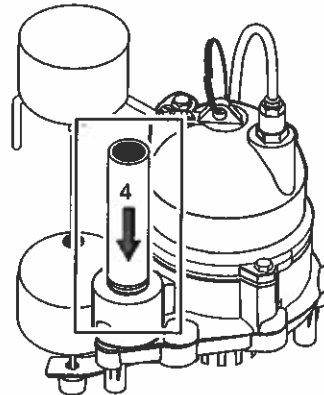


Figure 3

Step 5 (See Figure 4)

Place the pump in the basin as shown. Align the discharge with one of the threaded ports in the cover.

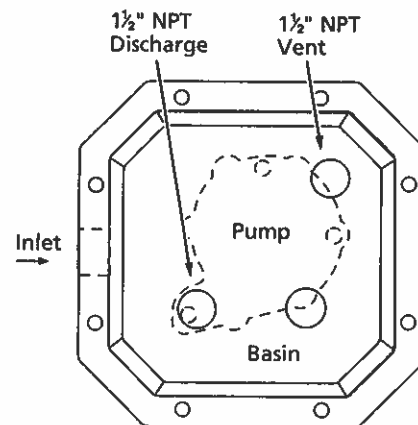


Figure 4

Step 6 (See Figure 5)

Turn the cover upside down and 'lay in' the basin gasket as shown.

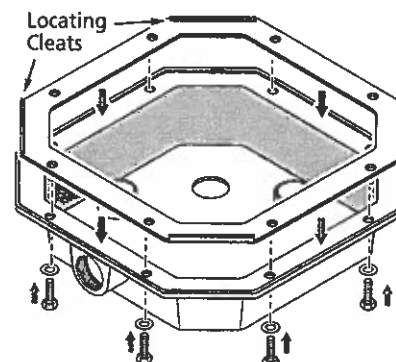


Figure 5

IMPORTANT: To prevent leaks, be sure that the cleats on the corners of the basin gasket are up with the cover upside down (that is, not pressed into the sealing face of the cover).

Step 7 (See Figure 5)

Push the screws with their washers installed up through the holes in the rim of the cover and in the basin gasket (the cover will retain the screws).

Step 8 (See Figure 6)

- Align the cover with the discharge pipe and cords.
- Pull the cords through the non-threaded hole in the basin cover.
- Place the cover over the discharge pipe.
- Install the cords in the cord grommet
- Install the cord/grommet assembly in the non-threaded hole in the basin cover; don't pull the cords tight.

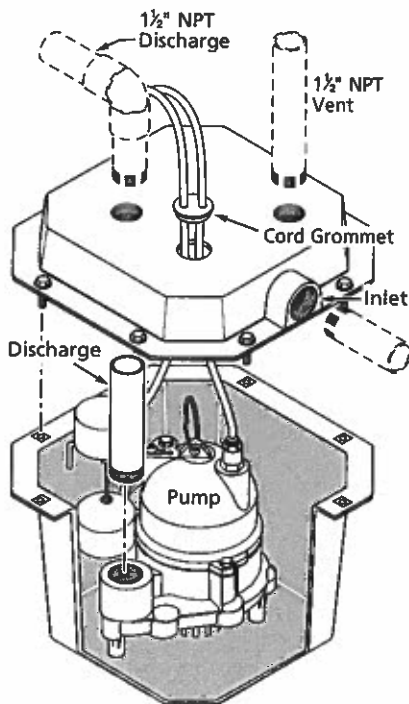


Figure 6

Step 9 (See Figure 6)

Fasten the basin cover to the basin with the capscrews previously inserted in the cover (Step 7).

IMPORTANT: To prevent leaks, be sure the locating cleats on the corners of the basin gasket are outside the edges of the basin rim, not pressing against the rim.

INSTALLATION (See Figure 7)

The basin (system) should be located at the lowest place possible relative to the area to be drained.

NOTE: Make sure that the inlet of the pre-plumbed system is lower than the water to be pumped.

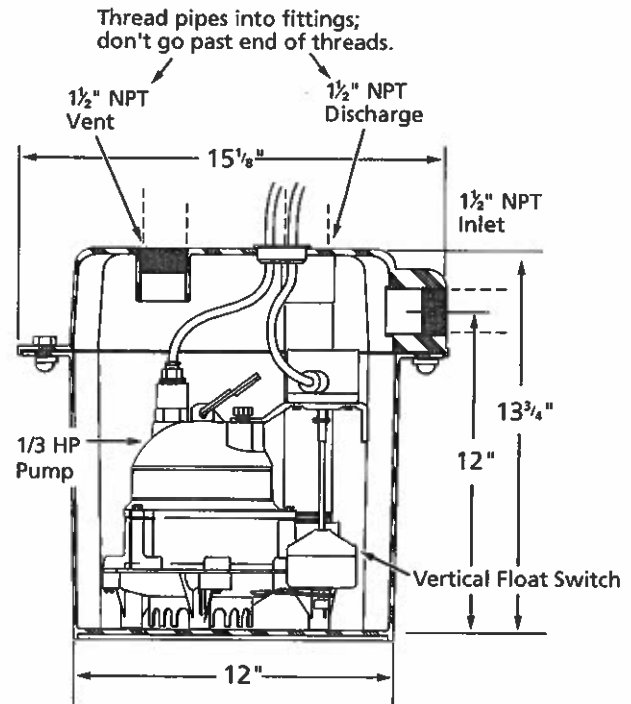


Figure 7 – Sink Pump System Dimensions

1. Install inlet pipe in opening as shown. Use RTV sealants or Plasto-Joint Stik* to seal threads. See Figures 8, 9, and 10, page 4 and 5, for typical installation arrangements.

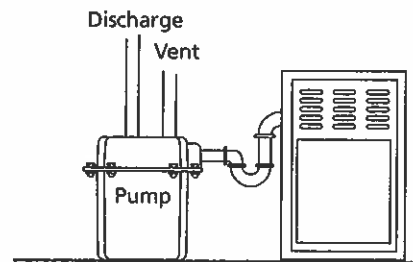


Figure 8 – Typical installation to remove air conditioner condensate or dehumidifier water

*Lake Chemical Co., Chicago, Illinois

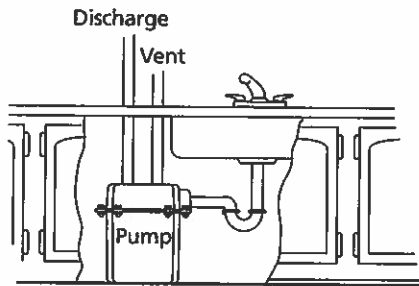


Figure 9 – Typical wet bar installation

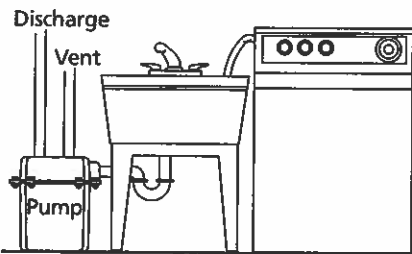


Figure 10 – Typical installation for laundry sinks and washing machines

2. Install discharge plumbing. When using rigid pipe, use plastic pipe. Wrap thread with Teflon tape or use Plasto-Joint Stik*. Screw pipe into discharge fitting hand tight +1 – 1-1/2 turns.

NOTE: Do not use ordinary pipe joint compound on plastic pipe. Pipe joint compound can attack plastics.

3. To reduce motor noise and vibrations, a short length of rubber hose (1-7/8" I.D., e.g. radiator hose) can be connected into discharge line near pump using suitable clamps.
4. Install an in-line check valve to prevent flow backwards through pump when pump shuts off.
5. Thread vent pipe into 1-1/2" NPT black vent fitting in basin cover. Pipe should not extend into basin. Connect vent pipe to sewer vent system.
6. Power Supply: Pump is designed for 115 V., 60 Hz., operation and requires a minimum 15 amp individual branch circuit. Both pump and switch are supplied with 3-wire cord sets with grounding-type plugs. Switch plug is inserted directly into outlet and pump plug inserts into opposite end of switch plug.

⚠ WARNING Hazardous Voltage. Pump should always be electrically grounded to a suitable electrical ground such as a grounded water pipe or a properly grounded metallic raceway or ground wire system. Do not cut off round ground pin.

7. If pump discharge line is exposed to outside sub-freezing atmosphere, portions of line exposed must be installed so any water remaining in pipe will drain to the outfall by gravity. Failure to do this can cause water trapped in discharge to freeze which could result in damage to pump.
8. After piping and check valve have been installed, unit is ready for operation.
9. Check operation by filling sump with water and observing pump operation through one complete cycle.

⚠ WARNING Risk of flooding. Failure to make this operational check may lead to improper operation, premature failure, and flooding.

MAINTENANCE

⚠ WARNING Risk of electric shock. Make certain that the pump is unplugged before attempting to service or remove any component.

⚠ WARNING Risk of electric shock. Do not handle a pump or pump motor with wet hands or when standing on wet or damp surface, or in water.

1. Keep pump inlet screen clear.
2. Shaft seal depends on water for lubrication. Do not operate pump unless it is submerged in water as seal may be damaged if allowed to run dry.
3. Motor is equipped with automatic reset thermal protector. If temperature in motor should rise unduly, switch will cut off all power before damage can be done to motor. When motor has cooled sufficiently, switch will reset automatically and restart motor. If protector trips repeatedly, pump should be removed and checked for cause of difficulty. Low voltage, long extension cords, clogged impeller, very low head or lift, etc., could cause cycling. Refer to Trouble shooting Guide on Page 6 for additional information.
4. Periodically inspect pump, system components, and sump for debris and foreign objects. Keep sump free of all refuse. Perform routine maintenance as required.

Pump Cleaning

NOTE: Attempting to disassemble motor will void warranty.

1. Use the pump ring to lift pump out of basin and place pump on a clean level surface.

⚠ WARNING Risk of electrical shock. Shock can burn or kill. Do not lift pump by power cord.

2. To clean impeller, remove eight screws holding baseplate to motor assembly. Clean impeller as necessary.
3. Re-install baseplate and screws.
4. Use pump ring to replace pump in basin.

Switch Replacement

⚠ WARNING Risk of electric shock. When servicing pump, always disconnect power to electrical outlet and remove pump electric cord from outlet.

⚠ CAUTION Float must be able to complete its entire cycle without interference from sidewall of basin, plumbing, or any other object.

1. Mount bracket on switch housing using existing screws.
2. Slide rod into slot in bottom of switch housing. Fasten rod into switch housing with pin.

⚠ CAUTION Make sure pin holds float rod in switch housing; otherwise pump will not shut off.

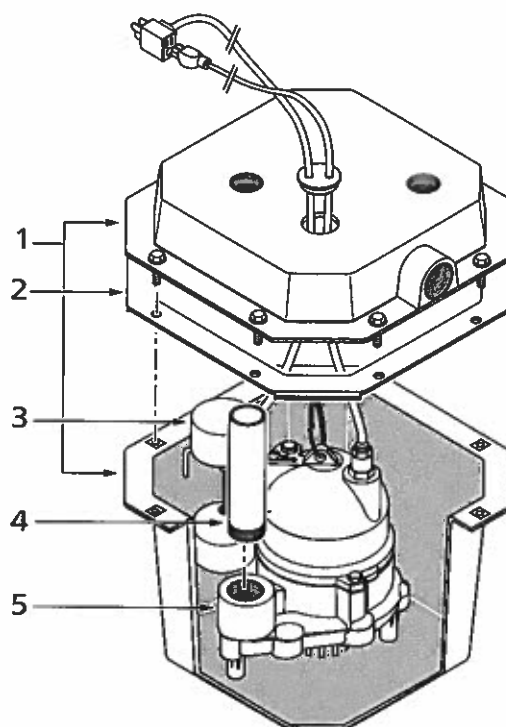
NOTE: Pull gently on rod to make sure that it cannot come out of switch housing.

3. Mount switch assembly on pump using existing screws. Make sure that nothing interferes with switch operation.
4. Mount float on rod.
5. Install rod stop on bottom of rod.
6. Run pump through one complete cycle to verify correct switch operation.

⚠ WARNING Risk of flooding. Drainer Pre-Plumbed System comes with the automatic float switch mounted on the motor housing ready for operation. Do not change switch settings. Switch is set to start at approximately 6.5" and to stop at approximately 2".

TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Pump won't start or run.	<ol style="list-style-type: none"> 1. Blown fuse. 2. Low line voltage. 	<ol style="list-style-type: none"> 1. If blown, replace with fuse of proper size. 2. If voltage under recommended minimum, check size of wiring from main switch on property. If OK, contact power company or hydro authority.
Pump won't shut off.	<ol style="list-style-type: none"> 1. Restricted discharge (obstacle in piping). 	<ol style="list-style-type: none"> 1. Remove obstacle in piping.
Pump operates but delivers little or no water.	<ol style="list-style-type: none"> 1. Restricted discharge (obstacle in piping). 	<ol style="list-style-type: none"> 1. Remove obstacle in piping.



Repair Parts List

Key No.	Part Description	Qty.	DP233110V-01
1	5 gallon Poly basin assembly (includes Key No. 2 and hardware kit)	1	PW73-64
2	Basin Gasket	1	U20-23
3	Automatic Vertical Float Switch	1	PKG 208
4	1-1/2" Discharge Pipe	1	U37-688P
5	1/3 HP Submersible sump pump	1	D33110V
•	Hardware kit (includes bolts, washers, and cord grommet)	1	PW198-6

- Not illustrated.

LIMITED WARRANTY

Pentair Water ("Pentair") warrants to the original consumer of the products listed below, that they will be free from defects in material and workmanship for the Warranty Period from the date of original installation or manufacture as noted.

Product	Warranty Period
Jet pumps, small centrifugal pumps, submersible pumps and related accessories	<i>whichever occurs first:</i> 1 year from date of original installation, or 2 years from date of manufacture
Hydro-Flow Filters	1 year from date of purchase
Fibrewound Tanks	5 years from date of original installation
Steel Pressure Tanks	5 years from date of original installation
Epoxy-Lined Tanks	3 years from date of original installation
Sump/Sewage/Effluent Products	1 year from date of original installation, or 2 years from date of manufacture

Our warranty will not apply to any product that has been subject to negligence, misapplication, improper installation or maintenance. In the event a three phase submersible motor is operated with single phase power through a phase converter, or if three-leg ambient compensated, extra-quick trip overload relays of recommended size are not used, our warranty is void.

Buyer's only remedy and Pentair's only duty is to repair or replace defective products (at Pentair's choice). Buyer agrees to pay all labor and shipping charges associated with this warranty and to request warranty service through the installing dealer as soon as a problem is discovered. If warranty service is requested more than 30 days after the Warranty Period has ended, it will not be honored.

PENTAIR SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, OR CONTINGENT DAMAGES WHATSOEVER.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES. IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL NOT EXTEND BEYOND THE WARRANTY PERIOD PROVIDED HEREIN.

Certain states do not permit the exclusion or limitation of incidental or consequential damages or the placing of limitations on the duration of an implied warranty, therefore, the limitations or exclusions herein may not apply. This warranty sets forth specific legal rights and obligations, however, additional rights may exist, which may vary from state to state.

Supersedes all previous publications.

Pentair Water, 293 Wright St., Delavan, WI 53115

SpaceSaver® Residential Electric Water Heaters

SPACE SAVER

For installations where space is at a premium

SpaceSaver® Compact Water Heaters

Designed for installations in cottages, offices, mobile homes or other applications where space is limited, the SpaceSaver line of residential electric water heaters provides the optimum in reliability, performance and energy efficiency. With unique and patented special features and a broad range of models and sizes, there is a GSW product to suit any application. Manufactured by GSW, a global leader in water heaters, our complete line of electric water heaters includes leading brand names like the John Wood PRO Series professional line of products. With a manufacturing history that dates back more than 150 years, GSW is a North American leader in the design and manufacture of residential and commercial water heaters.

High Quality Features

- Patented TankSaver® design
- Glass-lined tanks for longer-life
- Meets latest energy efficiency standards
- Factory-installed plastic lined nipples
- Removable anodes
- Galvanized bottom pan protects water heater from corrosion
- Patented Styropour® base for added energy efficiency
- T&P factory installed
- Thermostatically controlled long life elements
- CFC-free foam insulation
- Personnel protector covers elements and controls

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JUL 06 2010		
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Exclusive, patented innovation.

The exclusive and patented TankSaver® design works to prolong tank life. TankSaver® impedes corrosion by guarding metal tank openings from exposure and keeping them watertight. The durable construction virtually eliminates rust.



SPACE SAVER® COMPACT ELECTRIC WATER HEATERS

PLUG-IN SINGLE ELEMENT MODEL

Model	Capacity			Elements* watts/volts	Height		Diameter Width		Shipping Weight		Energy Factor
	Imperial gal.	US gal.	Litres		in	cm	in	cm	lb	kg	
SS025SE15	2.1	2.5	10	1500/120	15 1/4	39	13	35	18	8	N/A

SIDE ENTRY SINGLE ELEMENT MODELS

SS06SEB15	5	6	23	1500/120	15 3/4	40	14 1/4	36	35	16	N/A
SS06SEB30				3000/240							
SS12SEB15	9	12	43	1500/120	22 1/2	57	16	41	52	24	N/A
SS12SEB30				3000/240							
SS19LSEB1	14	19	65	1500/120	26 1/8	67	19 1/8	48	65	30	N/A
				3000/240							
SS30LSEB1	22	30	108	1500/120	31	79	18 5/8	48	90	41	0.93
				3000/240							

TOP ENTRY DOUBLE ELEMENT MODELS

SS40SDE**	33.3	40	143	1500/120	48	122	20 1/8	52	110	50	0.92
				3000/240							

LOWBOY TOP ENTRY DOUBLE ELEMENT MODELS

SS630LDE	22	30	108	4500/240	31	79	22 1/8	56	98	44	0.93
SS640LDE	30	40	142	4500/240	32 3/8	82	24	61	126	59	0.92
SS646LDE	34	46	153	4500/240	33	84	26 1/8	67	162	73	0.91

Note: Elements are dual rated for 3000W/240V, 2255W/208V and 4500W/240V, 3355W/208V per element.

*Specify voltage and wattage required when ordering.

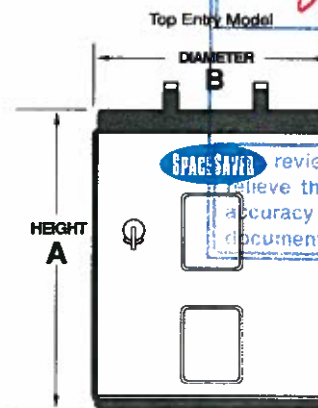
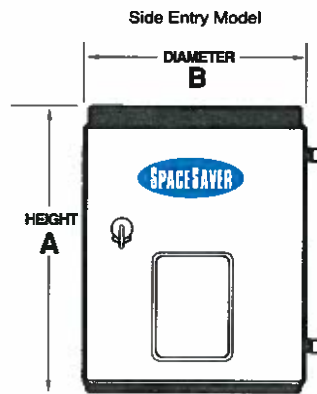
** Only available in Canada

GSW also offers a 19 US gallon SpaceSaver gas water heater.

In keeping with our policy of continuous product improvement, GSW Water Heating reserves the right to make changes without notice.

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JUL 06 2010		
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Contact Information:

GSW Water Heating

Canadian Head Office:

599 Hill Street West
Fergus, ON, Canada N1M 2X1
Tel: 888-599-2837
Fax: 519-787-5500
E-mail: gswinfo@gsw-wh.com

www.johnwoodwaterheaters.com

GSW Warranty:

All GSW and John Wood Water Heaters will be replaced free of charge in the case of tank leakage within the stated warranty period from the date of installation in domestic applications, and 1 year of commercial applications. All parts supplied are warranted for 1 year. Warranty does not include labour. Consult owner's manual for complete details.



For Water Heater/Tank Applications

Job Name _____	Contractor _____
Job Location _____	Approval _____
Engineer _____	Contractor's P.O. No. _____
Approval _____	Representative _____

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Model N36-M1

Vacuum Relief Valve

Sizes: 1/2" and 3/4" (15 and 20mm) Male NPT

FEATURES

- ✓ Low profile
- ✓ All brass body
- ✓ Protective cap
- ✓ Suitable for low pressure steam and water service
- ✓ Tested and rated to ANSI Z21.22
- ✓ CSA certified

APPLICATIONS

- Domestic water heaters and supply tanks
- Table top heaters
- Jacketed steam kettles
- Unit heaters
- Low pressure steam systems
- Steam coil heaters

Note: Vacuum relief valves are not designed or approved as back-siphonage backflow preventers. For protection against back-siphonage install Watts Series 288A vacuum breakers.

STANDARDS

Tested and rated to ANSI Z21.22
CSA certified

SPECIFICATIONS

A Watts Model N36-M1 Vacuum Relief Valve shall be installed on domestic hot water supply tanks/ heaters/ unit heaters/ steam kettles as indicated on plans. The vacuum relief valve shall be ANSI Z21.22 rated and CSA certified. The vacuum relief valve shall have an all brass body and include a protective cap.

Tested and rated under "ANSI Z21.22
Relief Valves for Hot Water Supply Systems".



Watts N36-M1

Design certified by 

For automatic venting of a closed system to atmosphere when a vacuum is created. The Watts N36-M1 Vacuum Relief Valve permits air to enter and prevent vacuum conditions that could siphon the water from the system, resulting in collapse of a tank or water heater or equipment burn out.

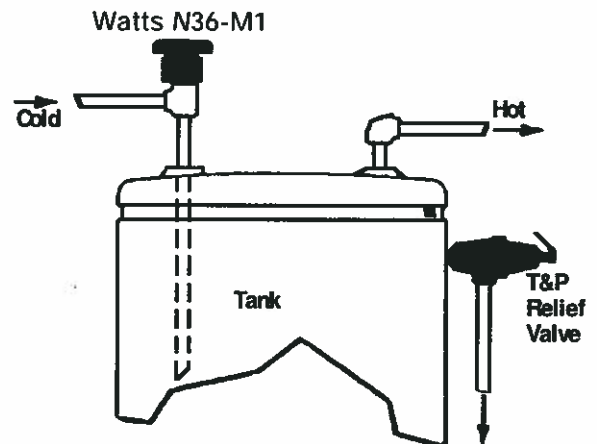


Figure 1
Domestic Hot Water Supply Tanks and Heaters
with Top Supply

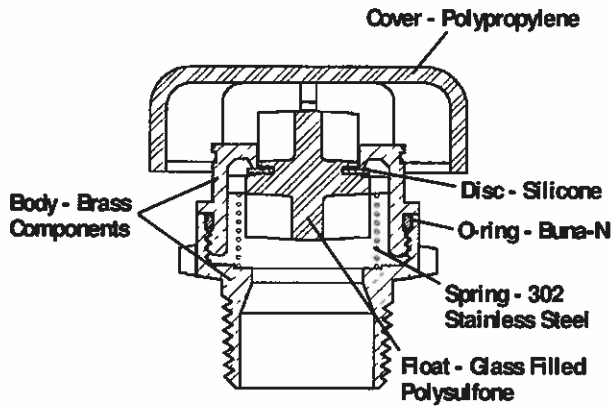
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REGULATOR
— Since 1874 —
Water Products Division • Safety & Control Valves

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Canada: 5435 North Service Rd., Burlington, ONT. L7L 5H7; www.wattscda.com

ISO 9001
CERTIFIED

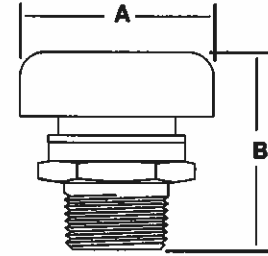
MATERIALS



PRESSURE/TEMPERATURE

Maximum steam working pressure: 15 psi (1.03 bars)
Maximum temperature: 250°F (121°C)

DIMENSIONS / WEIGHT



Size (DN)	in.	mm	Dimensions				Weight	
			A	B			oz.	gr.
1/2	15	2	50	2	50	4	113	
3/4	20	2	50	2	50	4	113	

CAPACITY

Size (DN)	in.	mm	Model	Venting Capacity	
				CFM	LPM
1/2	15	N36-M1	15	425	
3/4	20	N36-M1	15	425	

TYPICAL INSTALLATIONS

Water Service

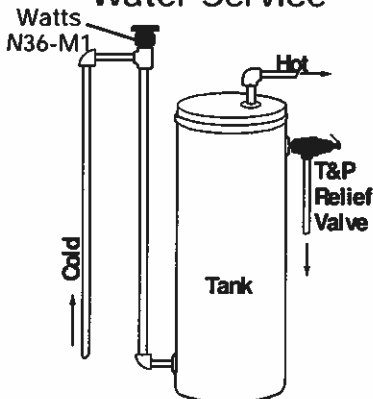


Figure 2

Domestic Hot Water Supply Tanks and Heaters with Bottom Feed

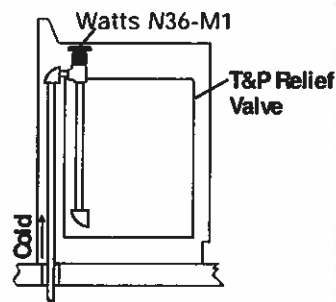


Figure 3 - Table Top Heaters

Steam Service

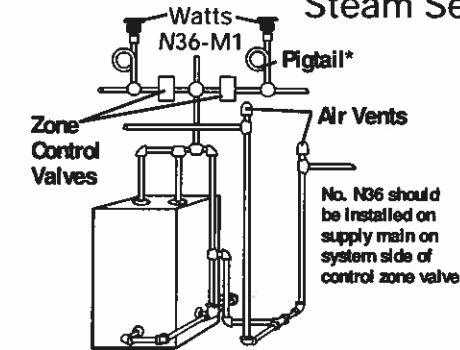


Figure 4

Low Pressure Steam Heating Systems

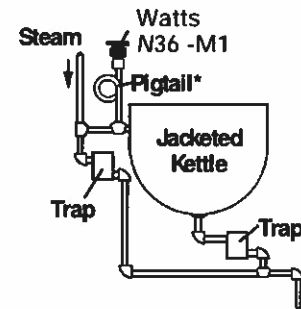


Figure 5

Jacketed Kettles

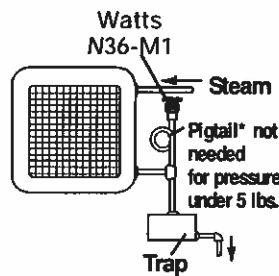


Figure 6

Unit Heaters

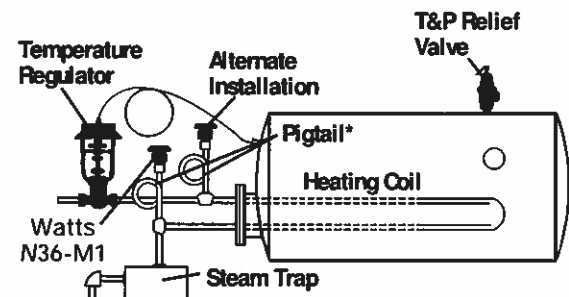


Figure 7

Steam Coil Heaters

* Note: When used for steam service, be sure to use pigtail to prevent live steam from damaging N36 valve.

Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.



USA: 815 Chestnut St., No. Andover, MA 01845-6098; www.wattsreg.com
Canada: 5435 North Service Rd., Burlington, ONT. L7L 5H7; www.wattscca.com



Section 22 42 00 2.1 & 2.2 Sink and Fawcett

CHICAGO FAUCETS

Last As Long As The Building



2100 SOUTH CLEARWATER DRIVE
DES PLAINES, ILLINOIS 60018-5999

FITTING NO.

891

SUBMITTED MODEL NO.

JOB NAME

ITEM NO.

SUBMITTED AS SHOWN

SUBMITTED AS NOTED

SEE ATTACHED FOR
SUBMITTED MODIFICATION

Suffix XK: Ceramic Cartridges

Suffix E2805-5: 0.5 gpm Vandal Resistant Aerator



ADA COMPLIANT

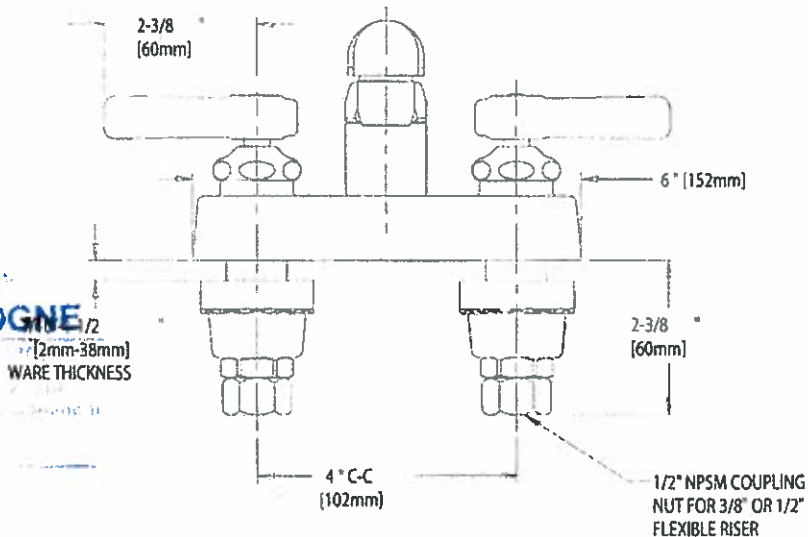
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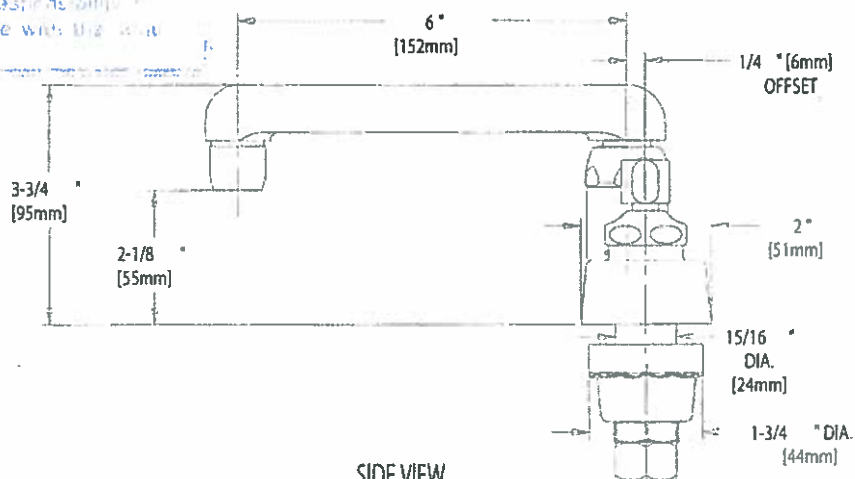
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ROUGHING IN DIMENSIONS MAY VARY AND ARE SUBJECT TO CHANGE. NO RESPONSIBILITY FOR SUCH CHANGES.



FRONT VIEW



SIDE VIEW

DIMENSIONS IN INCHES AND [MILLIMETERS].

TECHNICAL DATA

- DECK MOUNTED LAVATORY FAUCET
- S6 CAST SWING SPOUT
- 369 INDEXED LEVER HANDLES
- QUATURN OPERATING CARTRIDGES
- FINISH: CHROME PLATE

- E3 SOFTFLO AERATOR
- ~~2.2 GPM (83 L/min) FLOW RATE~~
- ASME A112.18.1M COMPLIANT
- CSA B125 COMPLIANT
- NSF 61 COMPLIANT

DATE: 05-21-02

BY: SID

CHK'D:

APP'D:

REV: A

891

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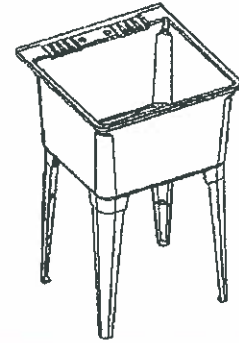
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Fax : 450-443-3840 1-800-858-3840
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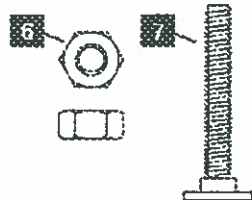
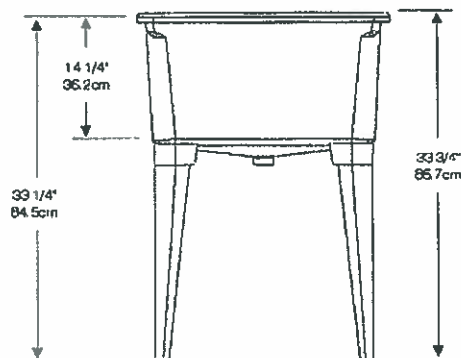
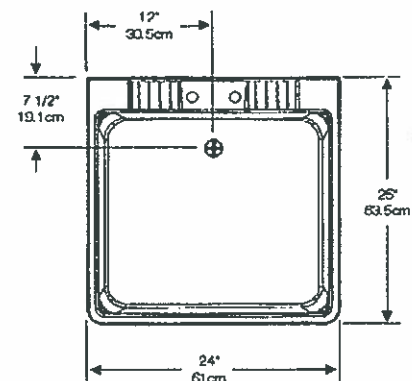
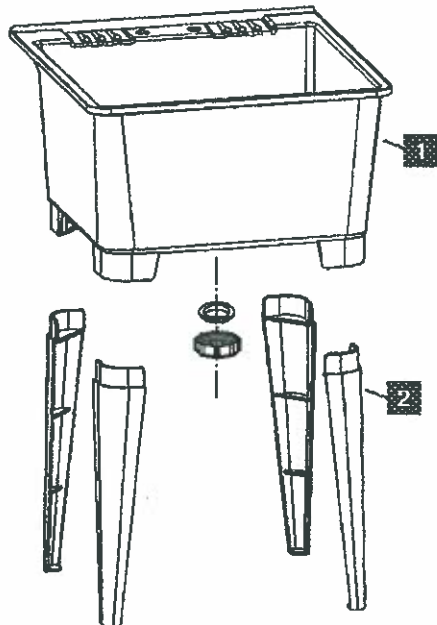
CUVE À LAVAGE SIMPLE SINGLE LAUNDRY TUB

PTB 150, PTGB 150



INSTRUCTIONS

Ensure that SP-02 can fit under new tub.



PIÈCES INCLUSES / PARTS INCLUDED			
Ref	Description		Qté / Qty
1	Cuve / Tub		1
2	Pied de plastique / Plastic leg		4
3*	Bouchon / Plug	1 1/2"	1
4*	Rondelle de plastique / Slip nut washer		1
5*	Écrou de raccordement / Slip nut		1
6*	Écrou / Nut	1/4-20	6
7*	Niveau / Levellers	1/4-20	4
	Sac de quincaillerie / Hardware bag		1
	* Articles inclus dans le sac de quincaillerie / Items included with hardware bag		

Lorsque vous commandez des pièces de rechange, nous vous prions de nous fournir les renseignements suivants :

1. No. de modèle
2. No. de référence
3. Description de la pièce

When you order replacement parts, always give the following information :

1. Model No
2. Item No
3. Description

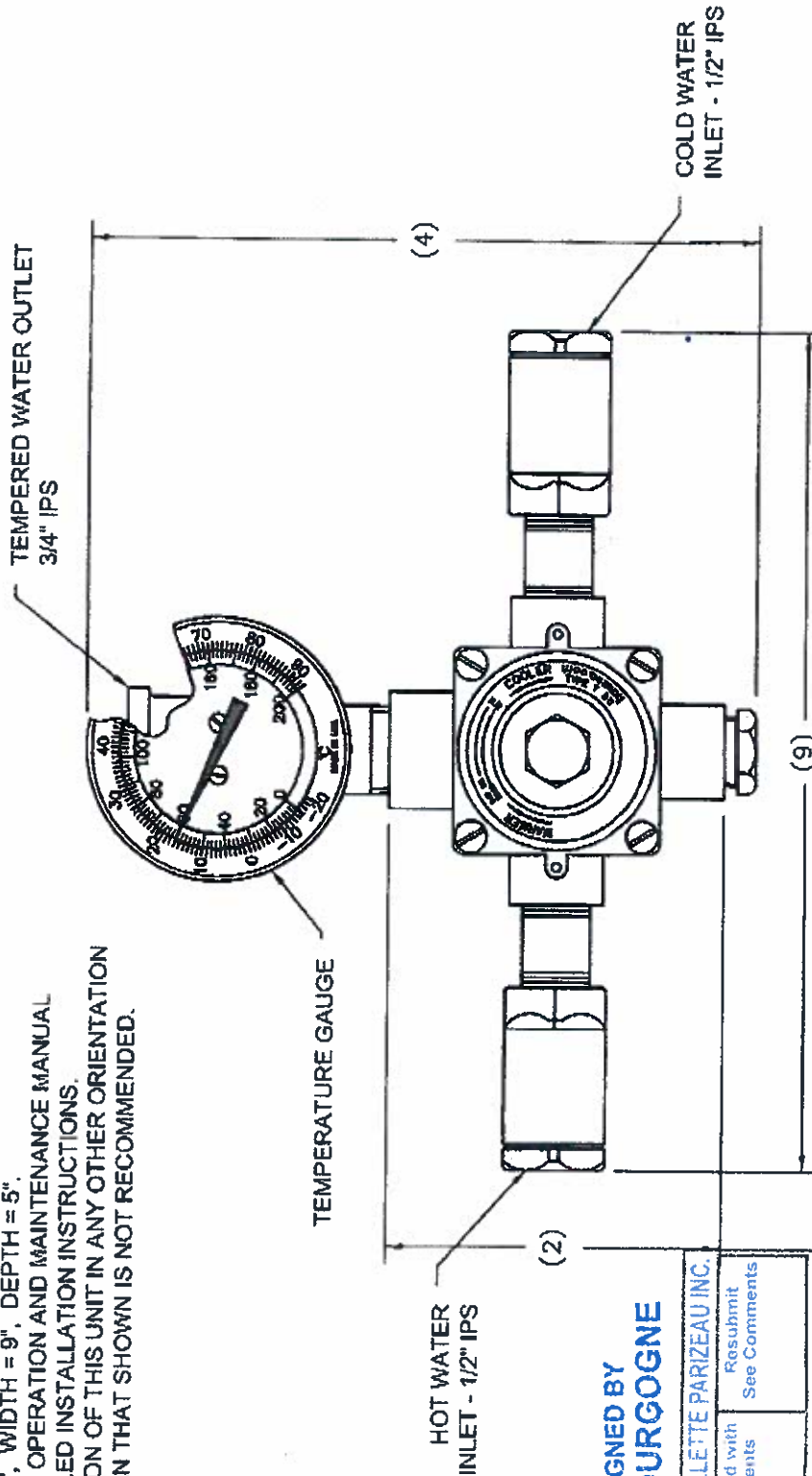
Modèle d'installation pour les modèles
à l'installation de la baignoire

150307
6480003

Water Truck Fill Station
Haws # 9201-Flow (EF)
Flow-01

NOTES:

1. THERMOSTATIC MIXING VALVE TO SUPPLY TEMPERED WATER FROM 2 TO 7 GPM @ 30 PSI.
2. FACTORY OUTLET FLOW SET AT 85° F.
3. INLETS 1/2" IPS, OUTLET 3/4" IPS.
4. OVERALL VALVE BODY REF. DIMENSIONS: HEIGHT = 4", WIDTH = 9", DEPTH = 5".
5. SEE 9201EF OPERATION AND MAINTENANCE MANUAL FOR DETAILED INSTALLATION INSTRUCTIONS.
6. INSTALLATION OF THIS UNIT IN ANY OTHER ORIENTATION OTHER THAN THAT SHOWN IS NOT RECOMMENDED.



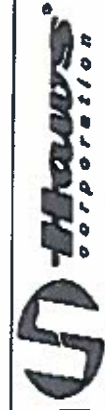
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#000 SANANI BOUTHILLETTE PARIZEAU INC.

Reviewed	Reviewed with Comments	Resubmit See Comments
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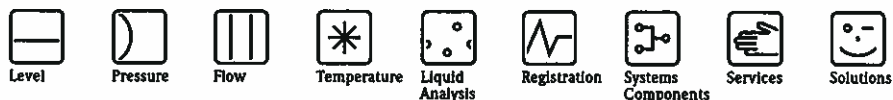
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SPARKS, NEVADA 89431
(775) 356-4112 FAX (775) 356-7404
E-MAIL: HAWS@HAWS.COM
WEBSITE: WWW.HAWS.COM

ITEM	QUANTITY	UNIT	PRICE	TOTAL
9201EF	1	EA	2920133	2920133
9201EF	1	EA	1530400	1530400
9201EF	1	EA	1530400	1530400
9201EF	1	EA	1530400	1530400
9201EF	1	EA	1530400	1530400
9201EF	1	EA	1530400	1530400
9201EF	1	EA	1530400	1530400
9201EF	1	EA	1530400	1530400
9201EF	1	EA	1530400	1530400
9201EF	1	EA	1530400	1530400

Section 22 42 01 2.4 Flow Meter

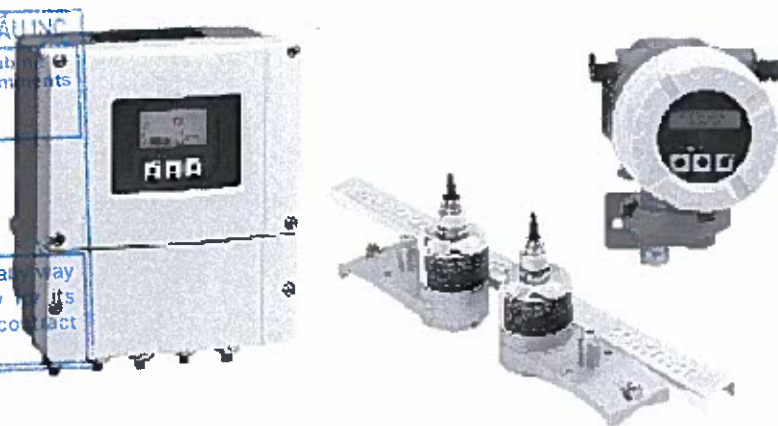
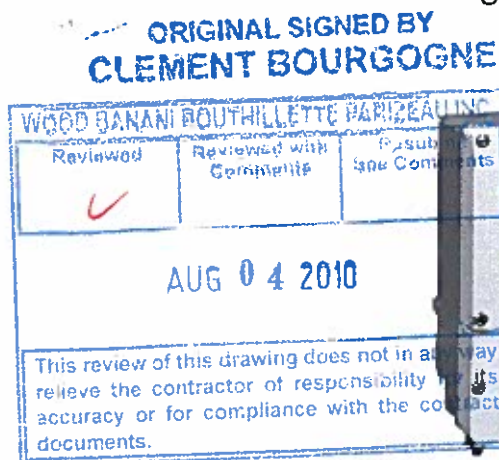


Technical Information

Proline Prosonic Flow 90U, 90W, 91W, 93C, 93U, 93W

Ultrasonic Flow Measuring System

Flowrate measurement for standard applications
with drinking water, wastewater and process water



Application

The sensors are perfectly suited for bidirectional measurement of pure or slightly contaminated liquids, regardless of the pressure, temperature, conductivity and viscosity.

- Applicable for all homogeneous fluids in acoustically transmissive pipes, even with lining
- For water/wastewater applications
- Ideal for retrofitting
- Installation without process interruption

Approvals for hazardous area:

- ATEX, FM, CSA

Industry approvals:

- Drinking water approval for Prosonic Flow C

Connection to process control system:

- HART, PROFIBUS PA, FOUNDATION Fieldbus

Your benefits

Prosonic Flow, the flexible and cost-effective flow measuring system, available as a clamp-on, insertion or inline unit, offers you a tailor-made solution.

The **Proline transmitter concept** comprises:

- Modular device and operating concept resulting in a higher degree of efficiency
- Diagnostic ability and data back-up for increased process quality

The tried-and-tested **Prosonic Flow sensors** offer:

- Easy and safe installation and commissioning guarantee precise measurement
- Insensitivity to vibrations
- No pressure loss
- Optionally available as dual-path version for short inlet runs
- Prosonic Flow C with guaranteed and accredited calibration accuracy

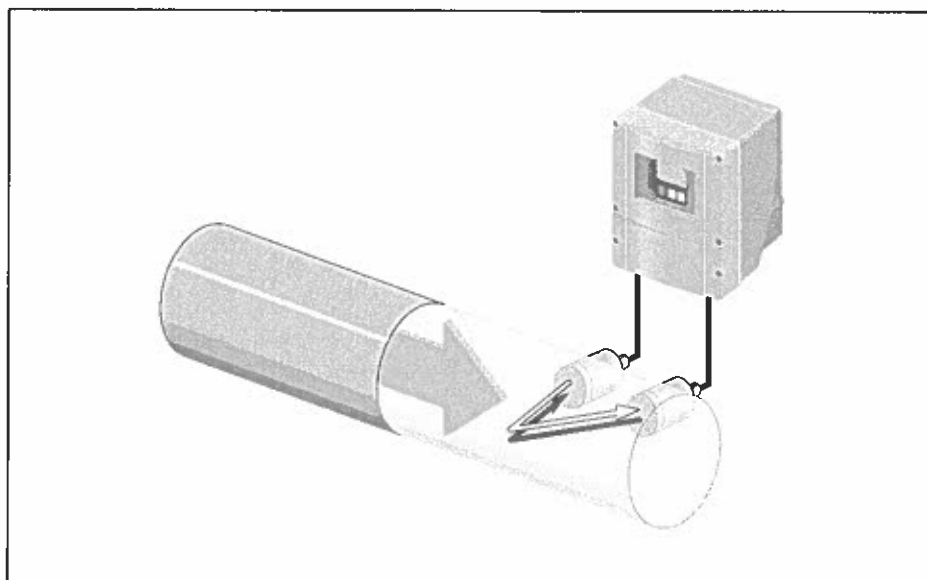
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Function and system design

Measuring principle

Prosonic Flow operates on the principle of transit time difference. An acoustic (ultrasonic) signal is sent in both directions from one measuring sensor to another. A transit time difference arises because the signal propagation velocity of the sound waves is greater in the direction of flow than against the direction of flow. This difference is directly proportional to the flow velocity. Prosonic Flow calculates the flow from the pipe cross-sectional area and the measured transit time difference.



$$v \sim \Delta t$$

$$Q = v \cdot A$$

v = Flow velocity
 Δt = Transit time difference
 Q = Volume flow
 A = Pipe cross-sectional area

In addition to the volume flow, the system also always measures the sound velocity of the fluid. The sound velocity can be used to distinguish different fluids or as a measure of fluid quality. Application-specific configuration of the Prosonic Flow can be carried out locally with the aid of the "Quick Setup" menu.

System design Measuring system

The Prosonic Flow ultrasonic flow measuring system always consists of a transmitter and the related measuring sensors. All components are available in different versions depending on the application requirements.

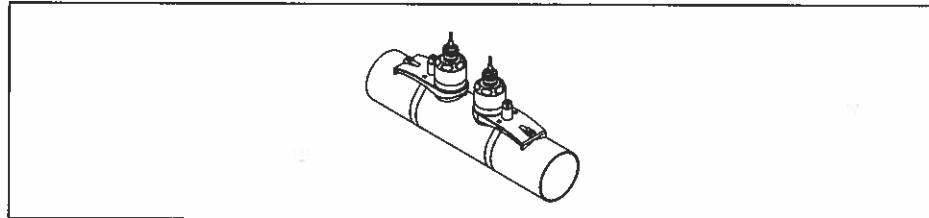
The transmitter is used to actuate the measuring sensors. The electronics and the software in the transmitter are used to prepare, process and evaluate the sensor signals and to convert the measuring signal to the desired output variables.

The measuring sensors work bidirectionally as sound transmitters and sound receivers. The electrical signals of the transmitter are converted to a pressure signal in the measuring sensors and vice versa.

Depending on the design, the different sensor versions of ultrasonic flow measuring devices offer unique possibilities in the application. The properties and benefits of the different versions are explained in detail on the following pages.

System design Clamp-on sensors

Prosonic Flow W and U



F06-Pr/WC000-31-05-06-xx-000

Design:

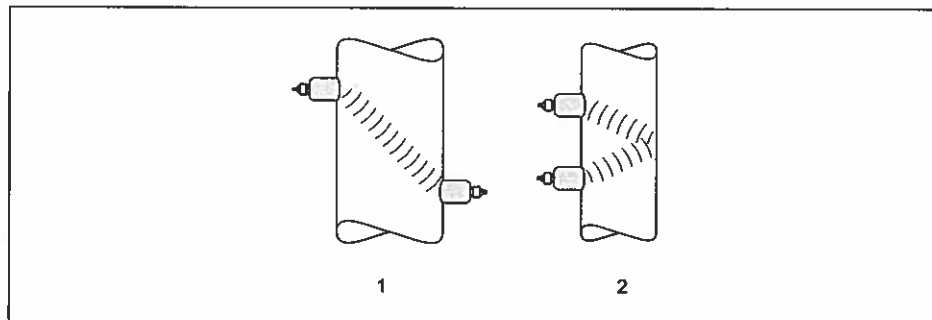
Prosonic Flow clamp-on sensors are mounted on the existing piping from outside.

Possibilities and applications:

- Ideal for retrofitting, installation possible without interrupting process.
- Easy, quick and low-cost mounting.
- Suitable for all acoustically transmissive pipes and all pure and slightly contaminated liquids.
- Very large nominal diameter range DN 15 to 4000 (1/2" to 156").

Sensor arrangement

The transmitter offers a number of options between 1 and 2 traverses for the type of installation.



A0005712

- 1 1 traverse
2 2 traverses

Recommendations:

Due to their design and properties, the Prosonic Flow sensors are particularly suited to certain nominal diameter ranges and pipe wall thicknesses. For this reason, various sensor types are offered for Prosonic Flow W and U for these different applications.

Recommendations for sensor installation can be found in the following table.

Sensor type	Nominal diameter	Type of mounting
Prosonic Flow U	DN 15 to 100 (1/2" to 4")	2 traverses
Prosonic Flow W	DN 50 to 60 (2" to 2 1/2")	2 (or 1) traverses
	DN 80 to 600 (3" to 24")	2 traverses
	DN 650 to 4000 (26" to 156")	1 traverse

Note!

- Please note that the signal strength is reduced with each additional reflection point in the pipe.
(Example: 2 traverses = 1 reflection point).
- The installation of clamp-on sensors is principally recommended in the 2 traverse type of installation. This type of installation allows the easiest and most comfortable type of mounting and means that a system can also be mounted even if the pipe can only be accessed from one side.

- If the pipe nominal diameter is small (DN 60 / 2-1/2" and smaller), the sensor spacing with Prosonic Flow W can be too small for an installation with 2 traverses. In this case, the 1 traverse type of installation must be used.
In all other instances, the 2 traverse configuration is the preferred method.
- The use of Prosonic Flow W sensors DN 100 to 4000 (4" to 156") is principally recommended for plastic pipes with a wall thickness > 10 mm (0.40 inch), pipes made of composites such as GRP, pipes with lining, even for nominal diameters < DN 100 (4"). This applies also to applications with media with high acoustic damping. For these applications, we principally recommend mounting the W sensors with 1 traverse configuration.
- In the DN 15 to 50 (1/2" to 2") nominal diameter range, Prosonic Flow U is preferred for use on plastic pipes. Both the Prosonic Flow W and the Prosonic Flow U sensor types can be used in the DN 50 to 100 (2" to 4") nominal diameter range. The use of Prosonic Flow W sensors is principally recommended for applications as of DN 60 (2-1/2").
- If the measuring device displays an insufficient signal strength, reduce the number of the traverses.

Dual-channel measuring devices

Prosonic Flow 93 has two measuring channels which are independent of one another. In other words, the transmitter supports the simultaneous operation of two sensor pairs at two individual measuring channels. In doing so, the resources of the transmitter are split evenly between the two channels.

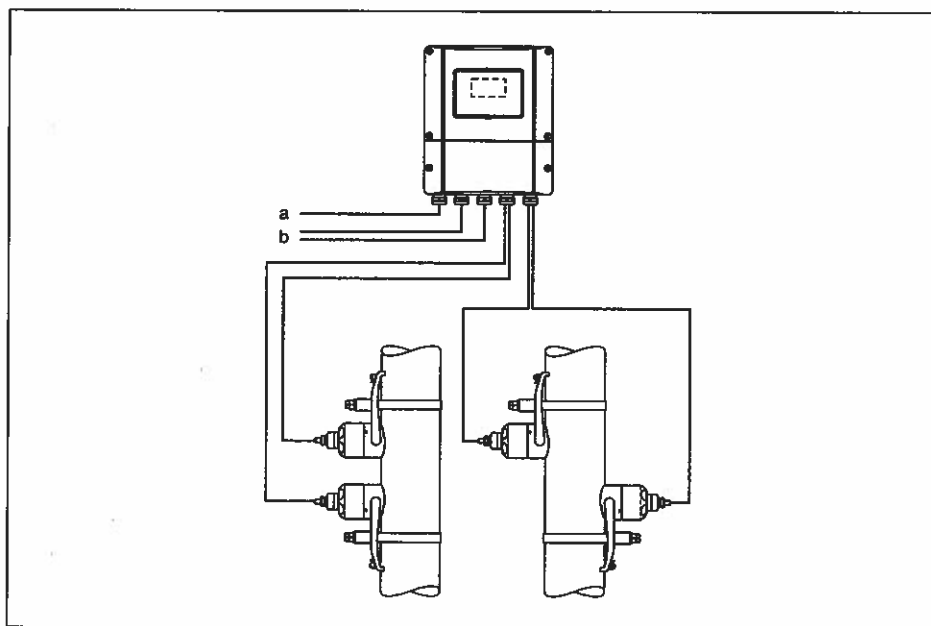
This ability of the transmitter can be used in many different ways:

- For dual-channel measurement
- For dual-path measurement

The transmitter can output the measured values of both channels either individually or arithmetically linked (as total, difference or mean).

Dual-channel measurement

In the case of dual-channel measurement, the measured values of two independent measuring points are determined and processed by one transmitter.



- a Cable for power supply
- b Signal cable (outputs)

If required, the measured values of measuring channel 1 and measuring channel 2 can be arithmetically linked together. The following possibilities for outputting measured values are suitable for dual-channel measurement:

- Individual output of measured values from channel 1 and 2
- Total of measured values from channel 1 and 2
- Difference of measured values from channel 1 and 2

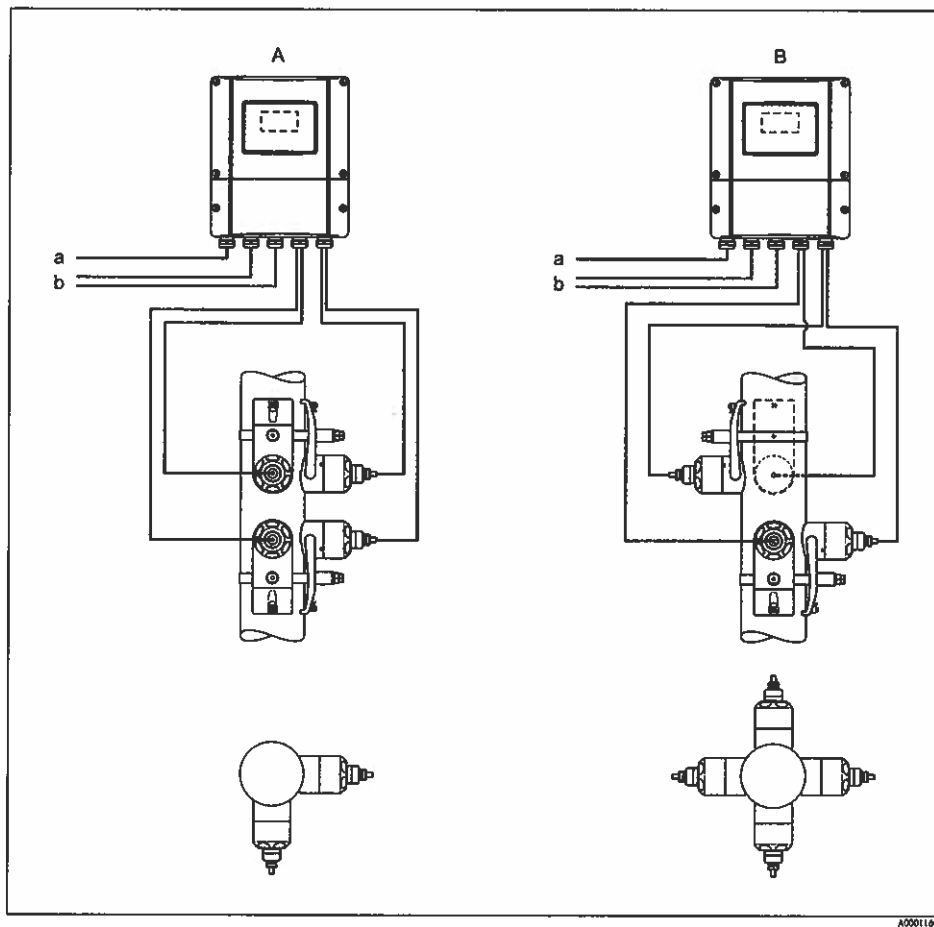
The measuring device supports the individual configuration of the measuring channels and the independent setting of the display and outputs. As a result, the sensor type and type of installation, for example, can be selected and configured separately for both channels.

Note!

Pay particular attention to the recommendations on installation in the "Mounting location" section, Page 26, the "Orientation" section, Page 27, the "Inlet and outlet run" section, Page 30 and the recommendations on the type of installation in the "Sensor arrangement" section, Page 4.

Dual-path measurement

In dual-path measurement, the transmitter is used to operate two sensor pairs which are installed on the same pipe. Different applications can necessitate different types of installation.



- a Cable for power supply
b Signal cable (outputs)

Note!

Observe the recommendations in the "Sensor arrangement" section, Page 4.

The following possibilities for outputting measured values are suitable for dual-path measurement:

- Individual output of measured values from channel 1 and 2
- Arithmetic mean of the measured values from channel 1 and 2 ($CH1 + CH2 / 2$)

The possibility of obtaining the mean value in dual-path measurement provides the advantage of a more stable measured value. A measured value that is generated from two independent measuring signals is generally less sensitive to irregularities and faults in the application.

As a result, if conditions are not ideal, for example, the dual-path system means that the different flow components within the flow can be better determined thanks to the fact that the measured values are determined independently on two levels. Differences are then balanced out when the two measured values are

subsequently averaged to form one process variable. This often results in a more stable and more accurate measured value than would be the case with single-path measurement.

The measuring device supports the individual configuration of the measuring channels.

Caution!

Pay particular attention to the recommendations on installation in the "Mounting location" section, Page 26, the "Orientation" section, Page 27, the "Inlet and outlet run" section, Page 30 and the recommendations on the type of installation in the "Sensor arrangement" section, Page 4.

Accessories for commissioning

If mounting and commissioning a clamp-on measuring point, you require information on the liquid to be measured and the pipe material used, as well as the exact pipe dimensions. The data of the most common liquids and pipe and lining materials are pre-programmed into the program of the Prosonic Flow 90 and 93 transmitters.

For liquids:

WATER – SEA WATER – DISTILLED WATER – AMMONIA – ALCOHOL – BENZENE – BROMIDE – ETHANOL – GLYCOL – KEROSENE – MILK – METHANOL – TOLUOL – LUBRICATING OIL – FUEL OIL – PETROL

For pipe material:

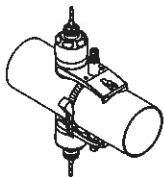
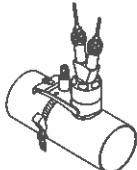
STAINLESS STEEL – SS ANSI 304 – SS ANSI 316 – SS ANSI 347 – SS ANSI 410 – SS ANSI 430 – ALLOY C – PVC – PE – LDPE – HDPE – GRP – PVDF – PA – PP – PTFE – GLASS PYREX – ASBESTOS CEMENT – CARBON STEEL – DUCTILE IRON

Lining:

CEMENT – RUBBER – TAR EPOXY

Additional accessories

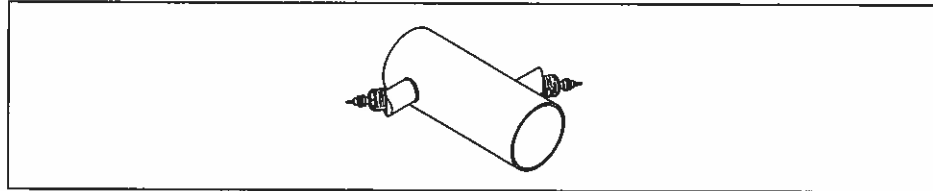
If your liquid or pipe material is not included in the pre-programmed options, and if these data are not known, they can be determined with the aid of the sound velocity measuring sensors DDU 18 and the wall thickness measuring sensor DDU 19. These are only available for Prosonic Flow 93 transmitters.

<p>DDU 18 Sound velocity measuring sensors</p>  <p style="text-align: center; font-size: small;">P06-9xDDU18x-21-05-06-xx-001</p>	<ul style="list-style-type: none"> ■ Sound velocity measuring sensors for Prosonic Flow 93 ■ Sensor pair for measuring the sound velocity of the fluid. Only required for commissioning the clamp-on version unless the sound velocity in the fluid is known. ■ DN 50 to 3000 (2" to 120") ■ Temperature range -40 to +80 °C (-40 to +176 °F) ■ Degree of protection IP 68 ■ Sensor holder made of stainless steel
<p>DDU 19 Wall thickness measuring sensors</p>  <p style="text-align: center; font-size: small;">P06-9xDDU19x-21-05-06-xx-001</p>	<ul style="list-style-type: none"> ■ Wall thickness measuring sensor for Prosonic Flow 93 ■ Sensor for measuring the pipe wall thickness. Only required for commissioning the clamp-on version. ■ Wall thickness measuring range: 2 to 50 mm (0.08" to 1.97") for steel pipes 4 to 15 mm (0.16" to 0.60") for plastic pipes (suited to a certain extent for use on PTFE or PE pipes) ■ Temperature range 0 to +60 °C (+32 to +140 °F) ■ Degree of protection IP 67 ■ Sensor holder made of stainless steel

System design

Insertion sensors

Prosonic Flow W Insertion



F06-9eW1xxxx-21-05-06-zz-000

Design:

Prosonic Flow W Insertion sensors are mounted on the existing piping with the aid of welding sockets. One or two measuring paths can be implemented in the pipe.

Possibilities and applications:

- Can be used for applications with water and wastewater
- Simple mounting, specially suited for retrofitting on all weldable pipes with or without lining.
- Dual-path measurement with 2 sensor pairs makes it possible to reduce the necessary inlet runs.

