SB12 Series Back Pressure/Relief Valves 1/2" to 2"

working pressure vs. flow rate

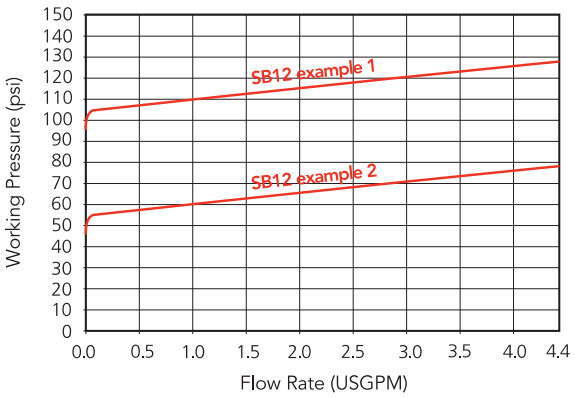
The curves show the relationship between the working pressure and the approximate flow rate through the valve for water at 20°C (68°F) . These values will vary depending on:

- The configuration of the piping and the pressure losses associated with it
- The fluid if not water at 20°C (68°F)
- Whether the pressure is rising or falling, hysteresis is approximately 4 psi for 1/2" to 2" valves. For valves 2-1/2" to 4", hysteresis is approximately 14.5 psi.

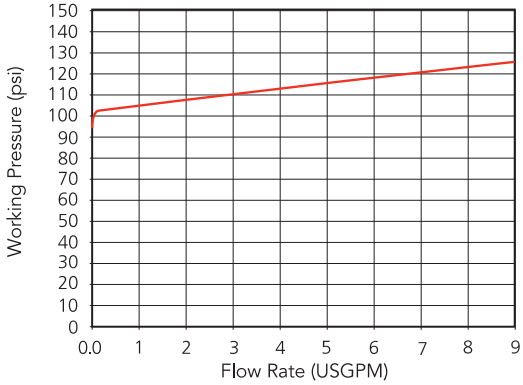
operation examples

1. The valve is set closed at 100 psi. At a pressure increase of 10 psi, a flow of approximately 1.0 USGPM will be reached.
   - set pressure = 100 psi
   - working pressure = 110 psi
   - opening pressure = approximately 104 psi
2. The valve is set closed at 50 psi. At a pressure increase of 10 psi, a flow of approximately 1.0 USGPM will be reached.
   - set pressure = 50 psi
   - working pressure = 60 psi
   - opening pressure = approximately 54 psi