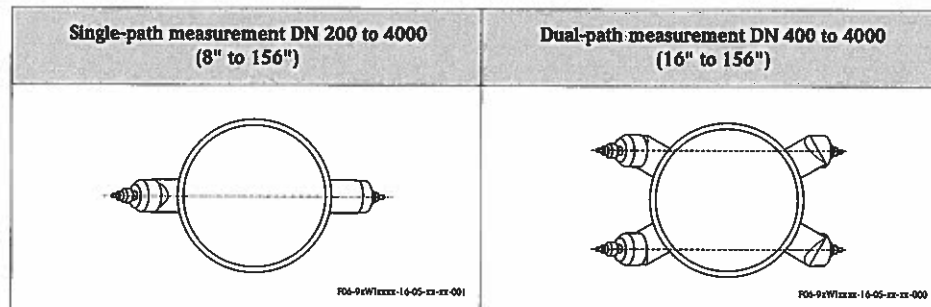
Sensor arrangement

The Prosonic Flow W Insertion sensors are mounted on the existing piping with the aid of welding sockets. For this, boreholes are required in the pipe into which the supports for the flowrate measuring sensors are welded. In a second step, the flowrate measuring sensors are screwed into the sensor supports.

Prosonic Flow W Insertion is available as a single-path or dual-path version (only for Prosonic Flow 93 transmitters). Two sensor pairs are mounted in the pipe in the dual-path version. The dual-path version is available for pipes in the nominal diameter range DN 400 to 4000 (16" to 156"). It offers the following advantages over the single-path version:

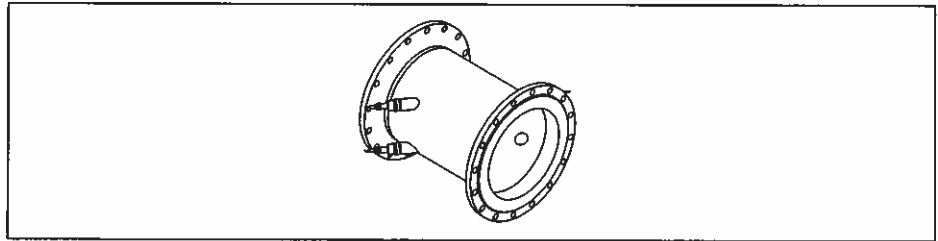
- Short inlet run of only 10 x nominal diameter.
- Increased tolerance towards turbulence (swirl).
- Improved linearity of measurement.

Please refer also to the "Installation" and "Technical data" sections.



**System design
Inline sensors**

Prosonic Flow C Inline



FS6-93Cxxxx-21-05-06-xx-000

Design:

The Prosonic Flow C Inline sensor consists of a measuring pipe which is integrated into the pipe system of the application by means of process flanges.

Prosonic Flow C is a dual-path system and has two pairs of W insertion sensors.

Possibilities and applications:

- High accuracy
- Traceably calibrated
- Suitable for applications with water and wastewater.

The measuring pipe is not an active part of the measuring system and is therefore not required for the measuring function. However, in contrast to the clamp-on and Insertion systems, which are installed on site, it allows the calibration to be transferred from the factory to the place of use. This has the advantage that a 93 C Inline measuring system measures with guaranteed and verifiable accuracy. Prosonic Flow C Inline makes it possible to achieve high accuracy of the ultrasonic flow measuring system and also offers traceable calibration.

The C Inline sensor is available specific to the application in two versions with different linings:

- For drinking water: epoxy coating with approval for drinking water
- For wastewater: epoxy coating for wastewater

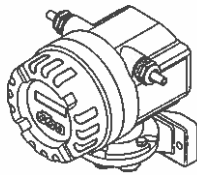
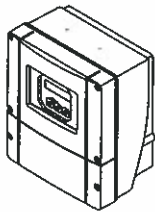
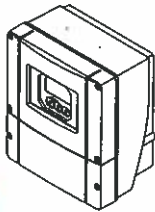
The Prosonic Flow 93 C Inline measuring system always consists of a combination of a Prosonic Flow 93 transmitter in a wall-mount housing and an optimized version of the Prosonic Flow W Insertion sensors integrated in the measuring pipe. Prosonic Flow 93 C Inline is only available as a remote version with 2 sensor pairs. This dual-path version offers the following advantages over the single-path version:

- Short inlet run of only 10 x DN.
- Increased tolerance towards turbulence (swirl).
- Improved linearity of measurement.

Please refer also to the "Installation" and "Technical data" sections.

Measuring system

The measuring system consists of the following transmitters and measuring sensors.

Transmitter	
Prosonic Flow 91  <small>A0000022</small>	<ul style="list-style-type: none"> ■ For mounting in non-hazardous areas and Class I Division 2 areas ■ Two-line LCD display ■ Configuration with keys ■ Sensor setup ■ All outputs are galvanically isolated from the power supply, measuring circuit and each other. ■ Volume measurement ■ Designed for single-channel measurement as standard ■ Degree of protection IP 67 / NEMA 4X
Prosonic Flow 90  <small>P00-x3xxxx-21-03-06-xx-000</small>	<ul style="list-style-type: none"> ■ For mounting in non-hazardous areas and Class I Division 2 areas ■ Two-line LCD display ■ Configuration with keys ■ Quick Setup ■ All outputs are galvanically isolated from the power supply, measuring circuit and each other. ■ Volume and sound velocity measurement ■ Designed for single-channel measurement as standard ■ Degree of protection IP 67 / NEMA 4X
Prosonic Flow 93  <small>P00-x3xxxx-21-03-06-xx-000</small>	<ul style="list-style-type: none"> ■ For mounting in non-hazardous areas and Class I Division 2 areas ■ Four-line LCD display ■ Configuration with Touch Control ■ Application-specific Quick Setup ■ All outputs are galvanically isolated from the power supply, measuring circuit and each other. ■ Volume and sound velocity measurement ■ Designed for wall thickness measurement as standard. ■ Designed for dual-channel measurement at one or two different measuring points as standard. ■ Degree of protection IP 67 / NEMA 4X

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WOOD BANANI BOUTHILLETTE PARIZEAU INC

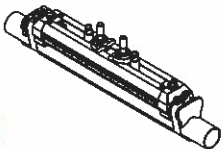
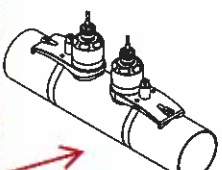
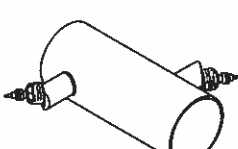
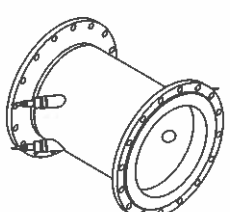
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Comments

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Measuring sensors	
Prosonic Flow U "Clamp-on" version  <p>R06-90Uxxxx-21-05-06-zx-001</p>	<ul style="list-style-type: none"> ■ Clamp-on flowrate measuring sensors for small pipe nominal diameters ■ Sensor pair for measuring the flow and the sound velocity of the fluid during operation. ■ 1 sensor type for DN 15 to 100 (1/2" to 4") ■ Temperature range -20 to +80°C (-4 to +176°F) ■ Degree of protection IP 54 ■ Sensor unit made of plastic, stainless cast steel and aluminum
Prosonic Flow W "Clamp-on" version  <p>R06-90Wxxxx-21-05-06-zx-000</p>	<ul style="list-style-type: none"> ■ Clamp-on flowrate measuring sensors ■ Sensor pair for measuring the flow and the sound velocity of the fluid during operation. ■ 2 sensor types for DN 50 to 4000 (2" to 156") ■ Temperature range -20 to +80°C / -4 to +176°F (optional 0 to +130°C / +32 to +266°F) ■ Degree of protection IP 67, IP 68 optional / NEMA 4X, NEMA 6P optional ■ Sensor holder made of stainless steel
Prosonic Flow W "Insertion" version  <p>R06-90Wxxxx-21-05-06-zx-000</p>	<ul style="list-style-type: none"> ■ Insertion flowrate measuring sensors ■ Sensor pair for measuring the flow and the sound velocity of the fluid during operation. ■ DN 200 to 4000 (8" to 156") ■ Temperature range -40 to +80°C (-40 to +176°F) ■ 2 sensor holder types single-channel (DN 200 to 4000 / 8" to 156") or dual-channel (DN 400 to 4000 / 16" to 156") ■ Degree of protection IP 68 / NEMA 6P ■ Sensor holder made of stainless steel
Prosonic Flow C Inline  <p>A0001149</p>	<ul style="list-style-type: none"> ■ Calibrated measuring pipe with flowrate measuring sensors ■ 2 sensor pairs for measuring the flow and the sound velocity of the fluid during operation. ■ 1 sensor type for DN 300 to 2000 (12" to 80") ■ Measuring pipe for nominal diameter range DN 300 to 2000 (12" to 80") ■ Temperature range -10 to +60°C (+14 to +140°F) ■ Degree of protection IP 68 / NEMA 6P ■ Measuring pipe in ST 37.2 epoxy coated ■ Measuring sensors made of stainless steel

System overview

Possible combinations of transmitters and sensors			
	Prosonic Flow 90 Transmitter	Prosonic Flow 91 Transmitter	Prosonic Flow 93 Transmitter
Prosonic Flow W Clamp-on version	✓	✓	✓
Prosonic Flow U Clamp-on version	✓	-	✓
Prosonic Flow W Insertion version	✓	-	✓
Prosonic Flow C Inline Calibrated measuring pipe with Prosonic Flow W sensors	-	-	✓

Ranges of application:

Warm and cold water and similar liquids

Input

Measured variable	Flow velocity (transit time difference proportional to flow velocity)
Measuring range	Typically $v = 0$ to 15 m/s (0 to 50 ft/s) with the specified measuring accuracy for Prosonic Flow W Typically $v = 0$ to 10 m/s (0 to 33 ft/s) with the specified measuring accuracy for Prosonic Flow U and C
Operable flow range	Over 150 : 1
Input signal	Prosonic Flow 90/93 Status input (auxiliary input): $U = 3$ to 30 V DC, $R_i = 5 \text{ k}\Omega$, galvanically isolated. Configurable for: totalizer(s) reset, positive zero return, error message reset. Prosonic Flow 91 None

Output

Output signal	Prosonic Flow 90 Current output: Active/passive selectable, galvanically isolated, time constant selectable (0.05 to 100 s), full scale value adjustable, temperature coefficient: typ. 0.005% o.r./°C; resolution: 0.5 μA . ■ Active: 0/4 to 20 mA, $R_L < 700 \Omega$ (for HART: $R_L \geq 250 \Omega$) ■ Passive: 4 to 20 mA, supply voltage 18 to 30 V DC, $R_L < 700 \Omega$ Pulse/frequency output: Passive, open collector, 30 V DC, 250 mA, galvanically isolated. ■ Frequency output: full scale frequency 2 to 1000 Hz ($f_{\max} = 1250 \text{ Hz}$), on/off ratio 1:1, pulse width max. 10 s ■ Pulse output: pulse value and pulse polarity selectable, max. pulse width adjustable (0.5 to 2000 ms / 1.6 to 6562 ft/s), max. pulse frequency selectable
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PROFIBUS PA interface:

- PROFIBUS PA in accordance with EN 50170 Volume 2, IEC 61158-2 (MBP), galvanically isolated
- Current consumption: 11 mA
- Error current FDE (Fault Disconnection Electronic): 0 mA
- Data transmission rate, supported baudrate: 31.25 kBit/s
- Signal encoding: Manchester II
- Function blocks: 3 x Analog Input (AI), 1 x Totalizer
- Output data: volume flow, sound velocity, flow velocity
- Input data: positive zero return (ON/OFF), operation control, totalizer control, zero point adjustment control, display value
- Bus address can be set via DIP switch on device

Prosonic Flow 91

Current output:

- Galvanically isolated
- Active: 4 to 20 mA, $R_L < 700 \Omega$ (for HART: $R_L \geq 250 \Omega$)
- Full scale value adjustable
- Temperature coefficient: typ. $2 \mu A/^{\circ}C$, resolution: $1.5 \mu A$

Pulse/status output:

- Galvanically isolated
- Passive: 30 V DC/250 mA
- Open collector
- Optionally configurable as:
 - Pulse output: pulse value and pulse polarity selectable, max. pulse width adjustable (5 to 2000 ms / 16 to 6562 ft/s), max. pulse frequency 100 Hz
 - Status output: configurable e.g. for error messages, empty pipe detection, flow direction detection, limit value

Prosonic Flow 93

Current output:

- Active/passive selectable, galvanically isolated, time constant selectable (0.05 to 100 s), full scale value adjustable, temperature coefficient: typ. 0.005% o.r./ $^{\circ}C$; resolution: $0.5 \mu A$
- Active: 0/4 to 20 mA, $R_L < 700 \Omega$ (for HART: $R_L \geq 250 \Omega$)
- Passive: 4 to 20 mA, max. 30 V DC, $R_L \leq 150 \Omega$

Pulse/frequency output:

- Active/passive selectable, galvanically isolated
- Active: 24 V DC, 25 mA (max. 250 mA during 20 ms), $R_L > 100 \Omega$
- Passive: open collector, 30 V DC, 250 mA
- Frequency output: full scale frequency 2 to 10000 Hz ($f_{max} = 12500$ Hz), 2 to 5000 Hz for EEx ia, on/off ratio 1:1, pulse width max. 10 s
- Pulse output: pulse value and pulse polarity selectable, max. pulse width adjustable (0.05 to 2000 ms / 0.16 to 6562 ft/s), the on/off ratio is 1:1 as of a frequency of 1 / (2 x pulse width)

Note!

The following values of the communication interfaces only apply to **Prosonic Flow W** (clamp-on and Insertion) and to **Prosonic Flow U** (clamp-on)!

PROFIBUS PA interface for Prosonic Flow W and U:

- PROFIBUS PA in accordance with EN 50170 Volume 2, IEC 61158-2 (MBP), galvanically isolated
- Data transmission rate, supported baudrate: 31.25 kBit/s
- Current consumption: 11 mA
- Error current FDE (Fault Disconnection Electronic): 0 mA
- Signal encoding: Manchester II
- Function blocks: 8 x Analog Input (AI), 3 x Totalizer
- Output data: volume flow channel 1 or channel 2, sound velocity channel 1 or channel 2, flow velocity channel 1 or channel 2, average volume flow, average sound velocity, average flow velocity, volume flow sum, volume flow difference, totalizer 1 to 3
- Input data: positive zero return (ON/OFF), operation control, totalizer control, zero point adjustment control, display value
- Bus address can be set via DIP switch on device

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FOUNDATION Fieldbus interface for Prosonic Flow W and U:

- FOUNDATION Fieldbus H1, IEC 61158-2, galvanically isolated
- Data transmission rate, supported baudrate: 31.25 kBit/s
- Current consumption: 12 mA
- Error current FDE (Fault Disconnection Electronic): 0 mA
- Signal encoding: Manchester II
- Function blocks: 8 x Analog Input (AI), 1 x Discrete Output, 1 x PID
- Output data: volume flow channel 1 or channel 2, sound velocity channel 1 or channel 2, flow velocity channel 1 or channel 2, signal strength channel 1 or 2, average volume flow, average sound velocity, average flow velocity, volume flow sum, volume flow difference, totalizer 1 to 3
- Input data: positive zero return (ON/OFF), reset totalizer, zero point adjustment control
- Link Master function (LAS) is supported

Note!

The following values of the communication interfaces only apply to **Prosonic Flow C Inline!**

PROFIBUS PA interface for Prosonic Flow C:

- PROFIBUS PA in accordance with EN 50170 Volume 2, IEC 61158-2 (MBP), galvanically isolated
- Data transmission rate, supported baudrate: 31.25 kBit/s
- Current consumption: 11 mA
- Error current FDE (Fault Disconnection Electronic): 0 mA
- Signal encoding: Manchester II
- Function blocks: 8 x Analog Input (AI), 3 x Totalizer
- Output data: average volume flow, average sound velocity, average flow velocity
- Input data: positive zero return (ON/OFF), operation control, totalizer control, zero point adjustment control, display value
- Bus address can be set via DIP switch on device

FOUNDATION Fieldbus interface for Prosonic Flow C:

- FOUNDATION Fieldbus H1, IEC 61158-2, galvanically isolated
- Data transmission rate, supported baudrate: 31.25 kBit/s
- Current consumption: 12 mA
- Error current FDE (Fault Disconnection Electronic): 0 mA
- Signal encoding: Manchester II
- Function blocks: 8 x Analog Input (AI), 1 x Discrete Output, 1 x PID
- Output data: average volume flow, average sound velocity, average flow velocity, totalizer 1 to 3
- Input data: positive zero return (ON/OFF), reset totalizer, zero point adjustment control
- Link Master function (LAS) is supported

Signal on alarm	<ul style="list-style-type: none"> ■ Current output → failsafe mode selectable ■ Pulse/frequency output → failsafe mode selectable ■ Status output (Prosonic Flow 90/91) → "nonconductive" in event of error or power supply failure ■ Relay output (Prosonic Flow 93) → "voltage-free" in event of error or power supply failure
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Load	See "output signal"
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Switching output	<p>Status output (Prosonic Flow 90/91): Open collector, max. 30 V DC / 250 mA, galvanically isolated. Configurable for: error messages, flow direction, limit values.</p> <p>Relay output (Prosonic Flow 93): Normally closed (NC) or normally open (NO) contacts available (factory setting: relay 1 = NO contact, relay 2 = NC contact), max. 30 V / 0.5 A AC; 60 V / 0.1 A DC, galvanically isolated. Configurable for: error messages, flow direction, limit values.</p>
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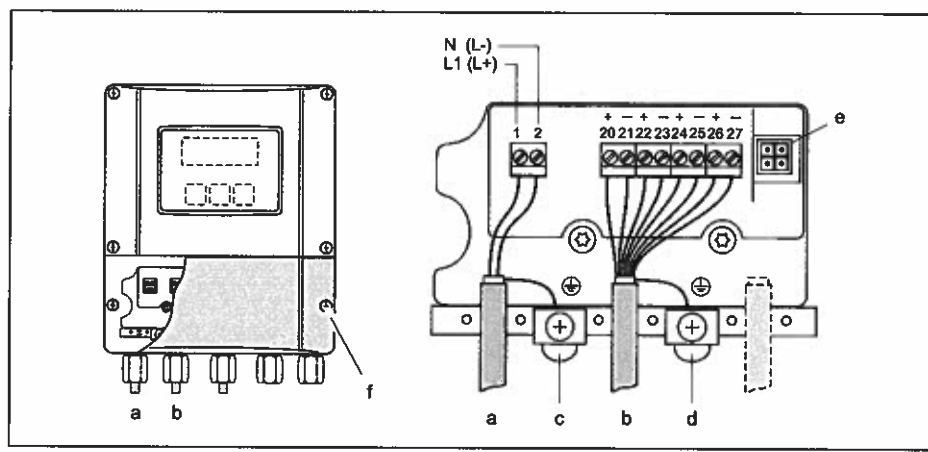
Low flow cut off	Switching point for the creepage freely selectable
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Galvanic isolation	All circuits for inputs, outputs and power supply are galvanically isolated from each other.
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Power supply

**Electrical connection
measuring unit for
Prosonic Flow 90/93
(standard version)**

Connecting power supply and signal cables in the connection compartment



Connecting the transmitter (wall-mount housing). Cable cross-section: max. 2.5 mm²

- a Cable for power supply: 85 to 260 V AC, 20 to 55 V AC, 16 to 62 V DC; power consumption: 18 VA / 10 W
Terminal No. 1: L1 for AC, L+ for DC
Terminal No. 2: N for AC, L- for DC
- b Terminals No. 20-27: signal cable
- c Ground terminal for protective earth
- d Ground terminal for signal cable shield
- e Service connector
- f Bolts on connection compartment housing

Terminal assignment Prosonic Flow 90

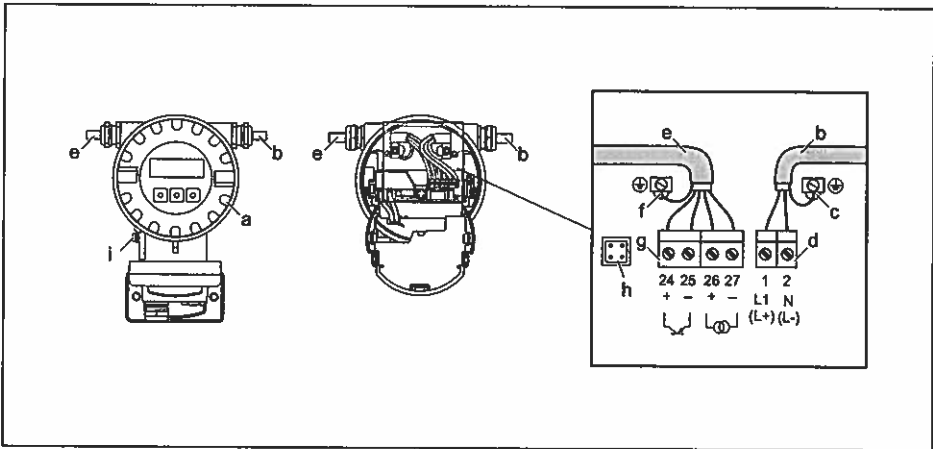
Order version	Terminal No. (inputs/outputs)			
	20 (+) / 21 (-)	22 (+) / 23 (-)	24 (+) / 25 (-)	26 (+) / 27 (-)
90***_*****W	–	–	–	HART current output
90***_*****A	–	–	Frequency output	HART current output
90***_*****D	Status input	Status input	Frequency output	HART current output
90***_*****H	–	–	–	PROFIBUS PA

Terminal assignment Prosonic Flow 93

Depending on the version ordered, the inputs/outputs on the communication board can be either permanently assigned (fixed) or variable (flexible) (see Table). Plug-in point modules which are faulty or need to be replaced can be ordered as accessories.

Order version	Terminal No. (inputs/outputs)			
	20 (+) / 21 (-)	22 (+) / 23 (-)	24 (+) / 25 (-)	26 (+) / 27 (-)
Fixed communication boards (fixed assignment)				
93***_*****A	–	–	Frequency output	HART current output
93***_*****B	Relay output	Relay output	Frequency output	HART current output
93***_*****H	–	–	–	PROFIBUS PA
93***_*****K	–	–	–	FOUNDATION Fieldbus
Flexible communication boards				
93***_*****C	Relay output	Relay output	Frequency output	HART current output
93***_*****4	Frequency output	Frequency output	Current output	HART current output
93***_*****D	Status input	Relay output	Frequency output	HART current output
93***_*****6	Relay output	Relay output	Current output	HART current output
93***_*****L	Status input	Relay output	Relay output	HART current output
93***_*****M	Status input	Frequency output	Frequency output	HART current output
93***_*****W	Relay output	Current output	Current output	HART current output
93***_*****2	Relay output	Current output	Frequency output	HART current output

Electrical connection
measuring unit
Prosonic Flow 91
(standard version)



Connecting the transmitter (aluminum field housing), max. cable cross-section 2.5 mm²

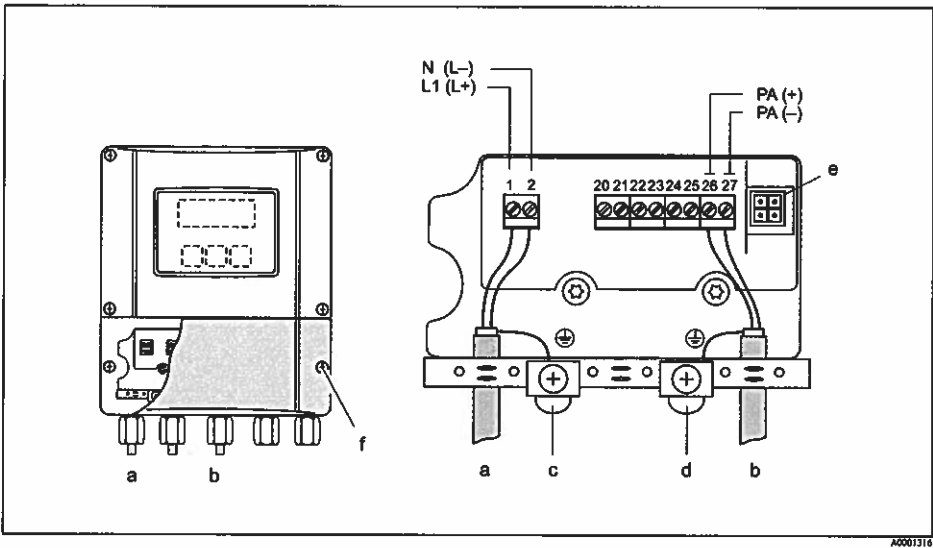
- a Electronics compartment cover
- b Cable for power supply: 85 to 250 V AC, 11 to 40 V DC, 20 to 28 V AC
- c Ground terminal for power supply cable
- d Terminal connector for power supply: No. 1-2 (terminal assignment)
- e Signal cable
- f Ground terminal for signal cable
- g Terminal connector for signal cable: No. 24-27 (terminal assignment)
- h Service connector
- i Ground terminal for potential matching

Terminal assignment Prosonic Flow 91

Order version	Terminal No. (Inputs/outputs)		
	24 (+) / 25 (-)	26 (+) / 27 (-)	1 (L1/L+) / 2 (N/L-)
91***-*****A	Pulse output	HART current output	Power supply
Functional values	See "output signal"		see "Supply voltage"

Electrical connection
measuring unit for
Prosonic Flow 90
(PROFIBUS PA)

Connecting power supply and bus cables in the connection compartment



Connecting the transmitter (wall-mount housing), max. cable cross-section 2.5 mm²

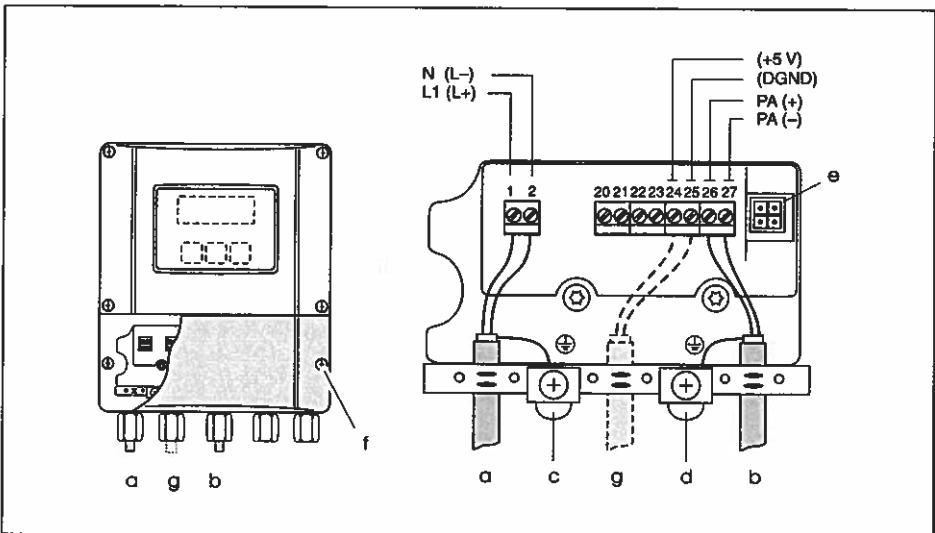
- a Cable for power supply: 85 to 260 V AC, 20 to 55 V AC, 16 to 62 V DC
Terminal No. 1: L1 for AC, L+ for DC
Terminal No. 2: N for AC, L- for DC
- b PROFIBUS PA line:
Terminal No. 26: PA+
Terminal No. 27: PA-
- c Ground terminal for protective earth
- d Ground terminal for signal cable shield
- e Service connector for connecting service interface FXA193 (Fieldcheck, ToF Tool - Fieldtool Package)
- f Connection compartment cover

Terminal assignment Prosonic Flow 90 PROFIBUS PA

Order version	Terminal No. (inputs/outputs)
	26: PA+ 27: PA-
90***_*****H	PROFIBUS PA (non Ex)
Connection values PROFIBUS PA	
PROFIBUS PA: Power supply: 9 to 32 V DC Current consumption: 11 mA	

**Electrical connection
measuring unit for
Prosonic Flow 93
(PROFIBUS PA)**

Connecting power supply and bus cables in the connection compartment



Connecting the transmitter (wall-mount housing), max. cable cross-section 2.5 mm²

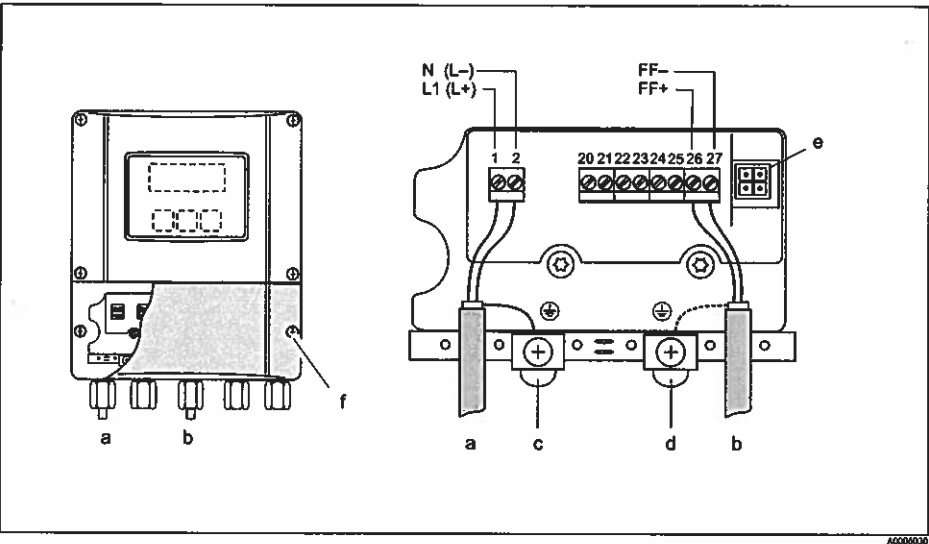
- a Cable for power supply: 85 to 260 V AC, 20 to 55 V AC, 16 to 62 V DC
Terminal No. 1: L1 for AC, L+ for DC
Terminal No. 2: N for AC, L- for DC
- b PROFIBUS PA line:
Terminal No. 26: PA+
Terminal No. 27: PA -
- c Ground terminal for protective earth
- d Ground terminal for signal cable shield
- e Service connector for connecting service interface FXA193 (Fieldcheck, ToF Tool - Fieldtool Package)
- f Connection compartment cover
- g Cable for external termination:
Terminal No. 24: DGND
Terminal No. 25: +5V

Terminal assignment Prosonic Flow 93 PROFIBUS/PA

Order version	Terminal No. (Inputs/outputs)
	26: PA+ 27: PA-
93***-*****H	PROFIBUS PA
Connection values PROFIBUS PA	
PROFIBUS PA: Power supply: 9 to 32 V DC Current consumption: 11 mA	

Electrical connection
measuring unit for
Prosonic Flow 93
(FOUNDATION Fieldbus)

Connecting power supply and bus cables in the connection compartment



Connecting the transmitter (wall-mount housing), max. cable cross-section 2.5 mm²

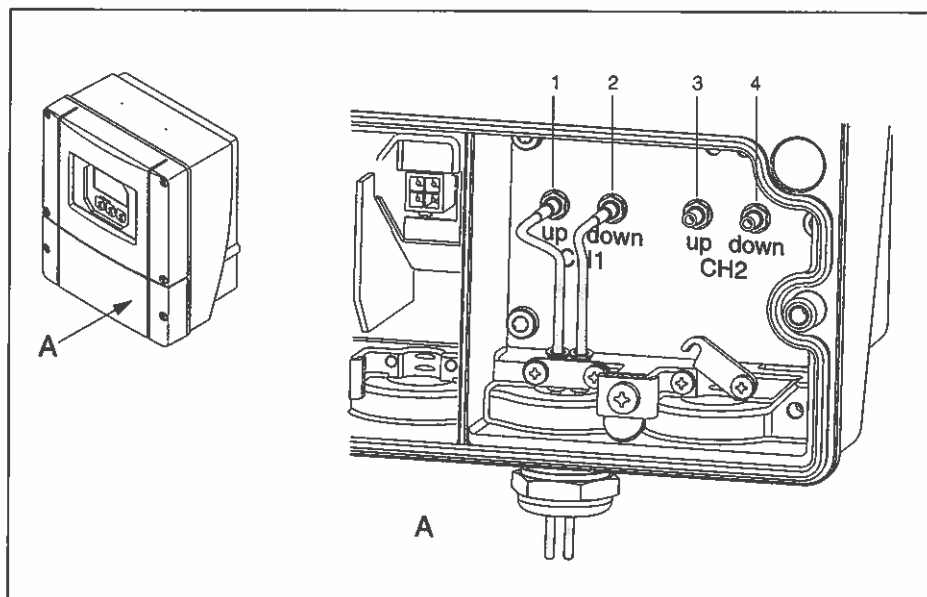
- a Cable for power supply: 85 to 260 V AC, 20 to 55 V AC, 16 to 62 V DC
Terminal No. 1: L1 for AC, L+ for DC
Terminal No. 2: N for AC, L- for DC
- b Fieldbus cable:
Terminal No. 26: FF+ (with integrated reverse polarity protection)
Terminal No. 27: FF- (with integrated reverse polarity protection)
- c Ground terminal for protective earth
- d Ground terminal for fieldbus cable shield
- e Service connector for connecting service interface FXA193 (Fieldcheck, ToF Tool - Fieldtool Package)
- f Connection compartment cover

Terminal assignment Prosonic Flow 93 FOUNDATION Fieldbus

Order version	Terminal No. (inputs/outputs)
	26: FF+ 27: FF-
93***_*****K	FOUNDATION Fieldbus
Connection values FOUNDATION Fieldbus	
FOUNDATION Fieldbus: Power supply: 9 to 32 V DC Current consumption: 12 mA	

**Electrical connection
sensor connecting cable
Prosonic Flow 90/93**

Connecting power sensor cables in the connection compartment

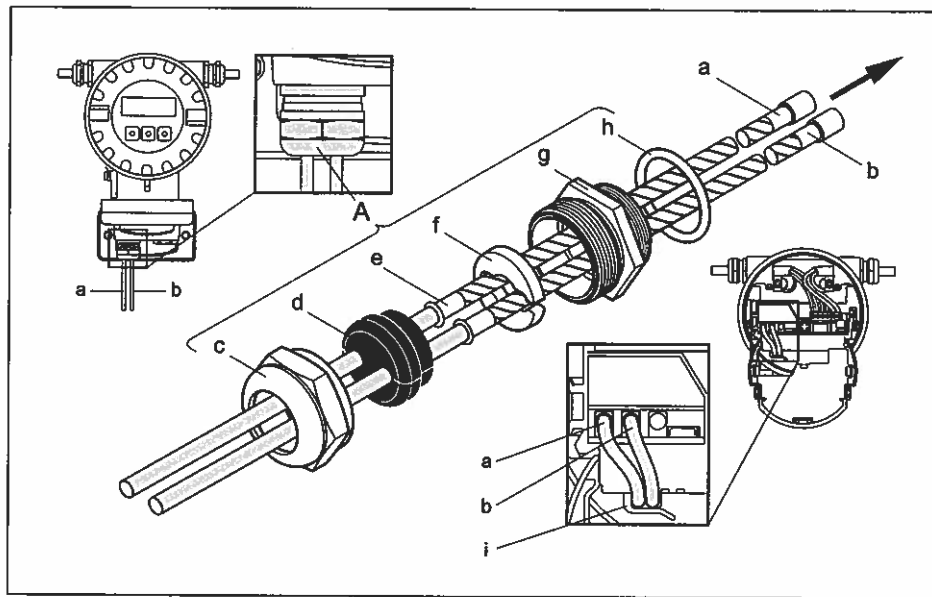


A = View A (wall-mount housing; non-hazardous areas, Ex Zone 2)

- 1 Channel 1 upstream
- 2 Channel 1 downstream
- 3 Channel 2 upstream
- 4 Channel 2 downstream

**Electrical connection
sensor connecting cable
Prosonic Flow 91**

Connecting power sensor cables in the connection compartment



Connecting the measuring system

- a, b Sensor connecting cables
- c Cover of cable gland
- d Rubber seal
- e Cable retaining sleeves
- f Ground disk
- g Cable gland holder
- h Seal
- i Cable holder

Supply voltage (power supply)

Transmitter:

- 85 to 260 V AC, 45 to 65 Hz
- 20 to 55 V AC, 45 to 65 Hz
- 16 to 62 V DC

Measuring sensors:

- Powered by the transmitter

Cable entry

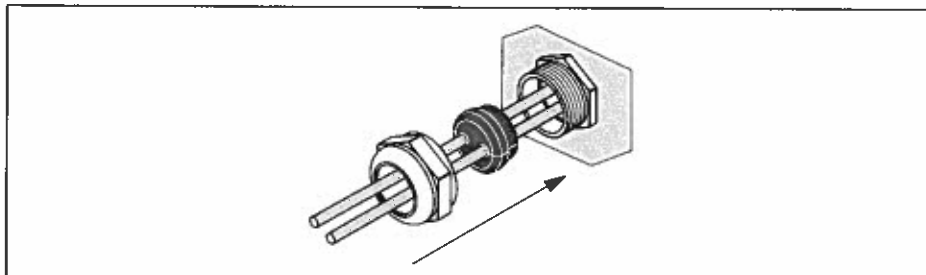
Power supply and signal cables (inputs/outputs):

- Cable entry M20 x 1.5 (8 to 12 mm / 0.31" to 0.47")
- or
- Cable gland for cables with \varnothing 6 to 12 mm (0.24" to 0.47")
- Threaded adapter 1/2" NPT, G 1/2"

Sensor connecting cable:

A special cable gland allows you to insert both sensor cables (per channel) into the connection compartment simultaneously.

- Cable gland M20 x 1.5 for 2 x \varnothing 4 mm (0.08" x \varnothing 0.16")
- or
- Threaded adapter 1/2" NPT, G 1/2"



Special cable gland of sensor connecting cables on transmitter side

90-93xxxx-17-11-40-xx-000

Cable specifications

Sensor cable:

- Use the ready-to-use cables supplied by Endress+Hauser with each sensor pair.
- The following cable lengths are available:
5 m, 10 m, 15 m, 30 m, 60 m and 100 m
16 ft, 33 ft, 49 ft, 98 ft, 197 ft and 328 ft
- You can choose between PTFE and PVC cable material.

Operation in zones of severe electrical interference:

The measuring system meets the general safety requirements as per EN 61010 and the EMC requirements as per EN 61326/A1 (IEC 1326) "Emission as per requirements for class A" as well as NAMUR recommendation NE 21.

Signal and power cable:

Caution!

Grounding is by means of the ground terminals provided for this purpose inside the connection housing. Keep the stripped and twisted lengths of cable shield to the terminals as short as possible.

Power consumption

Prosonic Flow 90/93

AC: <18 VA (incl. sensor)
DC: <10 W (incl. sensor)

Prosonic Flow 91

85 to 250 V AC: <12 VA (incl. sensor)
20 to 28 V AC: <7 VA (incl. sensor)
11 to 40 V DC: <5 W (incl. sensor)

Power supply failure

Bridging of min. 1 cycle frequency: EEPROM (Prosonic Flow 90) or HistoROM/T-DAT (Prosonic Flow 91 and 93) save measuring system data if power supply fails

Potential equalization

For potential equalization, no special measures are necessary.

Note!

For instruments for use in hazardous areas, observe the corresponding guidelines in the specific Ex documentation.

Performance characteristics

Reference operating conditions

- Medium temperature range: $+28\text{ }^{\circ}\text{C} \pm 2\text{ K}$
- Ambient temperature range: $+22\text{ }^{\circ}\text{C} \pm 2\text{ K}$
- Warm-up period: 30 minutes

Installation:

- Inlet run $> 10 \times \text{DN}$
- Outlet run $> 5 \times \text{DN}$
- Measuring sensors and transmitter are grounded.
- The measuring sensors are properly mounted.

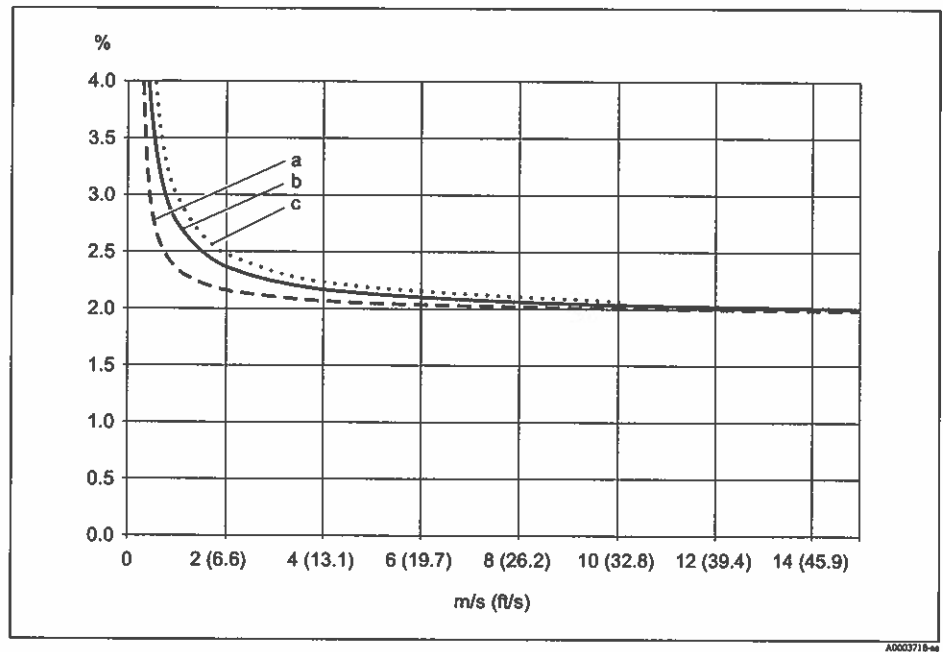
Maximum measured error

For flow velocities of $> 0.3\text{ m/s}$ ($> 0.98\text{ ft/s}$) and a Reynolds number of > 10000 , the system accuracy is:

Version	Guaranteed error limits		Report
Prosonic Flow W and U: – Clamp-on – Insertion	$< \text{DN } 50$ ($< 2''$) ⁽⁵⁾ $\text{DN } 50$ to 200 ($2''$ to $8''$) $> \text{DN } 200$ ($> 8''$)	$\pm 2.0\%$ o.r. plus $\pm 0.1\%$ o.f.s. ⁽⁴⁾ $\pm 2.0\%$ o.r. plus $\pm 0.05\%$ o.f.s. ⁽³⁾ $\pm 2.0\%$ o.r. plus $\pm 0.02\%$ o.f.s. ⁽³⁾ See note ⁽¹⁾	A report is not issued. The value given are typical values.
Prosonic Flow W and U: – Clamp-on	U W	$\pm 0.5\%$ o.r. plus $\pm 0.1\%$ o.f.s. ⁽⁴⁾ $\pm 0.5\%$ o.r. plus $\pm 0.05\%$ o.f.s. ⁽³⁾	Verification of accuracy ⁽²⁾
Prosonic Flow W: – Insertion		$\pm 0.5\%$ o.r. plus $\pm 0.02\%$ o.f.s. ⁽³⁾	Verification of accuracy ⁽²⁾
Prosonic Flow C Inline		$\pm 1.5\%$ o.r. plus $\pm 0.02\%$ o.f.s. ⁽⁴⁾	Calibration confirmation
Prosonic Flow C Inline		$\pm 0.5\%$ o.r. plus $\pm 0.02\%$ o.f.s. ⁽⁴⁾	Calibration report
o.r. = of reading o.f.s. = of full scale value			

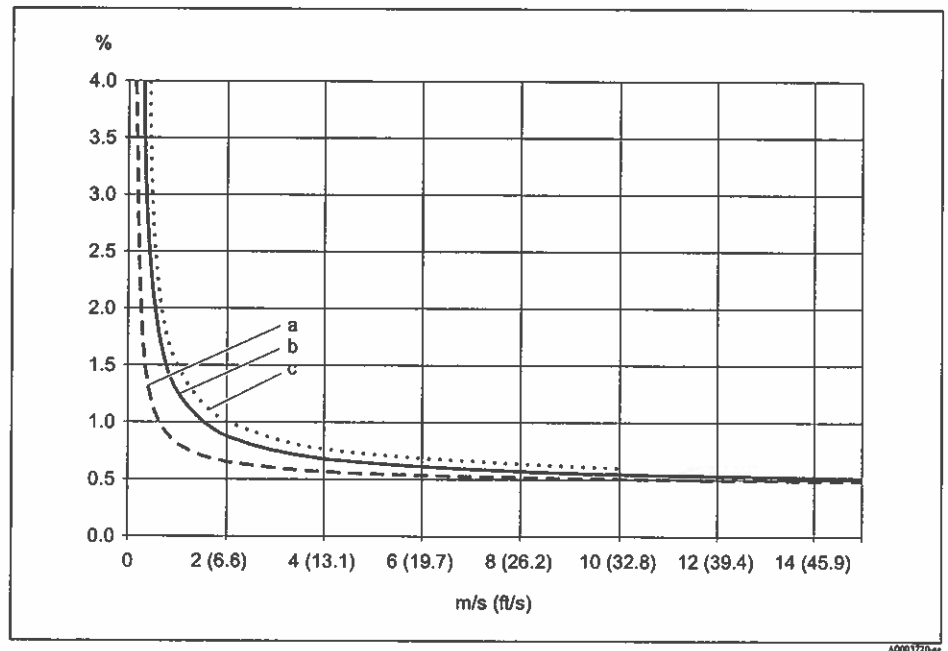
- ⁽¹⁾ The basic accuracy of the measuring system is 0.5%.
The dry calibration represents additional uncertainty due to mounting and actual pipe properties.
This additional uncertainty is better than 1.5% typically.
- ⁽²⁾ Accuracy verification is carried out on a DN 50 or DN 100 (2" or 4") pipe for the clamp-on version, on a DN 250 (10") pipe for the Insertion version (single-path version) and on a DN 400 (16") pipe for the Insertion version (dual-path version). The verification applies under reference operating conditions.
- ⁽³⁾ Maximum full scale value: 15 m/s (49.2 ft/s)
- ⁽⁴⁾ Maximum full scale value: 10 m/s (32.8 ft/s)
- ⁽⁵⁾ Only when used on plastic pipes

Max. measured error for dry calibration in % of reading



- a Pipe diameter > DN 200 (> 8")
- b Pipe diameter > DN 50 < DN 200 (> 2" < 8")
- c Pipe diameter < DN 50 (< 2")

Max. measured error for wet calibration and verification of accuracy in % of reading



- a Pipe diameter > DN 200 (> 8")
- b Pipe diameter > DN 50 < DN 200 (> 2" < 8")
- c Pipe diameter < DN 50 (< 2")

Repeatability $\pm 0.3\%$ for flow velocities > 0.3 m/s (0.98 ft/s)

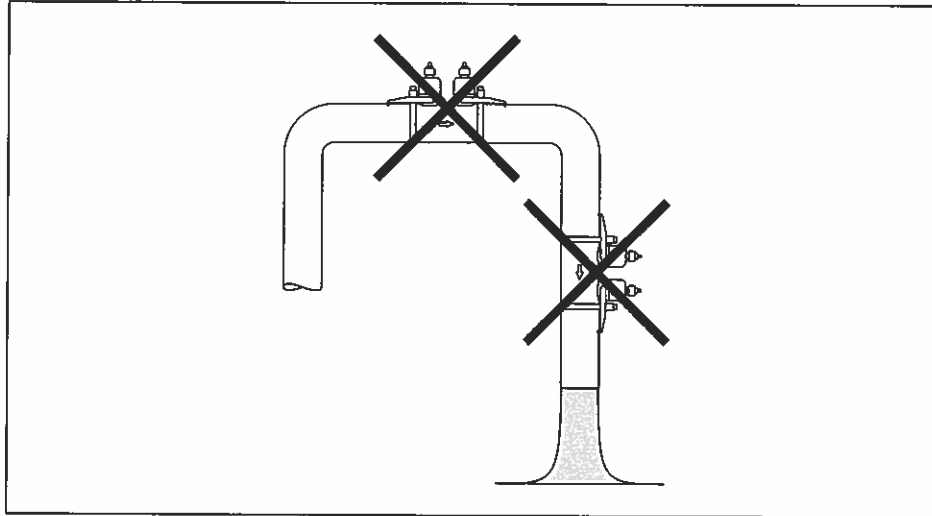
Operating conditions: Installation

Installation instructions

Mounting location

Correct measuring is possible only if the pipe is full. **Avoid** the following mounting locations:

- Highest point of a pipeline. Risk of air accumulating!
- Directly upstream from a free pipe outlet in a down pipe.

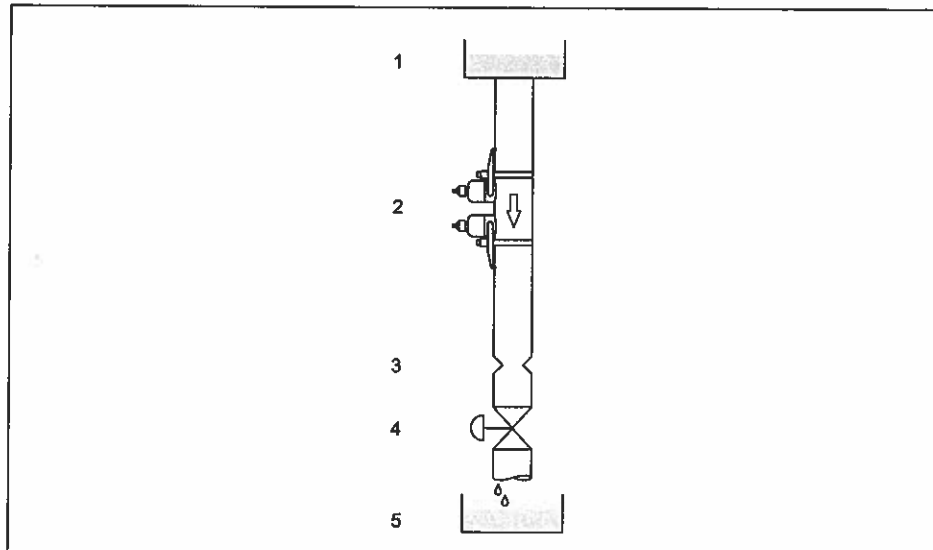


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(Applies to all sensor versions)

Down pipes

Notwithstanding the above, the installation proposal below permits installation in an open down pipe. Pipe constrictions or the use of an orifice plate with a smaller cross-section than the nominal diameter prevent the pipe from running empty while measurement is in progress.



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Installation in a down pipe (applies to all sensor versions)

- 1 Storage tank
- 2 Measuring sensors
- 3 Orifice plate, pipe constriction
- 4 Valve
- 5 Filling tank

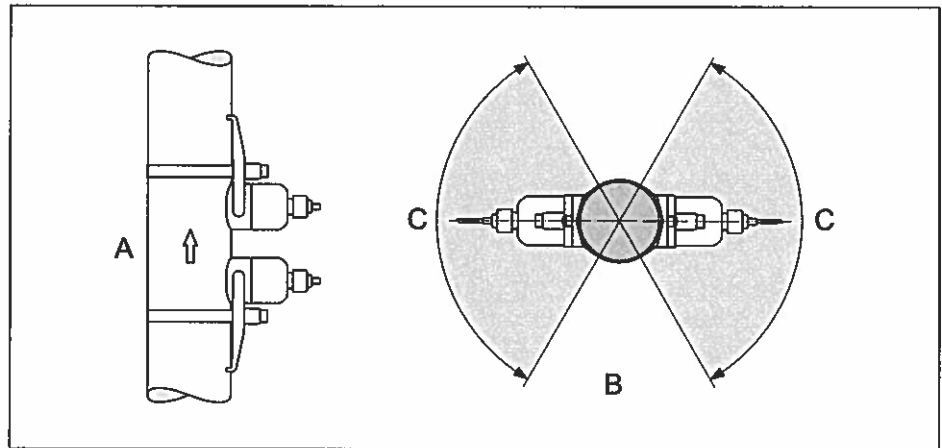
Orientation

Vertical

Recommended orientation with upward direction of flow (View A). Entrained solids sink down. Gases rise away from the measuring sensor when fluid is not flowing. The piping can be completely drained and protected against build-up.

Horizontal

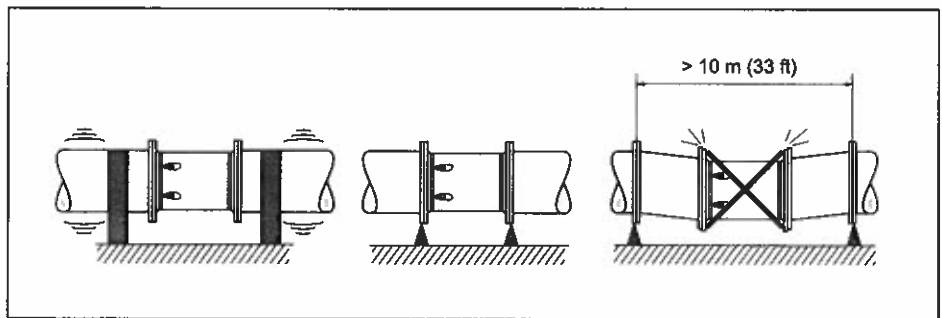
In the recommended installation range in a horizontal installation position (View B), gas and air accumulation at the pipe cover and problematic build-ups at the bottom of the pipe have a minor influence on the measurement.



C = Recommended installation range max. 120° (applies to all sensor versions)

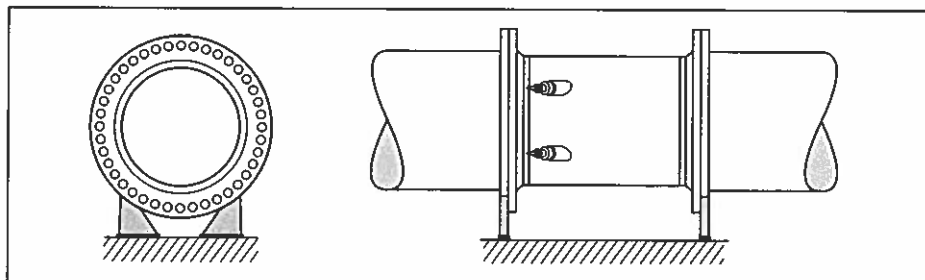
Vibrations

Secure the piping and the Prosonic Flow C Inline sensor if vibration is severe. Information on resistance to vibration and shock can be found on Page 31



Foundations, supports

For all nominal diameters, mount the sensor on a foundation of adequate load-bearing strength. The foundation/supports must work on the pipe flanges and not on the measuring pipe flanges of Prosonic Flow C.

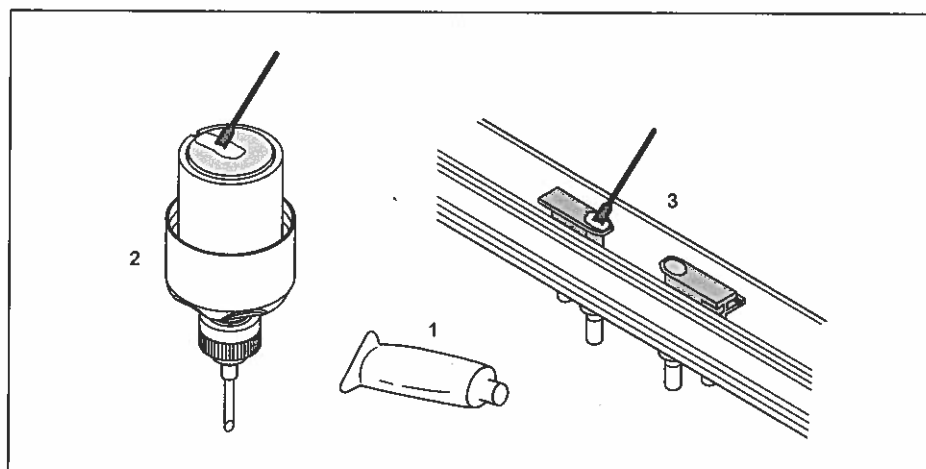


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Coupling fluid

A coupling fluid is required to ensure the acoustic link between the sensor (clamp-on version) and the piping. This is applied to the sensor surface during commissioning. Periodic replacement of the coupling fluid is usually not required.

As part of the "Advanced diagnostics" software package, Prosonic Flow 93 offers a coupling fluid monitoring function in which the signal strength can be output as a limit value.

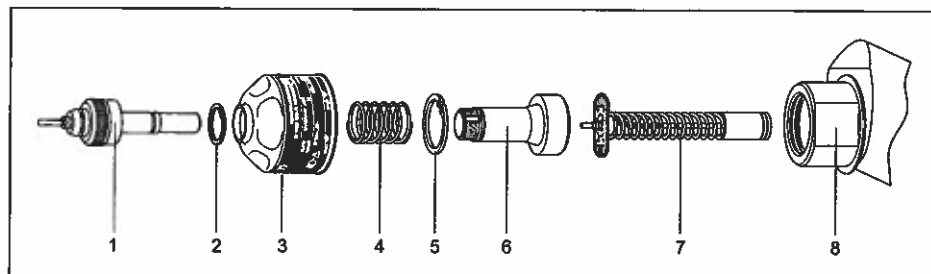


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- 1 Coupling fluid
- 2 Sensor surface Prosonic Flow W (clamp-on)
- 3 Sensor surface Prosonic Flow U

Sensor replacement, Prosonic Flow W Insertion

The active part of the sensor can be replaced without interrupting the process.

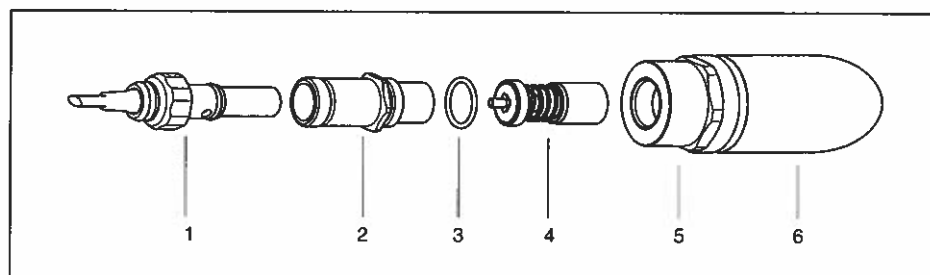


- 1 Sensor connector
- 2 Small circlip
- 3 Sensor cover
- 4 Spring
- 5 Large circlip
- 6 Sensor neck
- 7 Sensor element
- 8 Sensor holder

Sensor replacement, Prosonic Flow C Inline

The active part of the sensor can be replaced without interrupting the process.

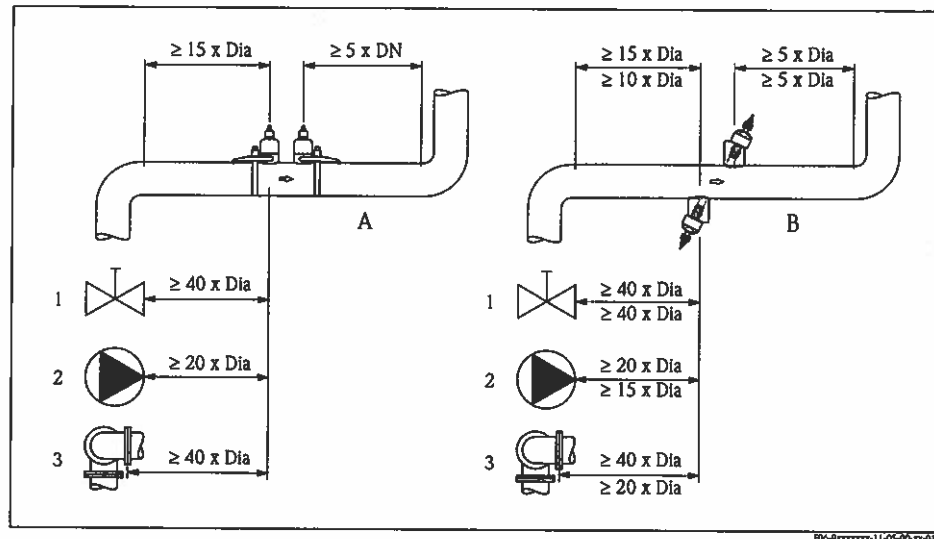
Prosonic Flow C Inline has 2 pairs of Prosonic Flow W Insertion sensors.



- 1 Sensor connector
- 2 Sensor neck
- 3 O-ring
- 4 Sensor element
- 5 Sensor holder
- 6 Sensor support in measuring pipe Prosonic Flow C

Inlet and outlet run

If possible, install the sensor well clear of fittings such as valves, T-pieces, elbows, etc. Compliance with the following requirements for the inlet and outlet runs is recommended to ensure measuring accuracy:



The figure above illustrates the minimum recommended inlet and outlet runs.

- A Prosonic Flow W and U (clamp-on versions)
 B Prosonic Flow W (insertion version) and Prosonic Flow C Inline
 (dimensions above the dimensioning line = single-path version;
 dimensions under the dimensioning line = dual-path version and Prosonic Flow C)
 1 Valve
 2 Pump
 3 Two pipe bends in different directions

Length of connecting cable

Shielded cables are offered in the following lengths:
 5 m, 10 m, 15 m, 30 m, 60 m and 100 m (applies to all sensor versions)
 16 ft, 33 ft, 49 ft, 98 ft, 197 ft and 328 ft

Comply with the following instructions when mounting in order to achieve correct measuring results:
 Route the cable well clear of electrical machines and switching elements.

Operating conditions: Environment

Ambient temperature range	<ul style="list-style-type: none"> ■ Transmitter Prosonic Flow 90/91/93: –20 to +60 °C (–4 to +140 °F) ■ Flowrate measuring sensors Prosonic Flow W (clamp-on): –20 to +80 °C (–4 to +176 °F) ■ Flowrate measuring sensors Prosonic Flow U (clamp-on): –20 to +60 °C (–4 to +140 °F) ■ Flowrate measuring sensors Prosonic Flow W (Insertion): –40 to +80 °C (–40 to +176 °F) ■ Prosonic Flow C Inline: Measuring pipe: –10 to +60 °C (+14 to +140 °F) Flowrate measuring sensors Prosonic Flow W (Inline): –40 to +80 °C (–40 to +176 °F) ■ Sound velocity measuring sensors DDU 18: –40 to +80 °C (–40 to +176 °F) ■ Wall thickness measuring sensor DDU 19: 0 to +60 °C (+32 to +140 °F) ■ Sensor cable PTFE –40 to +170 °C (–40 to +338 °F); sensor cable PVC –20 to +70 °C (–4 to +158 °F) ■ In heated piping or piping conveying cold fluids, it is always permissible to insulate the piping completely with the mounted ultrasonic sensors. ■ Install the transmitter at a shady location. Avoid direct sunlight, particularly in warm climatic regions.
Storage temperature	The storage temperature corresponds to the ambient temperature range of the measuring transmitter and the relevant measuring sensors and the corresponding sensor cables (see above).
Degree of protection	<ul style="list-style-type: none"> ■ Transmitter Prosonic Flow 90/91/93: IP 67 (NEMA 4X) ■ Flowrate measuring sensors Prosonic Flow W (clamp-on): IP 67 (NEMA 4X), optional IP 68 (NEMA 6P) ■ Flowrate measuring sensors Prosonic Flow U (clamp-on): IP 54 ■ Flowrate measuring sensors Prosonic Flow W (Insertion): IP 68 (NEMA 6P) ■ Flowrate measuring sensors Prosonic Flow W (Inline): IP 68 (NEMA 6P) ■ Sound velocity measuring sensors DDU 18: IP 68 (NEMA 6P) ■ Wall thickness measuring sensor DDU 19: IP 67 (NEMA 4X)
Shock and vibration resistance	In accordance with IEC 68-2-6
Electromagnetic compatibility (EMC)	Electromagnetic compatibility (EMC requirements) according to EN 61326/A1 (IEC 1326) "Emission to class A requirements" and NAMUR Recommendation NE 21/43

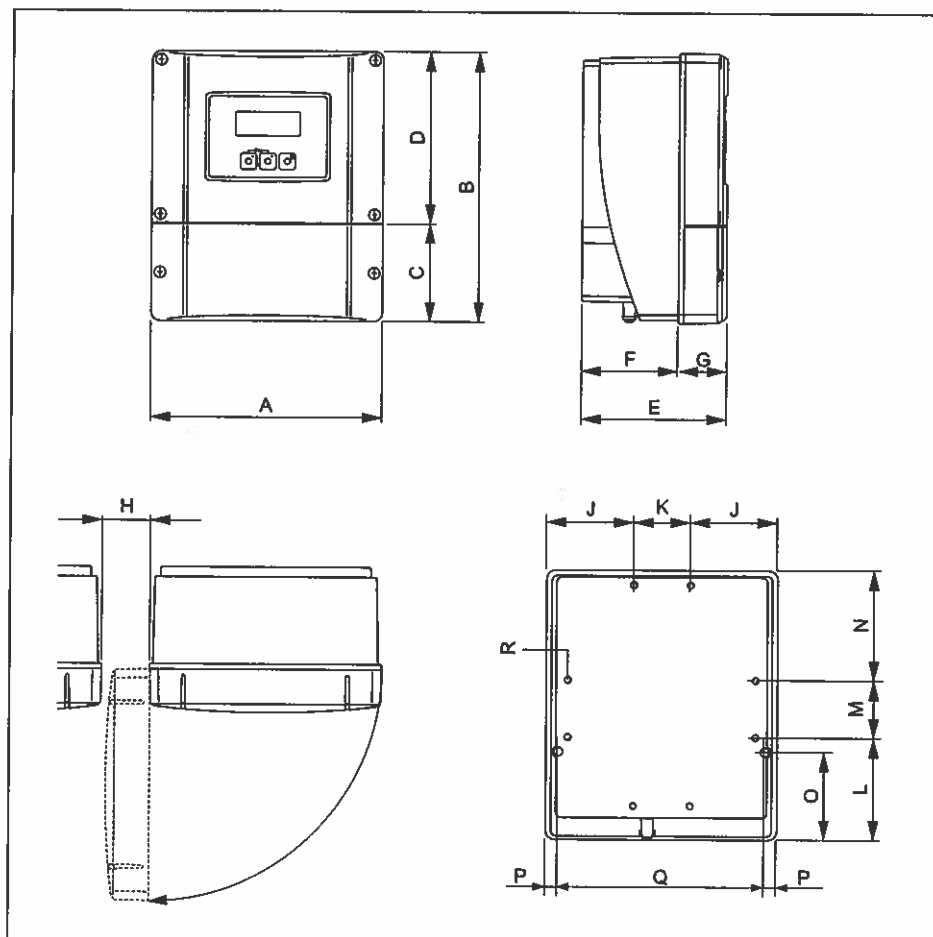
Operating conditions: Process

Medium temperature range	<ul style="list-style-type: none"> ■ Flowrate measuring sensors Prosonic Flow W (clamp-on): -20 to +80°C / -4 to +176°F (optional 0 to +130°C / +32 to +266°F) ■ Flowrate measuring sensors Prosonic Flow U (clamp-on): -20 to +80°C (-4 to +176°F) ■ Flowrate measuring sensors Prosonic Flow W (Insertion): -40 to +80°C (-40 to +176°F) ■ Prosonic Flow C Inline: Measuring pipe: -10 to +60°C (+14 to +140°F) (epoxy coated) Flowrate measuring sensors Prosonic Flow W (Inline): -40 to +80°C (-40 to +176°F) ■ Sound velocity measuring sensors DDU 18: -40 to +80°C (-40 to +176°F) ■ Wall thickness measuring sensor DDU 19: 0 to +60°C (+32 to +140°F)
Medium pressure range (nominal pressure)	<ul style="list-style-type: none"> ■ Perfect measurement requires that the static fluid pressure is higher than vapor pressure. ■ Max. nominal pressure Prosonic Flow W (insertion): PN 16 (232 psi).
Pressure loss	There is no pressure loss.

Mechanical construction

Design, dimensions

Dimensions of wall-mount housing, Prosonic Flow 90/93



A0001150

Metric units [mm]

A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R
215	250	90.5	159.5	135	90	45	>50	81	53	95	53	102	81.5	11.5	192	8xM5

US units [inch]

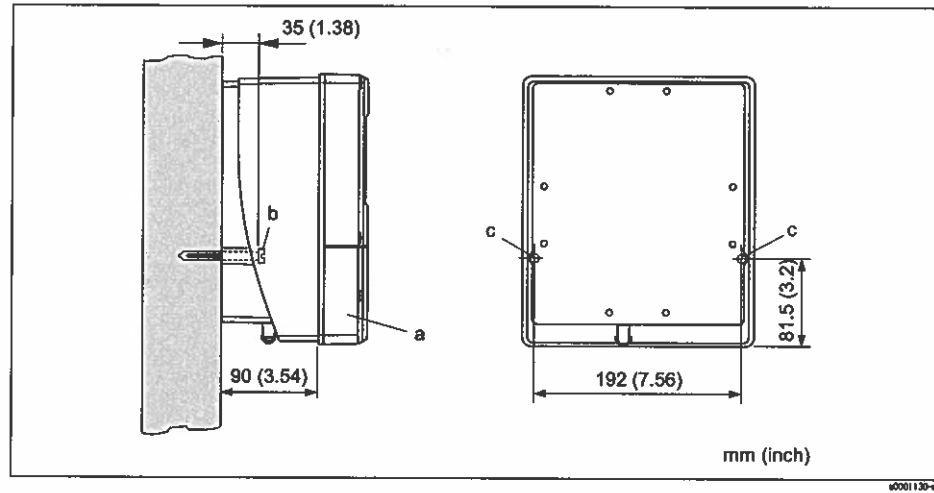
A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R
8.46	9.84	3.56	6.28	5.32	3.54	1.77	>1.97	3.19	2.09	3.74	2.09	4.02	3.21	0.45	7.56	8xM5

Installing the wall-mount housing

Caution!

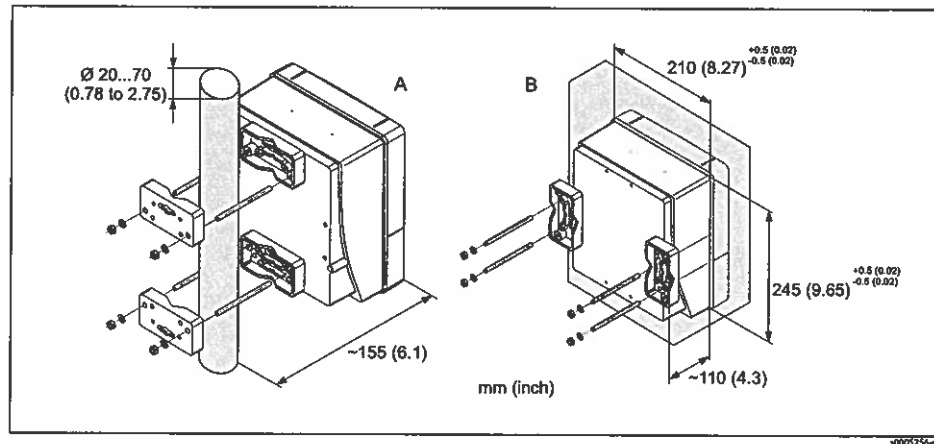
- Ensure that the ambient temperature does not exceed or undershoot the permitted range of -20°C to $+60^{\circ}\text{C}$ (-4 to $+140^{\circ}\text{F}$) or optionally -40°C to $+60^{\circ}\text{C}$ (-40 to $+140^{\circ}\text{F}$). Install the device at a shady location. Avoid direct sunlight.
- Always install the wall-mount housing in such a way that the cable entries point downwards.

Mounted directly on the wall



- a Wall-mount housing
- b Retaining bolts (M6): max. \varnothing 6.5 mm 0.25 inch; bolt head: max. \varnothing 10.5 mm (0.41 inch)
- c Assembly holes in the housing

Pipe mounting and panel mounting

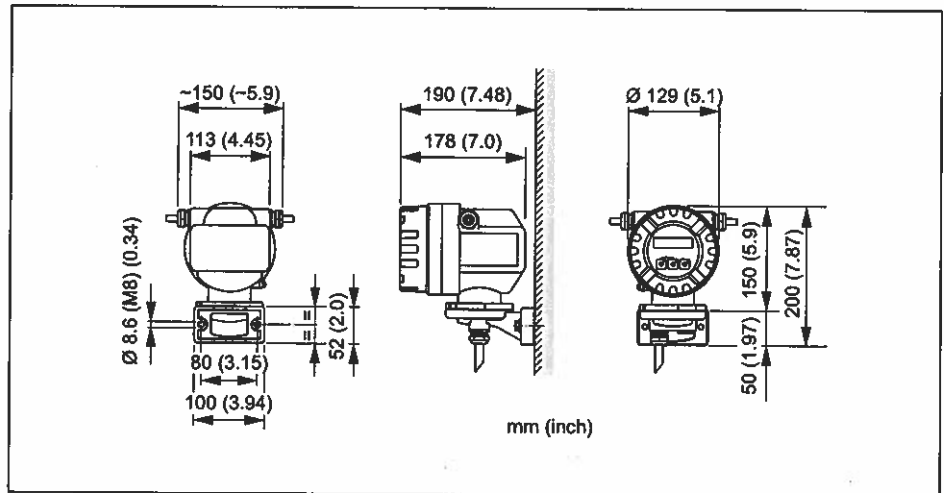


- A Pipe mounting the wall-mount housing
- B Installation of the wall-mount housing in a control panel

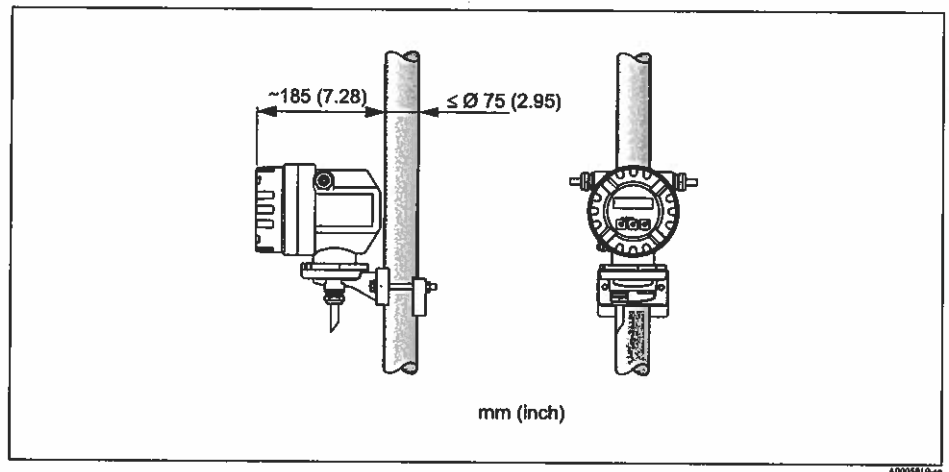
Caution!

If a pipe which is heated under normal conditions is used for installation you must ensure that the housing temperature does not exceed the max. permitted value of $+60^{\circ}\text{C}$ ($+140^{\circ}\text{F}$).

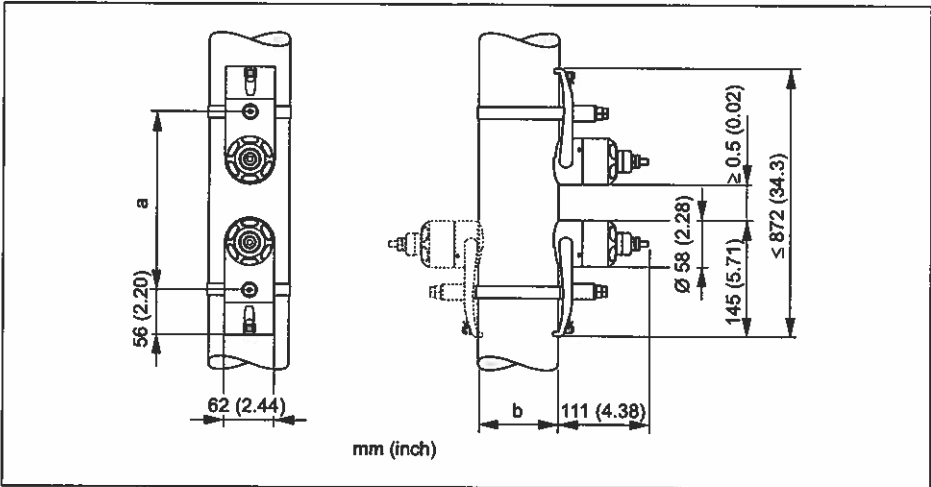
Dimensions of field housing, Prosonic Flow 91



Dimensions of pipe mounting, Prosonic Flow 91

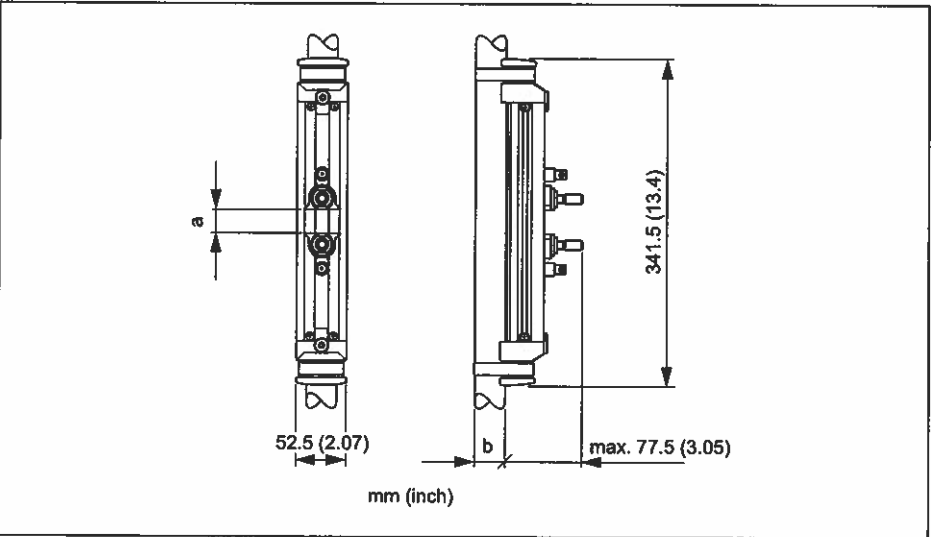


Prosonic Flow W (clamp-on version)



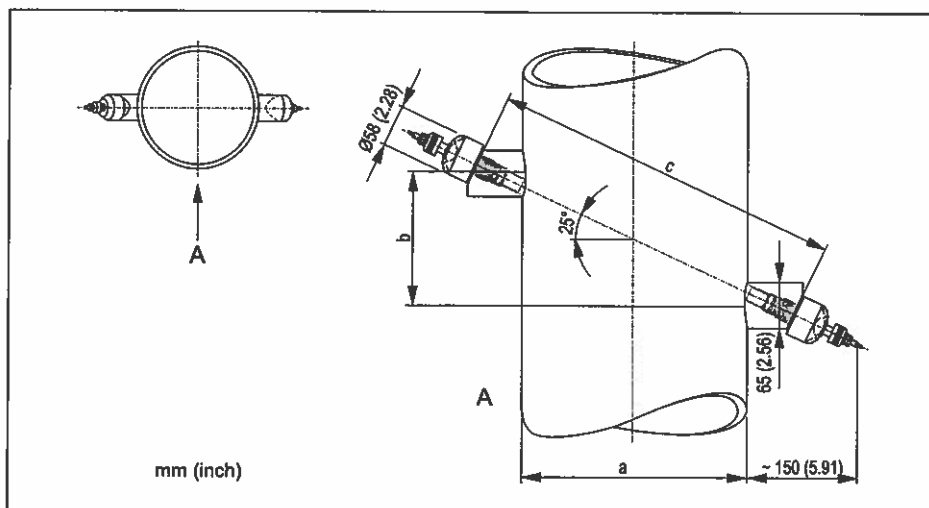
- a Sensor spacing can be determined using Quick Setup
b Pipe outer diameter (defined by the application)

Prosonic Flow U (clamp-on version for small nominal diameters)



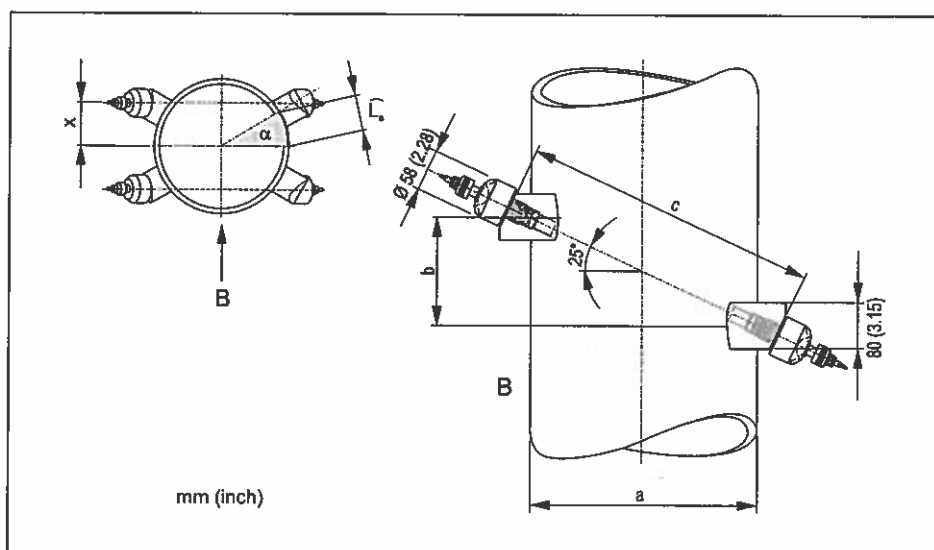
- a Sensor spacing can be determined using Quick Setup
b Pipe outer diameter (defined by the application)

Prosonic Flow W (Insertion version)
Single-path version



- A View A
a Pipe outer diameter (defined by the application)
b Sensor spacing can be determined using Quick Setup
c Path length can be determined using Quick Setup

Dual-path version



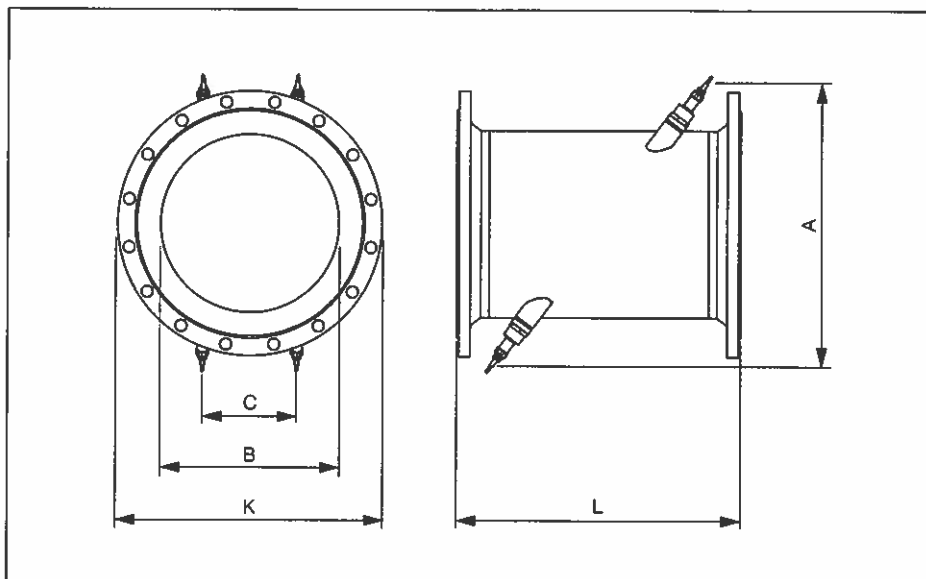
- B View B
a Pipe outer diameter (defined by the application)
b Sensor spacing can be determined using Quick Setup
c Path length can be determined using Quick Setup

$$\text{Arc length: } \widehat{L}_a = \frac{\pi \cdot d \cdot \alpha}{360^\circ}$$

$$\text{Offset: } x = \frac{d \cdot \sin \alpha}{2}$$

Prosonic Flow C Inline

Calibrated measuring pipe with flowrate measuring sensors W



P06-79Cxxxx-00-05-11-12-000

DN				A	B	C	L	K
EN (DIN) PN 6 [mm]	EN (DIN) PN 10 [mm]	EN (DIN) PN 16 [mm]	ANSI/ AWWA [inch]	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)
-	300	-	-	520	317.5	165.1	500	445
-	-	300	-	517	313.9	163.2	500	460
-	-	-	12"	517 (20.4)	313.9 (12.4)	163.2 (6.43)	500 (19.7)	482.6 (19)
-	350	-	-	548	350	182	550	505
-	-	350	-	546	348	181	550	520
-	-	-	14"	544 (21.4)	346 (13.6)	179.9 (7.1)	550 (21.7)	533.4 (21)
-	400	-	-	590	400	208	600	565
-	-	400	-	589	398	207	600	580
-	-	-	16"	587 (23.1)	396 (15.6)	205.9 (8.11)	600 (23.6)	596.9 (23.5)
-	-	-	18"	629 (24.8)	445 (17.5)	231.4 (9.11)	650 (25.6)	635 (25)
-	500	-	-	676	500	260	650	670
-	-	500	-	674	498	259	650	715
-	-	-	20"	672 (26.5)	496 (19.5)	257.9 (10.2)	650 (25.6)	699 (27.5)
-	600	-	-	763	602	313	780	780
-	-	600	-	760	598	311	780	840
-	-	-	24"	756 (29.8)	594 (23.4)	308.9 (12.2)	780 (30.8)	813 (32)
-	700	-	-	848	701	364.5	910	895
-	-	700	-	842	695	361.4	910	910
-	-	-	28"	846 (33.3)	699 (27.5)	363.5 (14.3)	910 (25.9)	927.1 (36.5)
-	-	-	30"	889 (35)	750 (29.5)	390 (15.4)	975 (38.4)	984.25 (38.8)
-	800	-	-	935	803	417.6	1040	1015
-	-	800	-	930	797	414.4	1040	1025
-	-	-	32"	933 (36.7)	801 (31.5)	416.5 (16.4)	1040 (40.9)	1060.45 (41.8)
-	900	-	-	1019	902	469	1170	1115

DN				A	B	C	L	K
EN (DIN) PN 6 (mm)	EN (DIN) PN 10 (mm)	EN (DIN) PN 16 (mm)	ANSI/ AWWA (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)
–	–	900	–	1012	894	464.9	1170	1125
–	–	–	36"	1016 (40)	898 (35.4)	467 (18.4)	1170 (46.1)	1168.4 (46)
–	1000	–	–	1106	1004	522.1	1300	1230
–	–	1000	–	1100	996	517.9	1300	1255
–	–	–	40"	1103 (43.4)	1000 (39.4)	520 (20.5)	1300 (51.2)	1289.05 (50.8)
–	–	–	42"	1147 (45.2)	1051 (41.4)	546.5 (21.5)	1365 (53.7)	1346.2 (53)
1200	–	–	–	1282	1210	629.2	1560	1405
–	1200	–	–	1277	1204	626.1	1560	1455
–	–	1200	–	1270	1196	621.9	1560	1485
–	–	–	48"	1274 (50.2)	1200 (47.2)	624 (24.6)	1560 (61.4)	1511.3 (59.5)
–	–	–	54"	1399 (55.1)	1347 (53)	700.4 (27.6)	1755 (69.1)	1682.75 (66.3)
1400	–	–	–	1453	1410	733.2	1820	1630
–	1400	–	–	1448	1404	730.1	1820	1675
–	–	1400	–	1441	1396	725.9	1820	1685
–	–	–	60"	1530 (60.2)	1500 (59.1)	780 (30.7)	1950 (76.8)	1854.2 (73)
1600	–	–	–	1622	1608	836.2	2080	1830
–	1600	–	–	1615	1600	832	2080	1915
–	–	1600	–	1607	1590	826.8	2080	1930
–	–	–	66"	1655 (65.2)	1646 (64.8)	855.9 (33.7)	2145 (84.4)	2032 (80)
1800	–	–	–	1793	1808	940.2	2340	2045
–	1800	–	–	1786	1800	936	2340	2115
–	–	1800	–	1776	1788	929.8	2340	2130
–	–	–	72"	1778 (70)	1790 (70.5)	930.8 (36.6)	2340 (92.1)	2197.1 (86.5)
2000	–	–	–	1961	2004	1042.1	2600	2265
–	2000	–	–	1954	1996	1037.9	2600	2325
–	–	2000	–	1943	1984	1031.7	2600	2345
–	–	–	80"	1949 (76.7)	1990 (78.3)	1034.8 (40.7)	2600 (102)	2362.2 (93)

The fitting length (L) is always the same per nominal diameter, regardless of the pressure rating selected.

Weight**Transmitter:**

- Wall-mount housing Prosonic Flow 90/93 6.0 kg (13.2 lbs)
- Wall-mount housing Prosonic Flow 91 2.4 kg (5.3 lbs)

Measuring sensors:

- Prosonic Flow W (clamp-on) incl. tensioning bands 2.8 kg (6.2 lbs)
- Prosonic Flow U (clamp-on) incl. tensioning bands 1 kg (2.2 lbs)
- Prosonic Flow W (Insertion / single-path version) 4.5 kg (9.9 lbs)
- Prosonic Flow W (Insertion / dual-path version) 12.0 kg (26.5 lbs)
- Sound velocity measuring sensors DDU 18 incl. tensioning bands 2.4 kg (5.3 lbs)
- Wall thickness measuring sensor DDU 19 incl. tensioning band 1.5 kg (3.3 lbs)

Nominal diameter		Prosonic Flow C (Inline)				
		Measuring pipe incl. measuring sensors in kg (lbs)				
[mm]	[inch]	EN (DIN) PN 6	EN (DIN) PN 10	EN (DIN) PN 16	ANSI Class 150	AWWA Class D
300	12"	–	41.8 (92.2)	59.6 (131.4)	77.2 (170.2)	–
350	14"	–	54.7 (120.6)	70.1 (154.5)	111.2 (245.2)	–
400	16"	–	66.4 (146.4)	90.3 (199.1)	139.6 (307.8)	–
–	18"	–	–	–	162.7 (358.7)	–
500	20"	–	96.8 (213.4)	145.9 (321.7)	197.8 (436.1)	–
600	24"	–	120.4 (265.4)	196.6 (433.4)	287.9 (634.7)	–
700	28"	–	183.6 (404.8)	251.3 (554.0)	–	229.9 (506.8)
–	30"	–	–	–	–	265.1 (584.4)
800	32"	–	245.0 (540.1)	327.0 (720.9)	–	323.9 (714.1)
900	36"	–	313.7 (691.6)	456.3 (1005.9)	–	455.6 (1004.4)
1000	40"	–	379.0 (835.5)	587.3 (1294.8)	–	552.6 (1218.3)
–	42"	–	–	–	–	626.1 (1380.3)
1200	48"	434.6 (958.1)	678.6 (1496.1)	941.7 (2076.1)	–	894.7 (1972.5)
–	54"	–	–	–	–	1280.2 (2822.4)
1400	–	569.2 (1254.9)	907.6 (2000.9)	1267.6 (2794.6)	–	–
–	60"	–	–	–	–	1584.5 (3493.2)
1600	–	818.7 (1804.9)	1381.4 (3045.5)	2012.0 (4435.7)	–	–
–	66"	–	–	–	–	2268.0 (5000.1)
1800	72"	993.5 (2190.3)	1726.7 (3806.7)	2608.2 (5750.1)	–	2707.0 (5967.9)
2000	80"	1508.2 (3325.0)	2393.6 (5276.9)	3601.3 (7939.5)	–	3073.9 (6776.8)

(Weight data valid for standard pressure ratings and without packaging material)

Material

Transmitter Prosonic Flow 90/91/93:

- Wall-mounted housing: powder coated die-cast aluminum

Prosonic Flow W (clamp-on):

- Sensor housing: 1.4301/DIN 17440 (304/AISI)
- Sensor holder (cast steel): 1.4308/DIN 17440 (CF-8/AISI)
- Sensor contact surfaces: chemically resistant plastic
- Tensioning bands: 1.4301/DIN 17440 (304/AISI)

Prosonic Flow U (clamp-on):

- Sensor housing: plastic
- Frame ends (cast steel): 1.4308/DIN 17440 (CF-8/AISI)
- Sensor securing rail (aluminum alloy): EN AW-6063/DIN EN 573-3 (AA 6063/UNS)
- Sensor contact surfaces: chemically resistant plastic
- Tensioning bands: 1.4301/DIN 17440 (304/AISI)

Prosonic Flow W (Insertion):

- Sensor housing: 1.4404/DIN 17440 (316L/AISI)
- Weld-in parts: 1.4301/DIN 17440 (304/AISI)

Prosonic Flow C (Inline)

- Sensor housing: 1.4404/DIN 17440 (316L/AISI)
- Weld-in parts: 1.4404/DIN 17440 (316L/AISI)
- Measuring pipe: ST 37.2 (carbon steel) - epoxy coated internally, externally painted

Prosonic Flow DDU 18 and DDU 19:

- Sensor housing: 1.4301/DIN 17440 (304/AISI)

Standard sensor cable:

- Cable connector (nickled brass): 2.0401/DIN 17660 (C38500/UNS)
- Cable sheath: PVC

High temperature sensor cable:

- Cable connector (stainless steel): 1.4301/DIN 17440 (304/AISI)
- Cable sheath: PTFE

Human interface

Display elements

- Liquid crystal display:
 - Prosonic Flow 90/91: illuminated, two lines, each with 16 characters
 - Prosonic Flow 93: illuminated, four lines, each with 16 characters
 - Custom configurations for presenting different measured values and status variables
 - Totalizers:
 - Prosonic Flow 90: 2 totalizers
 - Prosonic Flow 91: 1 totalizer
 - Prosonic Flow 93: 3 totalizers
-

Operating elements

Uniform operating concept for all transmitter types:

Prosonic Flow 90:

- Local operation via three operating keys (◀, ▶, ⏏)
- Quick Setup menu for quick commissioning

Prosonic Flow 91:

- Local operation via three operating keys (◀, ▶, ⏏)
- Quick Setup menu for quick commissioning

Prosonic Flow 93:

- Local operation with three optical sensor keys (◀, ▶, ⏏)
 - Application-specific Quick Setup menus for quick commissioning
-

Remote operation

Prosonic Flow 90:

- Operation via HART, PROFIBUS PA

Prosonic Flow 91:

- Operation via HART

Prosonic Flow 93:

- Operation via HART, PROFIBUS PA, FOUNDATION Fieldbus
-

Language group

Prosonic Flow 90/93:

Language groups available for operation in different countries:

- Western Europe and America (WEA):
 - English, German, Spanish, Italian, French, Dutch and Portuguese
- Eastern Europe and Scandinavia (EES):
 - English, Russian, Polish, Norwegian, Finnish, Swedish and Czech
- South and east Asia (SEA):
 - English, Japanese, Indonesian
- China (CIN):
 - English, Chinese

You can change the language group via the operating program "ToF Tool - Fieldtool Package."

Prosonic Flow 91:

- English, German, Spanish, Italian, French

Certificates and approvals

CE mark	The measuring system is in conformity with the statutory requirements of the EC Directives. Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.
C-Tick mark	The measuring system complies with the EMC requirements stipulated by the "Australian Communication and Media Authority (ACMA)".
Ex approval	<p>Prosonic Flow 90/93: The transmitter housing (wall-mount housing) is suitable for use in ATEX II3G (Ex Zone 2).</p> <p>Information about currently available Ex versions (ATEX, FM, CSA, etc.) can be supplied by your Endress+Hauser Sales Center on request. All explosion protection data are given in a separate documentation which is available upon request.</p>
PROFIBUS PA certification	<p>The flow device has successfully passed all the test procedures carried out and is certified and registered by the PNO (PROFIBUS User Organization). The device thus meets all the requirements of the following specifications:</p> <ul style="list-style-type: none"> ■ Certified to PROFIBUS PA, profile version 3.0 (device certification number: on request) ■ The device can also be operated with certified devices of other manufacturers (interoperability)
FOUNDATION Fieldbus certification	<p>The flow device has successfully passed all the test procedures carried out and is certified and registered by the Fieldbus Foundation. The device thus meets all the requirements of the following specifications:</p> <ul style="list-style-type: none"> ■ Certified to FOUNDATION Fieldbus Specification ■ The device meets all the specifications of the FOUNDATION Fieldbus H1. ■ Interoperability Test Kit (ITK), revision status 4.0 (device certification number: on request) ■ The device can also be operated with certified devices of other manufacturers ■ Physical Layer Conformance Test of the Fieldbus Foundation
Other standards and guidelines	<ul style="list-style-type: none"> ■ EN 60529: Degrees of protection by housing (IP code) ■ EN 61010: Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures. ■ EN 61326 (IEC 61326): "Emission as per requirements for class A". Electromagnetic compatibility (EMC requirements) ■ ANSI/ISA-61010-1 (82.02.01): Safety Standard for Electrical and Electronic Test, Measuring, Controlling and related Equipment - General Requirements. Pollution degree 2. ■ CSA C22.2 (No. 1010.1) Safety requirements for Electrical Equipment for Measurement and Control and Laboratory Use. Pollution degree 2. ■ NAMUR NE 21: Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment. ■ NAMUR NE 53: Standardization of the signal level for the breakdown information of digital transmitters with analog output signal.

Accessories

Measuring sensors:

- DDU 18 (sound velocity measuring sensors)
- DDU 19 (wall thickness measuring sensor)

Pipe mounting kit for transmitter:

- Wall-mount housing

Mounting material for clamp-on versions:

- Coupling fluid -40 to +80°C (-40 to +176°F)
- Coupling fluid 0 to +170°C (+32 to +338°F)

Prosonic Flow W:

- Tensioning bands for DN 50 to 200 (2" to 8")
- Tensioning bands for DN 200 to 600 (8" to 24")
- Tensioning bands for DN 600 to 2000 (24" to 80")
- Tensioning bands for DN 2000 to 4000 (80" to 156")

Prosonic Flow U:

- Tensioning bands for DN 15 to 40 (1/2" to 1-1/2")
- Tensioning bands for DN 32 to 65 (1-1/4" to 2-1/2")
- Tensioning bands for DN 50 to 100 (2" to 4")

More detailed information can be obtained from your Endress+Hauser service organization.

Documentation

- Flow measuring technology (FA005D/06/en)
- Technical Information Prosonic Flow 90P, 93P (TI056D/24/ae)
- Operating Instructions Prosonic Flow 90 (BA068D/06/en and BA069D/06/en)
- Operating Instructions Prosonic Flow 91 (BA100D/06/en)
- Operating Instructions Prosonic Flow 90 PROFIBUS PA (BA074D/06/en and BA075D/06/en)
- Operating Instructions Prosonic Flow 93 (BA070D/06/en and BA071D/06/en)
- Operating Instructions Prosonic Flow 93 PROFIBUS DP/PA (BA076D/06/en and BA077D/06/en)
- Operating Instructions Prosonic Flow 93 FOUNDATION Fieldbus (BA078D/06/en and BA079D/06/en)
- Operating Instructions Prosonic Flow 93 C Inline (BA087D/06/en and BA088D/06/en)
- Operating Instructions Prosonic Flow 93 C Inline PROFIBUS PA (BA089D/06/en and BA090D/06/en)
- Operating Instructions Prosonic Flow 93 C Inline FOUNDATION Fieldbus (BA091D/06/en and BA092D/06/en)

You can order the documents from your Endress+Hauser service organization or download them from the Internet addresses given on the last page.

Registered trademarks

HART®

Registered trademark of HART Communication Foundation, Austin, USA

PROFIBUS®

Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany

FOUNDATION™ Fieldbus

Registered trademark of the Fieldbus Foundation, Austin, USA

HistoROM™, T-DAT™, F-CHIP®, ToF Tool - Fieldtool® Package, Fieldcheck®

Registered or registration-pending trademarks of Endress+Hauser Flowtec AG, Reinach, CH

Ordering Information

NOTE: Endress+Hauser reserves the right to change or modify product, specifications and ordering information at any time without notice. Please consult Endress+Hauser or your local representative for the most recent information.

Prosonic Flow 90 U

90 U - ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12

- 0 Mounting type / Number of channels
A1 Clamp on / Single channel
- 1 Flow sensor type
A NEMA 12 sensor, 1/2" to 4" pipe size, clamp on, -4° to +175°F
- 2 Sensor holder
A Mounting rail for U sensor
- 3 Installation set
0 Without installation set
1 1/2" to 1-1/2" clamp on
2 1-1/4" to 2-1/2" clamp on
3 2" to 4" clamp on
- 4 Sensor cable
A 15 ft sensor cable, PVC, -4° to +175°F
B 30 ft sensor cable, PVC, -4° to +174°F
C 45 ft sensor cable, PVC, -4° to +175°F
D 95 ft sensor cable, PVC, -4° to +175°F
E 15 ft sensor cable, PTFE, -40° to +340°F
F 30 ft sensor cable, PTFE, -40° to +340°F
G 45 ft sensor cable, PTFE, -40° to +340°F
H 95 ft sensor cable, PTFE, -40° to +340°F
- 5 Sensor cable conduit adapters
0 Without sensor cable conduit adapter
- 6 Calibration
0 Dry calibrated
1 Verification of accuracy on 2" pipe, clamp on sensor
- 7 Approvals
A For use in nonhazardous areas
R FM approved non-incendive, Class I, Division 2, Groups A-D
CSA approved non-incendive, Class I, Division 2, Groups A-D and Zone 2

- 8 Protection type / Version
C NEMA 4X / Remote, wall mounted housing
X Sensor only
- 9 Cable glands
B 1/2" NPT thread for cable gland
L Fieldbus connector and 1/2" NPT (only for approval A, output/inputs H)
X Sensor only, without cable gland
- 10 Display / Power supply / Operation
7 85 to 260 VAC, without display, remote configuration only
8 20 to 55 VAC / 16 to 62 VDC, without display, remote configuration only
A 85 to 260 VAC, with display, touch-control operation (language: EN, ES, FR, IT, NL, PT, DE)
B 20 to 55 VAC / 16 to 62 VDC, with display, touch-control operation (language: EN, ES, FR, IT, NL, PT, DE)
X Sensor only (without transmitter)
- 11 Software
A Standard software
X Sensor only (without transmitter)
- 12 Outputs / Inputs
W Current HART, 2 current, relay
A Current HART, frequency
D Current HART, frequency, relay, status input
H Profibus PA (only for approval A)
X Sensor only (without transmitter)

Prosonic Flow 90 W

90 W - ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12

- 0 Mounting type / Number of channels
A0 Clamp on / Single channel, basic
A1 Clamp on / Single channel
B1 Insertion, weld-in / Single channel
- 1 Flow sensor type
A NEMA 4X sensor, 4" to 160" pipe size, clamp on, -4° to +175°F
B NEMA 4X sensor, 2" to 12" pipe size, clamp on, -4° to +175°F
M NEMA 6P sensor, 4" to 160" pipe size, clamp on, -4° to +175°F
N NEMA 6P sensor, 2" to 12" pipe size, clamp on, -4° to +175°F
K NEMA 6P sensor, 8" to 160" pipe size, insertion, -40° to +175°F (B1 only)
- 2 Sensor holder
A Fixed retaining nut, clamp on version
B Detachable retaining nut, clamp on version
C Weld-in, insertion type, 8" to 12" pipe size
D Weld-in, insertion type, 12" to 16" pipe size
E Weld-in, insertion type, 16" to 160" pipe size
- 3 Installation set
0 Without installation set
1 2" to 8" pipe size clamp on set
2 8" to 24" pipe size clamp on set
3 24" to 80" pipe size clamp on set
4 80" to 160" pipe size clamp on set
5 8" to 72" pipe size, insertion
6 72" to 160" pipe size, insertion
- 4 Sensor cable
A 15 ft sensor cable, PVC, -4° to +175°F
B 30 ft sensor cable, PVC, -4° to +174°F
C 45 ft sensor cable, PVC, -4° to +175°F
D 95 ft sensor cable, PVC, -4° to +175°F
E 15 ft sensor cable, PTFE, -40° to +340°F
F 30 ft sensor cable, PTFE, -40° to +340°F
G 45 ft sensor cable, PTFE, -40° to +340°F
H 95 ft sensor cable, PTFE, -40° to +340°F
- 5 Sensor cable conduit adapters
0 Without sensor cable conduit adapter
2 1/2" NPT cable conduit adapters

- 6 Calibration
0 Dry calibrated
1 Verification of accuracy on 4" pipe, clamp on sensor
2 Verification of accuracy in 10" pipe, insertion sensor
- 7 Approvals
A For use in nonhazardous areas
R FM approved non-incendive, Class I, Division 2, Groups A-D
CSA approved non-incendive, Class I, Division 2, Groups A-D and Zone 2
- 8 Protection type / Version
C NEMA 4X / Remote, wall mounted housing
X Sensor only
- 9 Cable glands
B 1/2" NPT thread for cable gland
L Fieldbus connector and 1/2" NPT (only for approval A, output/inputs H)
X Sensor only, without cable gland
- 10 Display / Power supply / Operation
7 85 to 260 VAC, without display, remote configuration only
8 20 to 55 VAC / 16 to 62 VDC, without display, remote configuration only
A 85 to 260 VAC, with display, push button operation (language: EN, ES, FR, IT, NL, PT, DE)
B 20 to 55 VAC / 16 to 62 VDC, with display, push button operation (language: EN, ES, FR, IT, NL, PT, DE)
X Sensor only (without transmitter)
- 11 Software
A Standard software
X Sensor only (without transmitter)
- 12 Outputs / Inputs
W Current HART
A Current HART, frequency
D Current HART, frequency, status output, status input
H Profibus-PA
X Sensor only (without transmitter)

Prosonic Flow 91 W

91 W - ☐ 0 ☐ 1 ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12

0 Mounting type / Number of channels

A1 Clamp on / Single channel

1 Flow sensor type

A 4" to 160" pipe size, -4° to +176°F

B 2" to 12" pipe size, -4° to +176°F

P 4" to 160" pipe size, 32°F to 266°F

S 2" to 12" pipe size, 32°F to 266°F

2 Sensor holder

A Retaining nut, not detachable

3 Installation set

1 2" to 8"

2 8" to 24"

3 24" to 78"

4 78" to 160"

4 Sensor cable

A 15 ft sensor cable, PVC, -4° to +160°F

B 30 ft sensor cable, PVC, -4° to +160°F

C 45 ft sensor cable, PVC, -4° to +160°F

D 95 ft sensor cable, PVC, -4° to +160°F

J 200 ft sensor cable, PVC, -4° to +160°F

K 330 ft sensor cable, PVC, -4° to +160°F

5 Sensor cable conduit adapters

0 Gland

2 Gland plus 1/2" NPT conduit adapter

6 Calibration

0 Without calibration

2 Verification of accuracy on 2" pipe

7 Approvals

A For use in nonhazardous areas

R FM approved non-incendive, Class I, Division 2, Groups A-D

CSA approved non-incendive, Class I, Division 2, Groups A-D and Zone 2

8 Protection type / Version

C NEMA 4X / Field mounted housing

K NEMA 4X / Field mounted housing, NEMA 6P sensor

X Sensor only

9 Cable glands

B 1/2" NPT thread for cable gland

X Sensor only, without cable gland

10 Power supply, display

0 85 to 250 VAC, without display, remote configuration

1 20 to 28 VAC / 11 to 40 VDC, without display, remote configuration

4 85 to 250 VAC, 2-line display, push-button configuration

5 20 to 28 VAC / 11 to 40 VDC, 2-line display, push-button configuration

X Sensor only (without transmitter)

11 Software

A Standard software

X Sensor only (without transmitter)

12 Outputs / Inputs

A Current HART, Pulse

X Sensor only

Prosonic Flow 93 U

93 U - ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12

- 0 Mounting type / Number of channels
 A1 Clamp on / Single channel
 A2 Clamp on / Dual channel
- 1 Flow sensor type
 A NEMA 12 sensor, 1/2" to 4" pipe size, clamp on, -4° to +175°F
- 2 Sensor holder
 A Mounting rail for U sensor
- 3 Installation set
 0 Without installation set
 1 1/2" to 1-1/2" clamp on
 2 1-1/4" to 2-1/2" clamp on
 3 2" to 4" clamp on
- 4 Sensor cable
 A 15 ft sensor cable, PVC, -4° to +175°F
 B 30 ft sensor cable, PVC, -4° to +174°F
 C 45 ft sensor cable, PVC, -4° to +175°F
 D 95 ft sensor cable, PVC, -4° to +175°F
 E 15 ft sensor cable, PTFE, -40° to +340°F
 F 30 ft sensor cable, PTFE, -40° to +340°F
 G 45 ft sensor cable, PTFE, -40° to +340°F
 H 95 ft sensor cable, PTFE, -40° to +340°F
- 5 Sensor cable conduit adapters
 0 Without sensor cable conduit adapter
- 6 Calibration
 0 Dry calibrated
 1 Verification of accuracy on 2" pipe, clamp on sensor
- 7 Approvals
 A For use in non-hazardous areas
 R FM approved non-incendive, Class I, Division 2, Groups A-D
 CSA approved non-incendive, Class I, Division 2, Groups A-D and Zone 2

- 8 Protection type / Version
 C NEMA 4X / Remote, wall mounted housing
 X Sensor only
- 9 Cable glands
 B 1/2" NPT thread for cable gland
 L Fieldbus connector and 1/2" NPT (only for approval A, output/inputs H)
 X Sensor only, without cable gland
- 10 Display / Power supply / Operation
 7 85 to 260 VAC, without display, remote configuration only
 8 20 to 55 VAC / 16 to 62 VDC, without display, remote configuration only
 A 85 to 260 VAC, with display, touch-control operation (language: EN, ES, FR, IT, NL, PT, DE)
 B 20 to 55 VAC / 16 to 62 VDC, with display, touch-control operation (language: EN, ES, FR, IT, NL, PT, DE)
 X Sensor only (without transmitter)
- 11 Software
 A Standard software
 E Advanced diagnostics
 X Sensor only (without transmitter)
- 12 Outputs / Inputs
 Fixed I/O modules
 A Current HART, Frequency
 B Current HART, Frequency, 2 relays
 H Profibus PA (only for approval A)
 Flexible I/O modules
 C Current HART, frequency, 2 relays
 D Current HART, frequency, relay, status input
 L Current HART, 2 relays, status input
 M Current HART, 2 frequency, status input
 W Current HART, 2 current, relay
 2 Current HART, frequency, current, relay
 4 Current HART, 2 frequency
 6 Current HART, 2 relays
 X Sensor only (without transmitter)

CLEMENT BOURGOGNE

WOOD BANANI BOUTHILLATE PAMIZAL INC.

Reviewed	Reviewer with Comments	Re-submitted See Comments

AUG 04 2010

This review of this drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.

Prosonic Flow 93 W

93WA1-BA1B20RCBAAA

93 W - ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12

- 0 Mounting type / Number of channels
 A1 Clamp on / Single channel
 A2 Clamp on / Dual channels
 B1 Insertion, weld-in / Single channel
 B2 Insertion, weld-in / Dual channels
- 1 Flow sensor type
 A NEMA 4X sensor, 4" to 160" pipe size, clamp on, -4° to +175°F
 B NEMA 4X sensor, 2" to 12" pipe size, clamp on, -4° to +175°F
 M NEMA 6P sensor, 4" to 160" pipe size, clamp on, -4° to +175°F
 N NEMA 6P sensor, 2" to 12" pipe size, clamp on, -4° to +175°F
 K NEMA 6P sensor, 8" to 160" pipe size, Insertion, -4° to +175°F (B1, B2 only)
- 2 Sensor holder
 A Fixed retaining nut, clamp on version
 B Detachable retaining nut, clamp on version
 C Weld-in, Insertion type, 8" to 12" pipe size
 D Weld-in, Insertion type, 12" to 16" pipe size
 E Weld-in, Insertion type, 16" to 160" pipe size
- 3 Installation set
 0 Without installation set
 1 2" to 8" pipe size clamp on set
 2 8" to 24" pipe size clamp on set
 3 24" to 80" pipe size clamp on set
 4 80" to 160" pipe size clamp on set
 5 8" to 72" pipe size, Insertion
 6 72" to 160" pipe size, Insertion
- 4 Sensor cable
 A 15 ft sensor cable, PVC, -4° to +175°F
 B 30 ft sensor cable, PVC, -4° to +174°F
 C 45 ft sensor cable, PVC, -4° to +175°F
 D 95 ft sensor cable, PVC, -4° to +175°F
 E 15 ft sensor cable, PTFE, -40° to +340°F
 F 30 ft sensor cable, PTFE, -40° to +340°F
 G 45 ft sensor cable, PTFE, -40° to +340°F
 H 95 ft sensor cable, PTFE, -40° to +340°F
- 5 Sensor cable conduit adapters
 0 Without sensor cable conduit adapter
 2 1/2" NPT cable conduit adapters
- 6 Calibration
 0 Dry calibrated
 1 Verification of accuracy on 4" pipe, clamp on sensor
 2 Verification of accuracy in 10" pipe, Insertion sensor (single path)
 3 Verification of accuracy in 16" pipe, Insertion sensor (dual path)

- 7 Approvals
 A For use in non-hazardous areas
 R FM approved non-incendive, Class I, Division 2, Groups A-D
 CSA approved non-incendive, Class I, Division 2, Groups A-D and Zone 2
- 8 Protection type / Version
 C NEMA 4X / Remote, wall mounted housing
 X Sensor only
- 9 Cable glands
 B 1/2" NPT thread for cable gland
 L Fieldbus connector and 1/2" NPT (only for approval A, output/inputs H)
 X Sensor only
- 10 Display / Power supply / Operation
 7 85 to 260 VAC, without display, remote configuration only
 8 20 to 55 VAC / 16 to 62 VDC, without display, remote configuration only
 A 85 to 260 VAC, with display, touch-control operation (language: EN, ES, FR, IT, NL, PT, DE)
 B 20 to 55 VAC / 16 to 62 VDC, with display, touch-control operation (language: EN, ES, FR, IT, NL, PT, DE)
 X Sensor only (without transmitter)
- 11 Software
 A Standard software
 E Advanced diagnostic functions
 X Sensor only (without transmitter)
- 12 Outputs / Inputs
 Fixed I/O modules
 A Current HART, Frequency
 B Current HART, Frequency, 2 relays
 H Profibus PA (only for approval A)
 K Foundation Fieldbus (only for approval A)
 Flexible I/O modules
 C Current HART, frequency, 2 relays
 D Current HART, frequency, relay, status input
 L Current HART, 2 relays, status input
 M Current HART, 2 frequency, status input
 W Current HART, 2 current, relay
 2 Current HART, frequency, current, relay
 4 Current HART, 2 frequency
 6 Current HART, 2 relays
 X Sensor only (without transmitter)

Prosonic Flow 93 C In-line

93 C - ☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12

0 Nominal size / full scale maximum

- 3H 12" / 10,600 gpm
- 3F 14" / 13,200 gpm
- 4H 16" / 18,500 gpm
- 4F 18" / 21,800 gpm
- 5H 20" / 29,000 gpm
- 6H 24" / 42,300 gpm
- 7H 28" / 60,800 gpm
- 7F 30" AWWA / 69,000 gpm
- 8H 32" / 77,000 gpm
- 9H 36" / 87,000 gpm
- T0 40" / 100,400 gpm
- V0 42" AWWA / 103,000 gpm
- T2 48" / 119,000 gpm
- T3 54" AWWA / 137,400 gpm
- V5 60" AWWA / 153,200 gpm
- V6 66" AWWA / 169,000 gpm
- T8 72" / 188,000 gpm
- V9 78" AWWA / 209,000 gpm

1 Flow sensor type

- L NEMA 6P sensor, -4° to +175°F

2 Measuring tube

- H Carbon steel for potable water, epoxy coated internally
- U Carbon steel for sewage water, epoxy coated internally

3 Process connections

- L CI 150 ANSI B16.5 carbon steel flanges (available for 12" to 24" only)
- P Class D AWWA C207 A105 steel flanges (available for 28" and larger)

4 Sensor cable

- A 15 ft sensor cable, PVC, -4° to +175°F
- B 30 ft sensor cable, PVC, -4° to +174°F
- C 45 ft sensor cable, PVC, -4° to +173°F
- D 95 ft sensor cable, PVC, -4° to +175°F

5 Sensor cable conduit adapters

- 0 Without sensor cable conduit adapter
- 2 1/2" NPT cable conduit adapters

6 Calibration

- 0 1.5% calibration with confirmation
- A 0.5% calibration, 3 points

7 Approvals

- A For use in nonhazardous areas
- R FM approved non-incendive, Class I, Division 2, Groups A-D
- CSA approved non-incendive, Class I, Division 2, Groups A-D and Zone 2

8 Protection type / Version

- C NEMA 4X / Remote wall mounted housing
- X Sensor only

9 Cable glands

- B 1/2" NPT thread for cable gland
- L Fieldbus connector and 1/2" NPT (only for approval A, output/inputs H)
- X Sensor only

10 Display / Power supply / Operation

- 7 85 to 260 VAC, without display, remote configuration only
- 8 20 to 55 VAC / 16 to 62 VDC, without display, remote configuration only
- A 85 to 260 VAC, with display, touch-control operation (language: EN, ES, FR, IT, NL, PT, DE)
- B 20 to 55 VAC / 16 to 62 VDC, with display, touch-control operation (language: EN, ES, FR, IT, NL, PT, DE)
- X Sensor only (without transmitter)

11 Software

- A Standard software
- E Advanced diagnostics functions
- X Sensor only (without transmitter)

12 Outputs / Inputs

- Fixed I/O modules
 - A Current HART, Frequency
 - B Current HART, Frequency, 2 relays
 - H Profibus PA (only for approval A)
 - X Foundation Fieldbus (only for approval A)
- Flexible I/O modules
 - C Current HART, frequency, 2 relays
 - D Current HART, frequency, relay, status input
 - L Current HART, 2 relays, status input
 - M Current HART, 2 frequency, status input
 - W Current HART, 2 current, relay
 - 2 Current HART, frequency, current, relay
 - 4 Current HART, 2 frequency
 - 6 Current HART, 2 relays
 - X Sensor only (without transmitter)

PROJECT :

OWNER :

ENGINEER :

CONTRACTOR :

WOLFF BANANI BOUTHILLETTE PARIZEAU INC.

Reviewed Reviewed with Resubmit
Comments Comments

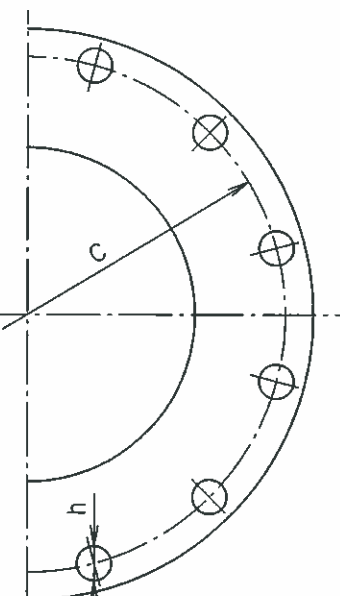
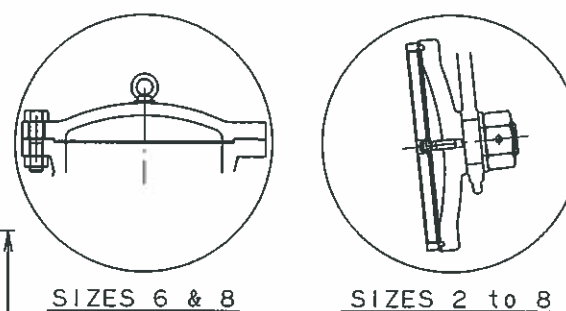
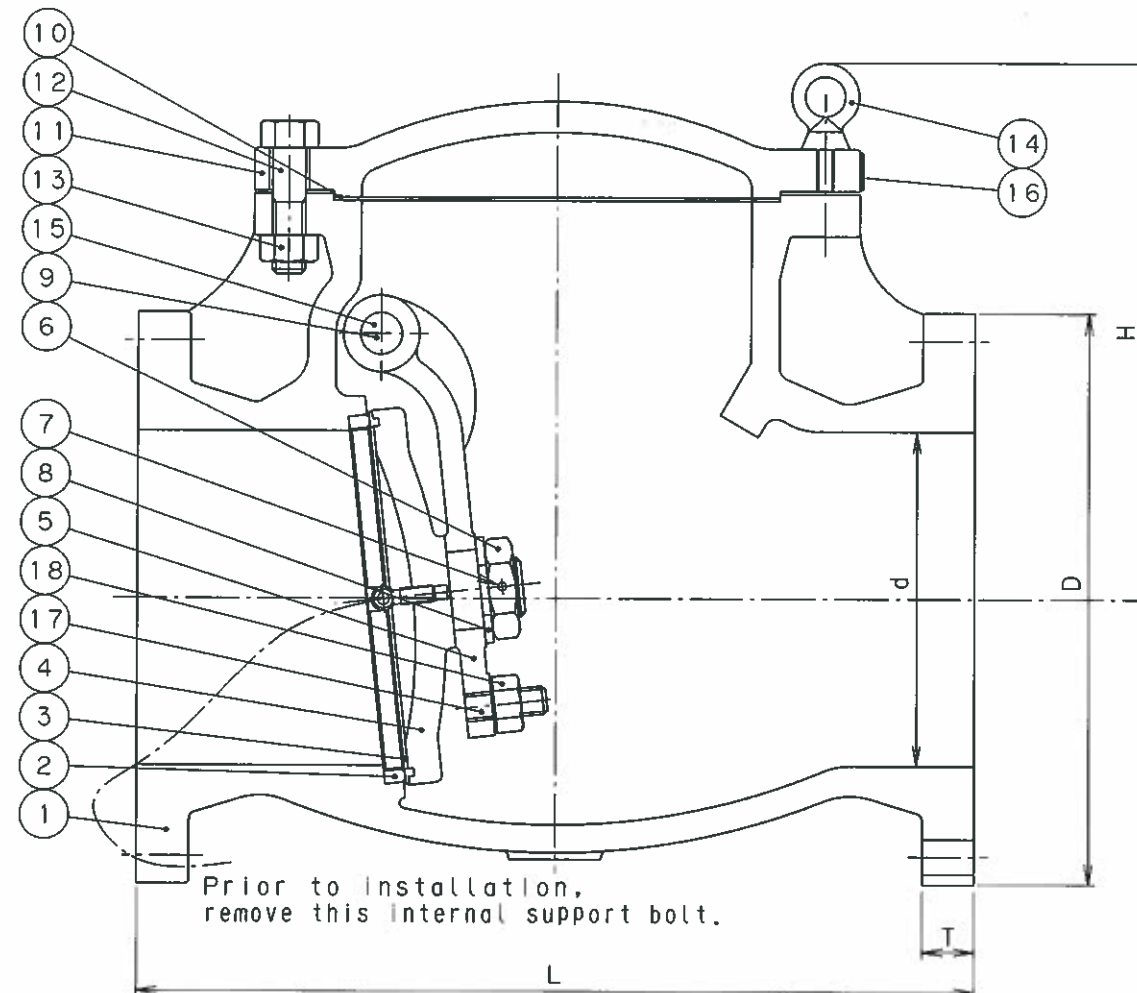
JUN 25 2010

This review of this drawing does not in any way
relieve the contractor of responsibility for its
accuracy or for compliance with the contract
documents.

18	NUT	A563-A	SIZES 10&12	ZINC PLATED
17	BOLT	A307-B	SIZES 10&12	ZINC PLATED
16	NAME PLATE	B209-1100		
15	PLUG	Malleable Cast Iron		
14	EYE BOLT	A36	SIZES 6to12	ZINC PLATED
13	NUT	A563-A		ZINC PLATED
12	BOLT	A307-B		ZINC PLATED
11	COVER	A126-B		
10	GASKET	Non Asbestos sheet		
9	HINGE PIN	304S.S		
8	WASHER	A276-410		
7	PIN	304S.S		
6	NUT	A563-A		ZINC PLATED
5	HINGE	A216-WCB		
4	DISC	A126-B		
3	DISC SEAT RING	B62-C83600		
2	BODY SEAT RING	B62-C83600		
1	BODY	A126-B		
No.	PART	MATERIAL (ASTM)	NOTE	

CONNECTION		CLASS 125 GRAY CAST IRON FLANGED SWING CHECK VALVE			
ASME B16.1 (CLASS 125)					
FACE TO FACE or END TO END					
ASME B16.10					
TRIM DESIGNATION					
BRZ					
APP'D	K. Kobayashi	TEST PRESSURE			VALVE CODE
CHK'D	J. P. P.		SHELL	SEAT	YA125-FNSF
CHK'D	N. Kasal	HYDRO	2.5 MPa	1.4 MPa	FIG. No.
PREP'D	H. Komatsu	STATIC	350 psi	200 psi	435A
SCALE	NON	AIR	MPa	0.6 MPa	DRAWING No.
DATE	JAN. 20. '05		psi	80 psi	14300000A ⚠

Check Valve
Section 23 05 23 02 2.1.7



BOLT DIA...G
NUMBER...N

1. The valve is designed in accordance with MSS SP-71.
2. The inspection and test of the valve shall be in accordance with MSS SP-71.