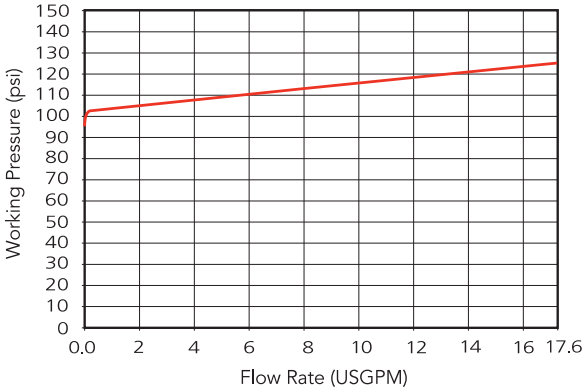
3/8" Valves



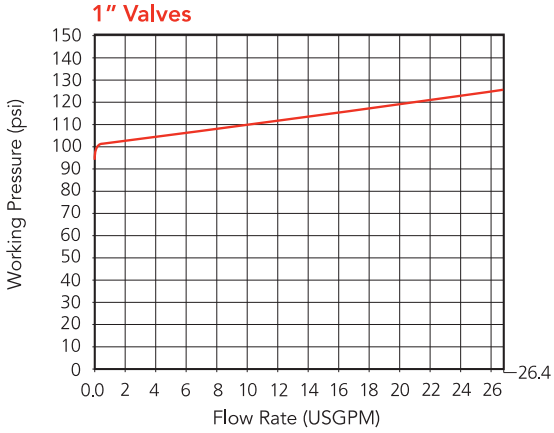
1/2" Valves



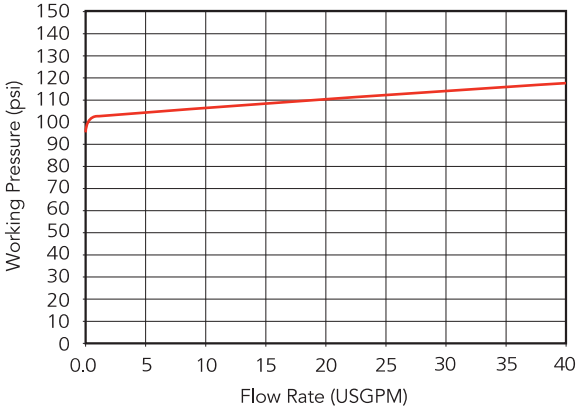
3/4" Valves



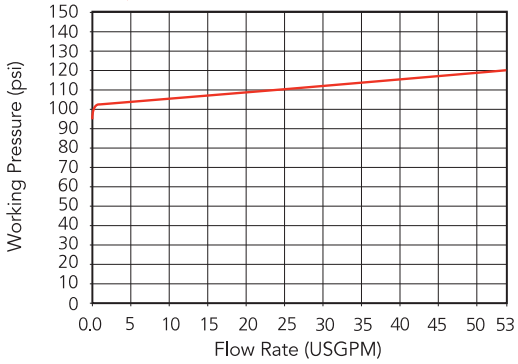
1" Valves



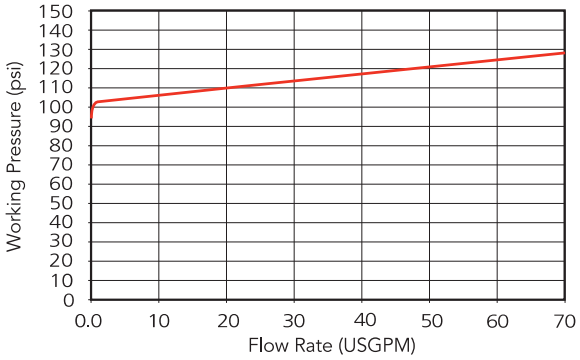
1-1/4" Valves



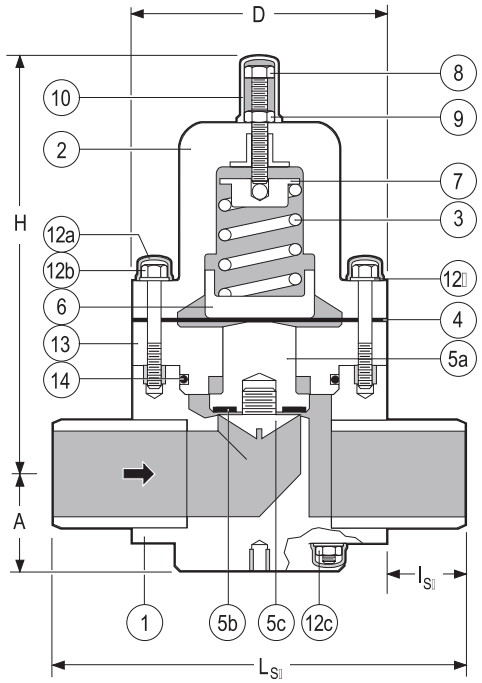
1-1/2" Valves



2" Valves



SB12 Series Back Pressure/Relief Valves 2-1/2" to 4"



Spigot Body

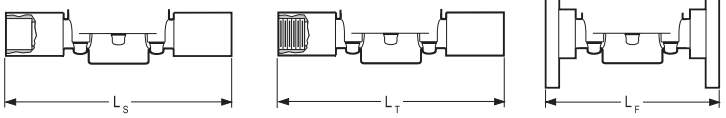
PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
1	Body	1	PVC, PP, PVDF
2	Bonnet	1	PPG
3	Spring	1	Galvanized Steel
4▲	Control Diaphragm	1	PTFE bonded EPDM
5a▲	Piston	2	PVC, PP, PVDF
5b▲	Seat	1	EPDM, FPM(Viton®)
5c▲	Seat Retainer	1	PVC, PP, PVDF
6	Lower Spring Retainer	1	PPG
7	Upper Spring Retauner	1	304 SS
8	Spring Tensioning Bolt	1	304 SS
9	Lock Nut	1	304 SS
10	Spring Bolt Cap	1	PE
12a	Hex Bolt/Nut Cap	20	PE
12b	Hex Bolt/Stud	12[1]	304 SS
12c	Hex Nut	20	304 SS
12d	Washer	20	304 SS
13	Spacer Disc	1	PVC, PP, PVDF
14	Spacer O ring	1	EPDM, FPM(Viton®)