BODY MARKING

DIMENSIONS

UNIT: mm

SIZE	d	H	L	FLANGE						MASS (Kg)	Q'ty
				D	C	N	h	G	T		
2	51	153	203	152	121	4	19	5/8	15.9	14	
2 1/2	64	162	216	178	140	4	19	5/8	17.5	20	
3	76	176	241	190	152	4	19	5/8	19.1	25	
4	102	220	292	229	191	8	19	5/8	23.9	39	
5	127	226	330	254	216	8	22	3/4	23.9	59	
6	152	307	356	279	241	8	22	3/4	25.4	70	
8	203	325	495	343	298	8	22	3/4	28.6	127	
10	254	384	622	406	362	12	25	7/8	30.2	185	
12	305	426	698	483	432	12	25	7/8	31.8	270	

REVISION

MARK	DATE	PREP'D	CHK'D	APP'D	DESCRIPTION					
1	JAN. 20. '05	H. Komatsu	J. P. P.	K. Keloyashi	FORM & DWG No. CHANGED	2				



Toyo Valve Co., Ltd.

Section 23 05 23.02 2.1.8.2 Silent Check Valve

Globe or Silent Check Valves

Cast Iron - Flanged

Type CF125ISC Cast Iron



Operating Pressures and Temperatures

Service	Size	psi	Temp.
Liquid	2" - 16"	200	150°F
Liquid	14" - 24"	150	150°F

Sure Flow Globe Style Check Valves are designed to close before the pump stops completely. This prevents flow reversal which eliminates water hammer and system surges associated with valve closure.

- Quiet Operation
- Guided Discs
- Vertical or Horizontal Installation
- Sizes 2" thru 24"

Service Applications

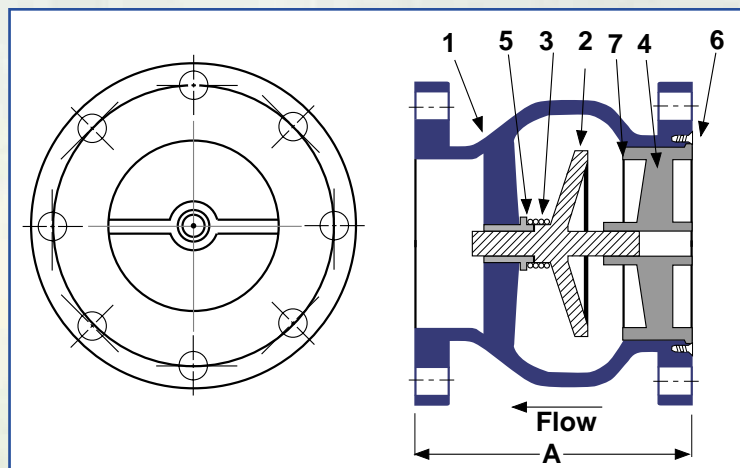
- Municipal Water Systems
- Industrial Class HVAC - Liquid Service
- Industrial Piping Systems
- Irrigation Systems

Construction

No	Name	Material
1	Body	A126 Class B
2	Plug	Stainless Steel
3	Spring	Stainless Steel
4	Seat	Stainless Steel
5	Bushing	Stainless Steel
6	Screw	Stainless Steel
7	Quad Ring	BUNA-N (Optional)

Dimensional Data

Size	Model	A 316SS Plug CF125ISC	CV	Shipping Weight (lbs)
2	0200CF125ISC	6 1/4	40	30
2 1/2	0250CF125ISC	7	100	34
3	0300CF125ISC	7 1/2	130	50
4	0400CF125ISC	8 1/2	225	75
5	0500CF125ISC	9 1/2	340	100
6	0600CF125ISC	10 1/2	540	130
8	0800CF125ISC	13 1/2	830	240
10	1000CF125ISC	16 1/4	1370	360
12	1200CF125ISC	20 1/4	1980	600
14	1400CF125ISC	22 3/4	2300	710
16	1600CF125ISC	24 3/4	3200	810
18	1800CF125ISC	22 1/2	6200	910
20	2000CF125ISC	24	6800	1140
24	2400CF125ISC	24	9800	2600



Ordering Information

Example: Include full description

Size Model
(Prefix) #

0400 - CF125ISC

4", Flat Face Flanged Cast Iron Silent
Check Valve with 316SS Disc

Consult factory for optional construction materials and installation instructions. Resilient seating of BUNA-N or VITON available for 4" sizes and larger.

We recommend that the valves be installed
7 to 10 pipe lengths away from the turbulence.

Notes

Manufacturer reserves the right to modify dimensions, materials, or design. Contact factory for certification.

The Flow Coefficient (Cv) is the number of gallons per minute of water flowing through a given size restriction at a pressure drop of one psi. To obtain the Cv factor for a given size check valve refer to table above.



**Sure Flow
Equipment Inc.**

Sanikiluaq New Territory Canada
Toll Free: 1-800-263-8251 Toll Free Fax: 1-800-876-1164
International 1-905-335-1350 International Fax: 1-905-332-4993
Email: info@sureflowequipment.com www.sureflowequipment.com



Section 23 05 53.01 Mechanical Identification

Sanikiluaq Truck Fill Station Pipe Marker Schedule

PIPE MARKERS							
System	Letter Height	Color	Pipe Size	Brady No.	Style	Qty	Unit
RAW WATER	2"	GREEN	3" & 4"	7230	1	12	CARD
FILTERED WATER	2"	GREEN	3" & 4"	7105	1	4	CARD
DRAIN	3/4"	GREEN	1 1/2"	7090	4	1	CARD
FILTERED WATER	3/4"	GREEN	3/4"	7230	4	1	CARD
DOMESTIC COLD WATER	5/16"	GREEN	1/2"	7086	3C	1	CARD
DOMESTIC HOT WATER	5/16"	YELLOW	1/2"	7087	3C	1	CARD
WASTE WATER	2"	GREEN	3"	7301	1	2	CARD
WASTE WATER	3/4"	GREEN	1 1/2"	7301	4	1	CARD
CHLORINE	5/16"	YELLOW	1/2"	7048	3C	6	CARD
ARROW							
System	Arrow Height	Color	Pipe Size	Brady No.	Qty	Unit	
PROCESS, FW, WASTE	2"	WHITE/GREEN	1 1/2", 3", 4"	91421	1	ROLL	
PROCESS, FW, WASTE	12"	WHITE/GREEN	1/2" & 3/4"	91425	1	ROLL	
FUEL	2"	BLACK/YELLOW	1 1/2" & 2"	91420	1	ROLL	
FUEL	1"	BLACK/YELLOW	1/2", 3/4", 1"	91424	1	ROLL	

must be a typo, should be 1/2"

ORIGINAL SIGNED BY
CLEMENT BOURGOGNE

WOOD BANANI BOUTHILLETTE PARIZEAU INC.		
Reviewed	Reviewed with Comments	Resubmit See Comments
	✓	
SEP 21 2010		
This review of this drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.		

Self-Sticking Vinyl Pipe Markers



Self-Sticking Vinyl Pipe Markers, made with durable B-946 material, are excellent for both indoor and outdoor use.

Size Chart

Outside Diameter	Letter Height	Style Description	Order Style
6" or greater	3 1/2"	HEATING RETURN Style 1HV: One 4" x 24" marker per card	1HV
3" to 5"	2"	HEATING RETURN Style 1: One 2 1/2" x 14" marker per card	1
1" to 2 1/2"	1"	Style 4: Four 1 1/2" x 7" markers per card	4
3/4" or less	3/8"	Style 3C: Three 2 1/2" x 2 1/2" markers per card plus 2 strips of Arrow Tape	3C

*When ordering, please indicate the catalog number for your desired legend followed by the Order Style (1HV, 1, 4 or 3C) that corresponds with your desired size and style.

Legend	Background Color	Catalog No.	Legend	Background Color	Catalog No.	Legend	Background Color	Catalog No.
ACETONE	Yellow	7000 -*	CHLORINE	Yellow	7048 -*	DOMESTIC HOT WATER SUPPLY	Yellow	7089 -*
ACETYLENE GAS	Yellow	7001 -*	CHLORINE GAS	Yellow	7049 -*	DRAIN**	Green	7090 -*
ACID**	Yellow	7002 -*	CHLORINE SOLUTION	Yellow	7050 -*	DRAIN**	Yellow	7091 -*
ACID VENT	Yellow	7003 -*	CIRCULATING WATER	Green	7051 -*	DRAIN WATER	Green	7092 -*
ACID WASTE	Yellow	7004 -*	CIRCULATING WATER	Yellow	7052 -*	DRAINING WATER	Green	7093 -*
AIR**	Blue	7005 -*	CITY GAS	Yellow	7053 -*	DUAL TEMPERATURE	Yellow	7094 -*
AIR**	Blue	7006 -*	CITY WATER	Green	7054 -*	EFFLUENT	Yellow	7095 -*
AIR**	Green	7007 -*	COLD WATER	Green	7055 -*	ELECTRIC TRACED	Yellow	7096 -*
AIR RETURN	Blue	7008 -*	COLD WATER RETURN	Green	7056 -*	ELECTRIC TRACED	Orange	7097 -*
AIR RETURN	White	7009 -*	COLD WATER SUPPLY	Green	7057 -*	EXHAUST**	Yellow	7098 -*
AIR SUPPLY	Blue	7010 -*	COMPRESSED AIR	Yellow	7058 -*	EXHAUST**	Green	7099 -*
AIR SUPPLY	White	7011 -*	COMPRESSED AIR	Green	7059 -*	EXHAUST AIR	Blue	7100 -*
ALCOHOL	Yellow	7012 -*	COMPRESSED AIR	Blue	7060 -*	EXHAUST AIR	White	7101 -*
ALUM**	Yellow	7013 -*	CONDENSATE	Yellow	7061 -*	EXHAUST INTAKE	Blue	7102 -*
AMMONIA	Yellow	7014 -*	CONDENSATE DRAIN	Yellow	7062 -*	FEED**	Yellow	7103 -*
ANGON	Green	7015 -*	CONDENSATE DRAIN	Green	7063 -*	FEED**	Green	7104 -*
ANGON	Blue	7016 -*	CONDENSATE	Yellow	7064 -*	FILTERED WATER	Green	7105 -*
ASBESTOS FREE	Blue	7017 -*	PUMP DISCHARGE	Yellow	7065 -*	FLUORIDE	Yellow	7106 -*
ASBESTOS FREE INSULATION*	Blue	7018 -*	CONDENSATE RETURN	Yellow	7066 -*	FIRE AUTO SPRINKLERS	Red	7107 -*
ASBESTOS INSULATION*	Yellow	7019 -*	CONDENSATE SUPPLY	Yellow	7067 -*	FIRE DRY STANDPIPE	Red	7108 -*
BACKWASH	Green	7020 -*	CONDENSER WATER	Green	7068 -*	FIRE MAIN	Red	7109 -*
BLANK	Blue	7021 -*	CONDENSER	Green	7069 -*	FIRE PROTECTION WATER	Red	7110 -*
BLANK	Green	7022 -*	CONDENSER	Green	7070 -*	FLOOR DRAIN	Green	7111 -*
BLANK	Orange	7023 -*	COOLING WATER	Green	7071 -*	FREON**	Green	7112 -*
BLANK	Red	7024 -*	COOLING WATER RETURN	Green	7072 -*	FRESH WATER	Green	7113 -*
BLANK	Yellow	7025 -*	COOLING WATER SUPPLY	Green	7073 -*	FUEL GAS	Yellow	7114 -*
BLANK	White	7026 -*	DEIONIZED WATER	Green	7074 -*	FUEL OIL	Yellow	7115 -*
BLOW OFF WATER	Yellow	7027 -*	DEIONIZED WATER RETURN	Green	7075 -*	FUEL OIL RETURN	Yellow	7116 -*
BLOWDOWN	Yellow	7028 -*	DEIONIZED WATER SUPPLY	Green	7076 -*	FUEL OIL SUPPLY	Yellow	7117 -*
BLOWER AIR	Green	7029 -*	DIGESTED SLAGGE	Yellow	7077 -*	FUEL OIL VENT	Yellow	7118 -*
BOILER BLOW DOWN	Yellow	7030 -*	DIGESTER GAS	Yellow	7078 -*	GAS**	Yellow	7119 -*
BOILER FEED	Yellow	7031 -*	DIESEL OIL	Yellow	7079 -*	GASOLINE	Yellow	7120 -*
BOILER FEED	Green	7032 -*	DISCHARGE	Yellow	7080 -*	GLYCOL	Yellow	7121 -*
BOILER FEED WATER	Yellow	7033 -*	DISCHARGE	Green	7081 -*	GLYCOL RETURN	Yellow	7122 -*
BOILER WATER	Green	7034 -*	DISCHARGE	Green	7082 -*	GLYCOL SUPPLY	Yellow	7123 -*
BREATHING AIR	Green	7035 -*	DISTILLED WATER	Green	7083 -*	HEATING	Yellow	7124 -*
BRINE**	Green	7036 -*	DOMESTIC	Yellow	7084 -*	HEATING RETURN	Yellow	7125 -*
CARBON DIOXIDE	Yellow	7037 -*	DOMESTIC	Green	7085 -*	HEATING STEAM	Yellow	7126 -*
CARBON DIOXIDE	Red	7038 -*	DOMESTIC COLD WATER	Green	7086 -*	HEATING SUPPLY	Yellow	7127 -*
CAUSTIC	Yellow	7039 -*	DOMESTIC COLD WATER RETURN	Green	7087 -*	HEATING WATER	Yellow	7128 -*
CAUSTIC SODA	Yellow	7040 -*	DOMESTIC HOT WATER	Green	7088 -*	HEATING WATER RETURN	Yellow	7129 -*
CHEMICAL	Yellow	7041 -*	DOMESTIC HOT WATER RETURN	Green	7089 -*	HEATING WATER SUPPLY	Yellow	7130 -*
CHEMICAL FEED	Yellow	7042 -*	DOMESTIC HOT WATER	Yellow	7090 -*	HELIUM**	Green	7131 -*
CHILLED HOT WATER	Green	7043 -*	DOMESTIC HOT WATER	Yellow	7091 -*	HELIUM**	Blue	7132 -*
CHILLED WATER	Green	7044 -*	DOMESTIC HOT WATER RETURN	Yellow	7092 -*	HIGH PRESSURE	Yellow	7133 -*
CHILLED WATER RETURN	Green	7045 -*	DOMESTIC HOT WATER	Yellow	7093 -*	HIGH PRESSURE AIR	Yellow	7134 -*
CHILLED WATER SUPPLY	Green	7046 -*	DOMESTIC HOT WATER RETURN	Yellow	7094 -*			

96 PIPE MARKERS

Markers meet or exceed the requirements of the ASME (ANSI) A13.1 Standard for the identification of piping system contents when used with Directional Flow Arrow Tape (sold separately pg. 104) See Comments

Durable B-946 material ideal for indoor and outdoor environments
Markers supplied on a coated backing material that makes handling and installation easy

Marker ends should be banded with Brady Directional Flow Arrow Tape (sold separately on page 104) to indicate pipe content flow direction

Available in four styles

Choose from more than 200 of this drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents

Custom Self-Sticking Vinyl Pipe markers are also available.

Brass Valve Tags sold on pg. 115.

Self-Sticking Vinyl Pipe Markers

SEP 21 2010

Legend	Background Color	Catalog No.	Legend	Background Color	Catalog No.	Legend	Background Color	Catalog No.
RESSURE AIR	Green	7138 -*	MEDIUM PRESSURE NATURAL GAS	Yellow	7190 -*	SANITARY VENT	Yellow	7252 -*
RESSURE KENSATE	Yellow	7137 -*	MEDIUM PRESSURE STEAM	Yellow	7191 -*	SANITARY WASTE	Yellow	7253 -*
RESSURE GAS	Yellow	7138 -*	MILL AIR	Blue	7192 -*	SEAL WATER	Yellow	7254 -*
RESSURE RAL GAS	Yellow	7139 -*	MIXED WATER	Green	7193 -*	SECONDARY	Green	7255 -*
RESSURE NITROGEN	Yellow	7140 -*	MIXED GAS	Yellow	7194 -*	SERVICE AIR	Yellow	7256 -*
RESSURE STEAM	Yellow	7141 -*	MURATIC ACID	Yellow	7195 -*	SERVICE WATER	Green	7257 -*
RESSURE WATER	Yellow	7142 -*	NATURAL GAS	Yellow	7196 -*	SEWAGE	Yellow	7258 -*
TEMPERATURE	Yellow	7143 -*	NITRIC ACID	Yellow	7197 -*	SEWER	Green	7259 -*
WATER	Yellow	7144 -*	NITROGEN	Green	7198 -*	SLUDGE	Yellow	7260 -*
IS	Yellow	7145 -*	NITROGEN	Blue	7200 -*	SLURRY	Yellow	7261 -*
WATER	Yellow	7146 -*	NITROUS OXIDE	Yellow	7202 -*	SODIUM CHLORATE	Yellow	7262 -*
WATER	Yellow	7147 -*	NON-POTABLE WATER	Yellow	7203 -*	SODIUM HYDROXIDE	Yellow	7263 -*
WATER	Yellow	7148 -*	ON**	Yellow	7204 -*	SODIUM HYPOCHLORITE	Yellow	7264 -*
WATER	Yellow	7149 -*	OUTLET	Green	7205 -*	SOFT WATER	Green	7265 -*
WATER	Yellow	7150 -*	OUTSIDE AIR	Blue	7206 -*	SOLVENT	Yellow	7266 -*
WATER	Yellow	7151 -*	OVERFLOW	Yellow	7207 -*	SPRINKLER	Red	7267 -*
WATER	Yellow	7152 -*	OXYGEN**	Yellow	7208 -*	SPRINKLER FIRE	Red	7268 -*
WATER	Yellow	7153 -*	OXYGEN**	Blue	7209 -*	SPRINKLER WATER	Red	7269 -*
WATER	Yellow	7154 -*	OXYGEN**	Yellow	7210 -*	STEAM**	Yellow	7270 -*
WATER	Yellow	7155 -*	PLANT AIR	Blue	7211 -*	STEAM RETURN	Yellow	7271 -*
WATER	Yellow	7156 -*	PLANT WATER	Yellow	7212 -*	STEAM SUPPLY	Yellow	7272 -*
WATER	Yellow	7157 -*	PLUMBING VENT	Green	7213 -*	STORM DRAIN	Green	7273 -*
WATER	Yellow	7158 -*	POLYMER	Yellow	7214 -*	STORM SEWER	Green	7274 -*
WATER	Yellow	7159 -*	POTABLE	White	7215 -*	STORM WATER	Green	7275 -*
WATER	Yellow	7160 -*	POTABLE WATER	Green	7216 -*	SUCTION	Yellow	7276 -*
WATER	Yellow	7161 -*	POTABLE WATER	Yellow	7217 -*	SULFUR DIOXIDE	Yellow	7277 -*
WATER	Yellow	7162 -*	POTABLE WATER	Green	7218 -*	SULFUR DIOXIDE LIQUID	Yellow	7278 -*
WATER	Yellow	7163 -*	POTABLE WATER	Yellow	7219 -*	SULFURIC ACID	Yellow	7279 -*
WATER	Yellow	7164 -*	PRIMARY	Yellow	7220 -*	SUMP PUMP DISCHARGE	Yellow	7280 -*
WATER	Yellow	7165 -*	PRIMARY	Green	7221 -*	SUPPLY**	Blue	7281 -*
WATER	Yellow	7166 -*	PRIMARY SLUDGE	Green	7222 -*	SUPPLY**	Green	7282 -*
WATER	Yellow	7167 -*	PROCESS	Brown	7223 -*	SUPPLY**	Yellow	7283 -*
WATER	Yellow	7168 -*	PROCESS WATER	Yellow	7224 -*	TEMPERED WATER	Yellow	7284 -*
WATER	Yellow	7169 -*	PROCESSED WATER	Green	7225 -*	TOWER	Yellow	7285 -*
WATER	Yellow	7170 -*	PROCESSED WATER	Green	7226 -*	TOWER WATER	Green	7286 -*
WATER	Yellow	7171 -*	PROPANE GAS	Yellow	7227 -*	TOWER WATER RETURN	Green	7287 -*
WATER	Yellow	7172 -*	PULP	Yellow	7228 -*	TOWER WATER SUPPLY	Green	7288 -*
WATER	Yellow	7173 -*	RAIN WATER	Yellow	7229 -*	TRANSFER	Yellow	7289 -*
WATER	Yellow	7174 -*	RAW WATER	Green	7230 -*	TREATED WATER	Green	7290 -*
WATER	Yellow	7175 -*	RAW WATER	Yellow	7231 -*	UNSAFE WATER	Yellow	7291 -*
WATER	Yellow	7176 -*	RECHLORINATED	Yellow	7232 -*	VACUUM**	Yellow	7292 -*
WATER	Yellow	7177 -*	RECOVERY	Yellow	7233 -*	VACUUM**	Green	7293 -*
WATER	Yellow	7178 -*	REFRIGERANT DISCHARGE	Yellow	7234 -*	VALVE	Yellow	7294 -*
WATER	Yellow	7179 -*	REFRIGERANT LIQUID	Yellow	7235 -*	VAPOR**	Yellow	7295 -*
WATER	Yellow	7180 -*	REFRIGERANT SUCTON	Yellow	7236 -*	VENT**	Yellow	7296 -*
WATER	Yellow	7181 -*	REFRIGERATED WATER	Green	7237 -*	VENT**	Green	7297 -*
WATER	Yellow	7182 -*	REFRIGERATION	Green	7238 -*	VENT**	Blue	7298 -*
WATER	Yellow	7183 -*	RELIEF	Yellow	7239 -*	WASTE	Yellow	7299 -*
WATER	Yellow	7184 -*	RELIEF AIR	Blue	7240 -*	WASTE	Green	7300 -*
WATER	Yellow	7185 -*	RETURN**	Blue	7241 -*	WASTE ACTIVATED SLUDGE	Yellow	7301 -*
WATER	Yellow	7186 -*	RETURN**	Green	7242 -*	WASTE WATER	Green	7302 -*
WATER	Yellow	7187 -*	RETURN**	Red	7243 -*	WASTE WATER	Yellow	7303 -*
WATER	Yellow	7188 -*	RETURN**	Yellow	7244 -*	WATER**	Yellow	7304 -*
WATER	Yellow	7189 -*	RETURN**	Yellow	7245 -*	WATER**	Green	7305 -*
WATER	Yellow	7190 -*	RETURN**	Yellow	7246 -*	WELL WATER	Green	7306 -*
WATER	Yellow	7191 -*	RETURN**	Yellow	7247 -*	WHITE WATER	Yellow	7307 -*
WATER	Yellow	7192 -*	RETURN**	Yellow	7248 -*	WHITE WATER	Yellow	7308 -*
WATER	Yellow	7193 -*	RETURN**	Yellow	7249 -*	WHITE WATER	Yellow	7309 -*
WATER	Yellow	7194 -*	RETURN**	Yellow	7250 -*	WHITE WATER	Yellow	7310 -*
WATER	Yellow	7195 -*	RETURN**	Yellow	7251 -*	WHITE WATER	Yellow	7311 -*
WATER	Yellow	7196 -*	RETURN**	Yellow	7252 -*	WHITE WATER	Yellow	7312 -*
WATER	Yellow	7197 -*	RETURN**	Yellow	7253 -*	WHITE WATER	Yellow	7313 -*
WATER	Yellow	7198 -*	RETURN**	Yellow	7254 -*	WHITE WATER	Yellow	7314 -*
WATER	Yellow	7199 -*	RETURN**	Yellow	7255 -*	WHITE WATER	Yellow	7315 -*
WATER	Yellow	7200 -*	RETURN**	Yellow	7256 -*	WHITE WATER	Yellow	7316 -*
WATER	Yellow	7201 -*	RETURN**	Yellow	7257 -*	WHITE WATER	Yellow	7317 -*
WATER	Yellow	7202 -*	RETURN**	Yellow	7258 -*	WHITE WATER	Yellow	7318 -*
WATER	Yellow	7203 -*	RETURN**	Yellow	7259 -*	WHITE WATER	Yellow	7319 -*
WATER	Yellow	7204 -*	RETURN**	Yellow	7260 -*	WHITE WATER	Yellow	7320 -*
WATER	Yellow	7205 -*	RETURN**	Yellow	7261 -*	WHITE WATER	Yellow	7321 -*
WATER	Yellow	7206 -*	RETURN**	Yellow	7262 -*	WHITE WATER	Yellow	7322 -*
WATER	Yellow	7207 -*	RETURN**	Yellow	7263 -*	WHITE WATER	Yellow	7323 -*
WATER	Yellow	7208 -*	RETURN**	Yellow	7264 -*	WHITE WATER	Yellow	7324 -*
WATER	Yellow	7209 -*	RETURN**	Yellow	7265 -*	WHITE WATER	Yellow	7325 -*
WATER	Yellow	7210 -*	RETURN**	Yellow	7266 -*	WHITE WATER	Yellow	7326 -*
WATER	Yellow	7211 -*	RETURN**	Yellow	7267 -*	WHITE WATER	Yellow	7327 -*
WATER	Yellow	7212 -*	RETURN**	Yellow	7268 -*	WHITE WATER	Yellow	7328 -*
WATER	Yellow	7213 -*	RETURN**	Yellow	7269 -*	WHITE WATER	Yellow	7329 -*
WATER	Yellow	7214 -*	RETURN**	Yellow	7270 -*	WHITE WATER	Yellow	7330 -*
WATER	Yellow	7215 -*	RETURN**	Yellow	7271 -*	WHITE WATER	Yellow	7331 -*
WATER	Yellow	7216 -*	RETURN**	Yellow	7272 -*	WHITE WATER	Yellow	7332 -*
WATER	Yellow	7217 -*	RETURN**	Yellow	7273 -*	WHITE WATER	Yellow	7333 -*
WATER	Yellow	7218 -*	RETURN**	Yellow	7274 -*	WHITE WATER	Yellow	7334 -*
WATER	Yellow	7219 -*	RETURN**	Yellow	7275 -*	WHITE WATER	Yellow	7335 -*
WATER	Yellow	7220 -*	RETURN**	Yellow	7276 -*	WHITE WATER	Yellow	7336 -*
WATER	Yellow	7221 -*	RETURN**	Yellow	7277 -*	WHITE WATER	Yellow	7337 -*
WATER	Yellow	7222 -*	RETURN**	Yellow	7278 -*	WHITE WATER	Yellow	7338 -*
WATER	Yellow	7223 -*	RETURN**	Yellow	7279 -*	WHITE WATER	Yellow	7339 -*
WATER	Yellow	7224 -*	RETURN**	Yellow	7280 -*	WHITE WATER	Yellow	7340 -*
WATER	Yellow	7225 -*	RETURN**	Yellow	7281 -*	WHITE WATER	Yellow	7341 -*
WATER	Yellow	7226 -*	RETURN**	Yellow	7282 -*	WHITE WATER	Yellow	7342 -*
WATER	Yellow	7227 -*	RETURN**	Yellow	7283 -*	WHITE WATER	Yellow	7343 -*
WATER	Yellow	7228 -*	RETURN**	Yellow	7284 -*	WHITE WATER	Yellow	7344 -*
WATER	Yellow	7229 -*	RETURN**	Yellow	7285 -*	WHITE WATER	Yellow	7345 -*
WATER	Yellow	7230 -*	RETURN**	Yellow	7286 -*	WHITE WATER	Yellow	7346 -*
WATER	Yellow	7231 -*	RETURN**	Yellow	7287 -*	WHITE WATER	Yellow	7347 -*
WATER	Yellow	7232 -*	RETURN**	Yellow	7288 -*	WHITE WATER	Yellow	7348 -*
WATER	Yellow	7233 -*	RETURN**	Yellow	7289 -*	WHITE WATER	Yellow	7349 -*
WATER	Yellow	7234 -*	RETURN**	Yellow	7290 -*	WHITE WATER	Yellow	7350 -*
WATER	Yellow	7235 -*	RETURN**	Yellow	7291 -*	WHITE WATER	Yellow	7351 -*
WATER	Yellow	7236 -*	RETURN**	Yellow	7292 -*	WHITE WATER	Yellow	7352 -*
WATER	Yellow	7237 -*	RETURN**	Yellow	7293 -*	WHITE WATER	Yellow	7353 -*
WATER	Yellow	7238 -*	RETURN**	Yellow	7294 -*	WHITE WATER	Yellow	7354 -*
WATER	Yellow	7239 -*	RETURN**	Yellow	7295 -*	WHITE WATER	Yellow	7355 -*
WATER	Yellow	7240 -*	RETURN**	Yellow	7296 -*	WHITE WATER	Yellow	7356 -*
WATER	Yellow	7241 -*	RETURN**	Yellow	7297 -*	WHITE WATER	Yellow	7357 -*
WATER	Yellow	7242 -*	RETURN**	Yellow	7298 -*	WHITE WATER	Yellow	7358 -*
WATER	Yellow	7243 -*	RETURN**	Yellow	7299 -*	WHITE WATER	Yellow	7359 -*
WATER	Yellow	7244 -*	RETURN**	Yellow	7300 -*	WHITE WATER	Yellow	7360 -*
WATER	Yellow	7245 -*	RETURN**	Yellow	7301 -*	WHITE WATER	Yellow	7361 -*
WATER	Yellow	7246 -*	RETURN**	Yellow	7302 -*	WHITE WATER	Yellow	7362 -*
WATER	Yellow	7247 -*	RETURN**	Yellow	7303 -*	WHITE WATER	Yellow	7363 -*
WATER	Yellow	7248 -*	RETURN**	Yellow	7304 -*	WHITE WATER	Yellow	7364 -*
WATER	Yellow	7249 -*	RETURN**	Yellow	7305 -*	WHITE WATER	Yellow	7365 -*
WATER	Yellow	7250 -*	RETURN**	Yellow	7306 -*	WHITE WATER	Yellow	7366 -*
WATER	Yellow	7251 -*	RETURN**	Yellow	7307 -*	WHITE WATER	Yellow	7367 -*
WATER	Yellow	7252 -*	RETURN**	Yellow	7308 -*	WHITE WATER	Yellow	7368 -*
WATER	Yellow	7253 -*	RETURN**	Yellow	7309 -*	WHITE WATER	Yellow	7369 -*
WATER	Yellow	7254 -*	RETURN**	Yellow	7310 -*	WHITE WATER	Yellow	7370 -*
WATER	Yellow	7255 -*	RETURN**	Yellow	7311 -*	WHITE WATER	Yellow	7371 -*
WATER	Yellow	7256 -*	RETURN**	Yellow	7312 -*	WHITE WATER	Yellow	7372 -*
WATER	Yellow	7257 -*	RETURN**	Yellow	7313 -*	WHITE WATER	Yellow	7373 -*
WATER	Yellow	7258 -*	RETURN**	Yellow	7314 -*	WHITE WATER	Yellow	7374 -*
WATER	Yellow	7259 -*	RETURN**	Yellow	7315 -*	WHITE WATER	Yellow	7375 -*
WATER	Yellow	7260 -*	RETURN**	Yellow	7316 -*	WHITE WATER	Yellow	7376 -*
WATER	Yellow	7261 -*	RETURN**	Yellow	7317 -*	WHITE WATER	Yellow	7377 -*
WATER	Yellow	7262 -*	RETURN**	Yellow	7318 -*	WHITE WATER	Yellow	7378 -*
WATER	Yellow	7263 -*	RETURN**	Yellow	7319 -*	WHITE WATER	Yellow	7379 -*
WATER	Yellow	7264 -*	RETURN**	Yellow	7320 -*	WHITE WATER	Yellow	7380 -*
WATER	Yellow	7265 -*	RETURN**	Yellow	7321 -*	WHITE WATER	Yellow	7381 -*
WATER	Yellow	7266 -*	RETURN**	Yellow	7322 -*	WHITE WATER	Yellow	7382 -*
WATER	Yellow	7267 -*	RETURN**	Yellow	7323 -*	WHITE WATER	Yellow	7383 -*
WATER	Yellow	7268 -*	RETURN**	Yellow	7324 -*	WHITE WATER	Yellow	7384 -*
WATER	Yellow	7269 -*	RETURN**	Yellow	7325 -*	WHITE WATER	Yellow	7385 -*
WATER	Yellow	7270 -*	RETURN**	Yellow	7326 -*	WHITE WATER	Yellow	7386 -*
WATER	Yellow	7271 -*	RETURN**	Yellow	7327 -*	WHITE WATER	Yellow	7387 -*
WATER	Yellow	7272 -*	RETURN**	Yellow	7328 -*	WHITE WATER	Yellow	7388 -*
WATER	Yellow	7273 -*	RETURN**	Yellow	7329 -*	WHITE WATER	Yellow	7389 -*
WATER	Yellow	7274 -*	RETURN**	Yellow	7330 -*	WHITE WATER	Yellow	7390 -*
WATER	Yellow	7275 -*	RETURN**	Yellow	7331 -*	WHITE WATER	Yellow	7391 -*
WATER	Yellow	7276 -*	RETURN**	Yellow	7332 -*	WHITE WATER	Yellow	7392 -*
WATER	Yellow	7277 -*	RETURN**	Yellow	7333 -*	WHITE WATER	Yellow	7393 -*
WATER	Yellow	7278 -*	RETURN**	Yellow	7334 -*	WHITE WATER	Yellow	7394 -*
WATER	Yellow	7279 -*	RETURN**	Yellow	7335 -*	WHITE WATER	Yellow	7395 -*
WATER	Yellow	7280 -*	RETURN**	Yellow	7336 -*	WHITE WATER	Yellow	7396 -*
WATER	Yellow	7281 -*	RETURN**	Yellow	7337 -*	WHITE WATER	Yellow	7397 -*
WATER	Yellow	7282 -*	RETURN**	Yellow	7338 -*	WHITE WATER	Yellow	7398 -*
WATER	Yellow	7283 -*	RETURN**	Yellow	7339 -*	WHITE WATER	Yellow	7399 -*
WATER	Yellow	7284 -*	RETURN**	Yellow	7340 -*	WHITE WATER	Yellow	7400 -*
WATER	Yellow	7285 -*	RETURN**	Yellow	7341 -*	WHITE WATER	Yellow	7401 -*
WATER	Yellow	7286 -*	RETURN**	Yellow	7342 -*	WHITE WATER	Yellow	7402 -*
WATER	Yellow	7287 -*	RETURN**	Yellow	7343 -*	WHITE WATER	Yellow	7403 -*
WATER	Yellow	7288 -*	RETURN**	Yellow	7344 -*	WHITE WATER	Yellow	7404 -*
WATER	Yellow	7289 -*	RETURN**	Yellow	7345 -*	WHITE WATER	Yellow	7405 -*
WATER	Yellow	7290 -*	RETURN**	Yellow	7346 -*	WHITE WATER	Yellow	7406 -*
WATER	Yellow	7291 -*	RETURN**	Yellow	7347 -*	WHITE WATER	Yellow	7407 -*
WATER	Yellow	7292 -*	RETURN**	Yellow	7348 -*	WHITE WATER	Yellow	7408 -*
WATER	Yellow	7293 -*	RETURN**	Yellow	7349 -*	WHITE WATER	Yellow	7409 -*
WATER	Yellow	7294 -*	RETURN**	Yellow	7350 -*			

Pipe Banding Tapes



Solid Color Pipe Banding Tape provides 360° visibility to improve safety and operational efficiency.

Solid Color Pipe Banding Tape

- Durable B-946 material withstands the elements indoors or out
- Provides 360° visibility
- Meets ASME color field size recommendation when used in combination with worded legends and directional flow arrows
- Supplied in liner-mounted rolled form
- Three roll widths available in your choice of 11 colors
- Use two bands per marker

Custom Pipe Banding Tape colors and sizes are also available. Contact your local Signmark Distributor for more information.

CUSTOMIZE

Roll Calculation Guide

Use to determine the number of rolls of Arrow or Banding Tape required for your job.

Pipe Diameter	Number of Color Bands Per Roll
1"	260
2"	150
3"	100
4"	80
5"	60
6"	50
7"	40
8"	35
9"	30
10"	30

Description	Price Per Roll
1" x 30 yds	\$ 28.75
2" x 30 yds	\$ 51.80
4" x 30 yds	\$101.40

PIPE MARKERS

Roll Size	Yellow	Green	Red	Blue	Orange	White	Brown	Black	Gray	Purple	Clear
1" x 30 yds	36301	36304	36302	36303	91428	91429	36305	36306	36307	36308	36309
2" x 30 yds	65280	65283	65281	65282	91430	91481	36310	36311	36312	36313	36314
4" x 30 yds	36287	36290	36288	36289	91432	91433	36315	36316	36317	36318	36319

Directional Flow Arrow Tape

- Durable B-946 material withstands the elements indoors or out
- Provides 360° visibility
- Supplied in liner-mounted rolled form - use two bands per marker
- Three roll widths available in your choice of nine color combinations



Banding pipes with Directional Flow Arrow Tape can enhance safety and improve operating efficiency.

Roll Calculation Guide

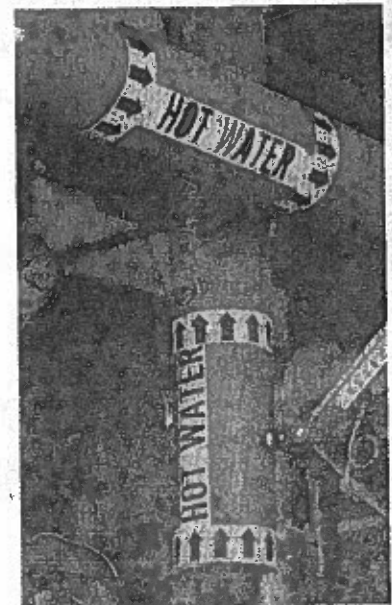
Use to determine the number of rolls of Arrow or Banding Tape required for your job.

Pipe Diameter	Number of Color Bands Per Roll
1"	260
2"	150
3"	100
4"	80
5"	60
6"	50
7"	40
8"	35
9"	30
10"	30

Description	Price Per Roll
1" x 30 yds	\$ 30.85
2" x 30 yds	\$ 59.25
4" x 30 yds	\$111.95

Custom Arrow Tape colors and sizes are also available. Contact your local Signmark Distributor for more information.

CUSTOMIZE



Secure Self-Sticking Vinyl Pipe Markers with Arrow Tape to identify flow direction and reinforce color coding.

Roll Size	Black/Yellow	White/Green	White/Red	White/Blue	Black/Green	Black/White	Black/Orange	Black/Gray	Arrows Per Roll
1" x 30 yds	91424	91425	91426	91427	91412	91413	91414	91415	1440
2" x 30 yds	91420	91421	91422	91423	91416	91417	91418	91419	720
4" x 30 yds	91287	91290	91288	91289	91408	91409	91410	91411	270

104 PIPE MARKERS

WOOD BANANI BOUTHILLETTE PARIZEAU INC		
Reviewed 	Reviewed with Comments	Resubmit! See Comments

Sanikiluaq Truck Fill Station Identification Tag Schedule

SEP 21 2010

TAG	SYSTEM	DESCRIPTION
MBV-F	PROCESS WATER	MOTORIZED BUTTERFLY VALVE, 4"NS
MBV-N	PROCESS WATER	MOTORIZED BUTTERFLY VALVE, 4"NS
FS-1	PROCESS WATER	FLOW SWITCH, 1"NPT
FS-2	PROCESS WATER	FLOW SWITCH, 1"NPT
FS-3	PROCESS WATER	FLOW SWITCH, 1"NPT
S-PUR	PROCESS WATER	SOLENOID VALVE, 1 1/2"NS
S-DWT	PROCESS WATER	SOLENOID VALVE, 3/4"NS
DWP-01	DOMESTIC WATER	DOMESTIC WATER PUMP, 1/2"
DWT-01	DOMESTIC WATER	DOMESTIC WATER TANK
WH-01	DOMESTIC WATER	DOMESTIC WATER HEATER
SP-01	WASTE WATER	SUMP PUMP 01
SP-02	WASTE WATER	SUMP PUMP 02
F-01	PROCESS WATER	FILTER HOUSING
F-02	PROCESS WATER	FILTER HOUSING
F-03	PROCESS WATER	FILTER HOUSING
F-04	PROCESS WATER	FILTER HOUSING
CC-01	CHEMICAL FEED	CHLORINE CONTROLLER NO. 1
CC-02	CHEMICAL FEED	CHLORINE CONTROLLER NO. 2
CC-03	CHEMICAL FEED	CHLORINE CONTROLLER NO. 3
CMP-01	CHEMICAL FEED	CHEMICAL METERING PUMP NO. 1
CMP-02	CHEMICAL FEED	CHEMICAL METERING PUMP NO. 2
CMP-03	CHEMICAL FEED	CHEMICAL METERING PUMP NO. 3
CMP-04	CHEMICAL FEED	CHEMICAL METERING PUMP NO. 4
CMP-05	CHEMICAL FEED	CHEMICAL METERING PUMP NO. 5
CST-01	CHEMICAL FEED	CHEMICAL STORAGE TANK
CMT-01	CHEMICAL FEED	CHEMICAL MIXING TANK
FP-01	FUEL	FUEL PUMP NO. 1
FP-02	FUEL	FUEL PUMP NO. 2
FST-01	FUEL	FUEL STORAGE TANK
DT-01	FUEL	FUEL DAY TANK
DPS-01	FUEL	FUEL CONTROL PANEL
GDP-01	GAS DETECTION	GAS DETECTION PANEL
EH-01	UNIT HEATER	GENERATOR ROOM UNIT HEATER
ERV-01	VENTILATION	ENERGY RECOVERY VENTILATOR
EF-01	VENTILATION	EXHAUST AIR FAN
UH-01	UNIT HEATER	MECHANICAL ROOM UNIT HEATER
G-1	GENERATOR	DIESEL GENERATOR
LS-01	CONTROL SENSOR	FST-01 TANK LEVEL SENSOR
LS-02	CONTROL SENSOR	DT-01 TANK LEVEL SENSOR
TLM-01	LEVEL GAUGE	FST-01 TANK LEVEL GAUGE
TLG-01	LEVEL GAUGE	FST-01 TANK LEVEL GAUGE ON TANK
TLG-02	LEVEL GAUGE	DT-01 TANK LEVEL GAUGE
LD-01	LEAK DETECTION SENSOR	FST-01 TANK LEAK DETECTION SENSOR
LD-02	LEAK DETECTION SENSOR	DT-01 TANK LEAK DETECTION SENSOR

This review of this drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.

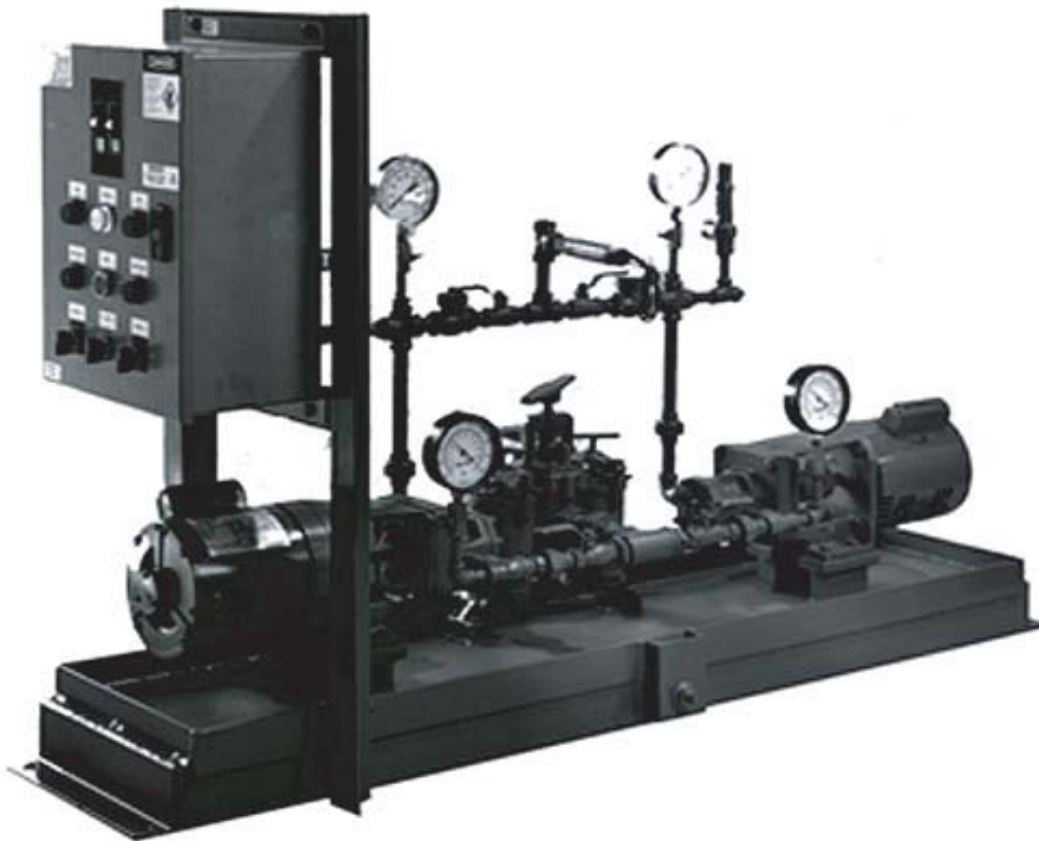
**ORIGINAL SIGNED BY
CLEMENT BOURGOGNE**

Note: Plastic tags with 12 mm stamped code lettering and numbers filled with black paint.



ALBANY FUEL OIL PUMP PACKAGES

START UP INSTRUCTIONS



420 HARRY WALKER PARKWAY, NEWMARKET, ONTARIO. L3Y 8P5
Telephone 888-334-3348 Fax 888-335-3391
www.albanypump.com / e-mail: sales@albanypump.com

INTRODUCTION

- 1) All Pump sets are supplied with Albany Helical Gear Pumps. As positive displacement pumps they will displace a definite amount of liquid with each revolution and produce a discharge pressure equivalent to the conditions of the particular installation.
- 2) Albany Gear pumps are self priming and capable of operating up to 25 ft. suction lift based on fuel oil at 70 F. If the static lift plus pipe friction losses combine to exceed this figure, pump operation will be erratic or no pumping at all will be realized.
- 3) It is particularly important that the suction line be air tight. Use a good pipe joint compound or tape at all joints. If the suction line is not tight and air is allowed to enter the pump capacity will be noticeably reduced or it may not pump at all.

FOR ALL PUMP SETS

- 1) Connect the Suction and Discharge lines to the pump set (see drawing).
- 2) Connect suitably sized piping to the relief valve outlet and run to the main storage tank or the main return line (see drawing).
- 3) **Note:** All gauges are shipped with the unit but are PACKAGED SEPARATELY in a box marked "GAUGES". DO NOT install any gauge until the motors are properly wired and the proper pump rotation has been set (see below).
- 4) Confirm that motors are properly WIRED to their CORRECT VOLTAGE.

FOR DUPLEX PUMP SETS

This pump set is fitted with either a Duplex Basket Strainer OR a Three Way Diverting Valve located in inlet piping (see drawing).

a) For Duplex Basket Strainer:

This valve is designed so that the strainer screen can be removed from one side (or the other) while the pump set is in operation. When the pump set is operating, the handle must be positioned to one side or the other.

b) For Three Way Ball Valve:

This valve is labeled with the various flow directions available. Set this 3 way valve so that the directional arrows indicate a flow to both pumps. To service strainers, position the handle to divert flow away from strainer to be cleaned.

CHECKING ROTATION

Open all hand valves. Briefly jog Pump #1 and then Pump #2 to confirm that the ROTATION corresponds to the directional ARROWS on the pumps. If required, change the wiring for correct rotation. (See wiring diagram on the motor).

PRIMING THE PUMPS

CLOSE the hand valves on both sides of Pump #2 and CLOSE all gauge cocks. Start Pump #1 and operate until the system is completely primed and all air has been purged from the pump and suction piping. NOTE: to assist in priming loosen the plug in the tee located at the base of the relief valve. When the pump is fully primed the oil escaping from the plug will be clear in color (not milky). Tighten the plug. Repeat for pump #2.

INSTALLING THE GAUGES

The pump set is tagged with labels indicating “VACUUM” and “PRESSURE”. Install vacuum and pressure gauges into their proper locations. OPEN all VALVE COCKS. NOTE: DO NOT tighten gauges using the gauge housing. DO tighten gauges with a suitable wrench using the hex stem located at the bottom of the gauge.

SETTING THE RELIEF VALVES

The Relief Valves supplied on the unit must be SET at time of installation. To set, remove the acorn nut covering the adjusting screw, loosen the lock nut and back the screw off (ccw). With Pump #1 running tighten the screw until the gauge pressure no longer rises. The gauge pressure showing will then be the required “system working pressure”. Next loosen the adjusting screw until the gauge pressure falls slightly below the “system working pressure”. Carefully close the discharge valve for Pump #1. Further adjust the relief valve screw until the “shut off” pressure is approximately 20 percent higher than the “system working pressure”. Replace the lock nut and acorn nut with gasket.

Stop Pump #1 and close all corresponding suction and discharge valves.

Open the suction and discharge valves for Pump #2 and START PUMP. Prime Pump #2 as per instructions above (PRIMING THE PUMPS).

Adjust relief valve for Pump #2 as per instructions for valve #1.

Upon completion open all hand valves.

FOR SIMPLEX PUMP SETS

Follow the above instructions for Pump #1.

NOTE: Simplex pump sets do not include 3 way ball valves in the inlet piping. A simple hand valve is used. This valve must be closed or opened as per instructions.

SETTING THE PRESSURE SWITCHES

Your Albany Duplex Fuel Oil Pump Set is equipped with either a high pressure or a combination high / low pressure switch to properly protect the system. The pressure switch is installed at a common point in the discharge piping of the pump set and must be wired to the appropriate terminals in the electrical control panel (see control panel drawing). These switches become operative in the automatic mode only.

HIGH PRESSURE SWITCH

The high pressure switch is intended to stop the pump set in the event of a rise in pressure above the established normal operating pressure. This switch is wired in the normally open position and must remain so in order for the pump set to continue operating. Using the instructions supplied with the switch as a guide, set the activation point 5 to 10 psig above the normal system operating pressure. If a condition occurs in the system causing the pressure to rise, the switch contacts will close and the pumping system will stop. A fault light on the panel will serve to alert the operator. The system will REMAIN STOPPED until the system pressure falls back to normal and the MANUAL RESET on the control panel is activated.

LOW PRESSURE SWITCH

On systems with a vertical elevation greater than 50 feet, an additional Low pressure switch is used to detect a drop in pressure to something less than the established normal operating pressure. The low pressure switch contacts are wired in the normally closed position. Starting with the setting indicator below the desired actuation point, adjust the pressure upwards until the switch contacts open at a pressure approximately 5 psig below the established system working pressure. The pump set will continue to operate providing the operating pressure remains at or above the low pressure setting. If the system operating pressure falls below the low pressure setting, the switch contacts will open and the pumping system will stop. A fault light on the panel will serve to alert the operator.

In order to allow the pump set to operate on initial start up or when the system is partially empty, there are overriding timers (set at approximately 60 seconds) located in the control panel. The low pressure switch will not become effective until after the preset time has elapsed. If the lead pump timer has timed out and the system pressure is insufficient to satisfy the low pressure switch, the control will automatically stop the lead pump and start the lag pump. The lag pump will continue to operate after its timer has timed out, providing the required system pressure has been established. If the lag pump timer expires before the low pressure switch is satisfied, the system will then be shut down. (N.B. – It is our recommendation that on initial start up the system be run in the “HAND MODE” until completely filled with oil).

MAINTENANCE INSTRUCTIONS

Your Albany Fuel Oil Pump Set DOES NOT require periodic maintenance or service EXCEPT for the periodic cleaning of the Inlet Suction Strainers. Service as follows:

- a) Select the pump to be serviced first and set the control panel selector switch for that pump to the “OFF” position.
- b) Close the valve on the discharge of the pump to be serviced. Position either the 3 way suction valve handle or the Duplex Strainer handle so that the flow to the pump/ basket being serviced is closed.
- c) Remove the strainer basket and clean in a suitable solvent.
- d) Re-install the strainer basket. (Ensure that any and all o rings are suitably in place).
- e) Repeat process for second pump / basket when required.

Process and Controls Industrial (NS) Limited

3650 Hammonds Plains Road
Unit 14, Suite 130
Upper Tantallon, Nova Scotia
B3Z 4R3

processcontrols@ns.aliantzinc.ca
TEL: (902) 450-5181
FAX: (902) 450-5182

**Document Transmittal Form**

DATE: July 30, 2010
TO: Mosher Engineering
ATTENTION: Marc Losier
REFERENCE : Sanikiluaq

E-MAILED

We are sending herewith the following documents:


☐ Preliminary ☐ Resubmitted Revised
☒ For Approval ☐ For File

Document	Qty.	Description
DUP-S011667	1	Duplex Fuel Oil Package
TQ-10352-S1 1/2	1	Duplex Pump Controller
TQ-10352-SA 2/2	1	Duplex Pump Controller
	1	Jamesbury Firesafe Valves (3 Pages)
FLOATSW-4	1	Level Control Switch
LTX20	1	Diesel Fuel and Oil Level Sensor (2 Pages)
1A-25A	1	Fuel Oil Filter
TQ-5161-S1	1	Remote Alarm Panel

☒ Please Return 1 Copy of Each Approved Drawing
☐ For Your Files/Information

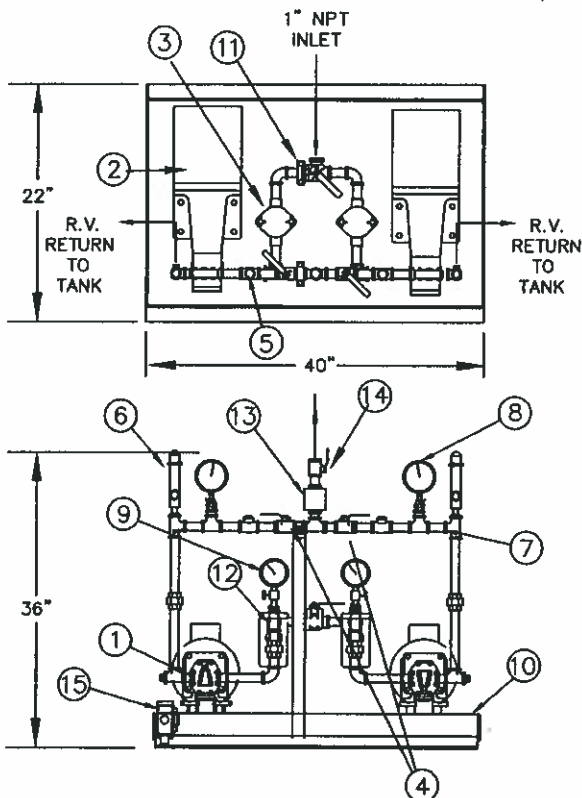

Douglas / Kevin Doyle

**ORIGINAL SIGNED BY
CLEMENT BOURGOGNE**

WOOD BANANI BOUTHILLETTE PARIZEAU INC.		
Reviewed 	Reviewed with Comments	Resubmit See Comments
AUG 03 2010		
This review of this drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.		

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CLEMENT BOURGOGNE

WOOD BAWAN CONSULTING LTD.	Reviewed	Reviewed By Equipment	Reviewed Date See Comments
AUG 03 2010			
This review of this drawing does not in any way, relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.			



CUSTOMER:
PROCESS AND CONTROLS LTD.
3650 HAMMONDS PLAINS ROAD
UNIT 14, SUITE 130
UPPER TANTALLON, NOVA SCOTIA

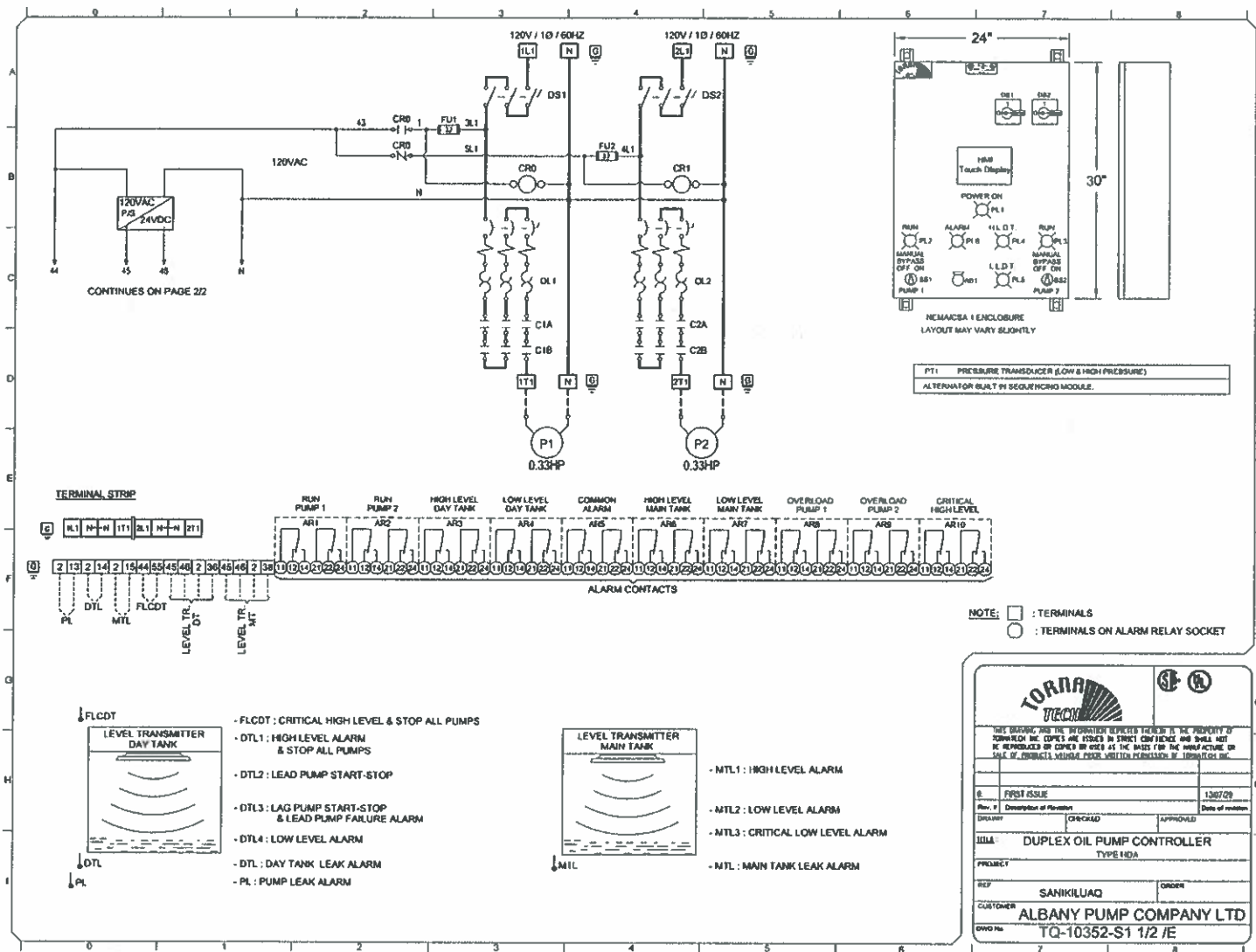
NO.	DESCRIPTION	MFG	QUAN.
1	PUMP MODEL# 03GC61312 (CW) 03GC61412 (CCW)	ALBANY	1
2	1/3 HP 120V 1PH 60HZ 1750RPM TEFC MOTOR	LEESON	2
3	1" NPT SIMPLEX BASKET STRAINER WITH 60 MESH S.S. SCREEN	ALBANY	2
4	BALL VALVE 1/2" NPT		2
5	CHECK VALVE 1/2" NPT		2
6	RELIEF VALVE 3/8" NPT	FULFLO	2
7	ALL 1/2" NPT PIPING EXCEPT RELIEF VALVE (3/8" NPT)	—	—
8	PRESSURE GAUGE 4" DIA. 0-100 PSI		2
9	COMPOUND VACUUM GAUGE 30"-0-30 PSI 4" DIA.		2
10	FABRICATED STEEL DRIP TRAY WITH 2" DRIP LIP	—	1
11	3/4" 3 WAY DIVERTER BALL VALVE	RUBBER-TIERIE	1
12	IN LINE CHECK VALVE		1
13	COMBINATION HIGH / LOW PRESSURE SWITCH	ASCO	1
14	BALL VALVE 3/4" NPT		1
15	LEAK DETECTION SWITCH		1

UNIT ADHERES TO CSA0B1390N-06
JOB REF. SANIKILUAQ
LIQUID NO.2 FUEL OIL
ELEVATION 60 KPA
CAPACITY 3.8 L/M

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ALBANY PUMP CO. LTD.	
DRWN. DAK	420 HARRY WALKER PARKWAY
DATE 7/29/2010	NEWMARKET, ONT. CANADA L3Y 8P5
SCALE NONE	DUPLEX FUEL OIL PKG.
CHK'D -	DRWG# DUP-S011667

APPROVALS



WOOD BANANI BOUTHELLETT & ASSOCIATES

Reviewed ☒

Reviewed with Comments ☐

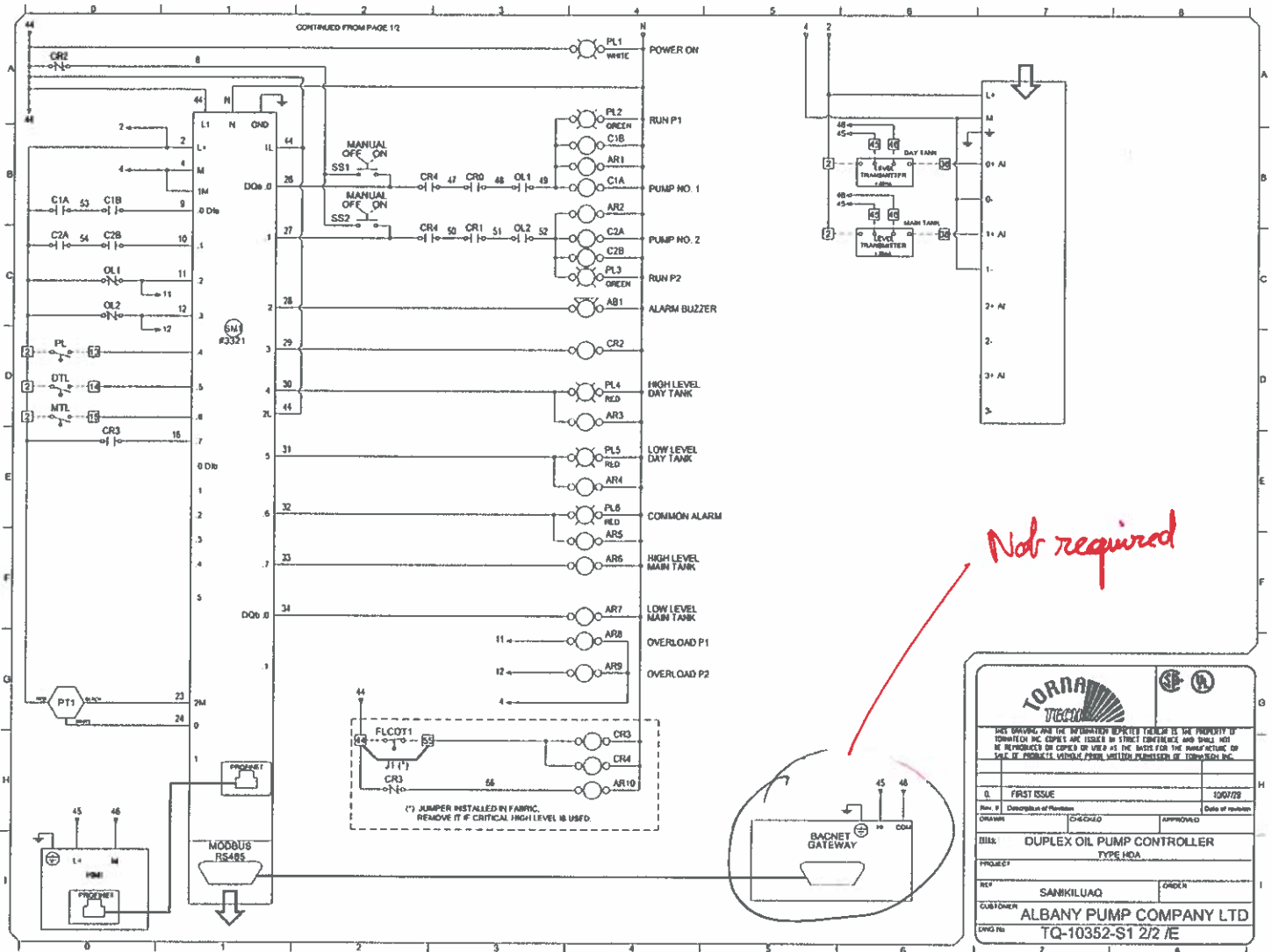
Reviewed ☐

AUG 03 2010

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AUG 03 2010

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EMERGENCY SHUTOFF AND FIRESAFE VALVES FIGURE 1075

The Jamesbury® brand FM (Factory Mutual) approved Emergency Shutoff and Firesafe Valves Figure 1075 are manual assemblies consisting of the Jamesbury Fire-Tite® valves and the Jamesbury Torq Handles®. These assemblies provide automatic closure of a normally open valve in the event of a fire or excessive temperature. These assemblies are used for all types of media including flammable gases, liquids, and toxic fluids.

Figure 1075 assemblies carry FM approval as Firesafe Valves, specifically designed for flammable liquid service. To meet the requirements of this category, the Jamesbury Fire-Tite valves have been tested and qualified to resist direct exposure typical of uncontrolled fire for at least 15 minutes.

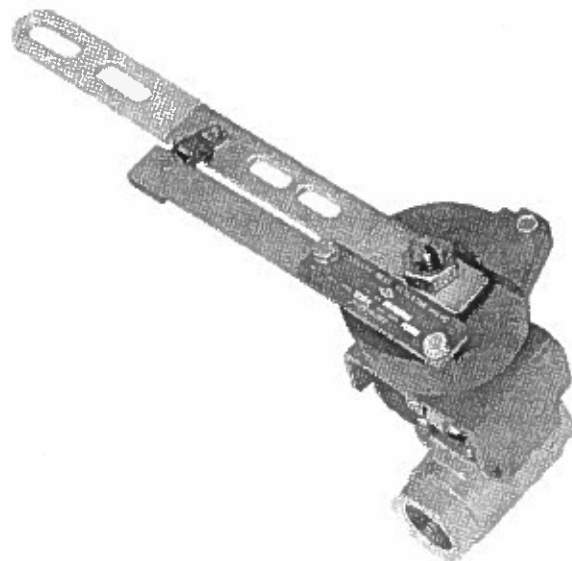
Included in the line of Figure 1075 Emergency Shutoff Valve assemblies are 1/2"-1" (DN 15-25) Series 7150 flanged ball valves and 1"-2" (DN 25-50) Eliminator Series screwed-end ball valves equipped with Torq-Handle spring-return handles and a choice of fusible links for specific temperature requirements.

FEATURES

- Automatic closure in the event of a fire.
- FM approved for Emergency Shutoff service.
- FM approved as Firesafe Valves for flammable liquid service.
- Quarter-turn operation for quick shutoff in the event of an emergency.
- Flexible-lip seat design for reliable long-lasting sealing.
- PTFE seats and seals for easy cycling, even when operated infrequently.

ACCESSORIES

Limit switches can be provided for remote indication of valve position or for various electrical interlocks. Switch arrangements available with these assemblies are:



Switch Ratings in Amperes		
Voltage	QZM2VB1DSS (SPDT)	QZM14B1DSS (DPDT)
125V AC	10	4.5
250V AC	10	4.5
125V DC	.50*	—

* Not recommended for electrical circuits operating at less than 20mA @ 24 VDC.

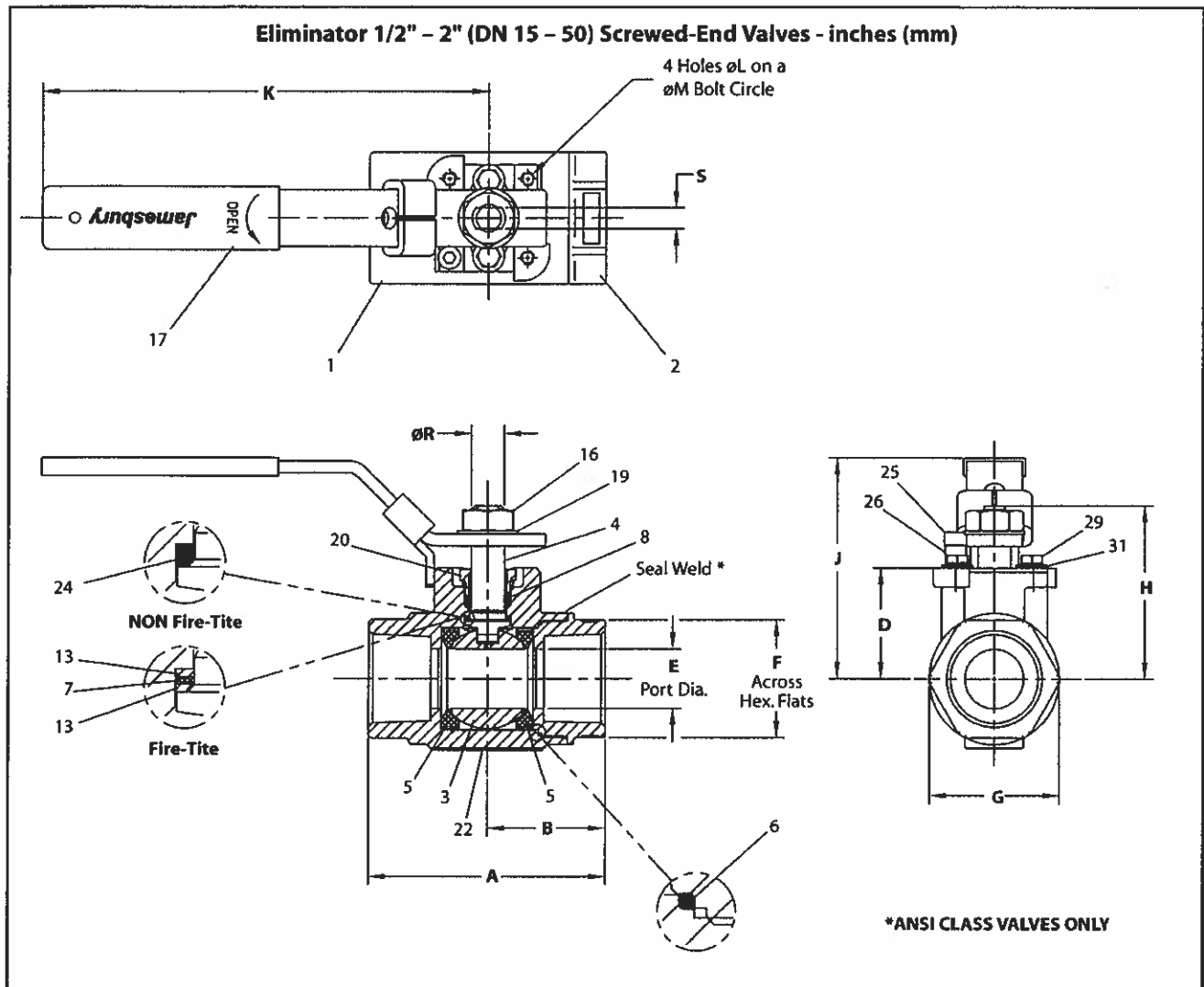
Approved for Watertight and Hazardous Location

- The limit switch housing assemblies are also CSA approved, filling NEMA 4, 4x, 6 and 7 Class I Groups C & D, and 9 Class II Groups E, F and G Div. 1 specifications for combined watertight and hazardous location design.

Unless otherwise specified, assemblies with limit switches are adjusted at the factory so that one switch is actuated when the valve is closed, and the other when the valve is fully open.

Spring-return handles may be specified with optional accessories when FM approval is not a consideration. Locking devices to padlock the handle in position or electrothermal links to allow connection to a remote device like a smoke or heat detector are available. See Bulletin B160-1 for non-FM-approved standard spring-return handles and various accessories.

DIMENSIONS



Valve Size Inches	APPROXIMATE DIMENSIONS - Inches														Approx. Weight lbs.
	A	B	D	E	F	G	H	J	K	L	M	R	S	ISO BONNET	
1/2	2.62	1.34	1.06	0.50	1.13	1.2	1.63	2.36	5.00	M5	1.42	0.31	0.18	F03	1.0
3/4	3.00	1.50	1.22	0.69	1.38	1.6	1.79	2.52	5.00	M5	1.42	0.31	0.18	F03	2.0
1	3.55	1.78	1.65	0.88	1.75	2.0	2.58	3.29	7.50	M5	1.65	0.50	0.31	F04	3.0
1-1/4	4.00	2.00	1.78	1.00	2.00	2.3	2.71	3.42	7.50	M5	1.65	0.50	0.31	F04	4.0
1-1/2	4.38	2.19	2.08	1.25	2.31	2.7	3.30	4.27	8.25	M6	1.97	0.63	0.37	F05	5.5
2	5.50	2.75	2.26	1.50	2.81	3.1	3.49	4.46	8.25	M6	1.97	0.63	0.37	F05	7.5

Valve Size DN	APPROXIMATE DIMENSIONS - mm														Approx. Weight kg
	A	B	D	E	F	G	H	J	K	L	M	R	S	ISO BONNET	
15	67	34	27	13	29	31	41	60	127	M5	36	08	05	F03	.4
20	76	38	31	18	35	41	45	64	127	M5	36	08	05	F03	.9
25	90	45	42	22	44	51	65	84	190	M5	42	13	08	F04	1.3
32	102	51	45	25	51	59	69	87	190	M5	42	13	08	F04	1.8
40	111	56	53	32	59	69	84	108	210	M6	50	16	09	F05	2.5
50	140	70	57	38	71	79	89	113	210	M6	50	16	09	F05	3.4

The designation for Emergency Shutoff Valves is made up of numbers and letters that fully describe all features of the available variations of these units. Coding is as follows:

Example: A 1-1/2" Emergency Shutoff Valve Assembly Eliminator, screwed end in carbon steel with 316 stainless trim and PTFE seats with +165°F (74°C) fusible link and Torq-Handle set for spring-to-close operation without limit switches is designated as Figure 1075-71T010.

1	2	3	4	5	6
7	1	T	0	1	0

1	Size	3	4	5	6*	7	8
	inches	1/2	3/4	1	1-1/4	1-1/2	2
	DN	15	20	25	32	40	50

*Eliminator Valves only.

2	Body Style & Materials
1	Eliminator, Screwed End, Carbon Steel Body - S/S Trim
3	Eliminator, Screwed End, Stainless Steel Body - S/S Trim
A	7150 Series, Flanged, Carbon Steel Body - S/S Trim
B	7150 Series, Flanged, Stainless Steel Body - S/S Trim

3	Seat Material
T	PTFE (Clincher only)
M	Filled PTFE (Clincher only)
X	Xtreme (7150 and Eliminator)

4	Temperature Rating of Fusible Link
0	165°F (74°C)
1	135°F (57°C)
2	212°F (100°C)
3	286°F (141°C)

5	Torq-Handle® Release Mode
1	Spring-to-close
2	Spring-to-open

6	Optional Limit Switch
0	No switch
2	QZM2VB1DSS (2SPDT)
3	QZM14B1DSS (2SPDT)

Available Sizes by Valve Type and Seat Material		
Style	Seat Material	Available Sizes
Eliminator	T Seats	1" - 2" (DN 25 - 50)
Eliminator	M Seats	1" - 1-1/4" (DN 25 - 32)
7150	X Seats	1/2" - 1" (DN 15 - 25)

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CLEMENT BOURGOGNE**

WOOD BANANI BOUTILLETTE PAR 7500		
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AUG 03 2010		
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CLEMENT BOURGOGNE

WOOD BANANI BOUTIQUE LTD. 1000 1000 1000		
Reviewed	Reviewed with Comments	Reviewed with Comments
	<input checked="" type="checkbox"/>	

AUG 03 2010

This review of this drawing does not constitute a release of the contractor from responsibility for accuracy or for compliance with applicable codes and documents.

Match dimensions of float to new day tank

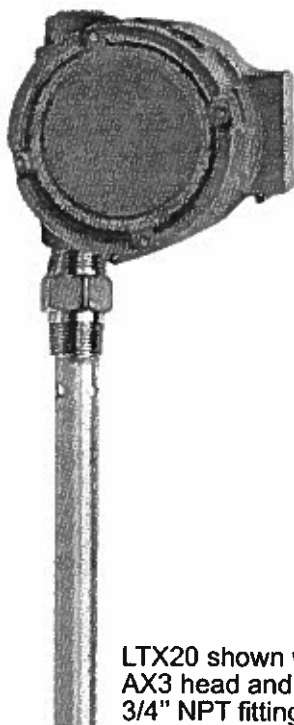
FOUR LEVEL CONTROL SWITCH FOR DAY TANK MOUNTING

<p><u>100VA SWITCH SPST</u></p> <table border="1"> <thead> <tr> <th>LENGTH</th> <th>STATUS</th> <th>NO</th> <th>or NC</th> </tr> </thead> <tbody> <tr> <td>FL4</td> <td>"</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>FL3</td> <td>"</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>FL2</td> <td>"</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>FL1</td> <td>"</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> </tbody> </table>	LENGTH	STATUS	NO	or NC	FL4	"	<input checked="" type="checkbox"/>	<input type="checkbox"/>	FL3	"	<input type="checkbox"/>	<input checked="" type="checkbox"/>	FL2	"	<input type="checkbox"/>	<input checked="" type="checkbox"/>	FL1	"	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<p>JUNCTION BOX</p> <p>2" MNPT</p>	<p><u>SWITCH FUNCTION</u></p> <p>HIGH LEVEL ALARM</p> <p>STOP ALL PUMPS</p> <p>START LEAD PUMP</p> <p>LOW LEVEL ALARM</p> <p>START LAG PUMP</p>
LENGTH	STATUS	NO	or NC																			
FL4	"	<input checked="" type="checkbox"/>	<input type="checkbox"/>																			
FL3	"	<input type="checkbox"/>	<input checked="" type="checkbox"/>																			
FL2	"	<input type="checkbox"/>	<input checked="" type="checkbox"/>																			
FL1	"	<input type="checkbox"/>	<input checked="" type="checkbox"/>																			
<p>FLOAT MATERIAL-S.S.</p> <p>FLOAT P/N</p>	<p>REQUIRES OAL + 7" ABOVE TANK FOR INSTALLATION</p>																					
<p>SWITCH CERTIFIED TO</p> <p>CAN/CSA Std. C22.2 No.1010-1</p> <p>CAN/CSA Std. C22.2 No. 30</p> <p>Conforms to</p> <p>UL1203 & ANSI/ISA S82-03</p>	<p><u>WIRE COLOUR CODES</u></p> <table border="1"> <tbody> <tr> <td>FL4</td> <td>RED</td> <td></td> <td>RED</td> </tr> <tr> <td>FL3</td> <td>GREEN</td> <td></td> <td>GREEN</td> </tr> <tr> <td>FL2</td> <td>BLUE</td> <td></td> <td>BLUE</td> </tr> <tr> <td>FL1</td> <td>BROWN</td> <td></td> <td>BROWN</td> </tr> </tbody> </table>		FL4	RED		RED	FL3	GREEN		GREEN	FL2	BLUE		BLUE	FL1	BROWN		BROWN				
FL4	RED		RED																			
FL3	GREEN		GREEN																			
FL2	BLUE		BLUE																			
FL1	BROWN		BROWN																			
<p><u>ALBANY PUMP CO. LTD.</u></p> <table border="1"> <tr> <td>DRWN.</td> <td>DAK</td> <td>420 HARRY WALKER PARKWAY</td> </tr> <tr> <td>DATE</td> <td></td> <td>NEWMARKET, ONT. CANADA, L3Y 8P5</td> </tr> <tr> <td>SCALE</td> <td>NONE</td> <td>FLOAT SWITCH</td> </tr> <tr> <td>CHK'D</td> <td>DRWG#</td> <td>FLOATSW-4</td> </tr> </table>			DRWN.	DAK	420 HARRY WALKER PARKWAY	DATE		NEWMARKET, ONT. CANADA, L3Y 8P5	SCALE	NONE	FLOAT SWITCH	CHK'D	DRWG#	FLOATSW-4								
DRWN.	DAK	420 HARRY WALKER PARKWAY																				
DATE		NEWMARKET, ONT. CANADA, L3Y 8P5																				
SCALE	NONE	FLOAT SWITCH																				
CHK'D	DRWG#	FLOATSW-4																				

Levels are as follows:

FL1 -> 40% of tank capacity
 FL2 -> 50% "
 FL3 -> 80% "
 FL4 -> 90% "

LTX20 LEVEL SENSOR



LTX20 shown with
AX3 head and
3/4" NPT fitting.



LTX20 shown with
CX2 head and
3/4" NPT fitting.



LTX20 shown with
AH2 head and
3/4" NPT fitting.

DIESEL FUEL AND OIL LEVEL SENSOR

Product Features

- For fuel oil tanks
- Compact 3/4 NPT concentric tube design
- Accuracy 1% of span for constant dielectric of material
- Tube and inner probe SS316
- For use with metallic and non-metallic tanks
- OEM applications, low cost
- Continuous loop powered 4-20mA operation
- Non-interactive zero and span calibration

Applications

- Diesel fuels
- Hydraulic oils
- Vegetable oils
- Chemical holding tanks
- MEK and other solvents
- Many other, non-conductive liquids.

Do Not use with:

- Water and other conductive liquids
- Conductive acids
- Materials corrosive to SS316

Description

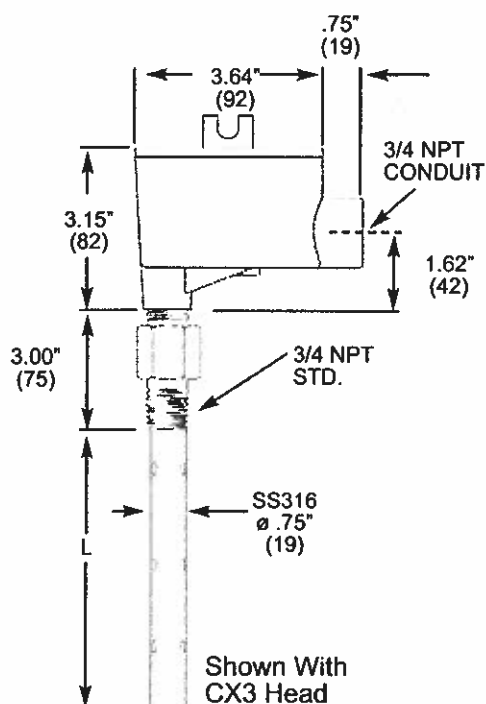
The Intempco LTX20 series fuel capacitance level transmitter is designed to measure level of fuels and oils in metallic and non-metallic tanks. The probe measures level by measuring the change in capacitance as level changes in the tank. The micro-processor based electronics converts this capacitance change into a linear, highly accurate 4-20 mA signal.

The LTX20 includes a standard 4 - 20mA loop powered LTX transmitter, a concentric 0.75-inch diameter concentric shield with 0.188 - rigid sensor for ranges up to 10 feet. Probe material is SS316. The LTX20 is designed for tanks which have fitting connections of 3/4 NPT or larger and in applications where the liquid is relatively clean or non-clogging.

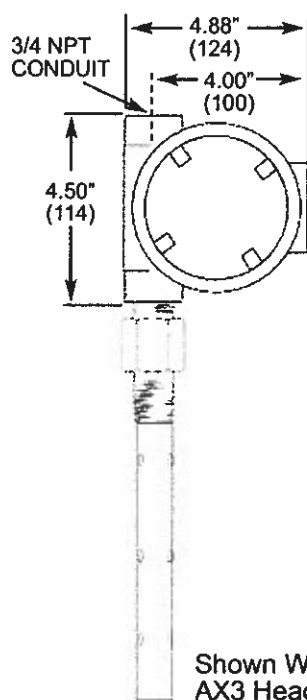
An excellent application for the LTX20 are stationary or mobile generators. This level sensor is shock resistant and very rugged. There are no moving parts. To isolate for ground loops, a non-conductive reducer (such as PVC) can be used between the tank and the 3/4"NPT fitting of the LTX20.



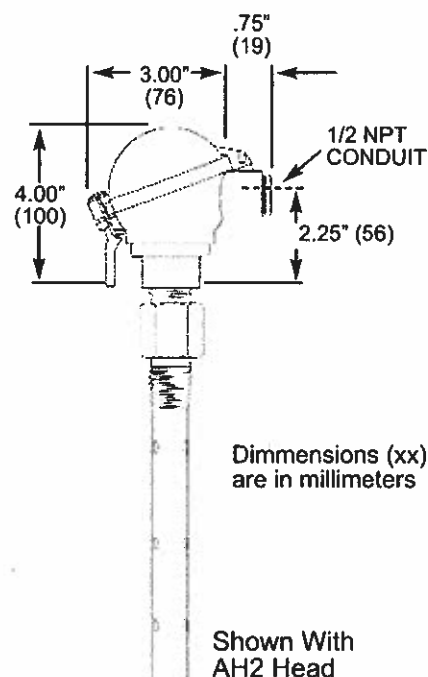
LTX20 LEVEL SENSOR



Shown With
CX3 Head



Shown With
AX3 Head



Dimmensions (xx)
are in millimeters

Shown With
AH2 Head

Electrical Specifications

Supply Voltage:	:12 VDC - 36 VDC
Output:	:4 - 20 mA, loop powered
Maximum Loop Res.	:(Vs - 10)/0.02 (i.e. 700Ω at 24VDC)
Calibration	:Via 4 push-button switches non-interactive ZERO and SPAN
Capacitance range	:10 pF to 10000 pF, jumper selectable in 3 ranges
Accuracy	:±1% of full span (constant dielectric)
Repeatability	:±0.1% of span
Damping adjust	:0 - 30 sec
Ambient Temperature:	:-40 to 70 °C (-40 to 158 °F)

Mechanical Specifications

Enclosures	AH2	:Aluminum, lift cover type, NEMA 4
	SS2	:Stainless 316, NEMA 4X
	AX3	:Aluminum Epoxy Coated, Class I, Gps. B,C&D, Class II, Gps. E,F&G, Class III, CENELEC: EExd IIC, IP66 NEMA 4, 7BCD, 9EFG
	CX3	:Aluminum Epoxy Coated, Class I, Class II, Div 2,Gps. C&G
Mounting Thread		:3/4 NPT standard
Process Temperature		:200°C max (392° F)-consult factory for higher temperatures
Pressure Limits		:100 psi (34 bar) @ 25°C (77 °F) 14.5 psi (1 bar) @ 200°C (392 °F)
Probe & Tube mat'l		:Stainless 316, 3/4" (19 mm) O.D.

Ordering Specifications

INTEMPCO MODEL ENCLOSURE PROCESS CONNECTION PROBE LENGTH "L" (10 feet Max.)

LTX20 - B - 3 - [] - P (3/4) - B - [] (in inches)

Enclosure	CODE
Explosion Proof	AX3
Explosion Proof	CX3
Aluminum Flip-cover	AH2
Stainless Steel	SS2
PVC (Pg9 Gland)	PV9
PVC (1/2" NPT)	PV2

Fuel Oil Filters

For All Types of Oil Fired Heating Equipment

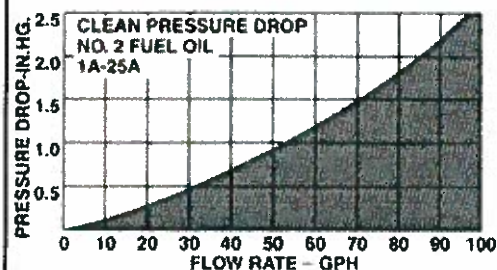
1A-25A And 2A-700A Fuel Oil Filter Features

- 1) Leakproof construction with machined gasket seat and UL listed gasket compounds.
- 2) High quality wool felt filter elements that remove all solid contaminants.
- 3) Iron and steel construction for maximum integrity and durability.
- 4) Low pressure drop, suitable for gravity flow and one or two pipe systems on pressure type burners.
- 5) Micronic filtration suited to the smallest oil burner nozzle.
- 6) Bonding treatment of center core in filter element eliminates lint.
- 7) Step design element offers largest dirt capacity with true depth filtration.
- 8) Listed by Underwriters' Laboratories.



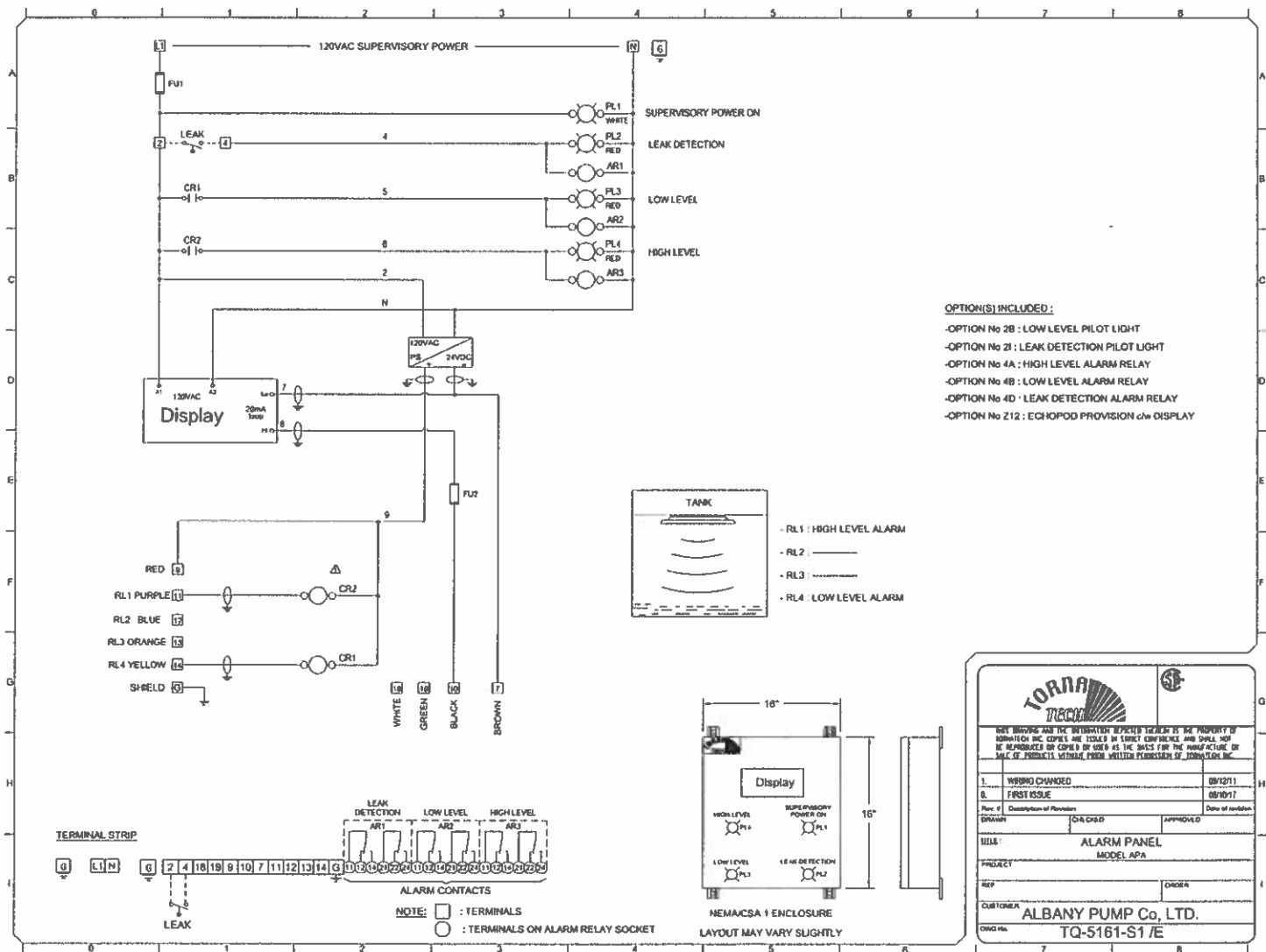
1A-25A Fuel Oil Filter

The Model 1A-25A is the perfect fuel oil filter for oil fired heating appliances used in small to average sized homes and commercial buildings. It is ideal for final filtration in central fuel oil distribution systems. The 1A-25A may be used in one or two-pipe systems.



ORIGINAL SIGNED BY
CLEMENT BOURGOGNE

WOOD BANANI BOYER & SONS, INC.	
Reviewed ✓	Controlled ✓
AUG 03 2010	
This revision is for relieve the company of accuracy of the information documented	



Section 23 11 13 1.3 Fuel-Oil Pump and Controller Factory Test Report



STANDARD INSPECTION & TEST REPORT FOR PUMP ASSEMBLY

Date: 8/30/2010 PROJECT No.: 5011667

Model No.: F00UP/036C/85

Drawing No.: DUP-5011219

1. MATCH ACKNOWLEDGEMENT AND CONFIGURATOR WORK SHEET WITH PURCHASE ORDER

Written confirmation	Yes	No
	ACKNOWLEDGEMENT	CONFIGURATOR
	OK	N/A
Customer name	✓	
Customer code	✓	
Customer address	✓	
Purchase order no.	✓	
Reference/tag no.	✓	
Ship to address	✓	
Shipping instructions	✓	
Quantity	4	
Controller	S/O.	
Options no.	✓	
Language	N/A	
Special instructions	hda.	

2. MATCH WITH BOM AND SALES ORDER

	OK	N/A
Drawings (BOM / SALES ORDER #)	✓	
Motor	✓	
Controller & Options	S/O.	

3. VISUAL INSPECTION AND MECHANICAL ADJUSTMENT

	OK	N/A
Verify actual layout to layout drawing	✓	
Inspect components	✓	
Inspect mounting	✓	
Inspect pump alignment	✓	
Inspect tightness of all connections	✓	
Verify motor	✓	
Verify proper switches installed	✓	
All labels / tags installed	✓	

4. PUMP TEST

		OK	N/A
Test for Suction Conditions	Pump 1	✓	
	Pump 2	✓	
	Pump 3		
Test for Capacity <i>2.61M</i>	Pump 1	✓	
	Pump 2	✓	
	Pump 3		
At 50 psi			
At 100 psi			
Tested			

Pressure Test @ 100 psi ✓

2 hrs. ✓

Comments

No Leaks.

5. FINAL INSPECTION

	OK
Paint touch up	✓
Reorganise file	✓
Drawing in file	✓
O & M's	✓

6. NOTES

7. DATE / SIGNATURE

DATE
8/30/2010

SIGNATURE




STANDARD TEST REPORT FOR PUMP CONTROLLER ONLY. NOT FOR FIRE PUMP

Date: 21/9/2010

PROJECT No.: _____

Z 72725
ALB100

Model No.: HDA-1-1-120-0.33-1TQ 10352

Drawing No.: A72725-S1/E

V. <u>120</u>	HP <u>2 x 0.33</u>	PH <u>1</u>	Hz <u>60</u>	KA <u>5</u>
Options : <u>NONE</u>				
UL NO. : <u>Bx 537470</u>			CSA <input checked="" type="checkbox"/>	

1. MATCH ENGINEERING WORK SHEET WITH INFO JOB #N

Written confirmation	Yes		No	
	INFO JOB #N		ENG.WORK SHEET	
	OK	N/A	OK	N/A
Homologation (dwg)	<u>/</u>		<u>/</u>	
Controller model # (BOM)	<u>/</u>		<u>/</u>	
Options no. (BOM)		<u>✓</u>		<u>✓</u>
Language (BOM)	<u>✓</u>		<u>✓</u>	
Special instructions		<u>✓</u>		<u>/</u>

2. MATCH WITH BOM AND ENGINEERING WORK SHEET

	OK	N/A
Drawings n# with (ENG.WORK SHEET)	<u>/</u>	
Power components (TABLE)	<u>/</u>	
Control components (BOM)	<u>/</u>	

unc.

3. VISUAL INSPECTION AND MECHANICAL ADJUSTMENT

	OK	N/A
Verify conformity of component layout to interior layout drawing	/	
Inspect mounting and identification of components	/	
Inspect mounting plate bolts tightness	/	
Inspect door for proper alignment and function of door locks	/	
Inspect tightness of all connections	/	
Location and language of name plate (Eng) (Fra)	✓	
Verify conformity of power wiring to power wiring diagram	/	
Verify that all wires are properly numbered or color coded	/	
Verify that all flexible wires are terminated by a ferrule	✓	
Inspect all terminals jumpers tightness	/	
Inspect door grounding and ground labels	/	
Inspect harness mechanical attachment and cable	✓	
Grounding of door	/	
Verify envelope contents:		
Wiring schematic diagram No/ Layout NO.(3 copy)	✓	
Pressure Switch instruction for PS1 (Type: _____) <input type="checkbox"/> x		/
Pressure Switch instruction for PS2 (Type: _____) <input type="checkbox"/> x		/
Time clock instruction (Lovato)		✓
Current relay instructions		✓
<i>Siemens</i> Zelio program (#: _____)		✓
Other component manuals :		✓
Install adhesive labels inside the controller:		
Ground Labels (3)	✓	
Max Fuse Rating (HRC) CLASS CC (7STi801)		✓
Fuse control (electr.) (7Sti 802)	✓	
Live circuit Label	✓	
Components Labels (Indication)	✓	
Water Lines Label and Use two wrenches (7LAB506+512)		✓
Pressure Switch Adjustment (7LAB704)		✓
Current Sensing Label (7LAB705)		✓
Terminal(WK4) (Sti 806)	✓	
Relay(contact rating) alarm (7lab614)	✓	
Contactors (LC1D.....) awg/Lb-In/Nm/Temp	✓	✓
Disc.switch or LUG# iemens (7LAE....) or (7LAB...)		✓
Install adhesive labels outside the controller:		
Tornatech / Service Tel. Number	/	
Armstrong label		/
Made in Canada	✓	
Danger	/	
Job number /information's (2)	✓	

Done

4. HIGH POT TEST

	OK	N/A
Disconnect all control transformers and surge arrester.		✓
Power section:		
Test voltage: <u>V. 1.5k</u> for 1 second → 208:1700, 240:1800, 400:2200, 440:2300, 480:2400, 600:2600		
Phase to ground	✓	
Phase to phase (autotransformer only)		✓
Control section		
Test voltage: 1500 V. for 1 second		
All wires to ground:	✓	DMC

PRESSURE SWITCH ADJUSTMENT	OK	N/A
PRESSURE TEST PS1:		
CUT IN <u>PSI</u> CUT OUT <u>PSI</u>		
PRESSURE TEST PS2:		
CUT IN <u>PSI</u> CUT OUT <u>PSI</u>		
PRESSURE TEST PS3:		
CUT IN <u>PSI</u> CUT OUT <u>PSI</u>		
PRESSURE TEST PS4:		
CUT IN <u>PSI</u> CUT OUT <u>PSI</u>		
PRESSURE TEST PS5:		
CUT IN <u>PSI</u> CUT OUT <u>PSI</u>		
PRESSURE TEST PS6:		
CUT IN <u>PSI</u> CUT OUT <u>PSI</u>		

MATCH COMPONENTS SELECTION TO TABLES(MANUFACTURE) UL/CSA

Reference Tables (manuf)			
Disconnect Switch-total HP	✓✓ OK	NA	
Circuit Breaker	OK	M.ADJ	✓ NA
Contactor	LC1D09	OK	
Contactor	LC1D09	OK	
Contactor	LC1D09	OK	
Contactor	LC1D09	OK	
Enclosure Type (NEMA)	2		
Enclosure Size	20 H.	16 W.	6 D.
Wire Size (Main)	AWG 14-14	MCM	
(Auxilliary)	AWG 14/14	MCM	
(Control)	AWG 16		
	TOP		DOWN
Minimum Bending Space	IN 38	MM 38	
Ground Lugs: Power	DB	Slu35	Slu70
Ground Lugs: Control	Slu35		
Power Terminals	OK	NA	

	1	2	3
Motor Protector	7.2 A.	7.2 A.	A.
Breaker (Fixe)	A.	A.	A.
Overload Relay	A.	A.	A.

5. VERIFICATION OF MOTOR STARTER SECTION

Measure incoming voltage:						
DS1	L1-L2/L1-N	116 V.	L2-L3	V.	L1-L3	V.
DS2	L1-L2/L2-N	117 V.	L2-L3	V.	L1-L3	V.
Measure voltage to motor terminals:						
C1	T1-T2/T1-N	116 V.	T2-T3	V.	T1-T3	V.
C2	T1-T2/T1-N	117 V.	T2-T3	V.	T1-T3	V.
C3	T1-T2	V.	T2-T3	V.	T1-T3	V.

LIVE CONTROL FUNCTION TEST AS PER SCHEMATIC WIRING DIAGRAM NO

172725-S1/E

RED. VOLTAGE AUTOTRANSFORMER STARTER							OK	N/A
Adjust pneumatic timer on contactor at 3 sec.:								
Verify autotransformer tap, all phases wired to tap							65%	
L1-L2	V.	L2-L3	V.	L1-L3	V.			
Measure reduced voltage to motor terminals.								
T1-T2	V.	T2-T3	V.	T1-T3	V.			
Measure full voltage to motor after transition delay:								
T1-T2	V.	T2-T3	V.	T1-T3	V.			
Perform start-stop sequence to adjust transition delay to 3 sec, and seal.							3 sec	

6. SET CURRENT SENSING RELAYS


ADJUST CURRENT SENSING RELAYS							OK	N/A
	CT	TURNS	HYST %	A.ADJUST	A.MEASURE	SCALE	DELAY (SEC)	
CSR1								
CSR2								
CSR3								
CSR4								
CSR5								
CSR6								

7. ADHESIVE LABELS

ADHESIVE LABELS		OK	N/A
Install adhesive labels inside the controller	Rating Label no(CSA)	✓	
	Tested (sign+date)	✓	
Install adhesive labels outside the controller	Rating Label (CSA)	✓	
	Withstand	✓	
	UL ind.	✓	
	Tested (stamp)	✓	

DMC.


SUITABLE FOR USE ON A CIRCUIT CAPABLE OF
DELIVERING NOT MORE THAN 5kA R.M.S.
SYMMETRICAL AT 120 V MAXIMUM



MODEL	HDA-1-1-120-0.33-1TQ10352
LINE[V] / CTRL[V]	120/120/24 PH / Hz
MOTOR 1 [HP]	0.33 FLA [A]
	FLA TOTAL [A]
	8.0
OPTION NO.	N/A
NEMA	2
Dwg.No.	A 72725-S1 /E
SERIAL No.	Z 72725 DATE 10-Sep-10

DUPLEX PUMP CONTROLLER (SOURCE 1)

SUITABLE FOR USE ON A CIRCUIT CAPABLE OF
DELIVERING NOT MORE THAN 5kA R.M.S.
SYMMETRICAL AT 120 V MAXIMUM



MODEL	HDA-1-1-120-0.33-1TQ10352
LINE [V] / CTRL [V]	120/120/24 PH / Hz
MOTOR 2 [HP]	0.33 FLA [A]
	FLA TOTAL [A]
	8.0
OPTION NO.	N/A
NEMA	2
Dwg.No.	A 72725-S1 /E
SERIAL No.	Z 72725 DATE 10-Sep-10

DUPLEX PUMP CONTROLLER (SOURCE 2)

8. FINAL INSPECTION

	OK
Clean properly panel	✓
Reorganise file	✓
1 extra set of drawing in file	✓
<i>Siemens</i> (Zero) Enter n# program in Genius ex: 1248v2/3640 n#progr/n#job	✓
Enter n# UL in Genius ex: BS067656	✓

9. REFERENCE CSA CPC-1

This controller has a similar CSA CPC-1 as job number Z _____

Is this job older than 6 month YES - NO

If yes, NEW CSA CPC-1 is necessary.

10. DATE / SIGNATURE

DATE

SIGNATURE

Section 23 11 13.13 Water Separator

Reviewed

Reviewer's

Comments

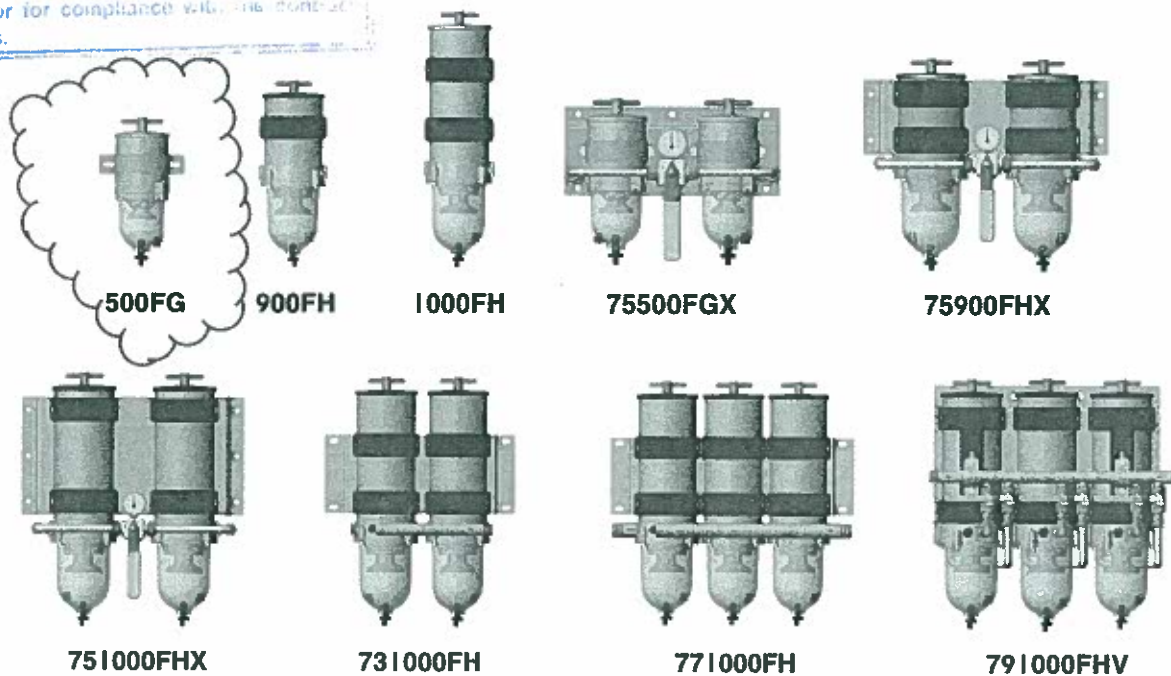
JUL 29 2010

This review of this drawing does not in any way
relieve the contractor of responsibility for the
accuracy or for compliance with the contract
documents.

Mobile Fuel Filtration

1

Turbine Series



Turbine Series

Turbine Series filter assemblies are designed to be installed on the vacuum side of the fuel transfer pump for best efficiency and protect precision engine components from dirt, rust, algae, asphaltines, varnishes, and especially water, which is prevalent in engine fuels. They remove contaminants from fuel using the following legendary three stage process:

Stage One: Separation

As fuel enters the filter assembly, it moves through the centrifuge and spins off large solids and water droplets which fall to the bottom of the collection bowl.

Stage Two: Coalescing

Small water droplets bead-up on the surface of the conical baffle and cartridge element. When heavy enough, they too fall to the bottom of the bowl.

Stage Three: Filtration

Proprietary Aquabloc®II cartridge elements repel water and remove contaminants from fuel down to two micron (nominal). They are waterproof and effective longer than water absorbing elements.

Features and Benefits

- Available in several sizes to fit any application.
- Heavy duty construction.
- Installs quickly.
- Available in 2, 10, and 30 micron.
- Easy to service.
- Clear collection bowl.
- Self-venting water drain.

Optional accessories may include: water detection kits, 12 or 24 volt dc heaters, heavy-duty fuel hose and fittings. see Accessories section.



Parker Hannifin Corporation
Racor Division, PO Box 3208
Modesto, CA 95354 USA
Phone: 800.344.3286
Fax: 209.529.3278
E-mail: racor@parker.com
www.parker.com/racor

RACOR

WOOD BANANI BOUTHILLETTE PARIZEAU INC.

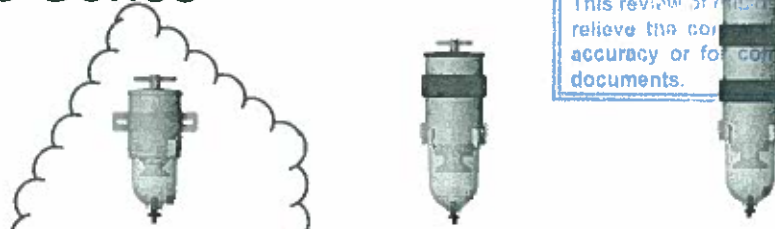
Reviewed ✓	Reviewed with Comments	Resubmit See Comments
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JUL 29 2010

This review of the drawing does not in any way relieve the company of responsibility for its accuracy or for compliance with the contract documents.

Mobile Fuel Filtration

Turbine Series



Specifications	500FG	900FH	1000FH
Maximum Flow Rate: (one unit online) (two units online) (three units online)	60 GPH (227 LPH) N/A N/A	90 GPH (341 LPH) N/A N/A	180 GPH (681 LPH) N/A N/A
Port Size (female threads)	3/4"-16 UNF (SAE J1926)	7/8"-14 UNF (SAE J1926)	7/8"-14 UNF (SAE J1926)
Min. Service Clearance: (above assembly) (below assembly)	5.0 in. (12.7 cm) 2.0 in. (5.1 cm)	7.5 in. (19.1 cm) 2.0 in. (5.1 cm)	10.0 in. (25.4 cm) 2.0 in. (5.1 cm)
Replacement Element: (2 micron) (10 micron) (30 micron)	(1 Per Assembly) 2010SM-OR 2010TM-OR 2010PM-OR	(1 Per Assembly) 2040SM-OR 2040TM-OR 2040PM-OR	(1 Per Assembly) 2020SM-OR 2020TM-OR 2020PM-OR
Height	11.5 in. (29.2 cm)	17.0 in. (43.2 cm)	22.0 in. (55.9 cm)
Depth	4.8 in. (12.2 cm)	7.0 in. (17.8 cm)	7.0 in. (17.8 cm)
Width	5.8 in. (14.7 cm)	6.0 in. (15.2 cm)	6.0 in. (15.2 cm)
Weight (dry)	4.0 lb (1.8 kg)	6.0 lb (2.7 kg)	10.0 lb (4.5 kg)
Clean Pressure Drop	0.25 PSI (1.7 kPa)	0.30 PSI (2.1 kPa)	0.43 PSI (3.0 kPa)
Maximum Pressure¹	15 PSI (1 bar)	15 PSI (1 bar)	15 PSI (1 bar)
Water In Bowl Capacity: (per bowl)	3.7 oz (109 ml)	10.3 oz (305 ml)	10.3 oz (305 ml)
Available Options:² (water detection kit) (12 or 24 volt dc heater) (vacuum gauge)	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes
H₂O Removal Efficiency	99%		
Operating Temperature	-40° to +255°F / -40° to +124°C		

¹ Pressure installations are applicable up to the maximum PSI shown. Vacuum installations are recommended.
² Not for use on gasoline applications.
Note: Units with 1/2" NPT ports are available, contact the factory.

RACOR.

Technical Support:
800.344.3286 ext. 7555
racortech@parker.com

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WOOD BANANI SOUTH

Reviewed ☒ Revises ☐
Comments

JUL 29 2010

This review of the design, construction, and performance of the product will relieve the responsibility of the manufacturer for the accuracy of the information in the product documents.

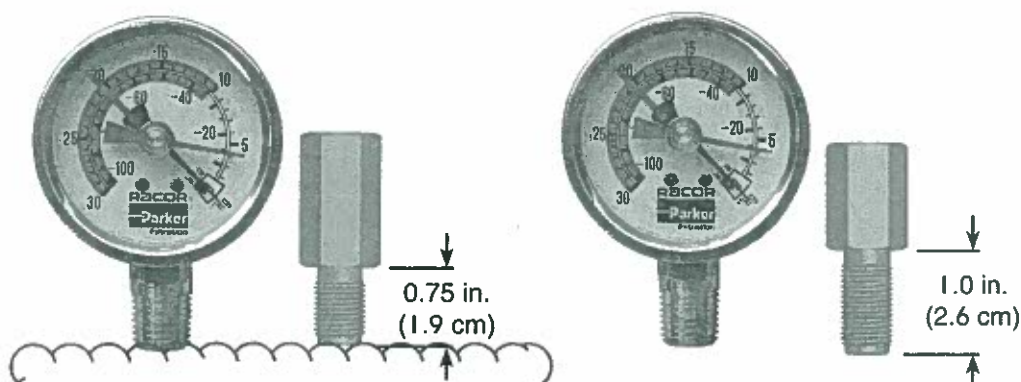
Mobile Fuel Filtration

Accessories

T-handle Vacuum Gauge

T-handle vacuum gauges are available to monitor element condition and as the filter element slowly becomes clogged with contaminants the restriction (resistance to flow) increases. The fuel pump still tries to draw fuel (suction) but because of this restriction less fuel is delivered to the engine and instead more air is pulled from it (fuel de-gassing). These results can cause the engine to lose power and eventually stall.

By installing a vacuum gauge in your fuel system (at the outlet side of the Racor filter) visual monitoring of element condition is possible at a glance. At the first indication of decreased performance, note the dial reading or apply the 'red line' decal provided with most kits. This will assist in knowing when to change the filter at the next interval.



Specifications	RK11-1669	RK11-1669
Description	500FG units only. T-handle vacuum gauge kit includes gauge & 11-1669 Fitting 9/16"-18 UNF	For 900FH & 1000FH units only. T-handle vacuum gauge kit includes gauge & 11-1668 Fitting, 9/16"-18 UNF
Threads	1/4" NPT bottom boss mount.	1/4" NPT bottom boss mount.
Dimensions	2.0" W x 1.1" D	2.0" W x 1.1" D
Dial	2 in.	2 in.
Weight	0.3 lb (0.1 kg)	0.3 lb (0.1 kg)
Special Notes: For severe vibration applications, mount the gauge on a stable, remote location and connect to the source using flexible tubing. After September 1999, Racor converted many liquid-filled gauges to new silicone dampened movement. This new (dry) technology provides a vibration resistant design that never leaks fluid or requires adjustments due to temperature or altitude variations.		

RACOR.

Technical Support:
800.344.3286 ext. 7555
racortech@parker.com


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Parker

AIR SYS ENGINEERING LTD.
10 AKERLEY BLVD. UNIT # 4
DARTMOUTH, NS B3B 1J4
PH# (902) 468.7618
FX# (902) 468.7615

PROJECT: SANIKILUAQ – NEW TRUCK FILL STATION
PROJECT #: J- 86 – 2010
CONTRACTOR: MOSHER ENG. LTD.
ENGINEER:
DATE: JUNE 9 , 2010

ORIGINAL SIGNED BY
CLEMENT BOURGOGNE

WOOD BANANI BOUTHILLETTE PARIZEAU INC.		
Reviewed 	Reviewed with Comments	Resubmit See Comments
JUN 09 2010		
This review of this drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.		

SECTION 23 37 13

NAILOR GRILLES AND DIFFUSERS

DIFFUSERS:- 61SH-O-S-A- AW [WHITE]
[AA -341] 1- 14 " X 14 " [350 X 350]

SECTION 23 33 15 ** RESUBMITTED ******

VENTEX DAMPERS

INSULATED LOW LEAKAGE :- MODEL 3960-OPB-DM C/W BELIMO 120/1 MOTORS.

[MD-06]	1- 6" WIDE X 8 " HIGH [150 X 200]	C/W LF-120 -US
[MD-07]	1- 12 " WIDE X 12 " HIGH [300 X 300]	C/W LF-120-US
[MD- 05]	1- 14 " WIDE X 14 " HIGH [350 X 350]	C/W LF-120-US
[MD- 08]	1- 14 " WIDE X 14 " HIGH [350 X 350]	C/W LF-120-US
[MD- 03 & 04]	2- 36" WIDE X 24 " HIGH [900 X 600]	C/W NF-24-SR [2-10VDC]
[MD-01]	1- 12 " WIDE X 30 " HIGH [300 X 750]	C/W LF-120-US
[MD-02]	1- 48 " WIDE X 30 " HIGH [1219 X 750]	C/W NF-24-SR [2-10 VDC]

SECTION 23 34 00 ** RESUBMITTED ******

COOK FANS :- [EF-01]

**1- MODEL GC- 740 120/60/1 C/W VIBRATION HANGING KIT AND FAN SPEED
CONTROLLER.**

SECTION 23 72 00

COOK AIR-TO-AIR ENERGY RECOVERY UNIT :- [ERV-01]

1- MODEL ERV-500 120/60/1
C/W FAN SPEED CONTROLLER .
C/W PREHEAT FROST CONTROL 1 KW 2- STAGE 115/1 ELECTRIC COIL.
C/W PURGE SECTION.

VENTALUMA

CONTROL DAMPERS

CONTROL DAMPER SERIES: 3100 • 3900 • 3965 BF • 4000 • 4100

From:
Company:
Fax:
Phone:
TAG:
PO #:
Project Name:
Engineer:
Contractor:
Submittal Date:

Reviewed	Reviewed with Comments	Resubmit See Comments
<input checked="" type="checkbox"/>		

JUN 09 2010

This review of this drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.

195 Healey Road
Bolton, Ontario
Tel: (905) 857-4700
Fax: (905) 857-4730
Toll Free: 1-800-668-7214
www.ventalexinc.com

Duct Mount [XX60 Series]

Duct Mount [XX61 Series]

Flanged-Duct [XX65 Series]

DAMPER SCHEDULE

Damper No.	Qty.	Model	Damper Size		Blade Type		Mount Type			Drive			Jackshaft		Application		Notes
			Width	Height	OB	PB	Duct Mount PX60J	Duct Mount PX61J	Flanged Duct PX65J	Trans. Round	Left	Right	Both	Type	Qty	Vertical	
HD-06	1	3960	6"	8"	✓		✓										LF-120
HD-07	1	✓	12"	12"	✓		✓										✓
HD-05	1	✓	14"	14"	✓		✓										✓
HD-08	1	✓	14"	14"	✓		✓										✓
HD-03	1	✓	36"	24"	✓		✓										NF-24-SR
HD-04	1	✓	36"	24"	✓		✓										✓
HD-01	1	✓	12"	30"	✓		✓										LF-120
HD-02	1	✓	48"	30"	✓		✓										NF-24-SR
	8																

"MD-01, 05, 06, 07, & 08"

BELIMO

LF series spring return direct coupled air damper actuator

Submittal

Torque min. 35 in-lb, for damper areas up to 8 ft²*

On-Off Control, 24 VAC/DC Power

- ☐ LF24 us
- ☐ LF24-S us (LF24 us with aux. switch)

On-Off Control, 120 VAC Power

- ☒ LF120 us
- ☐ LF120-S us (LF120 us with aux. switch)

On-Off Control, 230 VAC Power

- ☐ LF230 us
- ☐ LF230-S us (LF230 us with aux. switch)

Floating Control, 24 VAC/DC Power

- ☐ LF24-3 us (LF24 us with floating point control)
Input impedance: 1000 kΩ
- ☐ LF24-3(-S) us (LF230 us with aux. switch)

Proportional Control, 24 VAC/DC Power

- ☐ LF24-SR us
Control signal: 2 to 10 VDC
4 to 20 mA (with 500Ω resistor)
Input impedance: 100 kΩ
Feedback output: 2 to 10 VDC

- ☐ LF24-SR-S us (LF24-SR us with aux. switch)

- ☐ LF24-SR-MP us

Control signal: 6 to 9 VDC
Input impedance: 100 kΩ
Auxiliary power output: 20 VDC, 40 mA short circuit protected, to power controller

- ☐ LF24-SR-S-MP us (LF24-SR-MP us with aux. switch)

Common Data

Power consumption: 2.5 to 5.5 W running,
1 to 3.5 W holding (models vary)

Transformer sizing: 7 VA (LF24 us, LF230 us),
7.5 VA (LF120 us), 6 VA (LF24-SR-MP us),
5 VA (LF24-S us, LF24-SR us),
class 2 power

Electrical connection: 3 ft, 18 GA appl. cable, 1/2" conduit fit.
(plenum LF24-3 us, LF24-SR us)

Electrical protection: 120/230V actuators/aux. switches
double insulated

Overload protection: electronic throughout rotation

Angle of rotation: 95° (adjustable with integral stop)

Direction of rotation: selected by switch:
CW=CW with decrease signal
CCW=CCW with decrease signal

Spring return direction: CW/CCW mounting

Position indication: visual indicator

Auxiliary switch: 1 x SPDT, 5° to 85° (-S)

Running time: <40 to 75 sec. (on-off)
150 sec. independent of load (proportional)
spring: <25 sec. @ -4°F to +122°F (-20°C to +50°C)
<60 sec. @ -22°F to +30°C

Ambient temperature: -22° F to 122° F [-30° C to 50° C]

Housing: NEMA 2 / IP54

Agency listings: UL 873, CSA 4813 02, CE

Noise level: max. 62 dB(A)

Weight: 3.1 lbs to 3.5 lbs (models vary)

Application/Operation

For fail-safe control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. Actuator is mounted directly to a 3/8" to 1/2" diameter damper shaft by means of its universal clamp, or up to a 3/4" shaft with the optional K6-1 clamp. A crankarm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.



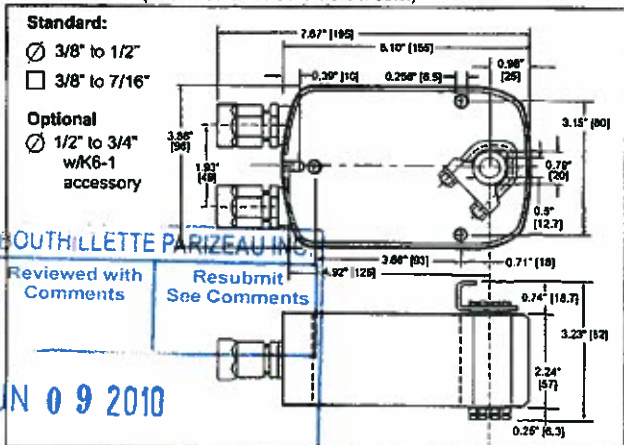
LF24(-S) us, LF120(-S) us and LF230(-S) us control is on-off from an auxiliary contact of a fan motor contactor or a manual switch. The LF24-SR(-S) us operates in response to a 2 to 10 VDC, or with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. The LF24-SR(-S)-MP us operates in response to a 6 to 9 VDC control signal and includes a 20 VDC, 40 mA auxiliary power output, used to power the controller. The LF24-3(-S) us control is 3 wire, floating point from a triac or relay, or on-off. The LF24-3(-S) us and LF24-SR(-S) us use a brushless DC motor which is controlled by an Application Specific Integrated Circuit (ASIC) and a microprocessor. The microprocessor provides the intelligence to the ASIC to provide a constant rotation rate. The ASIC monitors and controls the brushless DC motor's rotation and provides a digital rotation sensing function to prevent damage to the actuator in a stall condition. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. Power consumption is reduced in holding mode.

True spring return operation is provided for reliable fail-safe application and positive close-off on air-tight dampers. Consistent torque is provided to the damper with, and without, power applied to the actuator. The LF series provides 95° of rotation with a graduated position indicator showing 0° to 90°. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. Power consumption is reduced in holding mode.

The (-S) models are provided with 1 built in auxiliary switch. This SPDT switch is provided for safety interfacing or signaling, for example, for fan start-up. The switching function is adjustable between 0° and 95°. 120 and 230 V actuators, and all auxiliary switches are double insulated so an electrical ground connection is not necessary.

* Based on 4 in-lb/ft² damper torque loading. Parallel blade. No edge seals.

Dimensions (All numbers in brackets are metric.)



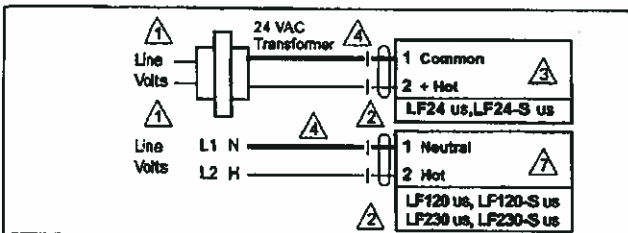
Project

Engineer

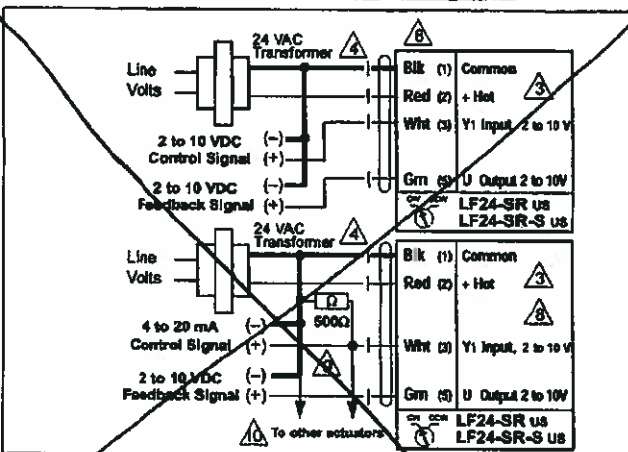
Submittal Date

Sanikiluaq New Truck Fill Station Operation and Maintenance Manual
This view of this drawing does not in any way constitute an approval of its accuracy or for compliance with the contract documents.