[1] 2 large upper bolts, 2 shorter lower bolts, 8 studs

OTHER ENDS



Socket Threaded Flanged

ChemFlare™ Ends
- For connection to PFA tube. Leak-free connections for difficult services such as sodium hypochlorite

DIMENSIONS INCHES

WEIGHTS LB.

Cv VALUES

Size	PVC, PP & PVDF A	D	H	L_{SP}[2]	I_{SP}	PVC L_F	PVC	PP	PVDF	USGPM Flow at 1 psi △P
2-1/2"	2.7	6.9	11.1	11.2	2.1	12.2	20.9	15.4	24.6	41
3"	3.0	7.9	12.2	14.2	3.1	15.0	26.4	23.8	30.8	63
4"	3.7	9.8	14.2	16.5	3.3	16.9	33.0	26.4	37.4	98

[2] Plain spigot ends in PP & PVDF may be butt fused directly to Chemline PP & PVDF piping systems. Weights based on spigot bodies.

MAXIMUM PRESSURES PSI

Size	PVC 20°C 68°F	30°C 86°F	40°C 104°F	50°C 122°F	PP 20°C 68°F	30°C 86°F	40°C 104°F	50°C 122°F	60°C 140°F	70°C 158°F	PVDF 30°C 86°F	50°C 122°F	70°C 158°F	80°C 176°F	90°C 194°F	100°C 212°F
2-1/2"–4"	150	90	44	15	150	116	90	60	37.5	15	150	90	55	40	30	15

Temperature Ranges: PVC 0 to 50°C (32 to 122°F), **PP** 10 to 70°C (50 to 158°F), **PVDF** –30 to 100°C (–22 to 212°F).

ORDERING EXAMPLE

Chemline Back Pressure/ Relief Valves	SB12	A	005	V	U
Body Material	**A** – PVC	**B** – PP	**K** – PVDF		
Size	**003** – 3/8" **010** – 1" **020** – 2"	**005** – 1/2" **012** – 1-1/4" **025** – 2-1/2"	**007** – 3/4" **015** – 1-1/2" **030** – 3"	**040** – 4"		
Elastomers	**E** – EPDM	**V** – FPM (Viton®)				
Ends	**S** – Socket **CFx** – ChemFlare™	**T** – Threaded	**F** – Flanged **Blank** – Spigot (Butt)	**U** – Union Socket		

Example: Chemline SB 12 Series, PVC, 1/2" diameter, FPM (Viton®) seals, Union socket ends.
x = 4 for 1/4", **6** for 3/8", **8** for 1/2", **12** for 1" ID tube connections.

OPTIONS

- 4 to 60 psi Pressure Range springs for 2-1/2" to 4" valves
- **Integral Pressure Gauge** – for inlet and/or outlet
- Bodies in 316 Stainless Steel and PTFE

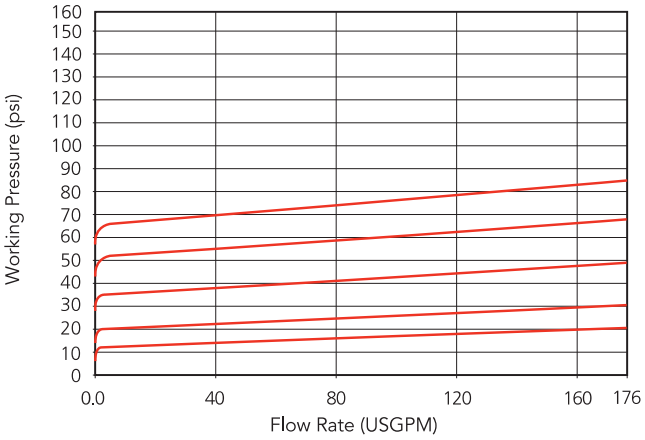
Optional Pressure Gauge
- For inlet and/or outlet