Wiring diagrams



On-off



Proportional (2 to 10 VDC, 4 to 20 mA control signals)

Typical Specification:

LF24/120/230 (-S) us and general

Spring return damper actuators shall be direct coupled type which require no crankarm and linkage, capable of direct mounting to a shaft up to a 3/4" diameter and center on a 1/2" shaft. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. The actuators must be designed so that they may be used for either clockwise or counterclockwise fail-safe operation. Actuators shall be protected from overload at all angles of rotation. If required, 1 SPDT auxiliary switch shall be provided having the capability of being adjustable. Actuators with auxiliary switch, and 120/230 VAC models, must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Actuators shall be UL listed and CSA certified, have a 2 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

LF24-SR (-S) us

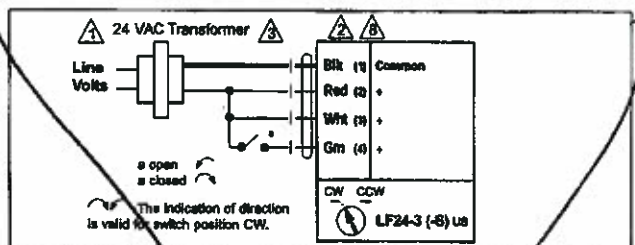
The actuator must provide proportional damper control in response to a 2 to 10 VDC, or, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. Actuators shall use a brushless DC motor controlled by a microprocessor and be protected from overload at all angles of rotation. A 2 to 10 VDC feedback signal shall be provided for position feedback or master-slave applications.

LF24-3 (-S) us

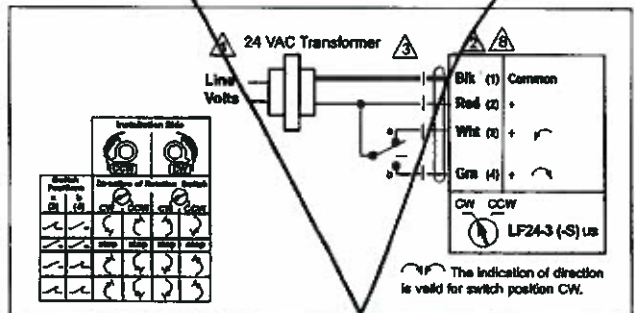
Actuator shall offer floating-point type control.

LF24-SR(-S)-MP us

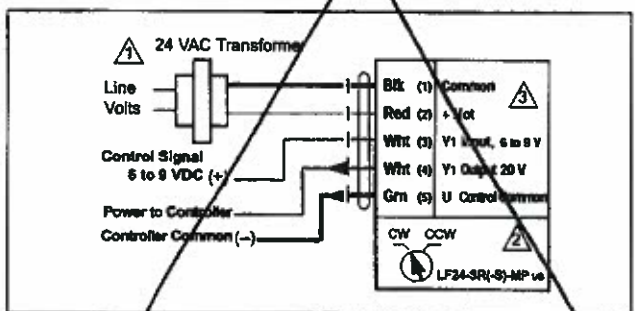
The actuator must provide damper control in response to a 6 to 9 VDC control input from an electronic controller or positioner. A built-in 20 VDC auxiliary power output capable of sourcing up to 40 mA shall be provided to power controllers.



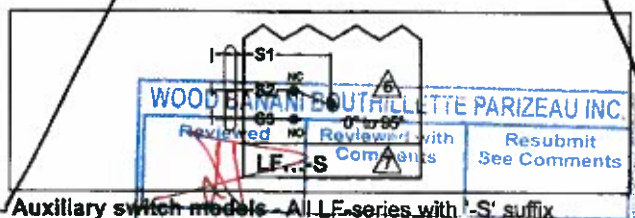
On-Off control of LF24-3 (-S) us



Floating point control of LF24-3 (-S) us



2 to 10 VDC control of LF24-SR(-S)-MP (-S) us



Auxiliary switch models - All LF-series with '-S' suffix

Notes:

- 1 Provide overload protection and disconnect as required.
- 2 Actuators may be connected in parallel. Power consumption must be observed.
- 3 May also be followed by 24 VDC contractor of responsibility for its documents.
- 4 The Common terminal of the actuator must be connected to the hot conductor of the control.
- 5 The actuator hot must be connected to the control board Common.
- 6 For end position indication, interlock control, fan startup, etc., "S" models incorporate one built-in auxiliary switch: 1 x SPDT, 6A (1.5A) @250 VAC, UL listed, adjustable 0° to 95°.
- 7 Meets UL & CSA requirements without the need of an electrical ground connection.
- 8 Actuators with plenum rated cable do not have numbers on wires; use color codes instead.
- 9 The ZG-R01 500Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC.
- 10 Up to 4 actuators may be connected in parallel. With 4 actuators wired to one 500Ω resistor, a +2% shift of control signal may be required. Power consumption must be observed.

On-Off Control, 24 VAC/DC Power

- ☐ NF24 us
- ☐ NF24-S us (NF24 us with built-in auxiliary switch)

On-Off Control, 120 VAC Power

- ☐ NF120 us
- ☐ NF120-S us (NF120 us with built-in auxiliary switch)

Proportional Control, 24 VAC/DC Power

- ☒ NF24-SR us
- Control signal: 2 to 10 VDC
4 to 20 mA (with 500Ω resistor)
- Input impedance: 100 kΩ (500Ω)
- Feedback output: 2 to 10 VDC

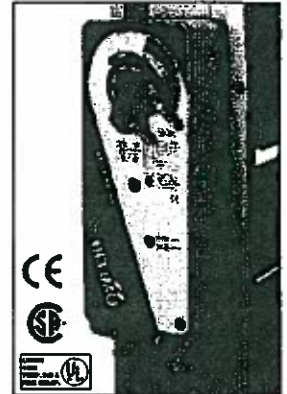
Common Data

Power consumption:	3 to 6 W running, 1 to 3.5 W holding (models vary)
Transformer sizing:	6 VA (NF24-SR us), 7 VA (NF120 us) 8 VA (NF24 us), class 2 power
Electrical connection:	3 ft, 18 GA appliance cable, 1/2" conduit fitting
Electrical protection:	120V actuators/aux. switches double insulated
Overload protection:	electronic throughout rotation
Angle of rotation:	95° (adjustable with ZDB-AF2)
Direction of rotation:	selected by switch: CW=CW with decrease signal CCW=CCW with decrease signal
Spring return direction:	CW/CCW mounting
Position indication:	visual indicator
Auxiliary switch:	1 x SPDT, 5° to 85° (-S)
Running time:	<75 sec. (on-off) 150 sec. independent of load (proportional) < 60 sec. (spring)
Ambient temperature:	-22° F to 122° F [-30° C to 50° C]
Housing:	NEMA 2 / IP54
Agency listings:	UL 873, CSA 4813 02, CE
Noise level:	max. 45 dB(A)
Weight:	6.0 lbs to 7.3 lbs (models vary)

Application/Operation

For fail-safe control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications.

NF series actuator is mounted directly to a damper shaft up to 3/4" in diameter by means of its universal clamp, or up to a 1.05" jackshaft with the optional K4-1 clamp. A crankarm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft.



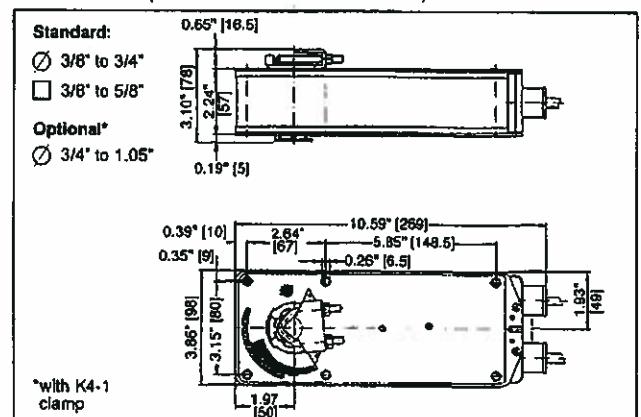
NF24(-S) us and NF120(-S) us control is on-off from an auxiliary contact of a fan motor contactor or a manual switch. The NF24-SR us operates in response to a 2 to 10 VDC, or with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. A 2 to 10 VDC feedback signal is provided for position indication or master slave applications. A microprocessor provides intelligence to the ASIC to provide a constant rotation rate and to know the actuator's exact zero position. The NF24-SR us uses a brushless DC motor which is controlled by an Application Specific Integrated Circuit (ASIC) and a microprocessor which monitors and controls the motor's rotation, and provides a digital rotation sensing function to prevent damage to the actuator in a stall condition. The 120 VAC models and all actuators with auxiliary switches are constructed to meet the requirements for Double Insulated devices. These units do not require a good connection to meet electrical code requirements.

True spring return operation is provided for reliable fail-safe application and positive close-off on air-tight dampers. Consistent torque is provided to the damper with, and without, power applied to the actuator.

The NF series provides 95° of rotation with a graduated position indicator showing 0° to 95°. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches.

* Based on 4 in-lb/ft² damper torque loading. Parallel blade. No edge seals.

Dimensions (All numbers in brackets are metric.)



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Reviewed	Reviewed with Comments	Resubmit See Comments
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Project Engineer

Submittal Date

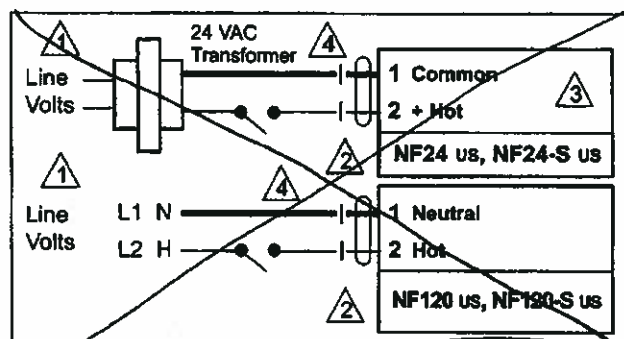
Typical Specification:

Spring return damper actuators shall be direct coupled type which require no crankarm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. The actuators must be designed so that they may be used for either clockwise or counter-clockwise fail-safe operation. Actuators shall be protected from overload at all angles of rotation. If required, 1 SPDT auxiliary switch shall be provided for on-off actuators, with the capability of being adjustable. High voltage 120 VAC actuators and actuators with auxiliary switches must be constructed to meet the requirements for Double Insulation so an electrical ground connection is not required to meet agency codes. Actuators shall be UL listed and CSA certified, have a 2 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

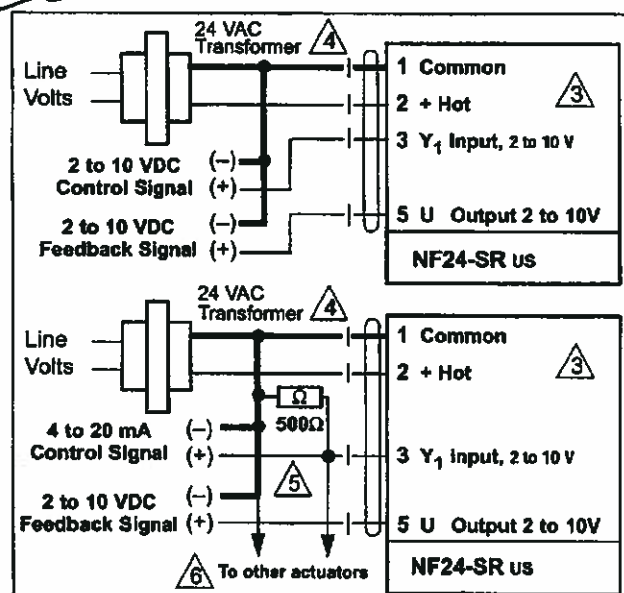
NF24-SR us

The actuator must provide proportional damper control in response to a 2 to 10 VDC, with the addition of a 500Ω resistor, a 4 to 20 mA control input from an electronic controller or positioner. Actuators shall use a brushless DC motor controlled by a microprocessor and be protected from overload at all angles of rotation. Run time shall be independent of load. A 2 to 10 VDC feedback signal shall be provided for position feedback or master-slave applications.

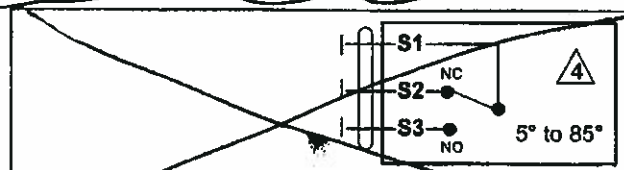
Wiring diagrams



On-off wiring



Proportional wiring (2 to 10 VDC, 4 to 20 mA control signals)



Auxiliary switch models - All NF-series with '-S' suffix

Wiring Notes

- ① Provide overload protection and disconnect as required.
- ② Actuators may be connected in parallel. Power consumption must be observed.
- ③ NF24 (-S) us, NF24-SR us actuators may also be powered by 24 VDC.
- ④ High voltage 120 VAC models and models with auxiliary switches meet UL and CSA requirements without the need of an electrical ground connection.
- ⑤ The ZG-R01 500Ω resistor converts the 4 to 20 mA control signal to 2 to 10 VDC.
- ⑥ Up to 4 actuators may be connected in parallel. With 4 actuators wired to one 500Ω resistor, a +2% shift of control signal may be required. Power consumption must be observed.

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Section 23 34 00

Cook Exhaust Fan



COOK

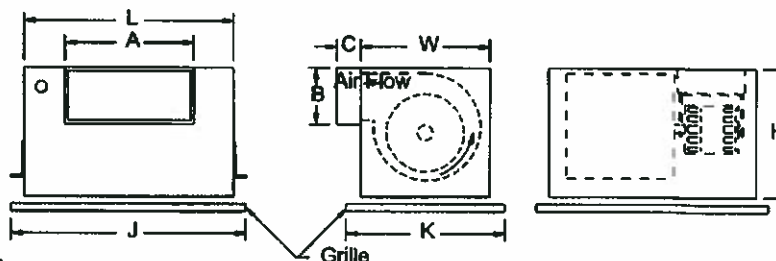

MARK: EF-1
PROJECT: SANIKILUAQ NEW TRUCK FILL STATION
DATE: 6/9/2010

GEMINI

Ceiling and Wall Blowers
200-700 Series

STANDARD CONSTRUCTION FEATURES:

Forward curved galvanized steel fan wheels -
Corrosion resistant galvanized steel fan housing -
Acoustically insulated housing - Aluminum
backdraft damper with solid aluminum hinge rod
mounted in brass bushings - Permanently
lubricated motor with built-in thermal overload
protection and disconnect plug - Interchangeable
panels with removable fasteners allows the
discharge to be easily changed - Internal wiring box
with disconnect receptacle - Powder-painted white
steel grille. Plastic grill standard on sizes 220,
240,320 and 340..



Performance

Qty	Catalog Number	Flow (L/s)	SP (Pa)	Nominal RPM	Input Watts
1	GC-740	341	31.1	1457	324

Altitude (m): 0 Temperature (C): 21

Motor Information

Volts/Ph/Hz	Nameplate Amps
115/1/60	3.9

Dimensions (millimeters)

L-HSG	431.8
W-HSG	301.8
H-HSG	301.6
A-Outlet	266.7
B-Outlet	120.7
C	25.4
J	533.4
K	362.0

NOTE: Accessories may affect dimensions shown.

Shipping Weight(kgs)***	17
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***includes fan, motor & accessories.

Sound Data Inlet Sound Power by Octave Band

1	2	3	4	5	6	7	8	LwA	dBA	Sones	HVISONes
70	69	67	62	56	51	52	52	64	50	6.9	5.5

Accessories:

FAN SPEED CONTROLLER 5 AMP 120 VOLT
GEMINI ISOLATOR KIT - ISOLATORS

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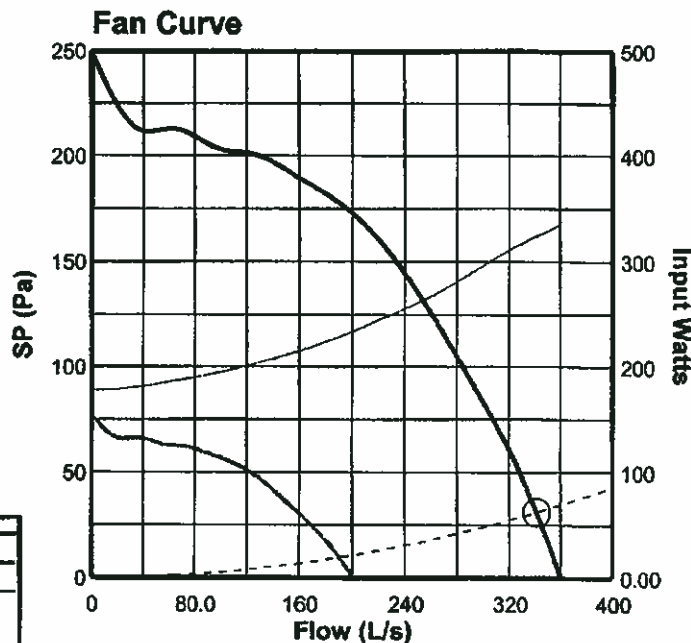
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Fan Curve Legend

L/s vs SP (1457)	—
50% FSC (812.5)	—
L/s vs Watts	—
Point of Operation	○
System Curve	---



Section 23 72 00

Cook Air to Air Energy Recovery Unit (ERV-01)



COOL



UL US



MARK: ERV-01

PROJECT: SANIKILUAQ NEW TRUCK FILL STATION

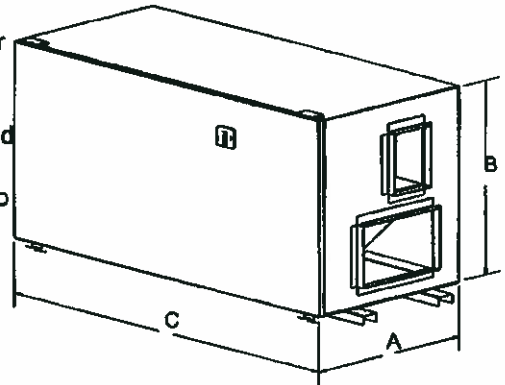
DATE: 6/7/2010

ERV

Energy Recovery Ventilator Direct Drive

STANDARD CONSTRUCTION FEATURES:

Energy recovery wheel constructed of fluted synthetic media containing water selective molecular sieve desiccant - Cassette assembly slides out for easy access and consists of energy recovery wheel, drive motor, and drive components - Ventilator cabinet consisting of a minimum 18 gauge galvanized steel housing - Cabinet internally lined with 1" thick, 3 lb. density, FSK insulation - Cabinet constructed with a hinged door that allows easy access to all internal components- Two SWSI forward curved steel blowers - Standard size 2" thick 30% efficient pleated filters in supply and exhaust air streams - All electrical components pre-wired for single point power connection - Interlock disconnect on hinged access door.



Performance

Qty	Catalog Number	Airstream	Flow (L/s)	SP (Pa)	Fan RPM	Input Watts
1	ERV-500	Supply	81.0	124	984	128
		Exhaust	81.0	124	1046	153

Altitude (m): 0

Motor Information

Airstream	KW	RPM	Volts/Ph/Hz	Enclosure	Mounted
Supply	.37	1725	115/1/60	ODP	YES
Exhaust	.37				

Electrical

ERV Full Load Amps	Minimum Circuit Amps	MOC ^P *
16.6	20.75	25

* Maximum Overload Circuit Protection

Design Conditions

	Outdoor		Indoor	
	Dry Bulb (°C)	Wet Bulb (°C)	Dry Bulb (°C)	Relative Humidity
Summer	27.8	19.4	23.9	50.0%
Winter	-23.3	-23.9	22.2	35.0%

Supply Conditions

	Flow (L/s)	Dry Bulb (°C)	Wet Bulb (°C)	Relative Humidity	Humidity Ratio (kg/kg)	Humidity Ratio (kg/kg)	Dew Point (°C)	Enthalpy (kJ/kg)
Summer	81.0	24.3	17.3	49.7%	0.00943	0.00943	13.2	66.37
Winter		17.4	10.5	41.4%	0.00509	0.00509	4.2	48.25

Dimensions (millimeters)

A	558.8
B	603.3
C	1272.4

NOTE: Accessories may affect dimensions shown.

Shipping Weight(kgs)*** 132

***includes fan, motor & accessories.

Accessories:

PREHEAT FRSTCTL 2 STAGE 115V-1KW
FAN SPEED CONTROLLER 10A SET OF 2
PURGE SECTION
C/W SPRING HANGING ISOLATORS SC-125

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WOOD BANANI BOUTRILLETTE PARIZEAU INC.

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MARK: ERV-01

PROJECT: SANIKILUAQ NEW TRUCK FILL STATION

DATE: 6/7/2010

ERV

Energy Recovery Ventilator
Direct Drive

Performance

Qty	Catalog Number	Airstream	Flow (L/s)	SP (Pa)	Fan RPM	Input Watts
1	ERV-500	Supply	81.0	124	984	128
		Exhaust	81.0	124	1046	153

Altitude (m): 0

Sound Data 8 Octave Bands dB (10⁻¹² Watts)

Airstream	1	2	3	4	5	6	7	8	LwA
Supply	79	74	69	63	58	54	51	47	66
Exhaust	82	76	71	65	61	57	53	50	69

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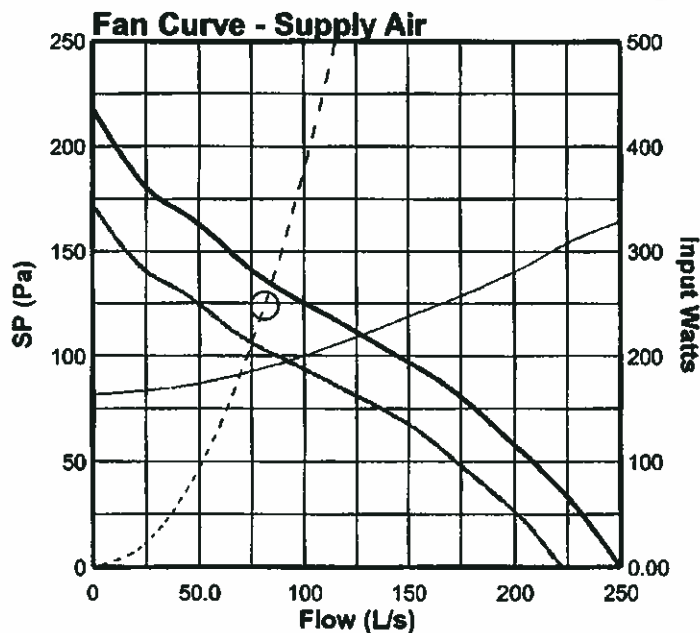
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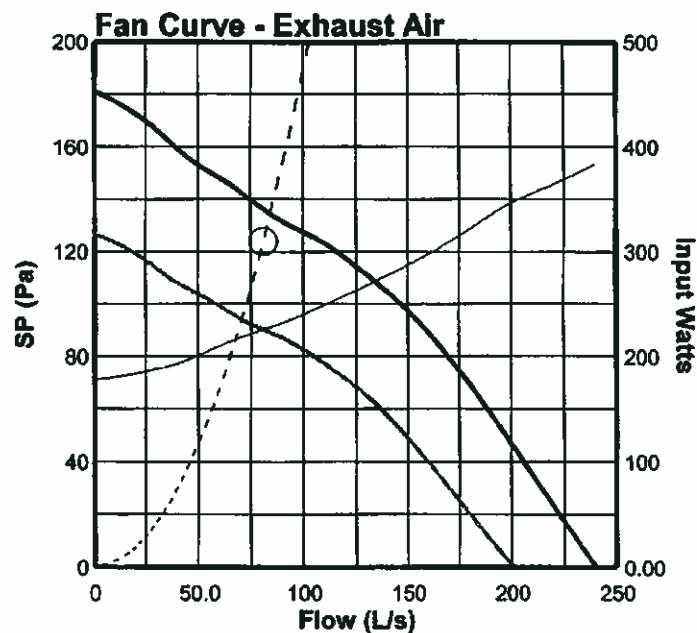
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Fan Curve Legend

L/s vs SP (984)	—
50% FSC (875)	—
L/s vs Watts	—
Point of Operation	○
System Curve	—



Fan Curve Legend

L/s vs SP (1046)	—
50% FSC (875)	—
L/s vs Watts	—
Point of Operation	○
System Curve	—



COOL



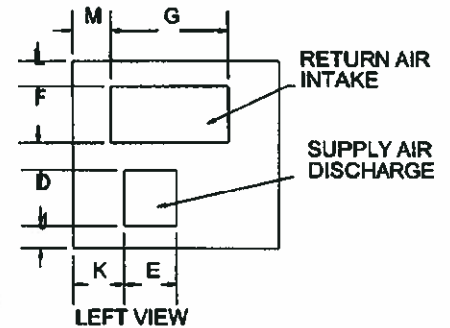
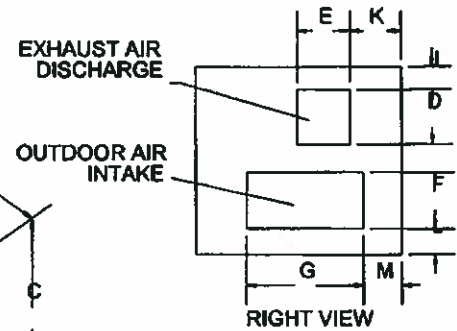
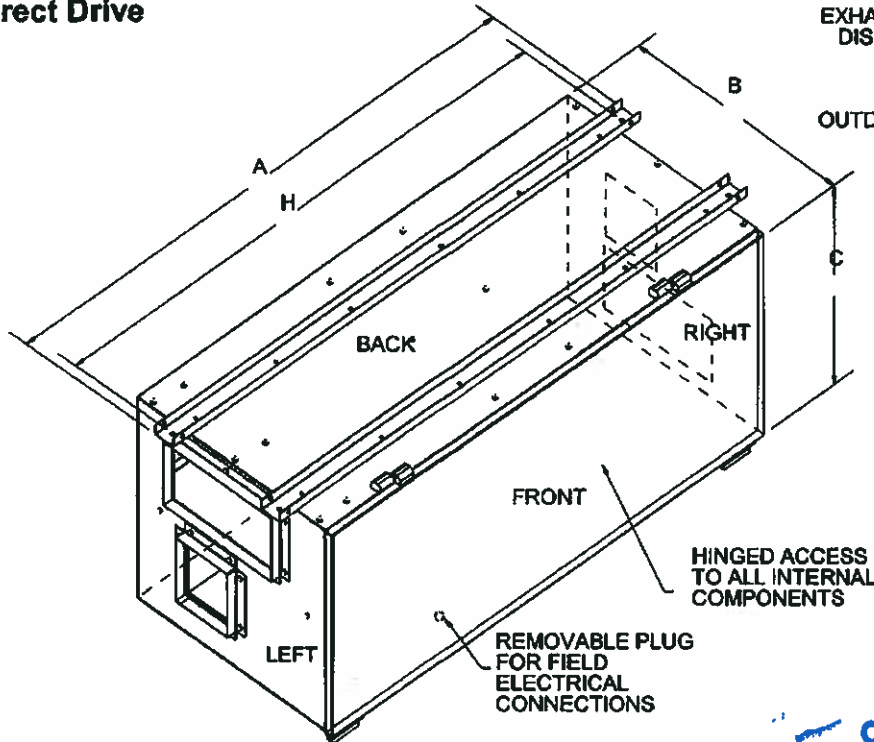
MARK: ERV-01

PROJECT: SANIKILUAQ NEW TRUCK FILL STATION

DATE: 6/7/2010

ERV

Energy Recovery Ventilator
Direct Drive



Dimensions (millimeters)

Size	500
A	1372
B	559
C	578
D	178
E	145
F	178
G	305
H	1321
J	102
K	135
L	38.1
M	102
N	1219
P	373

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MARK: ERV-01

PROJECT: SANIKILUAQ NEW TRUCK FILL STATION

DATE: 6/7/2010

ERV

ERV Wheel Performance Report

Performance

Catalog Number	Flow (L/s)		Wheel Effectiveness	
	Supply	Exhaust	Sensible	Latent
ERV-500	81.2	81.2	88.4%	87.0%

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Summer

Outdoor Intake		Room Supply	
Dry Bulb(°C):	27.8	Dry Bulb(°C):	24.3
Wet Bulb(°C):	19.4	Wet Bulb(°C):	17.3
Humidity Ratio (kg/kg):	0.01071	Humidity Ratio (kg/kg):	0.00943
Humidity Ratio (kg/kg):	0.01071	Humidity Ratio (kg/kg):	0.00943
Relative Humidity:	45.9%	Relative Humidity:	49.7%
Enthalpy (kJ/kg):	73.16	Enthalpy (kJ/kg):	66.37
Mass Flow Rate (kg/Min):	5.9	Mass Flow Rate (kg/Min):	5.9
Outdoor Exhaust		Room Exhaust	
Dry Bulb(°C):	27.3	Dry Bulb(°C):	23.9
Wet Bulb(°C):	19.1	Wet Bulb(°C):	17.0
Humidity Ratio (kg/kg):	0.01051	Humidity Ratio (kg/kg):	0.00924
Humidity Ratio (kg/kg):	0.01051	Humidity Ratio (kg/kg):	0.00924
Relative Humidity:	46.3%	Relative Humidity:	50.0%
Enthalpy (kJ/kg):	72.20	Enthalpy (kJ/kg):	65.42
Mass Flow Rate (kg/Min):	5.9	Mass Flow Rate (kg/Min):	5.9

Outdoor Air Cooling Load Reduction

Cooling Load w/o ERV (kW)	0.75
Cooling Load w/ERV (kW)	0.09
Energy Savings (kW)	0.66

Winter

Outdoor Intake		Room Supply	
Dry Bulb(°C):	-19.6°	Dry Bulb(°C):	17.4
Wet Bulb(°C):	-20.6°	Wet Bulb(°C):	10.5
Humidity Ratio (kg/kg):	0.00022	Humidity Ratio (kg/kg):	0.00508
Humidity Ratio (kg/kg):	0.00022	Humidity Ratio (kg/kg):	0.00508
Relative Humidity:	32.9%	Relative Humidity:	41.4%
Enthalpy (kJ/kg):	-1.35	Enthalpy (kJ/kg):	48.23
Mass Flow Rate (kg/Min):	5.9	Mass Flow Rate (kg/Min):	5.9
Outdoor Exhaust		Room Exhaust	
Dry Bulb(°C):	-14.8	Dry Bulb(°C):	22.2
Wet Bulb(°C):	-15.0	Wet Bulb(°C):	13.3
Humidity Ratio (kg/kg):	0.00095	Humidity Ratio (kg/kg):	0.00581
Humidity Ratio (kg/kg):	0.00095	Humidity Ratio (kg/kg):	0.00581
Relative Humidity:	91.3%	Relative Humidity:	35.0%
Enthalpy (kJ/kg):	5.33	Enthalpy (kJ/kg):	55.01
Mass Flow Rate (kg/Min):	5.9	Mass Flow Rate (kg/Min):	5.9

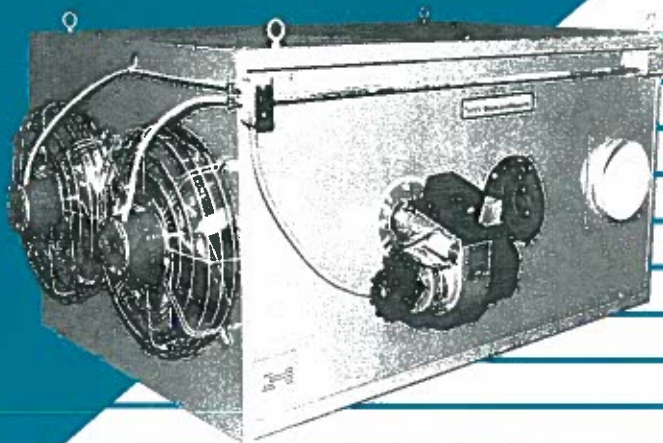
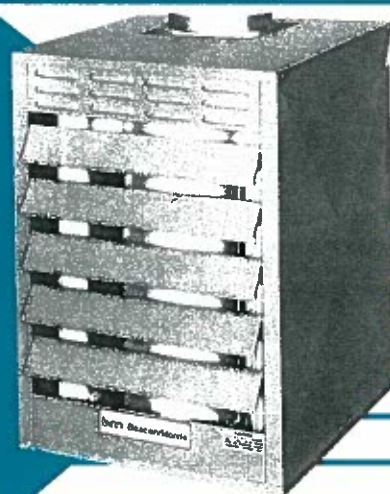
Outdoor Air Heating Load Reduction

Heating Load w/o ERV (kJ/hr)	16,070
Heating Load w/ERV (kJ/hr)	1,862
Energy Savings (kJ/hr)	14,208

OIL-FIRED UNIT HEATERS



bm®
Beacon/Morris



MODELS BMOF 50 - 250 STANDARD FEATURES

HEAT EXCHANGERS

18 gauge aluminized steel.

OIL BURNER

Efficient flame retention burner results in complete and clean combustion.

ADJUSTABLE LOUVERS

Directs the air where needed.

HEAVY DUTY FAN

Fan assembly is constructed of quality materials to insure trouble free operation.

COMPLETELY PACKAGED

Shipped factory assembled and ready to install. Cuts expensive labor and materials costs.

STANDARD EQUIPMENT

- Flame retention oil burner.
- 115V, 60Hz.
- CAD cell burner control.
- Fan/limit control.
- Summer fan operation.
- Four point suspension.
- Burner service switch.

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BAMANI BOUTILLETTE PARIZEAU INC.		
Reviewer	Reviewed with Comments	Resubmit See Comments
	C.B.	

JUN 08 2010

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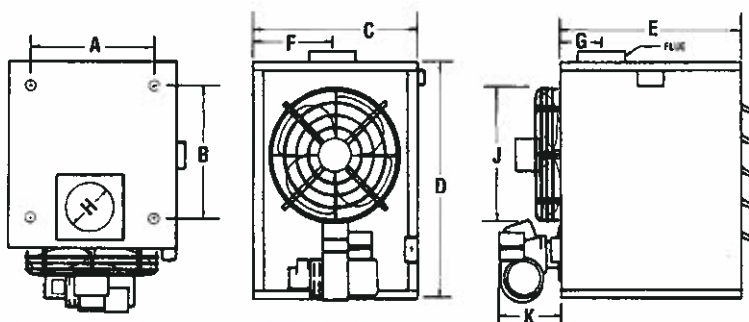
MODELS BMOF 50 - 250 PERFORMANCE AND DIMENSIONAL DATA

Unit Size	50*	84*	100*	180*	250*
Input — BTU per hour	70,000	105,000	126,000	231,000	312,000
Output — BTU per hour	56,000	84,000	100,000	184,000	250,000
Firing rate — No. 2 oil	.50 GPH	.75 GPH	.90 GPH	1.65 GPH	2.25
Fan motor RPM	1140	1140	1140	1140	1750
Fan motor HP	1/4	1/4	1/4	1/4	1/2
Air delivery	1050 CFM	1750 CFM	2000 CFM	3200 CFM	3400 CFM
Effective air throw at 12' suspension (ft.)	35'	46'	47'	56'	64'
Flue size diameter (inches)	7"	7"	7"	8"	9"
Hanger size	3/4" IPS	3/4" IPS	3/4" IPS	3/4" IPS	3/4" IPS
Net weight	155 lbs.	155 lbs.	155 lbs.	285 lbs.	420 lbs.
Shipping weight	175 lbs.	175 lbs.	175 lbs.	310 lbs.	450 lbs.

Dimensional Data

"A"	15"	15"	15"	26-3/4"	27-3/4"
"B"	12"	12"	12"	20-3/4"	19-3/4"
"C"	20"	20"	20"	28-1/8"	34-1/8"
"D"	31"	31"	31"	39"	44-1/4"
"E"	19-1/2"	19-1/2"	19-1/2"	31-1/8"	34-1/8"
"F"	10-1/8"	10-1/8"	10-1/8"	14-1/16"	17-1/16"
"G"	7-1/2"	7-1/2"	7-1/2"	7-3/8"	9-3/8"
"H"	7"	7"	7"	8"	9"
"J"	16"	16"	16"	20"	22"
"K"	10"	10"	10"	12"	12"

Specifications subject to change without notice. *Underwriters' Laboratories Listed



MODELS BMOF 300 & 450 STANDARD FEATURES

HEAT EXCHANGERS

Primary of 16 gauge, 400 Series, stainless steel; secondary of 14 gauge hot rolled steel.

FRAME AND CABINET

Welded Formex frame provides exceptional strength for rigid support. Frame and recessed vinyl-coated steel cabinet panels provide very rugged long-lasting casing for internal parts of unit. Handsome gray finish.

STANDARD EQUIPMENT

- 1-inch foil-faced fiberglass frame and casing insulation.
- 3,450 RPM flame retention burner for No. 2 oil.

- Cad cell burner control.
- Burner service switch.
- Fan and limit control with summer fan switch.
- Complete factory assembly, wiring and fire-tested.

OPTIONAL EQUIPMENT

Double direction louvers.

CLEMENT BOURGOGNE PARIZEAU INC.			
Reviewed	Reviewed	Resubmit	See Comments
	C.B.		
JUN 08 2010			
The reviewer has any way revised or responsibility for its accuracy or emphasis will be contract			

MODELS BMOF 300 & 450 PERFORMANCE DATA

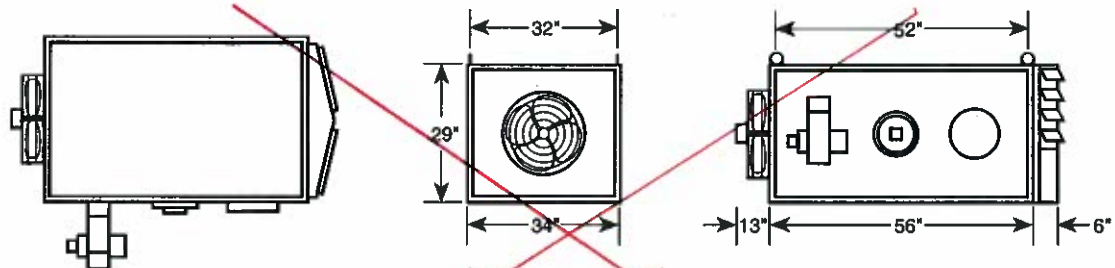
Unit Size	300	450
Input — BTU per hour	375,000	560,000
Output — BTU per hour	300,000	450,000
Firing rate — No. 2 oil	2.75 GPH	4.00 GPH
Fan motor Qty. — HP	1 — 1/2 HP	2 — 1/3 HP
Air delivery	5,000 CFM	6,000 CFM
Effective air throw at 12' suspension (ft.)	90'	90'
Flue size diameter (in.)	9"	10"
Standard electrical	115/1/60	115/1/60
Net weight	675 lbs.	800 lbs.
Shipping weight	700 lbs.	850 lbs.
1" suspension eye bolts	4	4

Specifications subject to change without notice.

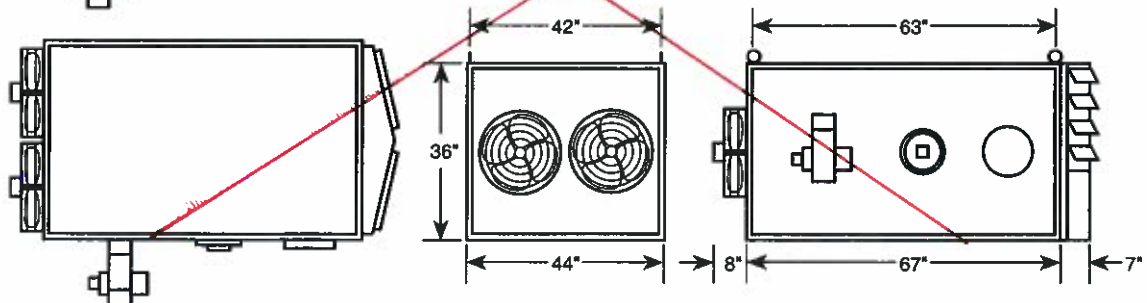
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MODELS BMOF 300 & 450 DIMENSIONAL DATA

BMOF-300



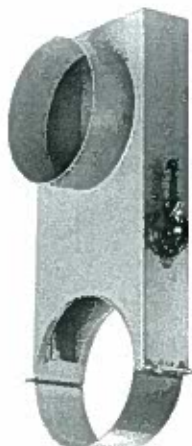
BMOF-450



OPTIONAL EQUIPMENT



THERMOSTAT
Honeywell T87F
Low Voltage
Range 60-90°



**COMBUSTION
OUTSIDE AIR ADAPTER**



PRESSURE SWITCH

TYPICAL SPECIFICATIONS

Beacon/Morris Oil-Fired Unit Heaters are the vented type intended for space heating, and designed for ceiling suspension.

Heaters are equipped with a 3450 RPM flame-retention oil burner of the pressure-atomizing type, using high-tension electric ignition. Operation excels that of conventional gun-type burners. Employing Group I or II safety combustion controls and oil pressures not greater than approximately 100 psi, the burner operates with fuels no heavier than Commercial grade No. 2.

CLEARANCE

Clearances between a Unit and combustible construction should be at least 6" at sides, 6" at top and 18" from the smoke pipe in any direction. For installation of draft regulation, allow 18" between Unit top and ceiling, 24" from burner.

SUSPENSION

Suspend utilizing four hangers of $\frac{3}{4}$ " steel pipe cut to length; pipe unions make installation easier.

LOCATION OF UNITS (A GENERAL GUIDE):

- One Heater** should be suspended over an area of low heat loss to blow toward the area of greatest heat loss.
- Two or More Heaters**, where there are no small areas of concentrated heat loss, should be arranged around the outside walls and blowing parallel to them. Each Heater blows toward the air-intake side of the Unit to create continuous circular air motion.

NOTE: Where there are concentrated heat-loss areas, like large garage doors, a combination of (a) and (b) is desirable. To supplement the circular air movement, direct individual Heaters toward the high heat-loss areas.

FLUE PIPE AND CHIMNEY

Flue pipe of galvanized steel the same size as the Heater connection is recommended. A full-size, approved type, barometric draft regulator (not furnished with Heater) should be installed close to the Unit's outlet. The air flow opening into the regulator

should face the front of the Heater to avoid air currents set up by the fan (such currents affect the regulator's operation). The flue should connect directly into a permanent chimney. The flue pipe must never pass through any floor or ceiling, or through any combustible material unless suitably guarded.

These general points should also be observed:

- Flue pipes through the roof, capped with a weatherproof anti-down draft cap, should rise at least two feet above any object within a 30' radius.
- If a chimney is used and 10' or more of it rises above the flue connection, no more than 20' of horizontal flue pipe is permissible. If chimney height above the flue connection is less than 10', the allowable horizontal length is 12'. Chimney walls should be clean and smooth, free from holes, flaws that permit air leakage, and offsets. Minimum inside chimney size for one Unit Heater is 8" x 8", or 8" round, inside. Chimney should be inspected (and vacuum-cleaned if necessary) at the beginning of each heating season.
- All flue pipes should rise about $\frac{1}{4}$ " per foot of horizontal run.
- Double flue pipe construction provides a safety thimble around a flue passing through roof. Consult local ordinances for proper method of installing flue pipes through the roof; in any case, minimum requirements must strictly accord with those of the National Board of Fire Underwriters.
- Flue pipe must always be extended full size with no restrictions whatsoever.

ELECTRICAL CONNECTIONS

Unit Heaters are completely factory-assembled and wired with No.14 type TW solid wire, ready for connection to single phase, 60 cycle, 115 volt power ONLY. Wiring from branch circuit to Heater terminals should accord with the National Electrical Code and any local ordinances that apply. Low voltage thermostat must be located out of the Unit's heated air stream.



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(413) 562-5423 Fax (413) 572-3764
www.beacon-morris.com



5 – FAN AND LIMIT CONTROL SETTING

A good rule to follow is to use lowest limit setting that will assure enough heat and use lowest fan settings that will not circulate cool air before fan stops.

The recommended setting is: Limit 200 degrees, fan on 130 degrees; fan off 90 degrees.

6 – STARTING AND TESTING OF UNIT

Before starting burner, it is advisable to remove nozzle assembly and check nozzle size (see nozzle specifications label on unit) and setting of electrodes. Put 5 to 10 drops of good quality SAE 20 non-detergent motor oil in the oil cups at each end of the motor. Repeat oiling of motor at the start of each heating season.

The burner is equipped with a cadmium sulfide flame detector that is located in the base plate of ignition transformer and is accessible by moving the transformer to a position normally required for the removal of the ignition assembly. If new installation, make sure fuel tank has been filled. Insert a fuse in fuse block. Set thermostat a minimum of 2 degrees above room temperature.

It is important that the installation be checked for safety shutdown in the event a malfunction of equipment occurs. There are several ways this can be accomplished. We recommend one of the following:

- a. Before opening oil valve and priming fuel unit, turn on switch. Burner should, but because of no fuel, combustion will not be established. Burner should operate the prescribed time, depending on the primary control, and then go off on "safety". If burner does not start, check reset of primary, thermal cutout on burner motor, or fuse.
- b. After priming fuel unit (see Section 7 "Primary Fuel Pump") and establishing combustion, disconnect motor lead from orange wire of primary and turn switch on. Primary control should be energized and remain so the prescribed time, depending on primary, and then go on "safety". After completion of test reconnect motor lead to orange wire.

7 – PRIMING FUEL PUMP

Place a can under valve of fuel pump and open bleed valve one-quarter turn. Make certain all fuel oil valves to burner are open. Push reset on primary control. Turn on switch to burner. Operate burner until a good stream of fuel, free from bubbles and foam, flows from bleed valve. Close bleed valve and combustion should occur. If primary goes "safety" before fuel unit is completely purged, wait approximately four minutes, RESET PRIMARY CONTROL AND CONTINUE PRIMING UNTIL COMBUSTION IS ESTABLISHED.

8 – FINAL ADJUSTING AND TESTING

Punch or drill a hole in flue pipe as close to unit as possible large enough to accommodate the probes of the instruments (1/4").

Using the draft gauge, adjust barometric draft regulator to establish a maximum of minus .04 inches of draft in flue pipe. It is desirable to operate with minimum draft required to remove products of combustion; however, unit should not operate with draft in flue pipe below minus .02 inches. Failure to obtain these readings indicate a need for a draft inducer.

Using the Smoke Tester, adjust "fine" air shutter of burner (see burner specifications sheet) to effect a 0+ reading on smoke scale. If this is not possible, open bulk air band to No. 1 setting on scale on burner housing and reset "fine" adjustment. Continue the procedure until recommended reading is obtained remembering final adjustment should be made with fine tuning air shutter.

Using the CO₂ Tester, analyze the flue gas. CO₂ should be a minimum of 8 percent. Determine the gross stack temperature using the Stack Thermometer. Net stack temperature (flue gas temperature minus room temperature) should be less than 600 degrees F.

If the recommended CO₂ or smoke readings cannot be obtained, check the fuel nozzle pressure, and flue draft. Recheck fuel nozzle for proper type (refer to nozzle specification label on unit).

Installation is now complete. Fill out warranty card and mail to register your warranty.

Figure 1 - Fuel Oil Piping.

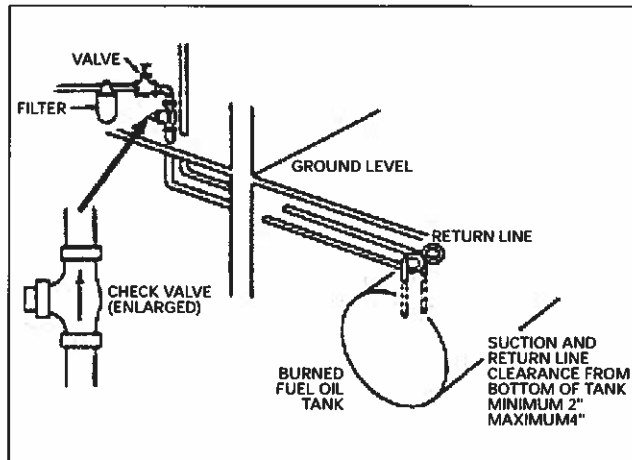


Figure 2 - Piping Overhead System

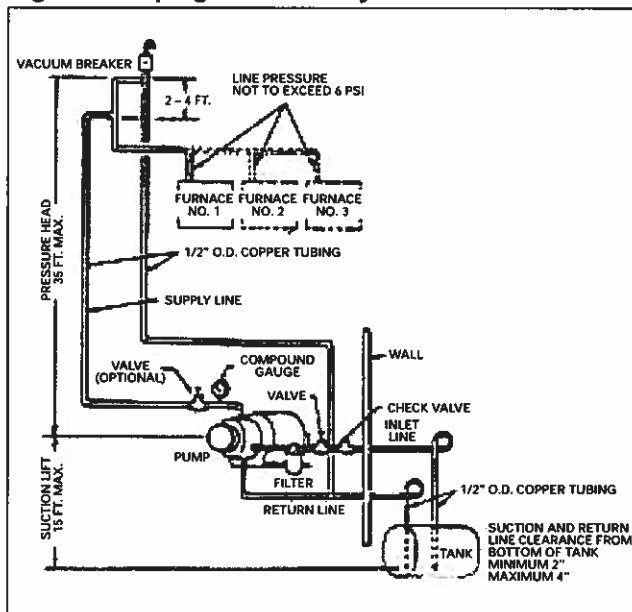
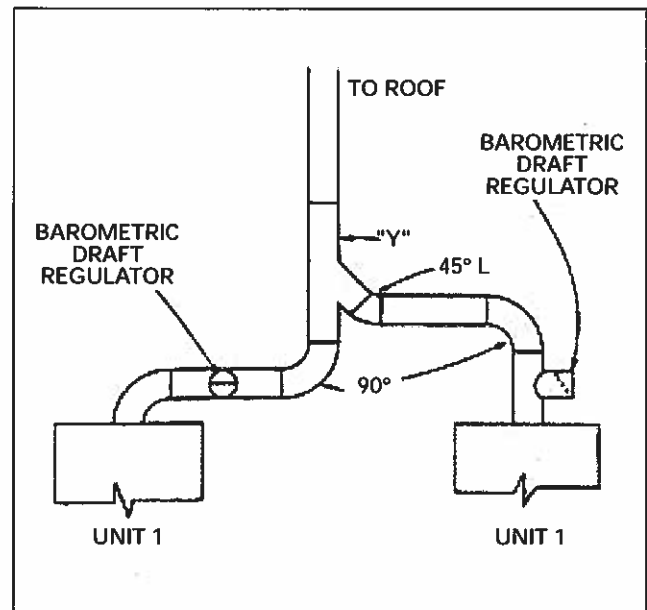


Figure 3



4 – FLUE CONNECTIONS

Connect flue pipe to chimney. If chimney is masonry type, be sure base is clean of debris and that opening through tile is at least as large as flue pipe (see specification sheet).

Chimney, either masonry or pre-fab, should be in accordance with local requirements. The flue gas exit of a chimney shall be at least 3 feet above the highest point where the chimney passes through the roof of a building, and at least 2 feet higher than any portion of a building within 10 feet of the chimney. Chimney should not be connected to an open fireplace, but could serve two heating units.

NOTE: When two units are connected to a common chimney, they should be connected as shown in Figure 3.

Barometric draft regulator should be installed in flue pipe. Regulator should be installed in run of flue pipe, either horizontal or vertical. It is poor practice to install in a tee that is substituted for an elbow as this has a tendency to puff odors out of regulator on starts.

Special attention must be given to those installations such as service stations and warehouses where units are suspended at ceiling level. Because of the height restrictions on the chimney, draft is not adequate. Available for these installations is a draft inducer and prover at additional cost.

All oil fired Unit Heaters are shipped in a heavy duty reinforced corrugated shipping crate. Upon receiving your unit, a careful inspection of this crate should be made to ascertain if there is any damage either external or concealed. Units are completely assembled and wired.

GENERAL INFORMATION

Oil Fired Unit heaters are designed to be suspended. However, they can be installed on approved fire-resistive slabs or supports having no combustible material against the underside of the unit. Other clearances to combustible sources should be not less than 6" from sides and top and 18" from flue pipe in any direction. When suspending the unit from a ceiling, an allowance of 18" from the top of the unit should be made to accommodate a barometric draft regulator.

Unit Heaters should not be subjected to negative pressures (drafts) created by room or building exhaust fans. Sufficient air for combustion is an important consideration.

Special attention must be given to those installations, such as service stations and warehouses, where the units have short stacks since the draft may not be adequate.

When the vertical distance from the fuel supply tanks to the fuel unit on the burner is more than 15 feet, or when a multiple installation is required, the fuel system should include a boost pump. See Figure 2.

INSTALLATION PROCEDURE

1 – HANGING OF UNIT

Welded to the top of the heat exchanger at each corner is a 3/4" pipe coupling which will accommodate a standard 3/4" pipe nipple. There are many ways the suspension of a unit can be accomplished. However, care should be taken to be sure the supporting beams or girders are of ample strength to support the weight of the unit. It is good practice to distribute the weight over several girders rather than depending on one.

2 – WIRING

As this is a prewired unit, all controls, with the exception of the thermostat are mounted and wired. 115 volt service to utility box on unit heater is required. Unit should be fused independent of other fixtures, equipment, etc. There is a service switch on the unit. An additional switch should be provided at the room or building entrance.

The thermostat should be mounted away from the blower air stream on an inside wall or partition approximately 5 feet above the floor.

3 – FUEL OIL PIPING

a) Gravity Systems

Gravity systems where fuel supply is on the same level as unit, require one line from tank to burner. This should be 1/2" or 3/8" O.D. tubing or 3/8" iron pipe according to local codes. There should be a hard seat globe valve at tank. A Main line oil filter should be installed immediately after valve. Another valve, either hard seat globe or heat responsive, should be installed at burner. Local codes must be adhered to.

b) Lift Systems

Lift systems where fuel supply tank is below unit, require a two-pipe system. See Figure 1.

Suction and return lines should originate no less than 2" nor more than 4" from bottom of fuel tank. If code permits, 1/2" O.D. soft tubing should be used. A double-tapped bushing should be used in tapping of tank with a slip connector so that both lines are continuous from bottom of tank to inside of building.

A good quality ball check valve should be in the suction line immediately inside of building.

Care should be exercised in installing lines in tank so that they do not curl up inside of tank.

Lines should continue to burner either as copper tubing or black pipe, depending on local codes, and should be run straight and direct, eliminating need for bends or elbows as much as possible. Lines should be securely fastened to eliminate vibration and/or sagging.

Be sure bypass plug is installed in proper place, tightly secured. See instruction sheet attached to pump for more detail. On all connections, use oil resistant joint compound. Either hard seat globe valve or heat responsive valve (Firomatic® or equal), depending on code, should be installed in suction line as close to pump as practicable.

A boost pump should be used on multiple unit heater installations, or where an installation has more than a 15 foot lift (measured from the suction line in fuel tank to the fuel unit on the burner). See Figure 2

INSTALLATION INSTRUCTIONS OIL FIRED UNIT HEATERS

MODELS: BMOF (50, 84, 100, 140, 180, 250)

ATTENTION: READ THIS MANUAL AND ALL LABELS ATTACHED TO THE UNIT CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THESE UNITS! CHECK UNIT DATA PLATE FOR ELECTRICAL SPECIFICATIONS AND MAKE CERTAIN THAT THESE AGREE WITH THOSE AT POINT OF INSTALLATION. RECORD THE UNIT MODEL AND SERIAL No.(s) IN THE SPACE PROVIDED. RETAIN FOR FUTURE REFERENCE.

Model No. BMOF - 50 Serial No. _____

FOR YOUR SAFETY

The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

WARNING: Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

WARNING: Install, operate and maintain unit in accordance with manufacturer's instructions to avoid exposure to fuel substances or substances from incomplete combustion which can cause death or serious illness. The state of California has determined that these substances may cause cancer, birth defects, or other reproductive harm.

INSTALLER'S RESPONSIBILITY

Installer Please Note: This equipment has been test fired and inspected. It has been shipped free from defects from our factory. However, during shipment and installation, problems such as loose wires, leaks or loose fasteners may occur. **It is the installer's responsibility to inspect and correct any problems that may be found.**

RECEIVING INSTRUCTIONS


Inspect shipment immediately when received to determine if any damage has occurred to the unit during shipment. After the unit has been uncrated, check for any visible damage to the unit. If any damage is found, the consignee should sign the bill of lading indicating such damage and immediately file claim for damage with the transportation company.

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Reviewed	Reviewed with Comments C.B.	Resubmit See Comments
JUN 08 2010		
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CLEMENT BOURGOINE

bmm
Beacon/Morris

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(413) 562-5423 • FAX: (413) 572-3764

 A MESTEK COMPANY
261

RECOMMENDED OIL SUPPLY SYSTEMS

BOOSTER PUMP

SETTING PRESSURE AND BLEEDING FIGURES 4 AND 5

1. Stop all burner pumps.
2. Start boost pump manually
3. Set boost pump pressure so that gauge in first burner manifold reads not more than 10 P.S.I.
4. Bleed air from first burner pump by loosening unused inlet plug; bleed other units downstream the same way.
5. Bleed manifold by loosening pipe cap (Figure 4).
6. For automatic operation, place switch on OFF.

Boost Pump Maximum Inlet Line (Ft.) For Figures 4 & 5

Height	0-7'	10'	13'	15'
30 GPH	100'	80'	63'	52'
50 GPH	60'	53'	41'	34'

Operation is extremely simple. Pressure developed by oil burner fuel unit closes low-voltage switch connected to it. This causes switch relay to energize boost pump motor, which starts and stop automatically with burner. For initial start-up, switch relay may be held "in" manually. Or a manual ON/OFF switch can be connected across low-voltage wires leading from switch relay to pressure switch. With manual switch in "ON" position, boost pump runs continuously.

NOTE: Check all burners for normal start and fuel units for stable atomizing pressure. Then open boost pump switch for automatic operation upon burner demand.

Systems in Figures 4 and 5 will be in constant operation when low-voltage switches are not used.

NOTE: Installations in figures 4 and 5 can be either Intermittent or Constant operation.

CAUTION: When 2' riser cannot be maintained, use pressurized system in Figure 4.

Manifold and feeder lines must be run in a horizontal plane and elevated above fuel unit intakes. At furnace locations, extend feeder lines downward to fuel unit intakes.

Install in accordance with National Board of Fire Underwriters and local ordinances where applicable.

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JUN 08 2010

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Figure 4 - Pressurized System

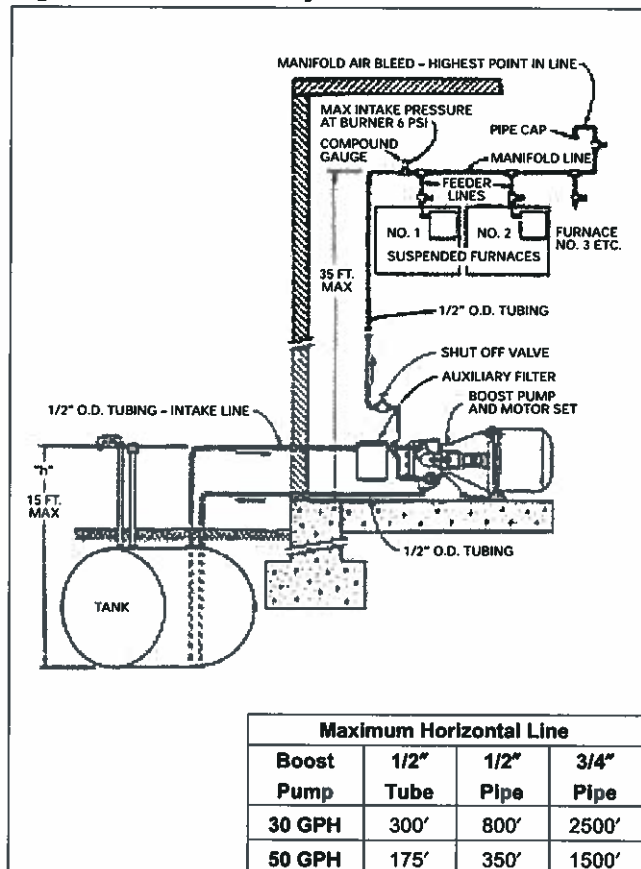
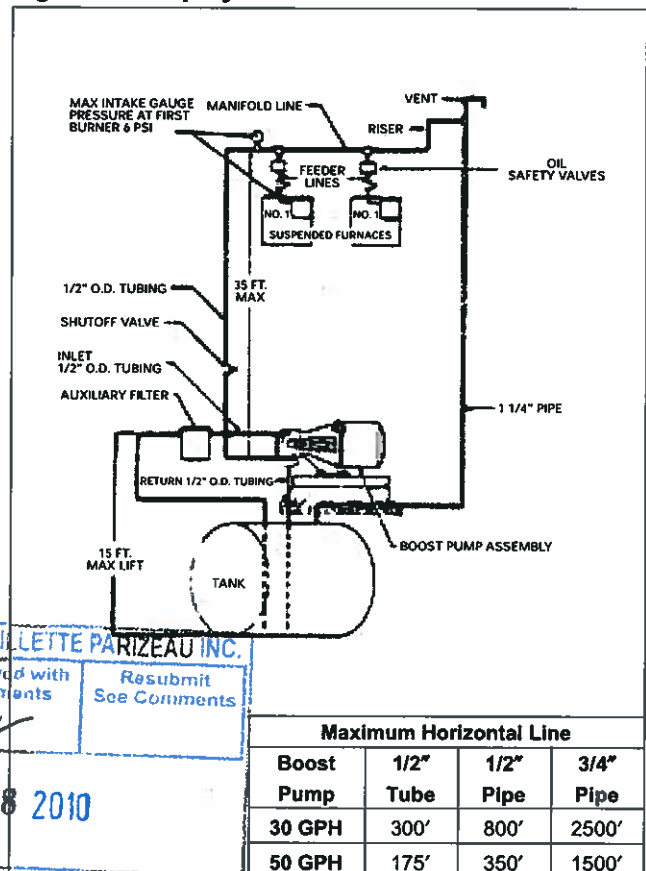


Figure 5 - Loop System



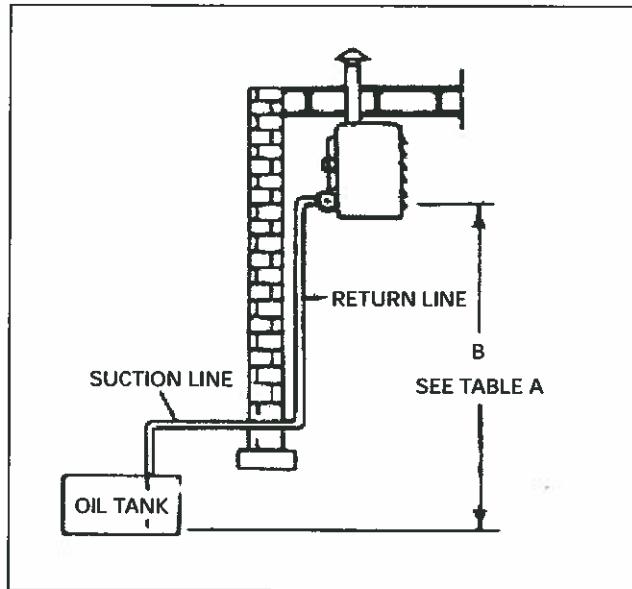
RECOMMENDED OIL SUPPLY SYSTEMS

2 PIPE SYSTEM

Separated suction oil line must be used for second unit.
Return oil lines can be twinned together.

Correct line size for two pipe installation 1/2" O.D. tubing.

Figure 6



Maximum allowable length of either intake or return line in feet, including horizontal and vertical run.

Maximum line lengths shown above are calculated for No. 2 oil at 60° and 3450 RPM pump speed.

Table A
"Lift" Installation Values

Distance "B" Lift	Single Stage	Two Stage
0'	100'	100'
1'	100'	100'
2'	100'	100'
3'	100'	100'
4'	100'	100'
5'	100'	100'
6'	100'	100'
7'	99'	100'
8'	83'	100'
9'	68'	100'
10'	52'	100'
11'	42'	100'
12'	25'	100'
13'	—	100'
14'	—	100'
15'	—	100'

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WIRING

Figure 7

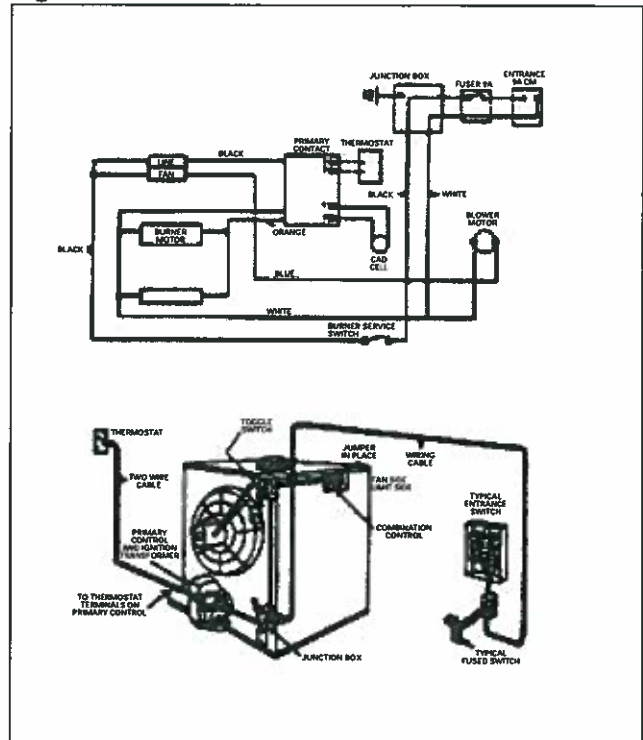
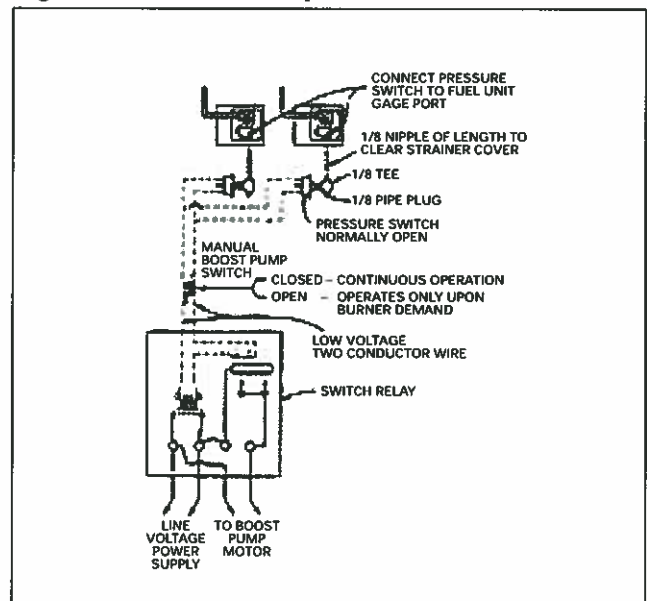


Figure 8 - Intermittent Operation



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Reviewed

C.B.

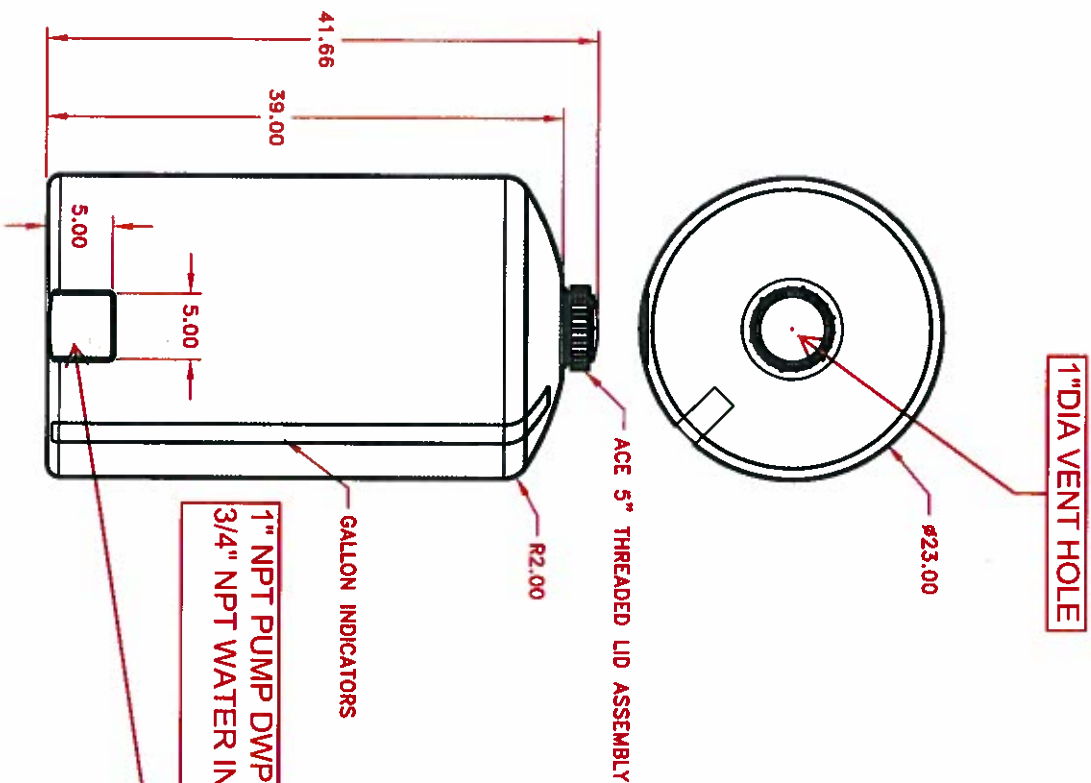
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Comments

Resubmit
See Comment

JUN 08 2010

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Section 23 85 00 Domestic Fresh Water Tank and Sewage Tank



JUL 07 2010

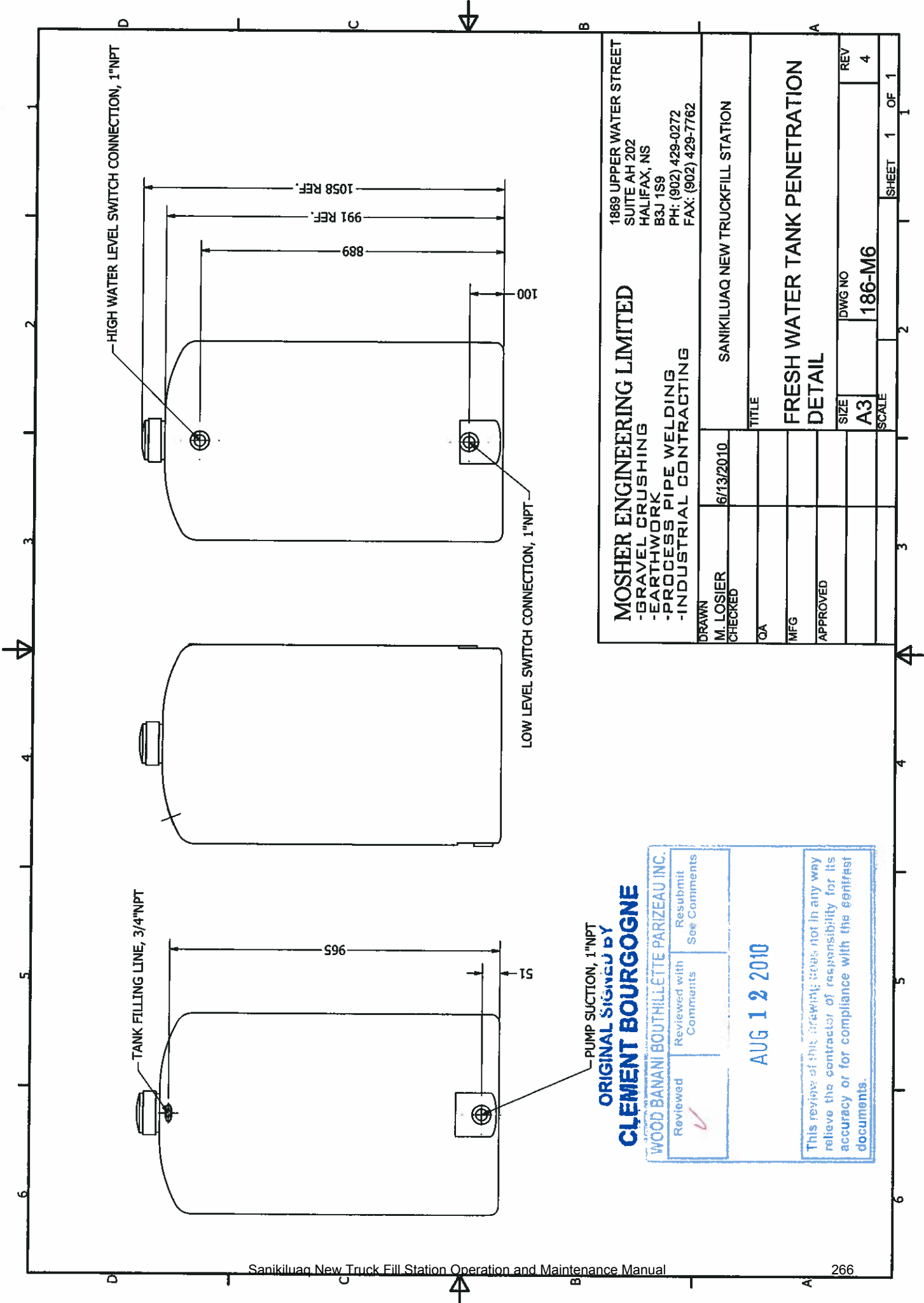
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CLEMENT BOURGOINE

1" NPT PUMP DWP-01 SUCTION
3/4" NPT WATER INLET FROM S-DWT

GENERAL NOTES:

QUAN. REQ.: ()

SCALE	MTS	BR	ZE	DATE	PKG. NO.
<div style="text-align: center;"> PROTECTOPLAS COMPANY DIVISION OF BECO, INC. 8020 RD., OHIO 44148 USA </div>					
REV	DATE	BY	REMARKS		
CUSTOMER:					
TITLE: 65 GAL VERT					



MOSHER ENGINEERING LIMITED
 -GRAVEL CRUSHING
 -EARTHWORK
 -PROCESS PIPE WELDING
 -INDUSTRIAL CONTRACTING
 1869 UPPER WATER STREET
 SUITE AH 202
 HALIFAX, NS
 B3J 1S9
 PH: (902) 429-0272
 FAX: (902) 429-7762

DRAWN		6/13/2010		SANIKILUAQ NEW TRUCKFILL STATION	
M. LOSIER		CHECKED		TITLE	
QA				FRESH WATER TANK PENETRATION	
MFG				DETAIL	
APPROVED				SIZE	REV
				A3	4
				DWG NO	
				186-M6	
				SCALE	
				SHEET	1 OF 1

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CLEMENT BOURGOGNE

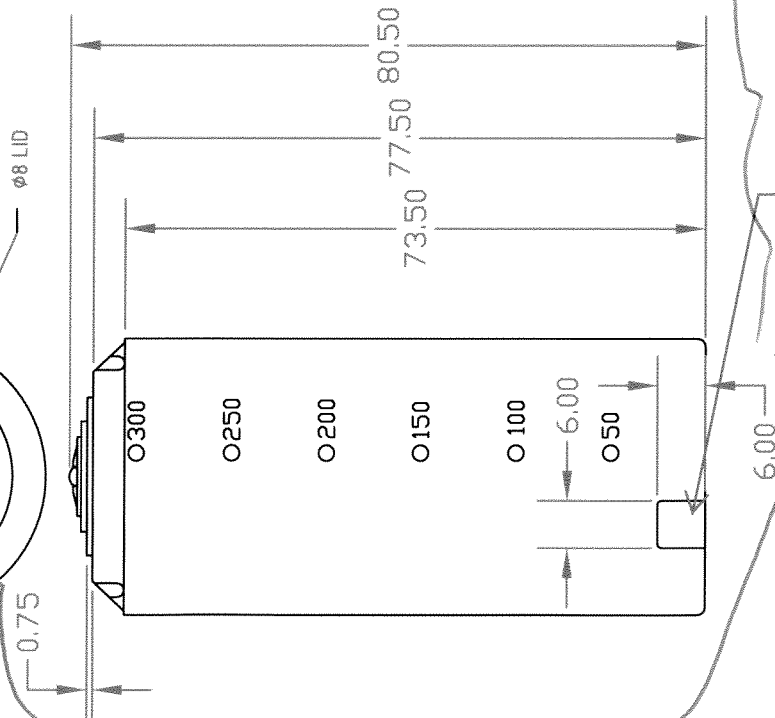
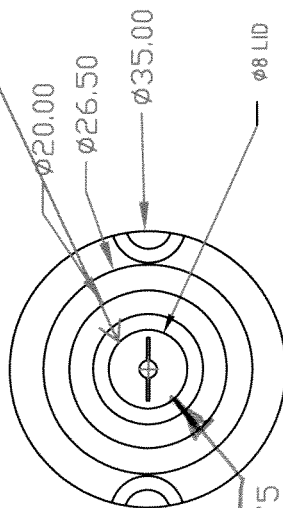
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Reviewed	Reviewed with Comments	Resubmit
✓		See Comments

AUG 12 2010

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COVER VENT EQUIVALENT TO A 2" HOLE



3" NPT CONNECTION - PUMPER TRUCK SUCTION
1 1/2" NPT CONNECTION SP1 DISCH.
1 1/2" NPT CONNECTION SP2 DISCH.

DRAWING REVIEW

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NO EXCEPTIONS
TAKEN

EXCEPTIONS
NOTED - RESUBMIT

Submission No. 1
Project No. 20127
By [Signature]
Date 11/18/2010

Trow Associates Inc.

2650 Queensview Drive, Suite 100 Tel: (613) 688-1899
Ottawa, Ontario K2B 8H6 Fax: (613) 225-7337

GENERAL NOTES:

1. MATERIAL TANK TO BE ONE PIECE MOLDED OF HIGH DENSITY POLYETHYLENE, COLOR: NATURAL, DESIGNED FOR CONTENTS TO S.G.
2. CONTENTS:
3. OPERATING TEMP.
4. FLANGES TO BE HAND WELDED W/ NITROGEN GAS
5. ORIENT ALL FITTINGS FROM PLAN VIEW
6. TANK REQUIRES 100% BOTTOM SUPPORT
7. ALL PIPING & VALVES MUST HAVE IT'S OWN SUPPORT
8. AND ALLOW FOR TANK EXPANSION & CONTRACTION
9. TANK IS TO BE LOCATED
10. TANK IS DESIGNED FOR ATMOSPHERIC PRESSURE

QUAN. REQ: ()

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SEWAGE TANK

REV DATE BY

CUSTOMER:

TITLE: 300 GAL VERT

PROTECTOPLAS COMPANY

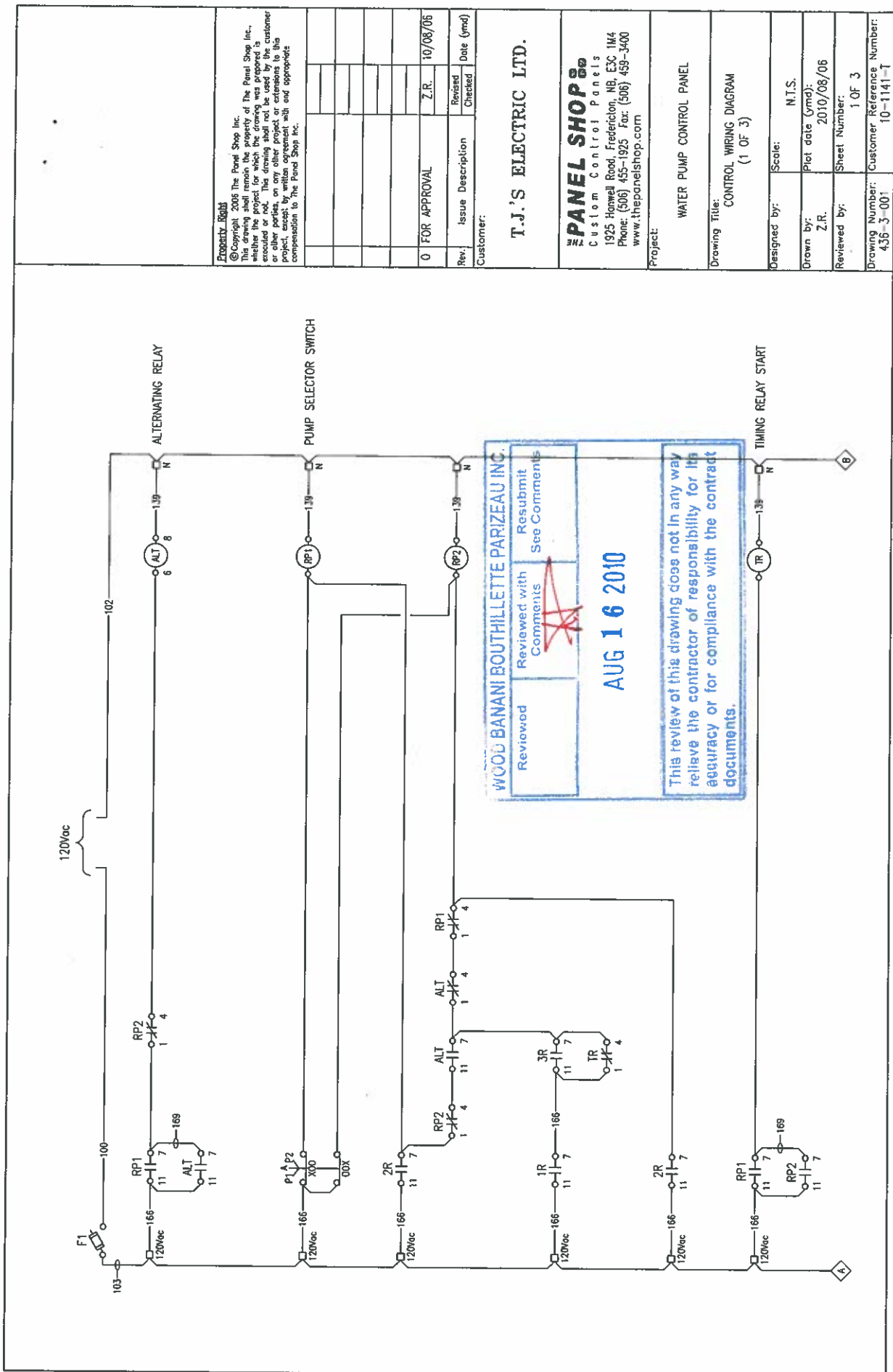
DIVISION OF EBCO, INC.

BEDFORD, OHIO 44146 USA

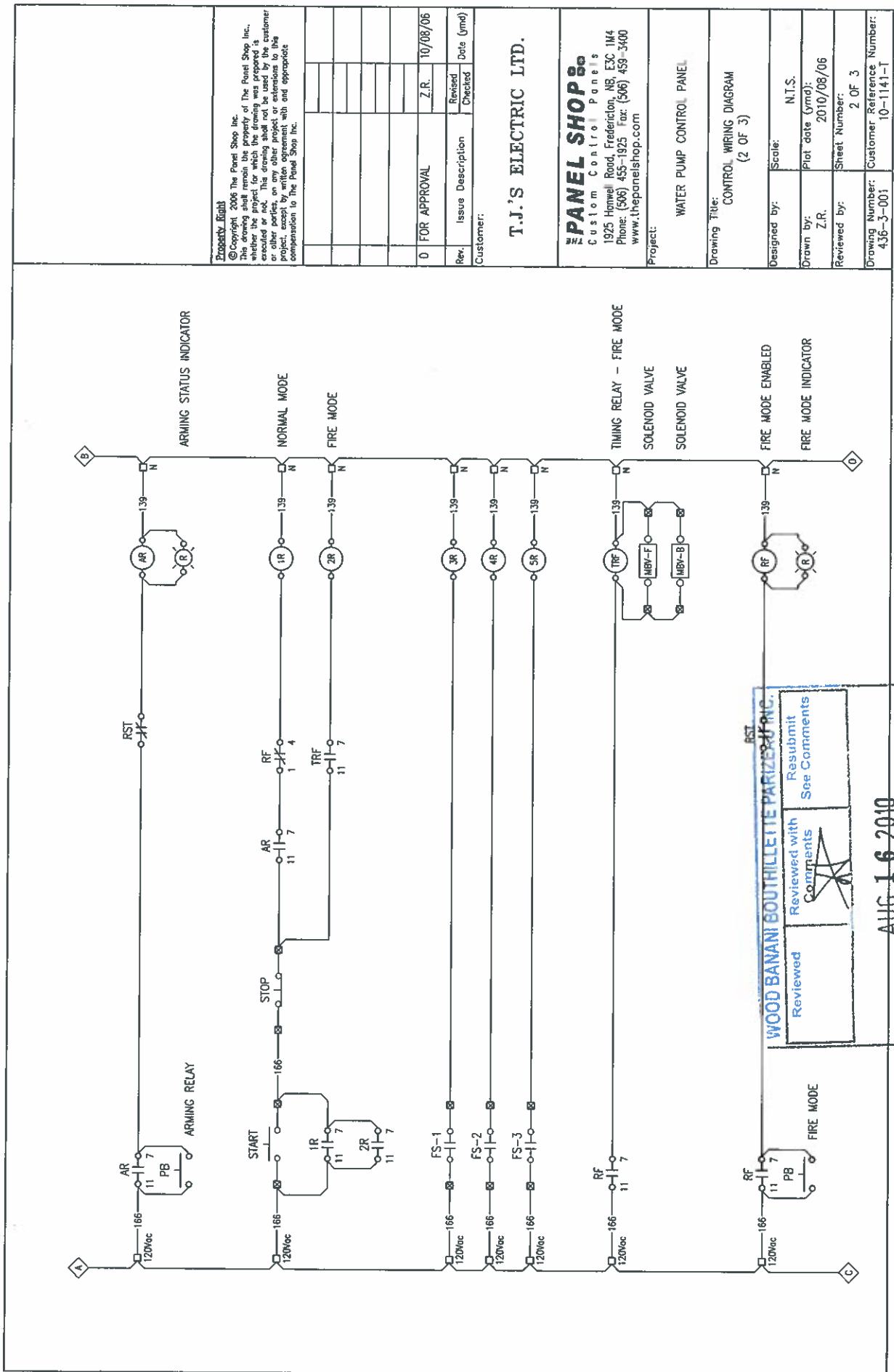
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25 30 02 2.15

Local Control Panel



- Please coordinate relay requirements with equipment supplied by others (e.g. Flow switches, chlorine controllers, gas detectors, etc.) to ensure compatibility.



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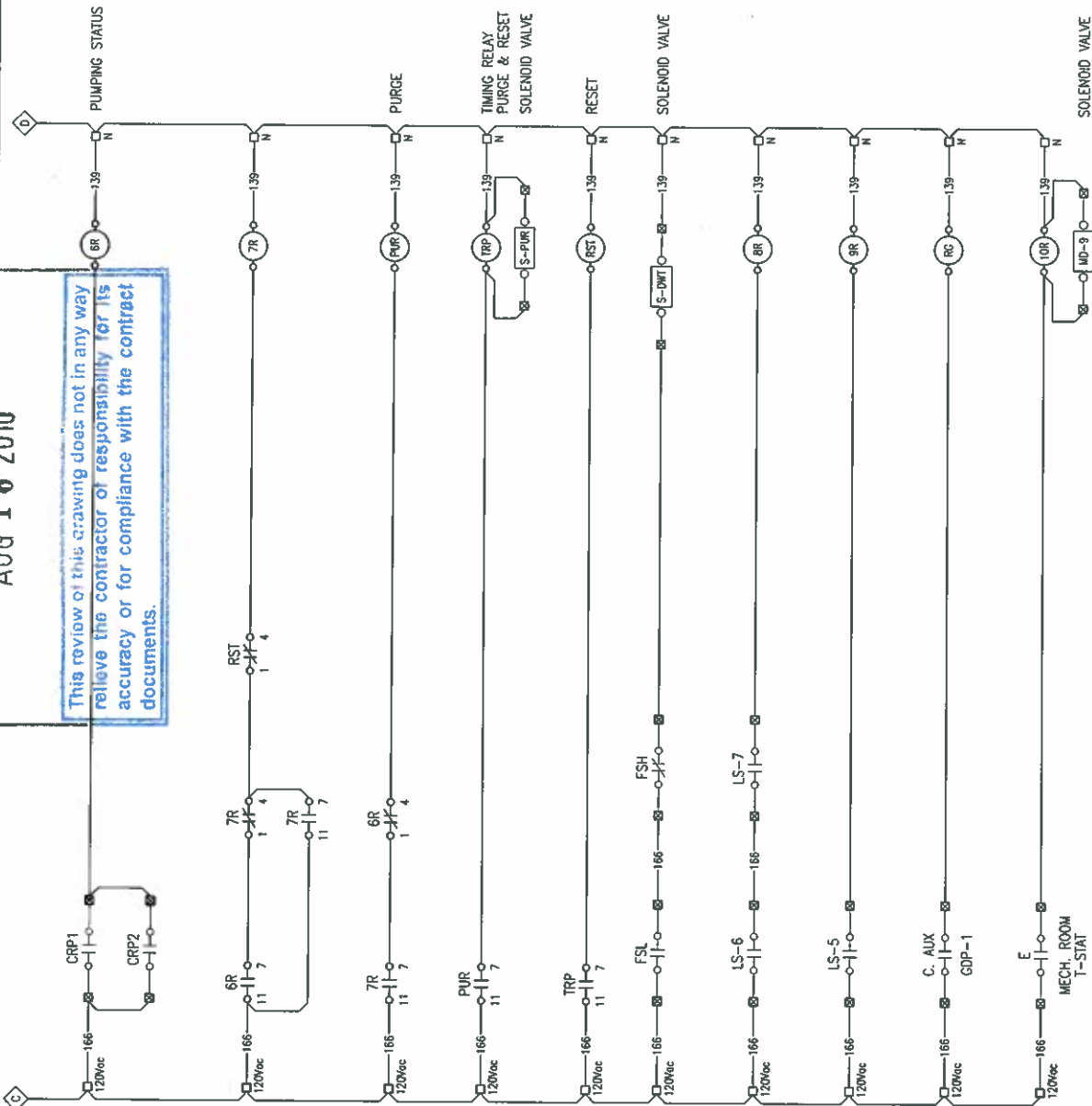
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0 FOR APPROVAL

Z.R.

10/08/06

Rev.

Issue Description

Revised

Checked

Date (ymd)

Customer:

T.J.'S ELECTRIC LTD.

PANEL SHOP

Custom Control Panels

1925 Hanwell Road, Fredericton, NB, E3C 1M4

Phone: (506) 455-1975 Fax: (506) 459-3400

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Project:

WATER PUMP CONTROL PANEL

Drawing Title:

CONTROL WIRING DIAGRAM (3 OF 3)

Designed by:

Scale:

N.T.S.

Drawn by:

Plot date (ymd):

2010/08/06

Reviewed by:

Sheet Number:

3 OF 3

Drawing Number:

Customer Reference Number:

456-3-001

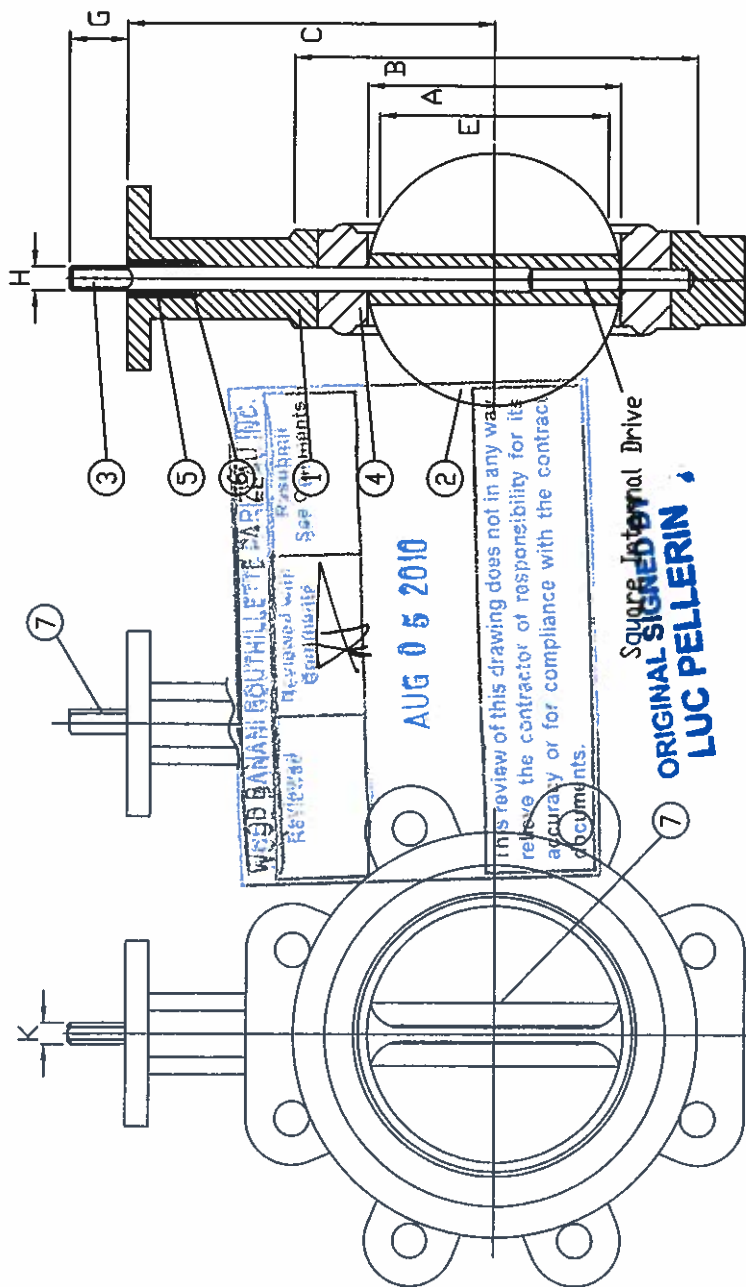
10-1114-1

NOTES:

The figure 397 can not be used on a pipe or flange with an inside diameter less than the "E" dimension.

API Standard 609

Item No.	Name	No. Req'd	Material	Remarks
1	Lugged Body	1		
2	Disc	1		
3	Stem	1		
4	Seat	1		
5	Bushing	1		
6	Seal	1		
7	Key	1		



FLOW VIEW

SECTION

TOP VIEW

VALVE DIMENSIONS

Size	A	B	C	D	E	F	G	H	K	Keyway	Weight	Top Plate Drilling			Tapped Lug Data		
												Bolt Circle	No. of Holes	Hole Dia.	Bolt Circle	No. of Holes	Tap
2"	2	3 1/2	5 1/2	1 5/8	1 3/8	4	1 1/4	9/16	3/8	-	7 1/2	3 1/4	4	7/16	4 3/4	4	5/8-11 UNC
2.5"	2 1/2	4 1/4	6	1 3/4	2 1/16	4	1 1/4	9/16	3/8	-	9 1/2	3 1/4	4	7/16	5 1/2	4	5/8-11 UNC
3"	3	4 3/4	6 1/4	1 3/4	2 9/16	4	1 1/4	9/16	3/8	-	10	3 1/4	4	7/16	6	4	5/8-11 UNC
4"	4	5 7/8	7	2	3 5/8	4	1 1/4	5/8	7/16	-	18	3 1/4	4	7/16	7 1/2	8	5/8-11 UNC
5"	5	7 1/8	7 1/2	2 1/8	4 3/4	4	1 1/4	3/4	1/2	-	22	3 1/4	4	7/16	8 1/2	8	3/4-10 UNC
6"	5 3/4	8 3/16	8	2 1/8	5 1/2	4	1 1/4	3/4	1/2	-	26	3 1/4	4	7/16	9 1/2	8	3/4-10 UNC
8"	7 3/4	10 1/4	9 1/2	2 1/2	7 1/2	6	1 1/4	7/8	5/8	-	42	5	4	9/16	11 3/4	8	3/4-10 UNC
10"	9 3/4	12 9/16	10 3/4	2 1/2	9 19/32	6	2	1 1/8	-	1/4x1/8	60	5	4	9/16	14 1/4	12	7/8-9 UNC
12"	11 3/4	14 3/4	12 1/4	3	11 9/16	6	2	1 1/8	-	1/4x1/8	90	5	4	9/16	17	12	7/8-9 UNC

SUBASSEMBLY PART NUMBER

Trim	Part	Size	Figure No.	Style

ABZ MANUFACTURING, INC.

2"-12" Figure 397 Valve
Standard Lug Pattern
Tapped Lug w/360° Top Plate
Standard
Line Piece w/Flats/Keyway
SEAL: Elastomer



DATE: 05-03-06

REVISIONS

DRAWING NO. 2-12 397



Fig. 396

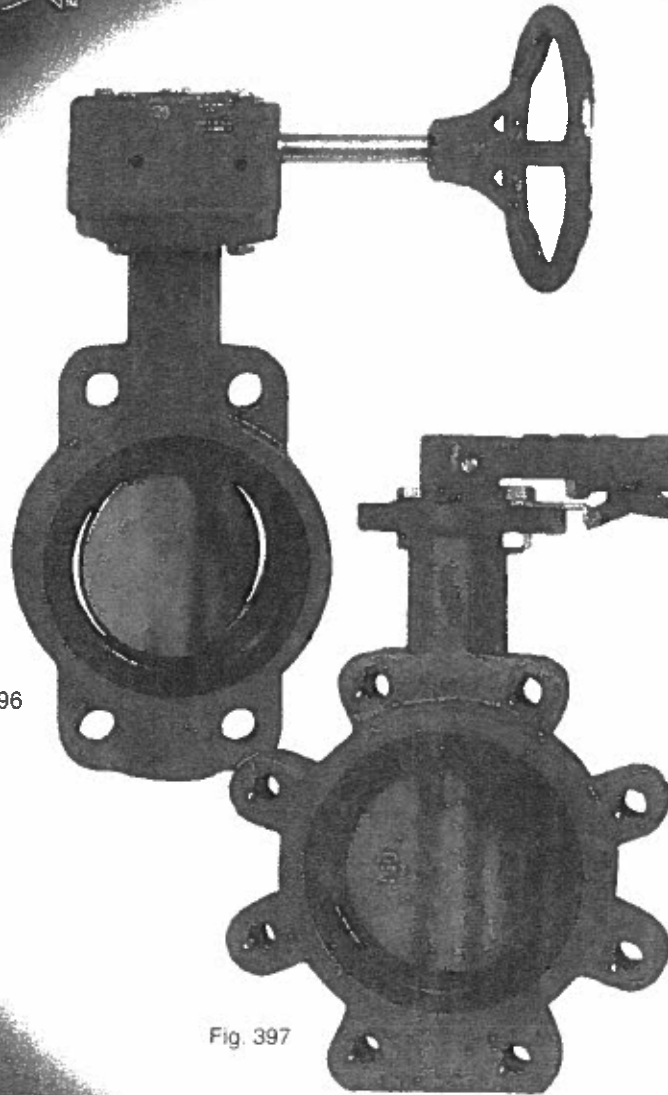


Fig. 397

ABZ
PRECISION BUILT
BUTTERFLY VALVES
FIGURES 396/397

**For Industrial, HVAC, Oil Patch, and
Agricultural Services**

FEATURES AND BENEFITS

The figure 396/397 series, like the entire ABZ line, is completely universal on the topside dimension and face-to-face.

The 2"-24" valves have a molded-in seat that is non-collapsible, stretch resistant and blowout proof. Sizes larger than 24" utilize a Phenolic backed seat design in place of the bonded in design.

ABZ's 2"-24" stem to disc engagement is internally driven. This gives you positive engagement with no external connections.

The figure 396/397 has a series of molded-in o-rings that give extra protection around the stem area, which aids in preventing stem leakage.

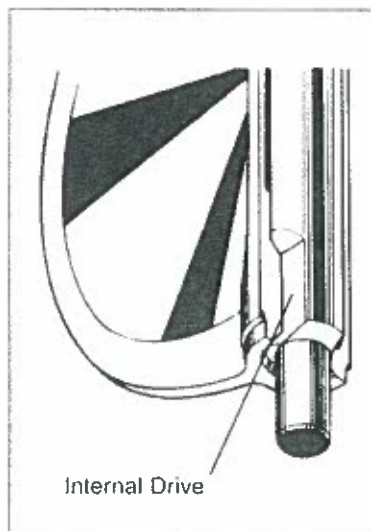
The 396/397 series has a Graphite-Teflon impregnated bushing.

The 2"-12" 396/397 is rated to 200 psi close off and 200 psi dead end service. The 14"-24" is rated to 150 psi close off and 150 psi dead end service. Valves larger than 24" are rated to 150 psi close off and 75 psi dead end service.

Standard range is 2"-72", with 2"-36" in stock, in a variety of construction specifications. Consult factory for availability.



Fig. 396



Internal Drive

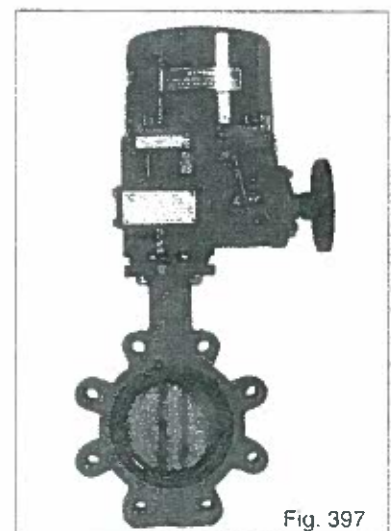


Fig. 397

STANDARD CONSTRUCTION SPECIFICATIONS:

Body: 2"-12" is Cast Iron 14"-72" is Ductile Iron

Disc: Ductile Iron / Nylon 11 Coated, Ductile Iron / Nickel Coated, Aluminum Bronze, 316 Stainless Steel

Stem: 416 Stainless Steel, 316 Stainless Steel

Seat: EPDM, Buna, Viton

Bushing: Graphite-Teflon

Stem Packing: Buna-N

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APPROVED	REVIEWED	DATE
AUG 05 2010		
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See the attached ABZ drawings for further material specifications, in addition to the contract documents.



ABZ VALVES & CONTROLS, INC.

A Division of ABZ Manufacturing, Inc.

P.O. Box 157 • 113 West Main • Madison, KS 66860

(620) 437-2440 • FAX (620) 437-2435

website: www.abzvalve.com • e-mail: info@abzvalve.com

This brochure presents data which is meant for general information only. The compatibility or acceptability of these products in relation to systems requirements is not the responsibility of the manufacturer.

Printed in U.S.A.

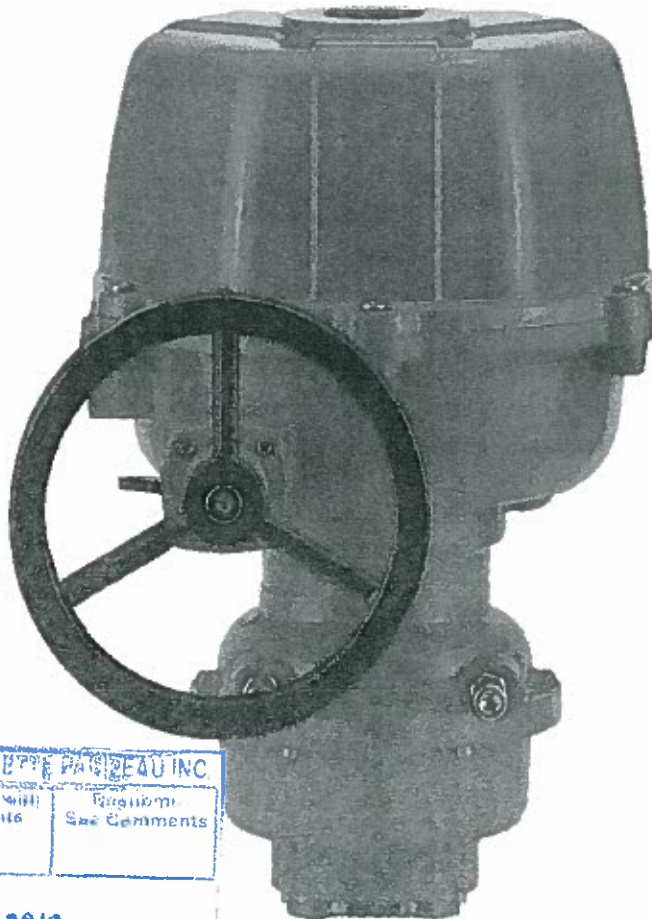
4.05

396/397

ELECTRIC ACTUATOR

"SR-05, SR-10"

SPRING RETURN ACTUATOR



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WOOD BARNANI BOUTHILLETTE PARISEAU INC		
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2009.05.27

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WOOD BARNETT BOOTHILL LTD. & PARIZEAU INC.		
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AUG 05 2010

1 .PERFORMANCE

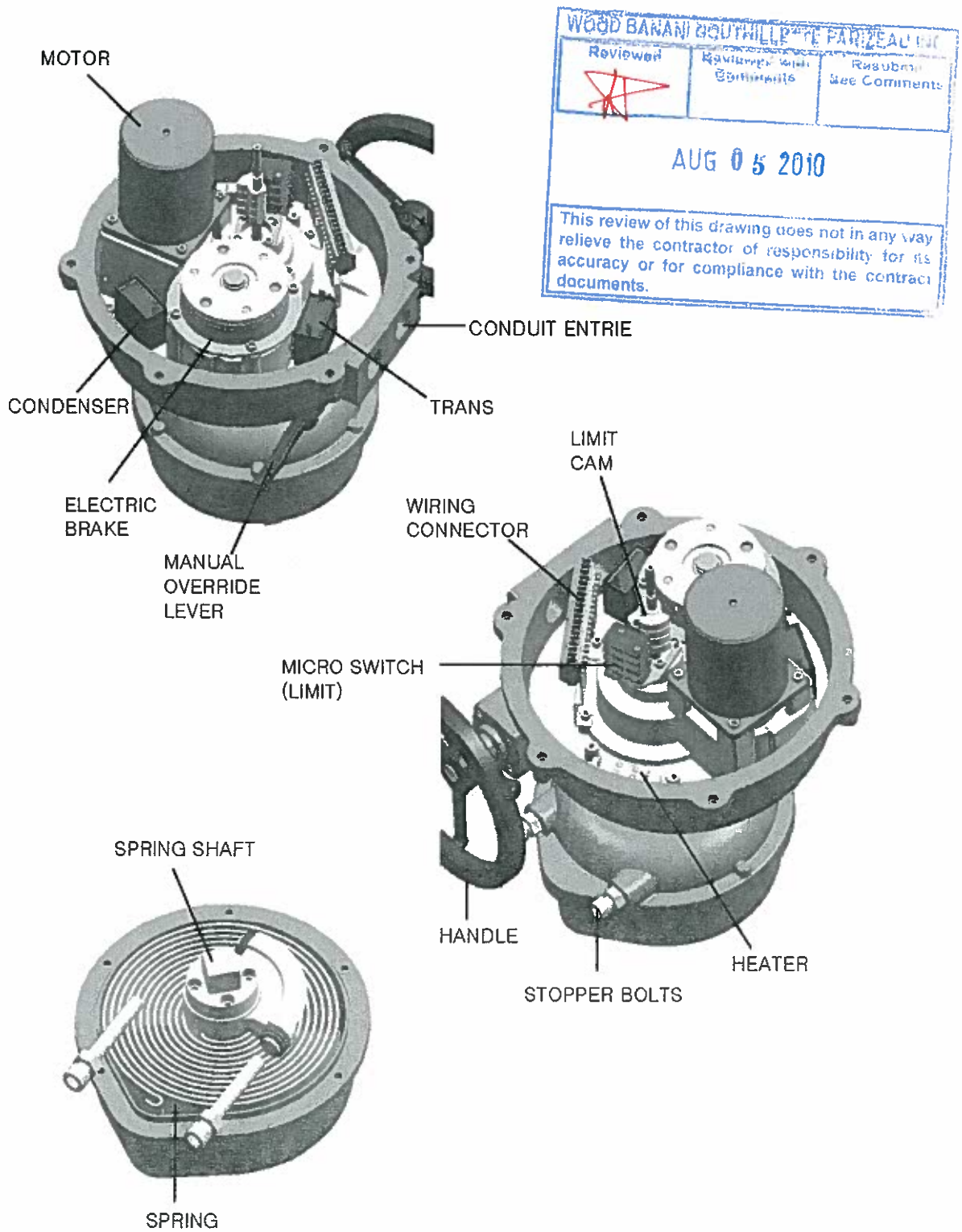
Model	Max output torque	Spring Return Time(90°)	Operating time(90°) for compliance with the contract documents.				Duty(S2) Motor
	kg.m		50Hz	60Hz			
SR-05	5kg.m	1sec	17 sec	14 sec	15 min		40W
SR-10	10kg.m	1sec	20 sec	17 sec	15 min		60W

Rated Current (A)				Mounting Base (ISO 5211)	Number of Handle turns	Weight(kg)
110VAC	220VAC	380/440VAC	24VDC			
1.6	1	0.4	5	F07	27	
2.3	1.3	0.4		F10	27	

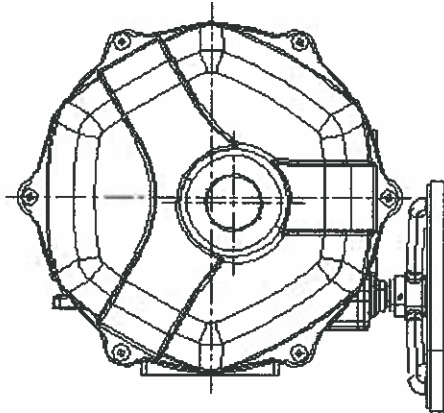
2. STANDARD SPECIFICATION

Endosure	Explosin Proof & watertight Enclosure Ex d II B T4 IP67
Ambient Temperature	-20°C ~ 55°C
Power Supply	1Ph 110/230 VAC 50/60Hz 3Ph 380/440 VAC 50/60Hz DC24V
Limit Switch	Open/Close Limit switch (250VAC 16A)
Travel Angle	90° ± 5°
Indicator	Continuous Position indicator
Mechanical Stops	External Adjustable Screws
Space Heater	20W
Conduit Entries	2-PF 3/4"
	Option : 2-M20, 2-NPT 3/4"
Lubrication	Shell ALVIDA EP2
Materials	Aluminium Alloy
Surface Treatment	Anodizing
Coating	Polyester (TGIC - Free)

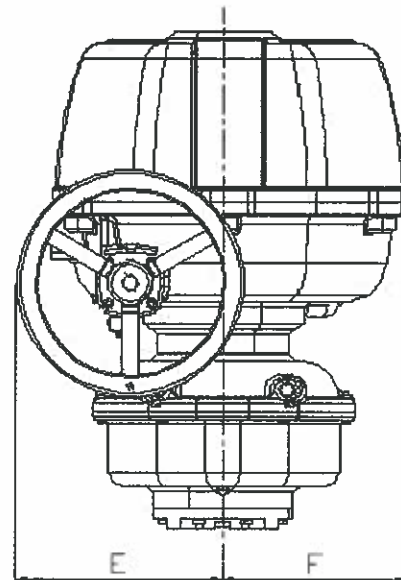
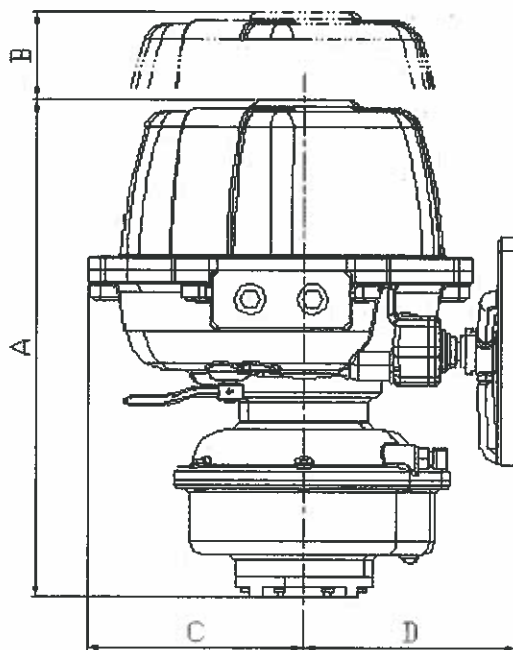
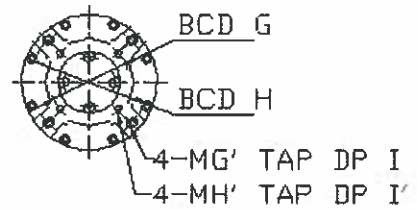
3. ACTUATOR CONFIGURATION



4. DIMENSION



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AUG 05 2010		
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	A	B	C	D	E	F	G	G'	H	H'	I	I'
SR-05	410	135	173	167	172	139	70	M8	-	-	12	-
SR-10	435	150	187	187	180	158	70	M8	102	M10	12	15

5. WIRING

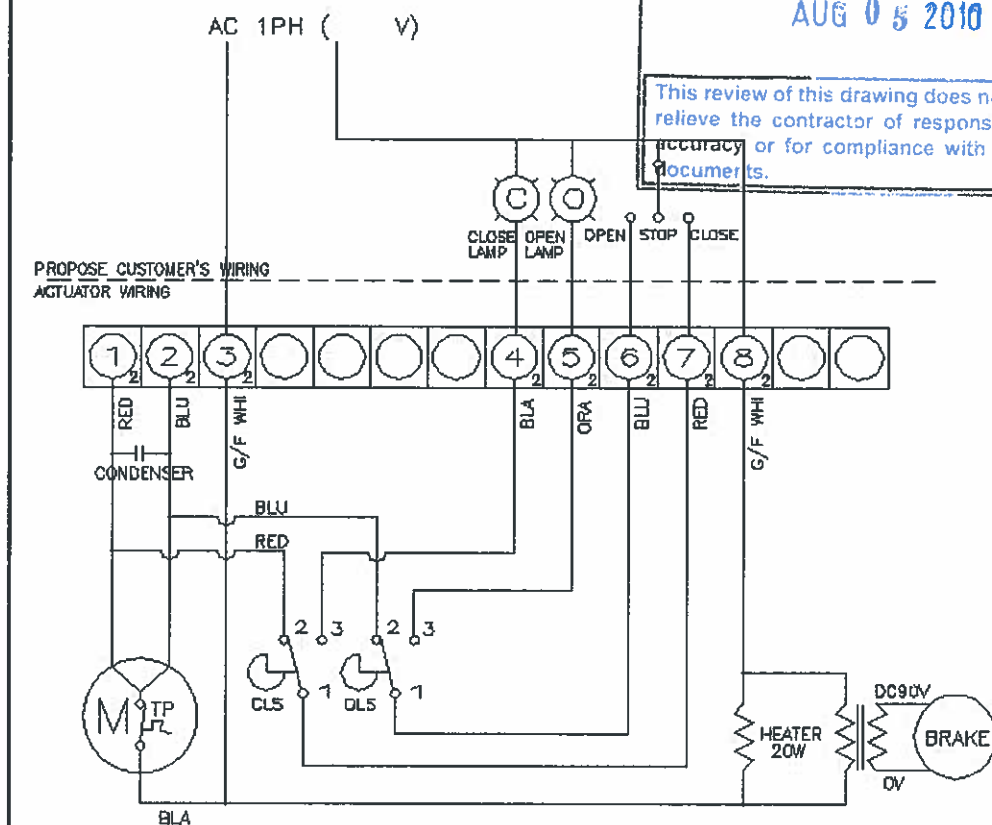
5 - 1. 110 / 230VAC

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CLS : CLOSE LIMIT SWITCH (250VAC 6A)
OLS : OPEN LIMIT SWITCH (250VAC 6A)
CTS : CLOSE TORQUE SWITCH (250VAC 6A)
OTS : OPEN TORQUE SWITCH (250VAC 6A)
TP : THERMAL PROTECTOR (250VAC 15A)

	CLOSE	OPEN
CLS 1-2		
CLS 1-3		
OLS 1-2		
OLS 1-3		

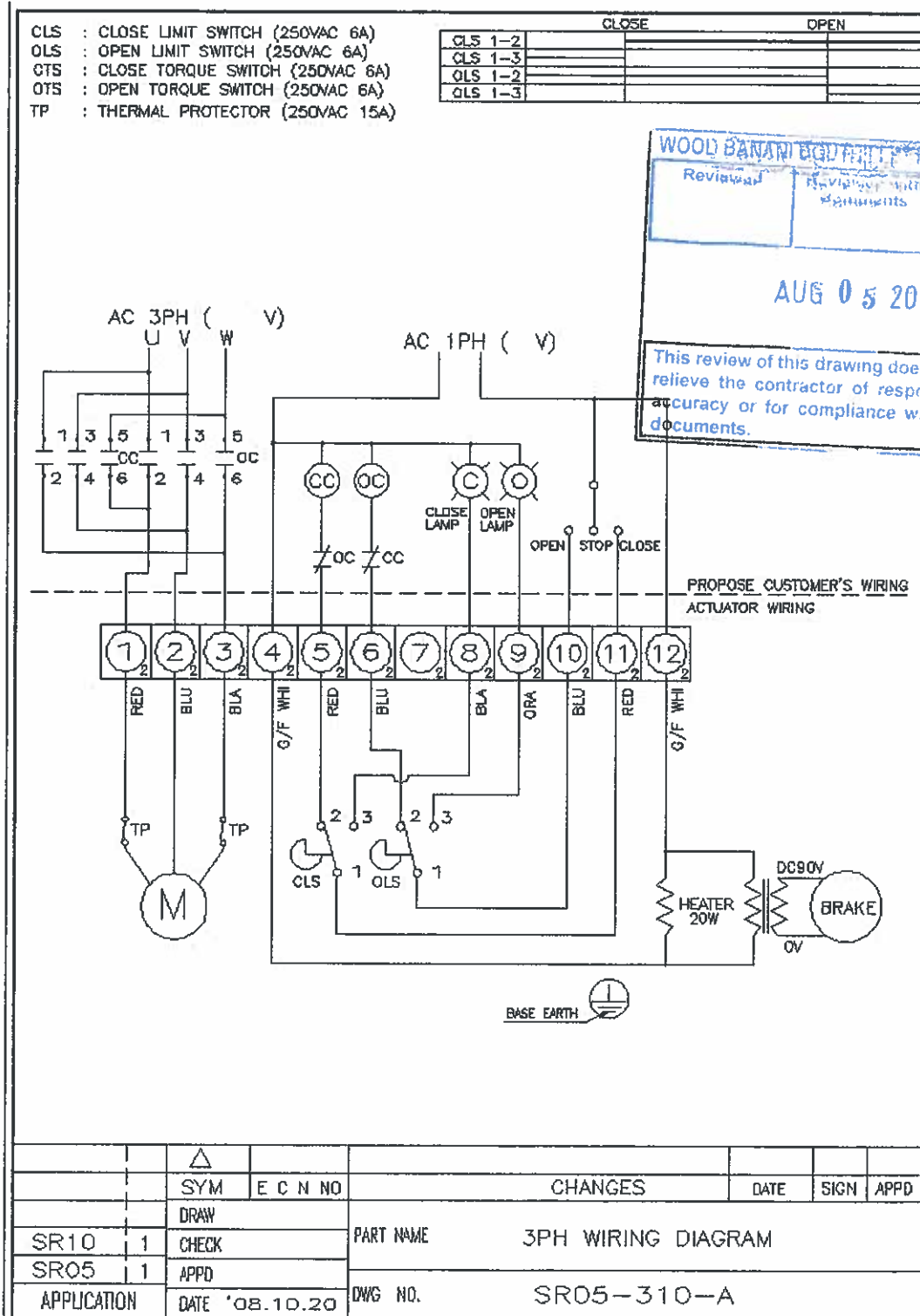
WOOD BAYAN SOUTH LITTE OAR TEAM INC.		
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SYM	E C N NO	CHANGES	DATE	SIGN	APPD
SR10	1	DRAW			
SR05	1	CHECK			
APPLICATION	DATE '08.10.20	DWG NO.	SR05-110-A		

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5 - 2. 380 / 440VAC





Division of BW Technologies

1 800 563-2967

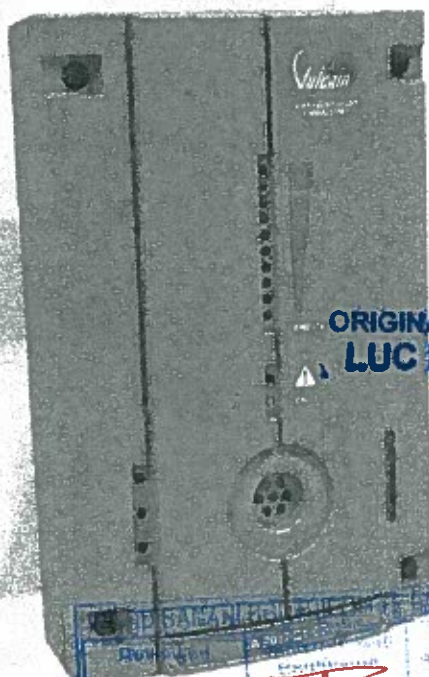
Toxic and Flammable Gas Transmitters

VA201T Series

Vulcain Inc., a world leader in gas detection for over three decades, has designed the VA201T series to meet or exceed safety requirements in a variety of commercial and industrial applications. These transmitters can work in a network mode with our VA201C or VA301C controller through their RS-485 link, or can be used in a stand-alone configuration offering 4-20mA and alarm relay outputs.

Vulcain's sensors' inherent reliability and stability characteristics have accounted for the universal acceptance within a broad spectrum of commercial and industrial applications. Catalytic gas sensors are used to detect hundreds of different flammable gases and vapor concentrations. Toxic gases are detected through electrochemical cells, while fuel cells are used for oxygen detection. Moreover, a second generation of semi-conductor sensors provides a highly effective solution for a range of different applications.

- Proven sensing technology
- 10-step LED display
- Stand-alone or network configuration
- Optional 4-20 mA and relay output
- Optional audible alarm and LCD display
- One-man remote calibration
- Field-proven protection
- Innovative and compact case design
- Easy installation and operation
- Full compatibility with VA201C and VA301C controllers



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- With - audible alarm
- LCD Display
- Relay output

VA201TQ1-xxx'
VA201TQ2-xxx'
VA420TQ1-xxx'
*gas to be detected

Packages:

NET	Network
NETCAR	Network, 4-20mA, Audible Alarm, Alarm Relay
NETCR	Network, 4-20mA, Alarm Relay
NET-D	Network Display
NETCAR-D	Network, 4-20mA, Audible Alarm, Alarm Relay, Display
NETCR-D	Network, 4-20mA, Alarm Relay, Display
C	4-20mA
CAR	4-20mA, Audible Alarm, Alarm Relay
CR	4-20mA, Alarm Relay
C-D	4-20mA, Display
CAR-D	4-20mA, Audible Alarm, Alarm Relay, Display
CR-D	4-20mA, Alarm Relay, Display

Gas transmitter with Q1-type sensor
Gas transmitter with Q2-type sensor
Two wire gas transmitter

Options:

RST	Remote sensor
TM/Guard	Metal guard
LTAT	Low temp. assembly
DT	Duct type (N/A for Q2)
4X	Nema 4X (N/A for Q2 and CL2)
ECLAB	Splash guard (N/A for CL2)

Ordering Information

VA201T Series

Toxic and Flammable Gas Transmitters

VA420T Two-Wire 4-20 mA Configuration

A two-wire version of the VA201T series is available for most toxic gases detected by our Q1-type sensor. When the unit is powered, it enables the 4-20 mA analog loop to vary in proportion with the level of gas detected.

Offering comparable characteristics as the VA201T series except for the LED indicators and the available options, the VA420T ensures substantial saving on the installation cost.



VA201T

- ① Sensor
- ② 10 LED 1-10 (1=10%)
- ③ Unit status
- ④ Multimeter ports
- ⑤ Calibration port



VA420T

- ① Sensor
- ② Unit status
- ③ Multimeter ports
- ④ Calibration port



Division of BW Technologies
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vulcaininc.com

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E-mail: sales@vulcaininc.com
www.vulcaininc.com

VA1019-01-01-00-8 25x11-20090218-5734-1

VA201T SPECIFICATIONS

SENSING TECHNOLOGY

Q1-type Sensor:

Electrochemical (toxic)
Catalytic combustion (combustibles)
Diffusion fuel cell (oxygen)
Solid-state
Electrochemical (Carbon Monoxide)

Q2-type Sensor:

10-step LED, LCD
Failure Indication: Yellow LED
(Available in network configuration only)
Green LED

DISPLAY

Visual Indicators:

Normal Operation:

Relay Output Rating:

Audible Alarm:

Outputs:

5A, 30Vdc or 250 VAc (resistive load)
65 dBA at 3 ft. / 1 m
RS-485 MODBUS, *4-20mA, *Alarm relay

GENERAL SPECIFICATIONS

Size:

8.4 x 5.3 x 2.25 in. / 21.3 x 13.4 x 5.7 cm

Weight:

0.88 lbs/0.4kg

Power Requirement:

17-27 VAC, 24-38 Vdc, 250 mA

Certified to UL and CSA standards

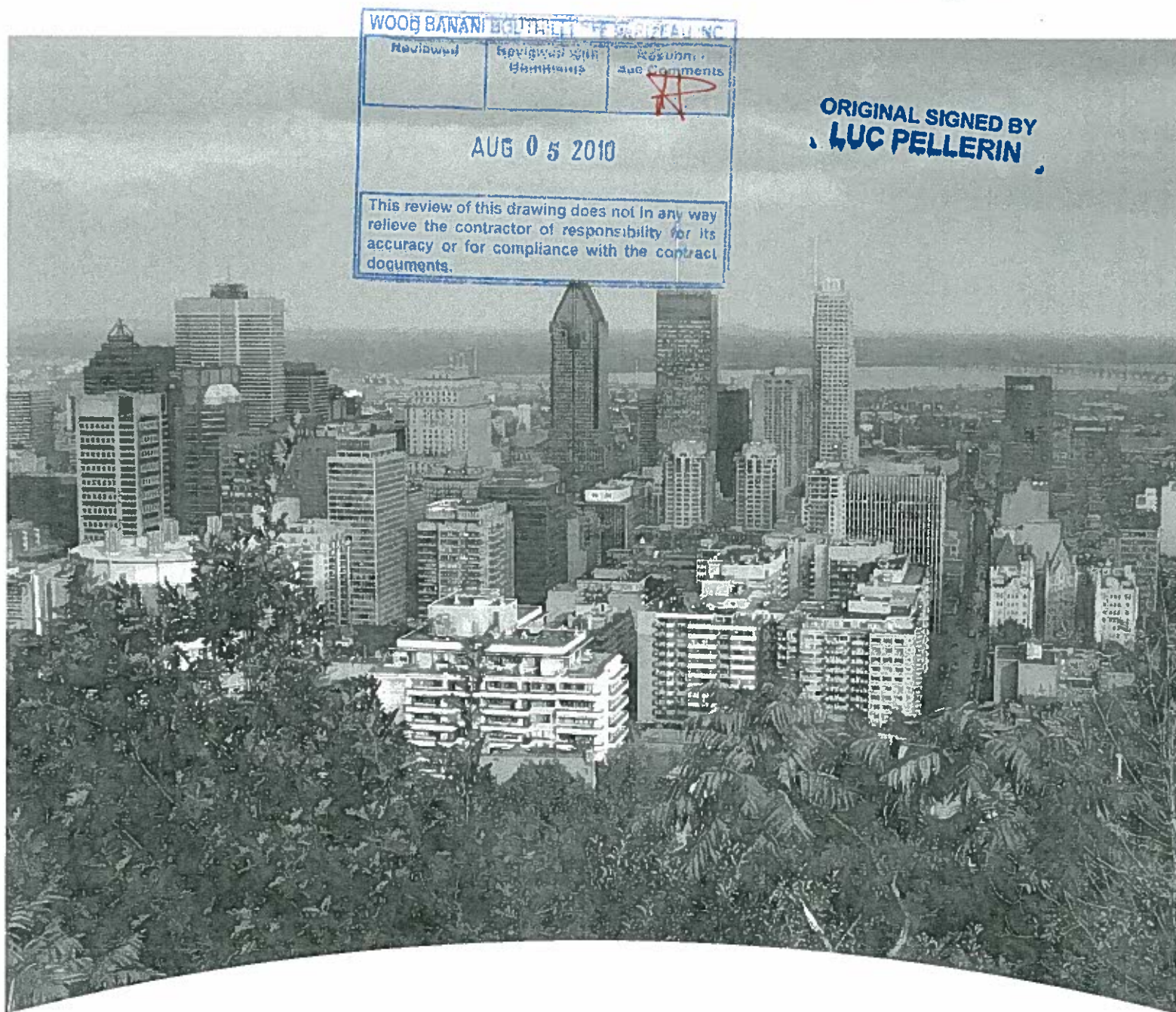
See options on previous page

Gas Detected	Detection Range		Accuracy	
	Q1-type sensor	Q2-type sensor	Q1-type sensor	Q2-type sensor
CO	0-50 ppm 0-100 ppm 0-250 ppm(std) 0-500 ppm	0-250 ppm	3%	5%
NO ₂	0-10 ppm	-	3%	-
H ₂	0-2.5%	0-100% LEL	3%	5%
CL ₂	0-15 ppm	-	3%	-
Combustibles	0-100% LEL	0-100% LEL	3%	5%
Refrigerants	-	0-2000 ppm *N/A R123	-	10%
H ₂ S	0-50 ppm	-	3%	-
O ₂	0-25%	-	3%	-
SO ₂	0-10 ppm	-	3%	-
ETO	0-20 ppm	-	3%	-
HCN	0-50 ppm	-	3%	-
HCL	0-50 ppm	-	3%	-
Gas Detected	Operating Humidity Range		Operating Temperature Range	
	Q1-type sensor	Q2-type sensor	Q1-type sensor	Q2-type sensor
CO	0% to 90% RH, non-condensing	10% to 95% RH, non-condensing	-20°C to +50°C (-4°F to 122°F)	-20°C to +50°C (-4°F to 122°F)
NO ₂	15% to 90% RH, continuous	-	-30°C to +50°C (-22°F to 122°F)	-
H ₂	15% to 90% RH, non-condensing	20% to 100% RH, non-condensing**	-20°C to +50°C (-4°F to 122°F)	-10°C to +40°C (14°F to 104°F)**
CL ₂	15% to 90% RH, non-condensing	-	-20°C to +50°C (-4°F to 122°F)	-
Combustibles	-	0% to 95% RH, non-condensing	-	-10°C to +40°C (14°F to 104°F)
Refrigerants	-	40% to 100% RH, non-condensing**	-	0°C to +50°C (32°F to 122°F)**
H ₂ S	15% to 90% RH, non-condensing	-	-40°C to +50°C (-40°F to 122°F)	-
O ₂	5% to 95% RH, continuous	-	-20°C to +55°C (-4°F to 131°F)	-
SO ₂	15% to 90% RH, non-condensing	-	-20°C to +50°C (-4°F to 122°F)	-
ETO	15% to 90% RH, non-condensing	-	-20°C to +50°C (-4°F to 122°F)	-
HCN	15% to 90% RH, non-condensing	-	-20°C to +50°C (-4°F to 122°F)	-
HCL	15% to 90% RH, non-condensing	-	-20°C to +50°C (-4°F to 122°F)	-

**According to the datasheet's graphic



DUE TO ONGOING RESEARCH AND PRODUCT IMPROVEMENT, SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE



Continuously monitor and control toxic gases, combustible gases and oxygen hazards

Vulcain 301C digital gas detection controller



User Friendly

- Zero maintenance
- Automatic quick self-test and warm-up
- Continuous alphanumeric display

Inexpensive and Reliable

- Low installation costs
- Allows for up to 126 zoning groups which can save energy and extend fan and relay life
- Manages up to 768 events with programmable latching alarms

Flexible Operation

- Modbus compatible; with BACnet/IP available
- Interchangeable transmitters able to detect different gases
- Expands to handle up to 96 transmitters or modules and up to 50 Vulcain 301W wireless transmitters
- Programmable time delays
- Integrated time clock enables scheduling of system operations

Safety Measures

- Full array of visual indicators and integrated 65dBA alarm levels
- Fully programmable relays (can be set as fail-safe or not)

Beneficial Options

- Available in a heavy duty industrial housing
- Data logging option

The Vulcain 301C continuously monitors and controls toxic gases, combustible gases, and oxygen hazards. Designed for installation and operational simplicity, the Vulcain 301C reduces the cost of installation and ownership.

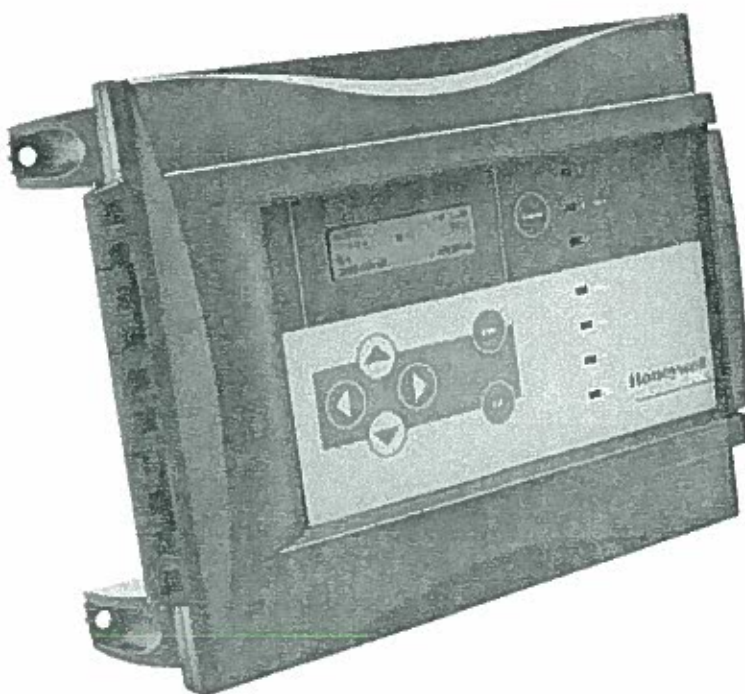
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Reviewed	Reviewed with Comments	See Comments
AUG 05 2010		
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Zoning / Averaging		

Not required

Using an addressable RS-485 Modbus communication protocol, the Vulcain 301C uses daisy chain wiring requiring only 2 pairs of wires to connect up to 96 transmitters on the 3 input channels. This simplifies installation, in turn lowering costs. The 301C's zoning and averaging abilities significantly reduce operational and maintenance costs.

The Vulcain 301C controller offers unique zoning capabilities which permit the averaging and comparison of multiple sensor readings. Zoning can reduce operational costs by ensuring that localized brief fluctuations registered at a single transmitter do not activate relays. For example, a car idling in a parking structure may locally increase a reading at a nearby transmitter. Rather than activating a fan as a result of the temporary localized fluctuation, zoning can be used to limit relay activation until the average reading for a zone exceeds a set-point. This can reduce run time of fans, yielding savings in both energy usage and wear and tear. The Vulcain 301C has the capacity to manage input from three Modbus channels for up to 96 transmitters and up to 50 wireless transmitters which can be associated with up to 126 zones. Transmitters can belong to an unlimited number of zones, providing maximum operational and control flexibility.



Technical summary



General Specifications

Use	Modbus controller for centralized gas detection monitoring with real-time gas reading, selective alarm activation and low cost of installation.
Size	28 x 20.3 x 7 cm (11.02 x 7.99 x 2.76 in.)
Weight	1.1 kg (2.4 lb.)
Enclosure	NEMA 4X Polycarbonate – ABS
Power Requirement	17-27 Vac, 24-38 Vdc, 500 mA
Network Capacity	Three Modbus channels for up to 96 transmitters, one wireless channel for up to 50 301W wireless transmitters and an optional BACnet/IP output
Communication Line Lengths	Up to 609 m (2000 ft.) per channel T-Tap: 20 m (65 ft.), maximum per T-Tap 40 m (130 ft.), maximum for all T-Tap combined
Relay Output Rating	5 A, 30 Vdc or 250 Vac (resistive load)
Alarm Levels	3 fully programmable alarm levels
Time Delays	0, 30 sec., 45 sec., 1-99 minutes before and after alarm
Outputs	4 DPDT relays (alarms and/or fault); 65dBA buzzer
Display	Large 122 x 32 dot matrix display
Operating Humidity Range	0-95% RH, non-condensing
Operating Temperature Range	-20 to 50°C (-4 to 122°F)

Ratings and Certifications

Certified to	CAN/CSA C22.2 No 61010-1 FC 116662
Conforms to	ANSI/UL 61010-1 IEC 61010-1 Including Amendments A1:1992 + A2:1995 and National Deviations (Canada, US)

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WOODBURN BEUTHELE ENGINEERING INC		
Reviewed	Reviewed with Comments	Reviewed See Comments
AUG 05 2010		
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*Not
Required*

As world leaders in gas detection solutions, Honeywell Analytics' Vulcain range of gas detection systems has been designed to provide efficient, practical and cost-effective equipment to protect people from a variety of forms of hazardous gases and to efficiently monitor and control indoor air quality. The equipment is also extremely simple to install and easy to operate and maintain.

The Vulcain range of fixed gas detection and air monitors



Vulcain 301RLC



GasPoint II



Vulcain 201T



Vulcain 301W



Vulcain 301C



Vulcain 301EM

Vulcain Sensors

From refrigerants to toxic and combustible gases, Honeywell Analytic's Vulcain line has a sensor designed for any industrial or commercial application. With award winning sensor technology, this line of sensors is the answer to any fixed HVAC, IAQ or gas detection concerns.

Find out more

For more information on Honeywell Analytic's Vulcain line of products, visit www.honeywellanalytics.com or contact us at 800 563 2967

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Tel: +1 954 514 2700
Toll free: +1 800 538 0363
Fax: +1 954 514 2784
detectgas@honeywell.com
www.honeywell.com

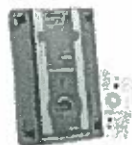
Customer business centre

Europe and the rest of the world

Honeywell Analytics
Wilstrasse 11-U11
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Tel: +41 (0) 44 943 4300
Fax: +41 (0) 44 943 4398
gasdetection@honeywell.com
www.honeywell.com

Vulcain Controllers

Designed for industrial or commercial use, the Vulcain 301C monitors and controls toxic gases, combustible gases and oxygen hazards. With the same simple installation and operation and flexibility as the Vulcain 301C, the Vulcain 301EM is specifically designed to fulfil the requirements of a mechanical room.



Vulcain 301M

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Stand-Alone Dual Gas Monitor

For applications where gas detection is only needed at one or two points, the Vulcain 301M offers a simple solution. While continually monitoring for CO, a remote sensor can also be integrated to detect CO, NO₂, propane, hydrogen or methane with a remote sensor that can be placed up to 200' away.



Vulcain 90DM4

Commercial CO₂ Detector

Using proven infrared dual sensing technology to detect carbon dioxide (CO₂) the Vulcain 90DM4 can be either wall or duct mounted to monitor CO₂ levels in your commercial environment.

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Honeywell

H_301C_DS01005_V1

September 2006

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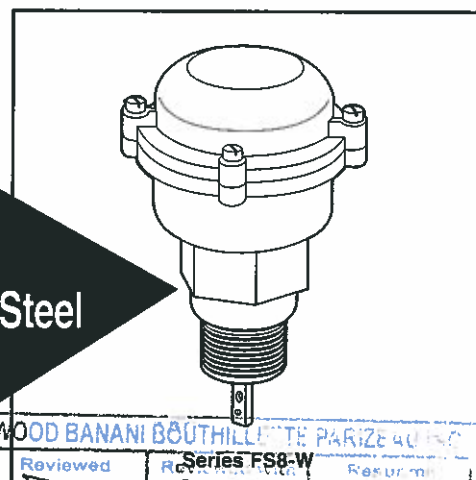
Installation & Maintenance Instructions MM-600(G)

Series FS8-W General Purpose Liquid Flow Switch

OPERATION

This control is an independently mounted water flow sensing device that makes or breaks an electrical circuit when flow stops or starts.

Now
with
Stainless Steel
Paddles



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	<p>WARNING</p>
	<ul style="list-style-type: none"> • Before using product, read and understand instructions. • Save these instructions for future reference. • All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of plumbing, steam and electrical equipment and/or systems in accordance with all applicable codes and ordinances. • To prevent electrical shock, turn off the electrical power before making electrical connections. • To prevent an electrical fire or equipment damage, electrical wiring insulation must have a rating of 167°F (75°C) if the liquid's temperature exceeds 180°F (82°C). • To prevent electrocution, when the electrical power is connected to the flow switch, do not touch the terminals. • Make sure flow switch electrical cover is secured before turning on electric power. <p>Failure to follow this warning could cause property damage, personal injury or death.</p>

Engineered for life

SPECIFICATIONS

Maximum Liquid Pressure: 160 psi (11.3 kg/cm²)

Liquid Temperature Range (T_L): 32 - 225°F (0 - 107°C)


Ambient Temperature Range (T_s): 32 - 120°F (0 - 49°C)

Electrical Enclosure Rating: Nema Type 4X (IP 56)

Maximum Velocity: 10ft/sec (3M/sec)

Pipe Connection Thread Size: - 1" NPT - *All models except "J"*
- 1" BSPT - *"J" models*

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ELECTRICAL RATINGS

Voltage	Motor Switch Rating (Amperes)		Pilot Duty
	Full Load	Locked Rotor	
120 VAC	7.4	44.4	125 VA at
240 VAC	3.7	22.2	120 or 240 VAC 50 or 60 cycles

CE Circuit Rating	
7.4 (7.4)/120~	0.3/120=
3.7 (3.7)/240~	0.15/240=

NOTE: Switch on 'G' models is rated for 300 watts @ 125VAC.

Models that meet CE Conformance: FS8-WJA-E

- **This Control:** is for continuous operations
is not electronic
has Type 1C action (micro
interruption on operation)

- **LVD 73/23/EEC**

- **EMC 89/33/EEC**

For applications with loads between 0.5 and 3.7 Amps, power factors exceeding 0.65, an anticipated system switch operation rate of less than once per 2.5 minutes, and any one cycle greater than 3 seconds on and 3 seconds off.

For applications with loads 0.5 and 38mA, power factors exceeding 0.65, an anticipated system switch operation rate of less than once per 5 minutes, and any one cycle greater than 3 seconds on and 3 seconds off.

Additional suppression may be required for applications outside these ranges.

- **Declaration of Conformity**

Available on request.

FLOW RATES

Flow rates required to activate flow switch are shown in chart below. The values are calculated for sensing water (potable, non-polluted) in a horizontal pipe.


Settings will vary when used to sense flow of other fluids or if located in a vertical pipe.

Pipe Size NPT in. (mm)	Settings	Mode of Operation				Max. Flow Rate gpm (lpm) w/o Paddle Damage
		Flow gpm (lpm)	Velocity fps (mps)	No Flow gpm (lpm)	Velocity fps (mps)	
1 (25)	Factory or Minimum	4.9 (18.5)	1.82 (.55)	3.4 (12.9)	1.25 (.38)	27 (102)
	Maximum	17.6 (66.6)	6.53 (2.60)	15 (56.8)	5.56 (1.69)	
1¼ (32)	Factory or Minimum	7.5 (28.4)	1.60 (.49)	5.3 (20.1)	1.14 (.35)	47 (178)
	Maximum	29 (110)	6.23 (1.9)	24.6 (93.1)	5.28 (1.61)	
1½ (40)	Factory or Minimum	9.4 (35.6)	1.48 (.45)	6.7 (25.4)	1.05 (.32)	63 (239)
	Maximum	37.8 (143)	5.95 (1.81)	32.2 (122)	5.07 (1.54)	
2 (50)	Factory or Minimum	13.7 (51.8)	1.31 (.4)	9.4 (35.6)	.9 (.27)	105 (398)
	Maximum	56.4 (214)	5.39 (1.64)	47.4 (179)	4.53 (1.38)	
2½ (65)	Factory or Minimum	17.9 (67.8)	1.20 (.36)	12.1 (45.8)	.81 (.25)	149 (565)
	Maximum	71.3 (270)	4.78 (1.46)	59.2 (224)	3.97 (1.21)	
3 (80)	Factory or Minimum	24.2 (91.6)	1.05 (.32)	16.4 (62.1)	.71 (.22)	230 (872)
	Maximum	89 (337)	3.87 (1.18)	72.5 (274)	3.15 (.96)	
4 (100)	Factory or Minimum	35.3 (134)	.89 (.27)	27 (102)	.68 (.21)	397 (1505)
	Maximum	118 (446)	2.89 (.91)	105 (397)	2.64 (.8)	
5 (125)	Factory or Minimum	48.6 (184)	.78 (.24)	37.4 (142)	.6 (.18)	654 (2479)
	Maximum	178 (674)	2.86 (.87)	160 (606)	2.57 (.78)	
6 (150)	Factory or Minimum	60.3 (228)	.67 (.20)	46.8 (177)	.52 (.16)	900 (3411)
	Maximum	245 (927)	2.72 (.83)	225 (852)	2.5 (.76)	

Values are ± 10%

NOTE: DO NOT USE LIQUID FLOW SWITCHES ON SYSTEMS WITH FLOW VELOCITY GREATER THAN 10 FEET (3M) PER SECOND.

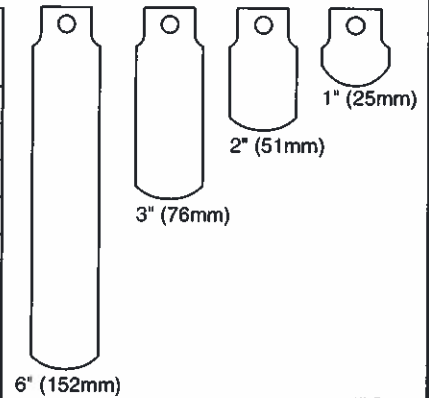
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STEP 1 - Paddle Sizing

Determine the correct paddle length for your installation from the chart below.

Pipe Size		Paddle (Standard Length)		Trim to Length	
in.	(mm)	in.	(mm)	in.	(mm)
1	(25)	1	(25)	N/A	
1 1/4	(32)	2	(25)	1 1/4	(32)
1 1/2	(40)	2	(51)	1 1/2	(38)
2	(50)	2	(51)	1 5/8	(41)
2 1/2	(65)	3	(76)	2 1/4	(57)
3	(80)	3	(76)	2 5/8	(67)
4	(100)	6	(152)	3 5/8	(92)
6	(150)	6	(152)	5 5/8	(143)
8+	(200+)	6	(152)	N/A	



NOTE: All models include 4 paddles as shown.

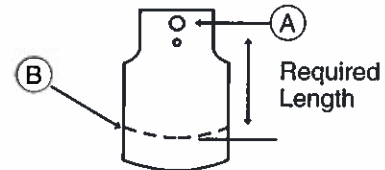
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- a. If the paddle must be trimmed, measure the paddle from the center of large hole (A) to the length required. Using non-serrated tin snips, trim the end (B) on a curve just like the paddle was originally cut.



- b. If the flow rate in the pipe exceeds the maximum adjustment on the Flow Switch use the following formula to change the paddle lengths.

$$\text{Paddle Length} = \frac{K}{\text{Flow Rate (GPM)}}$$

NOTE: If trimming the paddle for a no-flow action make sure there is enough flow to activate switch.

Series FS8-W "K" Factor

Pipe Size NPT in. (mm)	Flow Maximum Adjustment	No-Flow Maximum Adjustment
2 (50)	118.5	99.5
3 (80)	278.0	227.0
4 (100)	442.0	391.0
5 (125)	847.0	762.0
6 (150)	1440.0	1325.0

b. Electrical Conduit Connection

- Connect electric conduit to flow switch electrical enclosure.
- Follow accepted electrical practices when installing fittings and making connections.
- Refer to and follow local codes and standards when selecting the types of electrical fittings and conduit to connect to flow switch.

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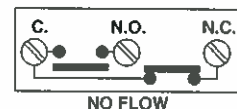
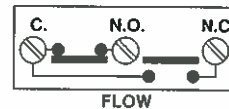
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c. Determine which switch action is required for the flow switch.

- "Flow" means that the switch will close circuit C.-N.O. and open circuit C.-N.C. when flow rate is increased above setpoint of flow switch.
- "No Flow" means that the switch will open circuit C.-N.O. and close circuit C.-N.C. when flow rate is decreased below setpoint of flow switch.



- ### d. Based upon the mode of operation ("Flow" or "No-Flow") required, complete the appropriate steps to connect wires to flow switch. Use a Phillip's head screwdriver to loosen and tighten switch terminal screws when attaching wires.

For "Flow" Mode of Operation (Fig. 1)

If the flow switch will be used to actuate a signal, alarm or other device when **flow** occurs, connect the wire from that device to the "N.O." contact. Connect the "Hot" power supply wire to "C" terminal.

For "No Flow" Mode of Operation (Fig. 2)

If the flow switch will be used to actuate a signal, alarm or other device when **no flow** occurs, connect the wire from that device to the "N.C." contact. Connect the "Hot" power supply wire to "C" terminal.

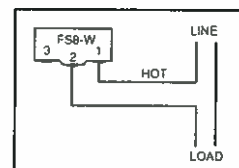
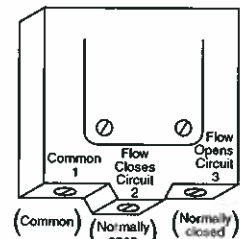
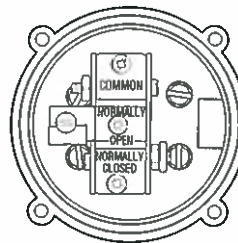


Fig. 1

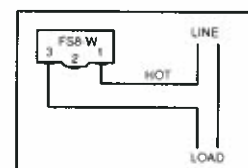
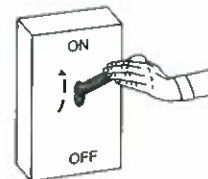


Fig. 2

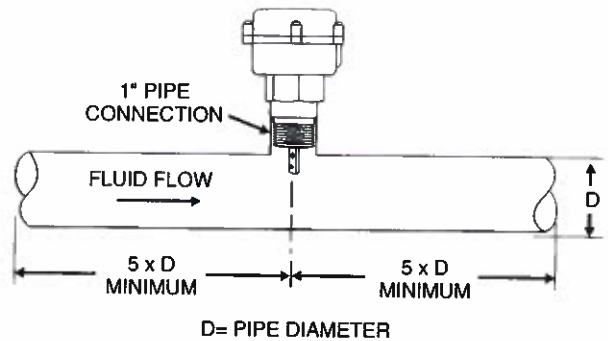
STEP 5 - Testing

- Place cover on flow switch and turn on power. Initiate fluid flow through the system. Observe the device being activated by the flow switch to determine if device is operating as required.
- Turn off fluid flow to determine if device is operating as required.
- Repeat initiating and turning off fluid flow several times to test flow switch and device for proper operation.
 - If operating as required, put system into service.
 - If not operating as required, Flow Switch may need to be adjusted.

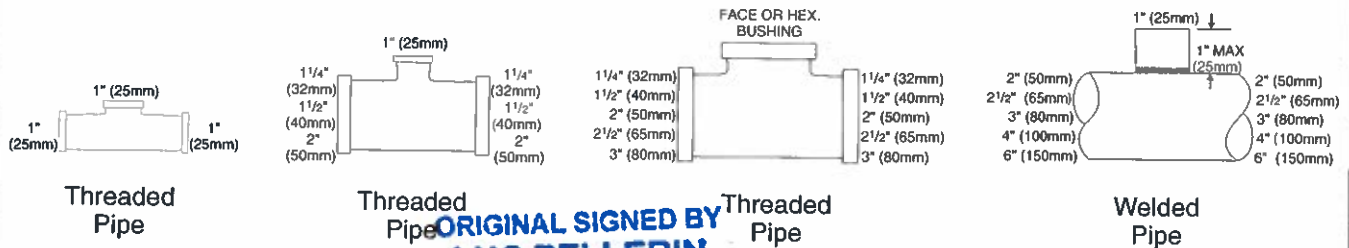


STEP 2 - Determine the Location of the Flow Switch

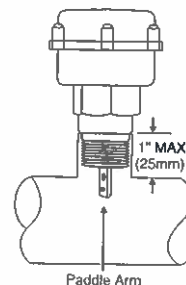
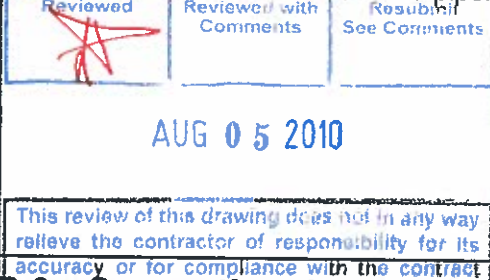
- The flow switch **should be located in a horizontal section of pipe** where there is a straight horizontal run of at least 5 pipe diameters on each side of the flow switch. The flow switch may be installed in a vertical pipe if the flow is in the upward direction.
- The flow switch **must be installed in the upright position** as shown with arrow mark on side of casting in the same direction as fluid will flow.
- Some system conditions that require more than 5 pipe diameters are high viscosity fluid and high fluid velocity.
- The flow switch must be installed in the pump suction piping when spring-loaded check valves and/or other close coupled accessories are installed in the pump discharge piping.



- a. The flow switch must be installed in the pipe using a threaded tee connection or welding fitting of minimum length such as a half coupling. Use a face or hex bushing to reduce the tee outlet to 1" pipe thread if a reduced tee outlet thread size fitting is not available.



- b. When installing brazed/soldered copper pipe, size the threaded adapter to ensure the paddle arm extends into the main run of the pipe.



CORRECT

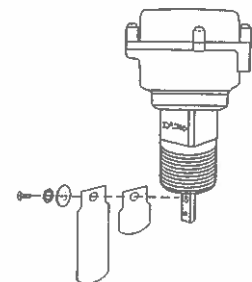


INCORRECT

STEP 3 - Connecting the Flow Switch to Pipe

- a. Insert the 8/32 x 5/16" screw through lock washer, new larger washer and paddle. Attach screw to the paddle arm and tighten to a torque of approximately 12-16 lb•in (1.36-1.81 N•m).

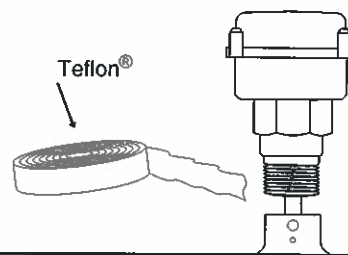
NOTE: If two paddles are being installed, they must be stacked one on top of the other with the longer paddle first in line to the flow.



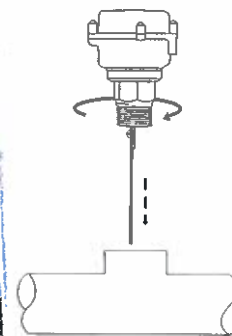
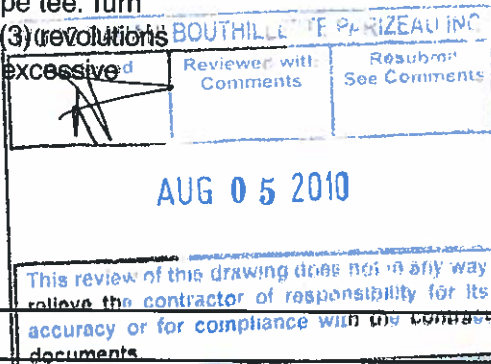
- b. Apply pipe sealing compound or Teflon® tape to the flow switch pipe threads.

NOTE: Do not apply sealant to first threads as this switch is grounded (earthed) via the pipe mounting.

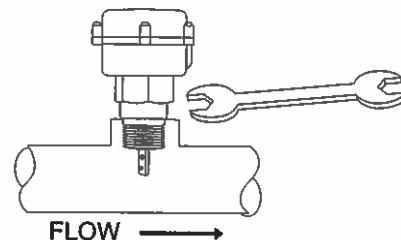
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- c. Insert the flow switch into the pipe tee. Turn the flow switch two (2) or three (3) revolutions clockwise until tight. Do not put excessive force on cover when turning.



- d. Place a 1 3/8" open end wrench on flow switch body to tighten to final position. Final position is with arrow on body aligned in the same direction as liquid flow.



STEP 4 - Electric Wire Connections

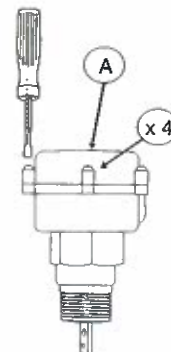
WARNING



- To prevent electrical shock, turn off the electrical power before making electrical connections.
 - To prevent an electrical fire or equipment damage, electrical wiring insulation must have a rating of 167°F (75°C) if the liquid's temperature exceeds 180°F (82°C).
 - To prevent electrocution, when the electrical power is connected to the flow switch, do not touch the terminals.
 - Make sure flow switch electrical cover is secured before turning on electric power.
- Failure to follow this warning could cause property damage, personal injury or death.

a. Cover Removal and Installation Procedure

- Using a flathead screwdriver, unscrew the four cover screws and remove the electrical connection cover (A).
- Place electrical connection cover on the flow switch and insert four cover screws. Tighten the screws to 10 lb•in (1.13 N•m).





ITT

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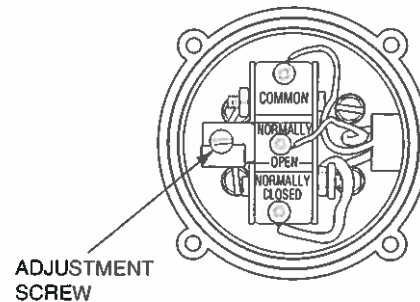
STEP 6 - Adjustment

Adjustment is necessary only if required flow/no flow set-points are **above** factory set minimum.

- Turn off power. Remove electric enclosure cover.
- Turn the adjusting screw clockwise to increase setpoint.

IMPORTANT: Do not attempt to lower flow switch setpoint from original factory minimum setting. Lowering (turning adjusting screw counterclockwise) the setpoint from original factory setting may cause erratic flow switch operation.

- Place cover on flow switch and turn on power.
- Test the operation of the flow switch after each adjustment.



MAINTENANCE

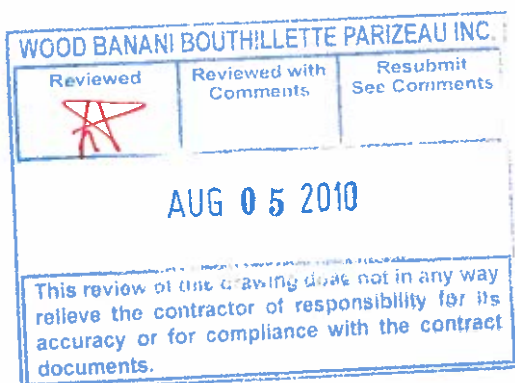
SCHEDULE:

- Inspect paddle annually. Turbulent or high flow velocity conditions may require more frequent inspection and/or replacement.

- Replace paddle if damaged or showing signs of wear.

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- Replace flow switch every 5 years or 100,000 cycles, whichever occurs first.



TROUBLESHOOTING

Problem:

1. Flow Switch Does Not Operate

Solution:

- Make sure power has been turned on to device and flow switch.
- Verify that flow rate is high enough for flow switch to activate. Measure flow rate and match with velocities shown in flow rate chart.
- Check to see if paddle moves freely. Some system piping disassembly may be required.

2. Flow Switch Operates Erratically

Solution:

- Flow switch may be located in an area of high turbulence causing paddles to flutter.
- Adjustment screw may have been turned below original factory setpoint. Verify that flow rate is high enough for flow switch to activate. Measure flow rate and match with velocities shown in flow rate chart.
- Check to see if paddle moves freely. Some system piping disassembly may be required.

3. Flow Switch Does Not Deactivate

Solution:

- Check to see if paddle moves freely. Some system piping disassembly may be required.
- Measure flow rate and match with velocities shown in flow rate chart. Flow switch must prove flow before it can indicate no flow.

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Series
L6

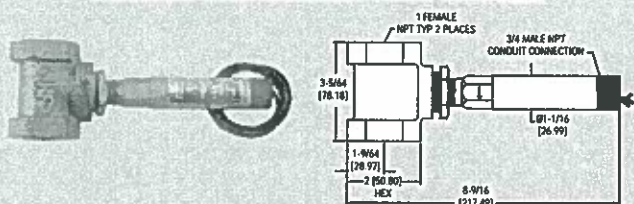
FLOTECT® Liquid Level Switch

Easy In-wall or External Installation, Up to 2000 psig (138 bar)

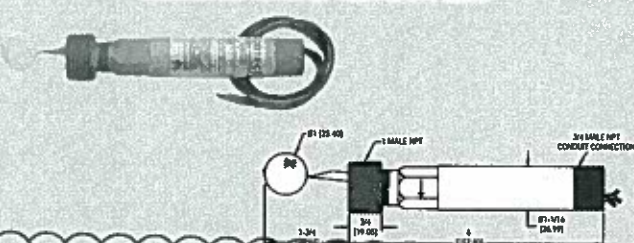


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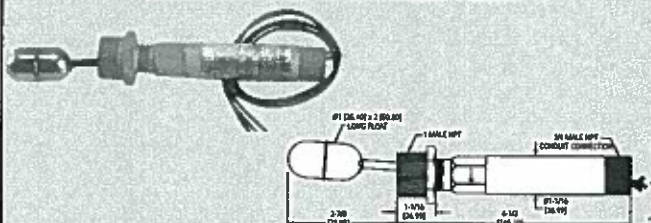
MODEL L6 WITH EXTERNAL FLOAT CHAMBER



MODEL L6 WITH SPHERICAL FLOAT



MODEL L6 WITH CYLINDRICAL FLOAT



MODELS

Model No.	Body	Installation	Float Material	Max. Pressure psig (bar)	Min. Sp. G.	
L6EPB-B-S-3-O	Brass	Side Wall Mounting	Polypropylene Spherical	1000 (69)	0.9	
L6EPB-B-S-3-A	Brass	Side Wall Mounting	304 SS Cylindrical	200 (13.8)	0.5	
L6EPB-B-S-3-C	Brass	Side Wall Mounting	304 SS Spherical	350 (24.1)	0.7	
L6EPB-B-S-3-B	Brass	Brass External Float Chamber (Tee)	Polypropylene Spherical	250 (17.2)	0.9	
L6EPB-B-S-3-H	Brass	Brass External Float Chamber (Tee)	304 SS Spherical	250 (17.2)	0.7	
L6EPB-S-S-3-O	303 SS	Side Wall Mounting	Polypropylene Spherical	2000 (138)	0.9	
L6EPB-S-S-3-A	303 SS	Side Wall Mounting	304 SS Cylindrical	200 (13.8)	0.5	
L6EPB-S-S-3-C	303 SS	Side Wall Mounting	304 SS Spherical	350 (24.1)	0.7	
L6EPB-S-S-3-S	303 SS	304 SS External Float Chamber (Tee)	Polypropylene Spherical	2000 (138)	0.9	
L6EPB-S-S-3-L	303 SS	304 SS External Float Chamber (Tee)	304 SS Spherical	350 (24.1)	0.7	

Surprisingly compact, the Series L6 Flotect® Level switch is designed and built for years of trouble-free service in a wide variety of process liquid level applications. Operation is simple and dependable with no mechanical linkage as the level switch is magnetically actuated. The float lever pivoted within the body moves when the process liquid displaces the float. A magnet on the opposite end of the float lever controls a second magnet on the switch actuating lever located in the switch housing.

FEATURES

- Leak proof lower body machined from bar stock
- Choice of models for direct side wall mounting or mounted in a tee to act as an external float chamber
- Weatherproof
- Explosion-proof (listings included in specifications)
- Electrical assembly can be easily replaced without removing the unit from the installation so that the process does not have to be shut down
- Sensitive to level changes of less than 1/2" (12 mm)

SPECIFICATIONS

Service: Liquids compatible with wetted materials.

Wetted Materials:

Float: Solid polypropylene or 304 SS

Lower Body: Brass or 303 SS

Magnet: Ceramic

External Float Chamber (Tee): Matches lower body choice of brass or 303 SS.

Other: Lever Arm, Spring, Pin, etc.: 301 SS

Temperature Limit: -4 to 220°F (-20 to 105°C) Standard, MT high temperature option 400°F (205°C) (MT not UL, CSA or ATEX). ATEX compliant AT option ambient temperature: -4 to 167°F (-20 to 75°C) process temperature: -4 to 220°F (-20 to 105°C). Pressure Limits: See chart below.

Enclosure Rating: Weatherproof and Explosion-proof. Listed with UL and CSA for Class I, Groups A, B, C and D; Class II, Groups E, F, and G. (Group A on stainless steel body models only). ATEX CE0344 II 2 G EEx d IIC T6 Process Temp 75°C. EC-Type Certificate No.: KEMA 04ATEX2128

Switch Type: SPDT snap switch standard, DPDT snap switch optional.

Electrical Rating: UL models: 5A @ 125/250 VAC (V-); 5A res., 3A ind. @ 30 VDC (V=). MV option: 1A @ 125 VAC (V-). MT option: 5A @ 125/250 VAC (V-). [MT option not UL, CSA or ATEX].

Electrical Connections: UL models: 18 AWG, 18" (460 mm) long. CSA and ATEX models: terminal block.

Upper Body: Brass or 303 SS.

Conduit Connection: 3/4" male NPT standard, 3/4" female NPT on junction box models.

Process Connection: 1" male NPT on models without external float chamber, 1" female NPT on models with external float chamber.

Mounting Orientation: Horizontal with index arrow pointing down.

Weight: Approximately 1 lb (5 kg) without external float chamber, 1.75 lb (8 kg) with external float chamber.

Specific Gravity: See chart below.

Agency Approvals: UL, CSA, CE and ATEX.

Options:

Gold Plated Contacts option for dry circuits, add suffix -MV (see electrical rating in specifications)

High Temperature option rated 400°F (204°C), add suffix -MT (see electrical rating in specifications, no listings or approvals, only available on models with stainless steel floats)

CSA and UL approved construction, includes weatherproof and explosion-proof junction box, add suffix -CSA

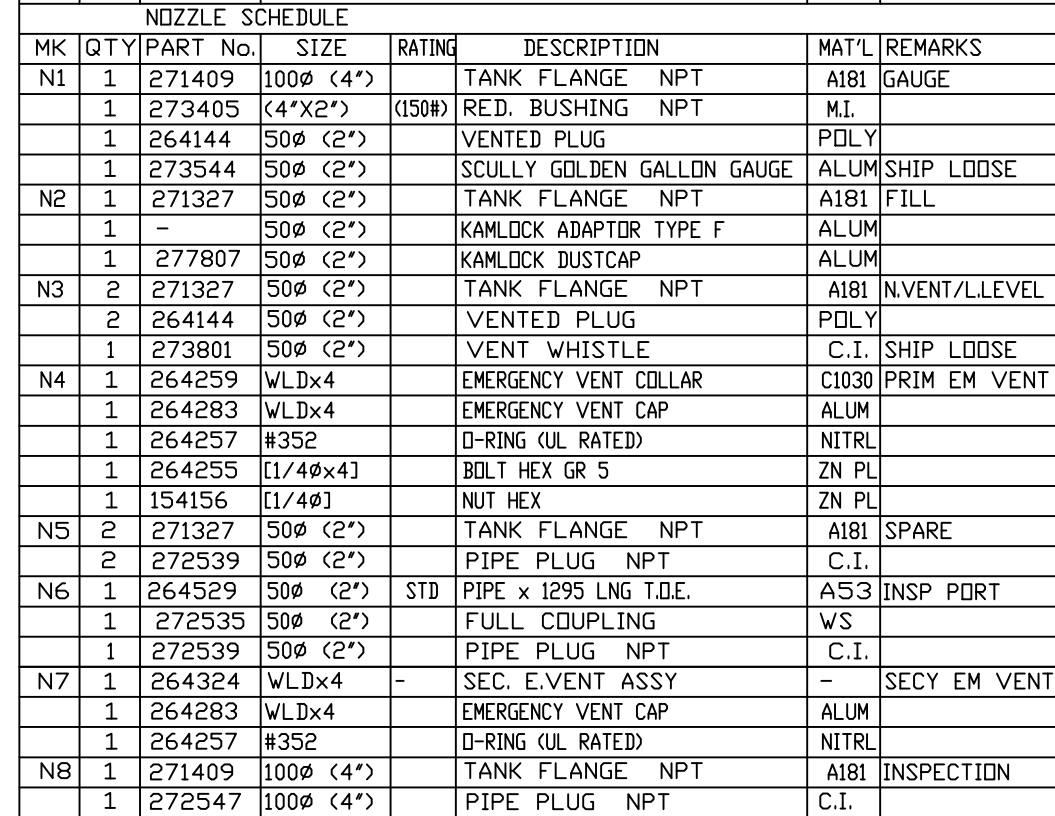
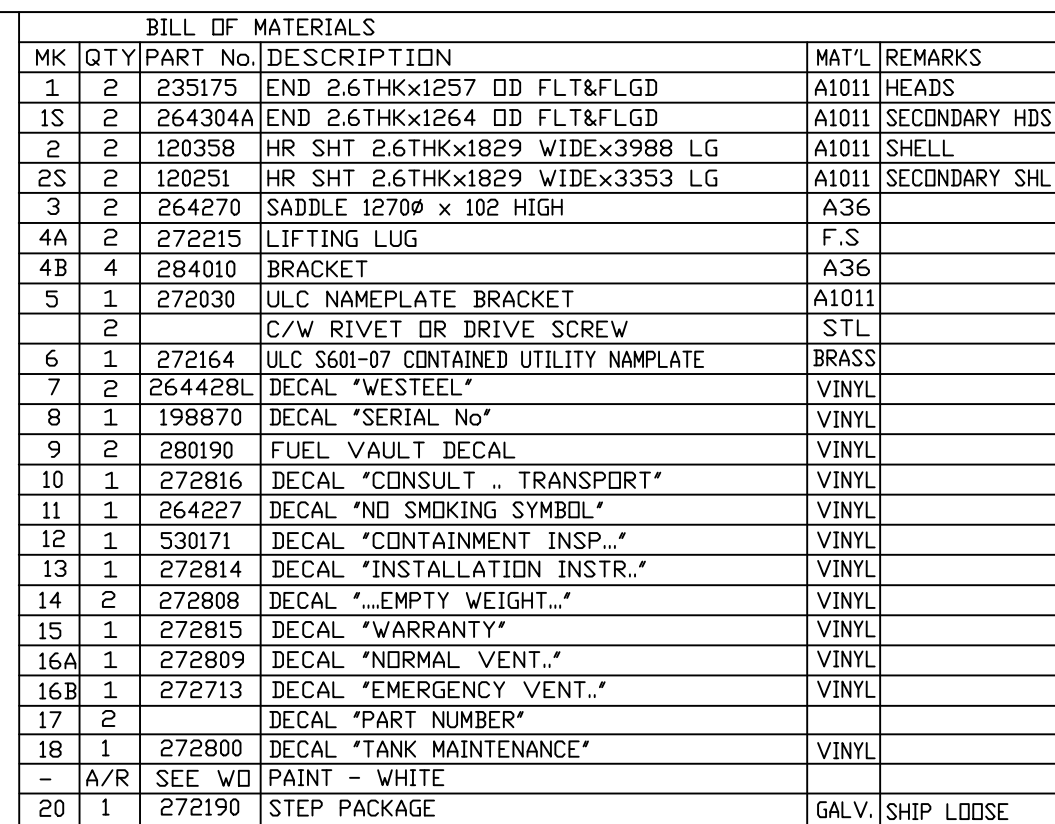
ATEX approved construction includes, weatherproof and explosion-proof, junction box add suffix -AT

DPDT contacts, change seventh character in model number to "D". Example: L6EPB-B-D-3-O

303 Stainless Steel Upper Body, change fifth character in model number to "S". Example: L6EPS-S-S-3-S

Options Not Shown: 1-1/2" and 2" male NPT process connection, 2" female NPT connection tee, and top mount.

Section 33 56 13 2.1 Above Ground Fuel Storage Tank



MK 16B DETAIL

THIS TANK IS INTENDED FOR STATIONARY INSTALLATION ONLY			METRIC			MATERIAL SEE BOM		BLANK SIZE -		WEIGHT (LBS.) SEE MK14	
						DESND. NK	WESTEEL THIS DRAWING IS THE EXCLUSIVE PROPERTY OF WESTEEL AND ALL RIGHTS ARE RESERVED. NO PART OF THIS DRAWING MAY BE USED OR REPRODUCED IN ANY MANNER WHATSOEVER WITHOUT WRITTEN PERMISSION FROM Westeel Limited S.I. UNITS ARE SHOWN, IMPERIAL UNITS ARE SHOWN IN []	SCALE N.T.S.	DWN. <Y.M.D.> 10-06-29	LOCATION 67	
						DWN. SBK		I.O. -	E.P. NO. -	W.D. -	
2	10-07-27	ADDED STEP PACKAGE-COR. LBL	-	NK	PK	CHKD. NK	DRAWING TITLE INTEGRAL CONTAINED TANK ULC S601-07 MODEL FV4500HD 4546 L (1000 GAL)	SIZE B	DRAWING NO. 264905HD_10C1		REV. NO. 2
1	10-07-15	ADDED NSB, MOUNT DIM, DEL LG		SBK	NK	APPD. JH	CUSTOMER MOSHER ENGINEERING LIMITED	ORDER NO. 186-1011			
NO.	DATE	REVISION	E.C.R.	BY	CH.						

WESTEEL

GAUGE CHART FOR HORIZONTAL TANK WITH FLAT ENDS

VOLUME IN LITRES @ 1cm INCREMENTS

(LENGTH SET @ 1.25% OVER NOMINAL FOR CHART CAPACITIES)

1000 GALLON FARM STORAGE TANK

APPLIES TO PART #'S:		264905			264905HD		
		FV45H			FV45H - Heavy Duty		
DIAMETER (D) =		1270	MILLIMETERS		50	INCHES	
LENGTH OF TANK (L) =		3658	MILLIMETERS		144	INCHES	
TOTAL VOLUME (V) =		4634	LITRES		1019	IMP GALLONS	
DEPTH	VOLUME	DEPTH	VOLUME	DEPTH	VOLUME	DEPTH	VOLUME
(cm)	(litres)	(cm)	(litres)	(cm)	(litres)	(cm)	(litres)
1	6	33	968	65	2416	97	3845
2	16	34	1010	66	2463	98	3885
3	29	35	1052	67	2510	99	3924
4	44	36	1094	68	2557	100	3963
5	61	37	1137	69	2604	101	4001
6	81	38	1179	70	2651	102	4039
7	101	39	1223	71	2698	103	4076
8	124	40	1266	72	2745	104	4112
9	147	41	1310	73	2791	105	4148
10	172	42	1354	74	2838	106	4184
11	198	43	1399	75	2884	107	4218
12	225	44	1443	76	2930	108	4252
13	253	45	1488	77	2976	109	4285
14	282	46	1533	78	3022	110	4318
15	312	47	1579	79	3069	111	4349
16	342	48	1624	80	3113	112	4380
17	374	49	1670	81	3158	113	4410
18	406	50	1716	82	3204	114	4439
19	440	51	1762	83	3248	115	4467
20	474	52	1808	84	3293	116	4494
21	508	53	1854	85	3338	117	4520
22	543	54	1901	86	3382	118	4545
23	579	55	1947	87	3425	119	4568
24	616	56	1994	88	3469	120	4590
25	653	57	2041	89	3512	121	4611
26	691	58	2088	90	3555	122	4630
27	729	59	2134	91	3598	123	4648
28	768	60	2181	92	3640	124	4663
29	807	61	2228	93	3682	125	4676
30	847	62	2275	94	3723	126	4686
31	887	63	2322	95	3764	127	4692
32	927	64	2369	96	3805	128	

FUEL STORAGE TANK LEVEL GAUGE

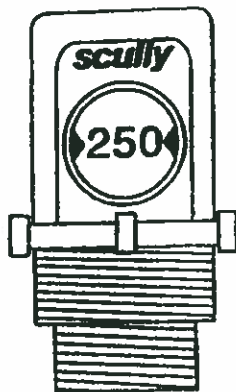
scullyORIGINAL SIGNED BY
CLEMENT BOURGOINE**Golden Gallon Gauges®***Ensure that string length
matches fuel tank dimension***Double Float Tank Gauge For Indoor, Outdoor And Buried Tanks**

WOOD BANANI BOUTHILLETTE PARIZEAU INC.

Reviewed	Reviewed with Comments	Resubmit See Comments
	✓	

JUL 20 2010

- NEW interior design and kevlar string for smoother operation.
- Eliminates the need to stick the tank, saving time and money.
- Unique polypropylene double float.
- Measurement readings available in gallons or inches.
- Easy-to-read window has UV and anti-fog protection.
- Most accurate gauge of its kind.



METRIC !

273 544

- Large numbers allow you to check level from a distance.
- Installs easily in 1 1/2" and 2" openings.
- Accommodates tank depths to 108".
- Used in a variety of liquid products.
- Perfect for will call accounts.
- The standard in lube oil and waste oil tanks.

READ IN GALLONS OR LITERS

MODEL SIZE	PART #
158 gallon-Highland, 60" depth	03173
192 gallon-Highland, 72" depth	03174
245 gallon, 48" depth	03177
260 gallon, 23" depth, w/ 9" ext	03182
270 gallon, 36" depth	03162
275 gallon, 44" depth	03101
275 gallon, 42" depth	03102
275 gallon, 27" depth	03105
275 gallon, 26" depth	03106
280 gallon, 60" depth	03185
300 gallon, 60" depth	03175
325 gallon, 39" - 43" depth	03163
330 gallon, 43" depth	03157
500 gallon, 26" depth w/ 11 1/4" ext*	03180
500 gallon, 49.5" depth w/ 14 1/2" ext.*	03196
500 gallon, 65" depth	03176

* 11 1/4" and 14 1/2" extensions are for cement vaulted tanks.
window. Models produced after March 1, 1994 contain

READ IN GALLONS OR LITERS

MODEL SIZE	PART #
Dbl 500 gallon, 36" depth, w/ 11 1/4" ext*	03192
520 gallon, 48" depth	03158
550 gallon-Twin 275s, 44" depth	03171
550 gallon-Twin 275s, 42" depth	03170
560 gallon, 48" depth	03159
1,000 gallon, 36" depth w/ 11 1/4" ext*	03179
1,000 gallon, 48" depth	03160
1,000 gallon, 49.5" depth w/ 14 1/2" ext.*	03195
1,000 gallon, 64" depth	03184
1,000 gallon, 60" - 64" depth	03181
1,000 gallon, 47" depth w/ 11 1/4" ext.*	03191
2,000 gallon, 60" - 64" depth	03165
2,000 gallon, 48" depth w/ 11 1/4" ext*	03193
680 liters, DTE	03198
725 liters, DTE	03199
795 liters, DTE	03200

Models produced after August 1, 1993 contain the anti-fog glass
the kevlar string.



See Next Page For Gauges Which Read In Inches Or Centimeters. See Next Page For Technical Specifications.

Model FS601 Stainless Steel Float Switch

CAUTION: Refer to instructions before operating or servicing switch.

Switch set-point distances are field adjustable by using an extension pipe. The lead wires must be ordered to a suitable length in order to pass through the extension pipe. Standard lead wire length is 24". The switch must be connected in series with a load. The contact arrangement may be changed from normally open (NO) to normally closed (NC) and vice versa. Remove the retaining ring, turn over the float and put the retaining ring back in place.

A high temperature option is available. Please consult the factory.

DO NOT CONNECT THE SWITCH DIRECTLY ACROSS THE POWER SUPPLY.

The voltage / current product must not exceed the power rating.

Electrical Specifications

Maximum Switching Voltage VOLTS DC/AC	240
Maximum Switching Current AMPS DC/AC	1.0
Maximum Switching Power WATTS DC/AC	100
Max. Operating Temperature	90°C 194°F

Meets Standards:

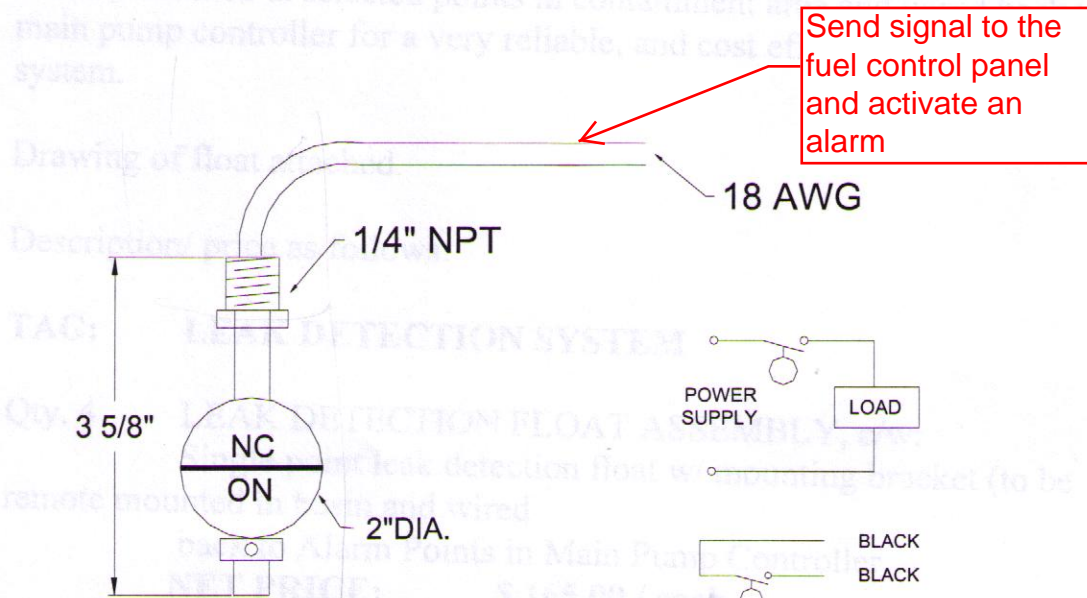
Class 1 Division 1, Groups B,C,D

CSA C22.2 No. 1010-1 and ANSI / I SA S82-03

CSA C22.2 No. 30 and UL1203



9700099



Stem and float are 316 ss.



Technical Data Sheet

This Polyester TGIC powder was designed for exterior applications specifically for corrosive environments. Designed for use with a primer, this product offers excellent mechanical properties and superior chemical resistance.

Product Code: WH90-CRP1074

Product Name: CR Tesco White

*** Testing Performed on Bondrite 1000(Chrome rinse), 22 Gauge CRS Panels**

SPECIFIC GRAVITY:	1.54
GLOSS (ASTM D523)	90
RECOMMENDED FILM THICKNESS:	2.0-3.0 mils
PENCIL HARDNESS (ASTM D3363):	2H - 4H
IMPACT TEST (ASTM D2794-90):	160 / 160
CROSS HATCH ADHESION (ASTM D3359-METHOD B)	PASS 100%
ABRASION RESISTANCE (ASTM D4060):	40 Minimum
MANDREL BENDING TEST (ASTM D522):	3/16" (5mm)
SALTSPRAY RESISTANCE:	2000 Hrs
HUMIDITY RESISTANCE:	2000 Hrs

APPLICATION:
CURE:

ELECTROSTATIC
15 min @ 200 C

Warranty Policy: This product has been tested in our laboratory and meets our product specifications. We recommend trials under the customer's processing conditions to ensure it is suitable for its end use. Since matters of surface preparation, application procedures, and other fact that can affect performance are beyond our control, Spectrum Powder manufacturing Ltd. assumes no liability for coating failure other than supply replacement material for a coating shown to be defective.

Spectrum Powder Manufacturing Ltd.
3956 64th Ave. S.E.
Calgary, Alberta
T2C 2B4
www.spectrumpowder.com

September 20th, 2009

Section 33 56 13 2.2 Fuel Day Tank

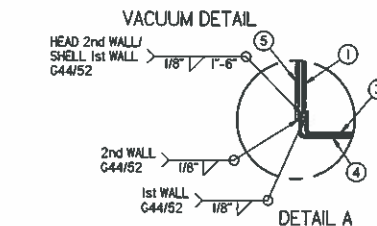
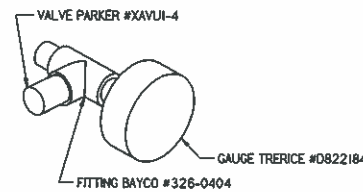
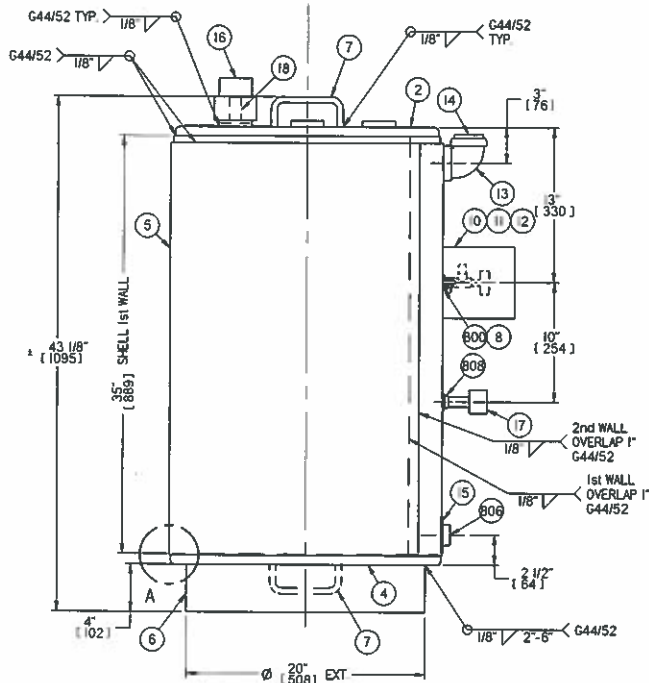
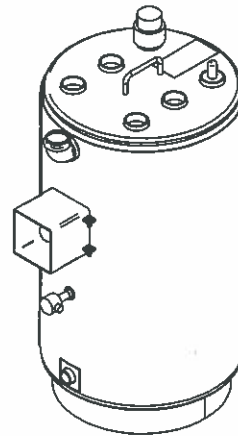
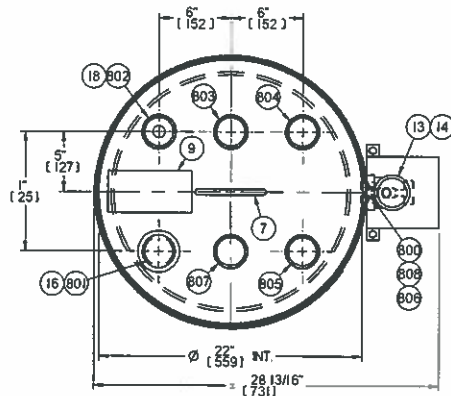
ORIGINAL SIGNED BY
CLEMENT BOURGOGNE

WOOD BANANI BOUTHELLE & PARIZEAU INC.

Reviewed	Reviewed with Comments	Resubmit See Comments
	✓	

JUN 30 2010

This review of the drawing does not in any way relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.



APPROX. PROFILES	DUAL BEAM										SINGLE BEAM									
	LINEAR	QUADRATIC	RECTANGULAR	COSINE SINEWAVE	COSINE SINEWAVE	MEAN MODULATED	LINEAR	QUADRATIC	RECTANGULAR	COSINE SINEWAVE	COSINE SINEWAVE	MEAN MODULATED								
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