SB12 Series Back Pressure/Relief Valves 2-1/2" to 4"

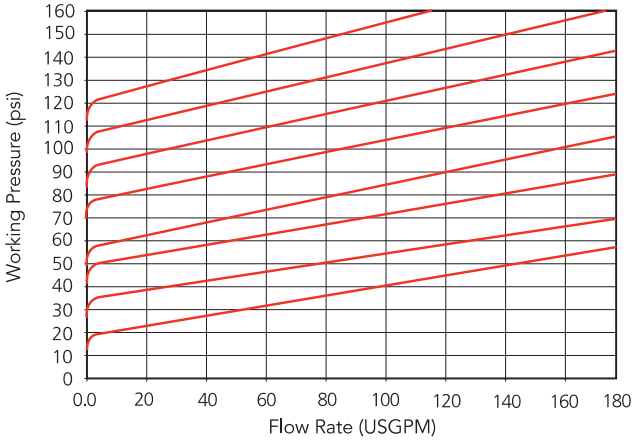
working pressure vs. flow rate

• Whether the pressure is rising or falling, hysteresis is approximately 14.5 psi for 2-1/2" to 4" valves

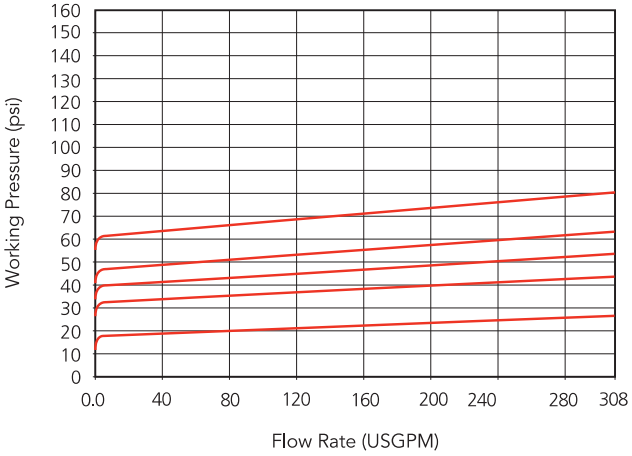
2-1/2" Valves / 4 to 60 psi set pressure range



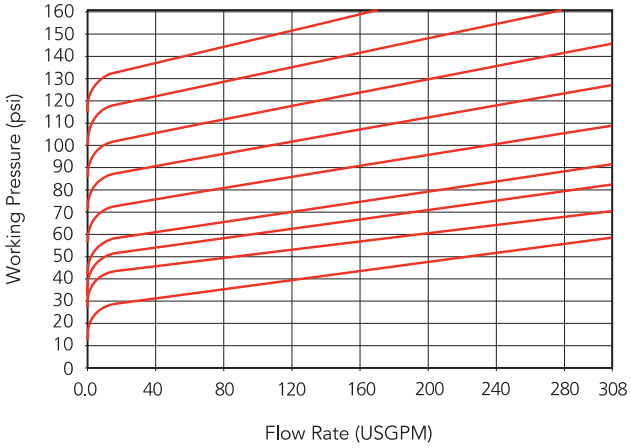
2-1/2" Valves / 7.5 to 150 psi set pressure range



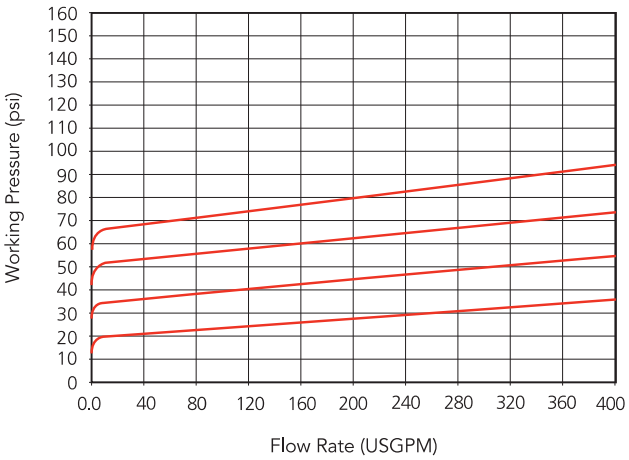
3" Valves / 4 to 60 psi set pressure range



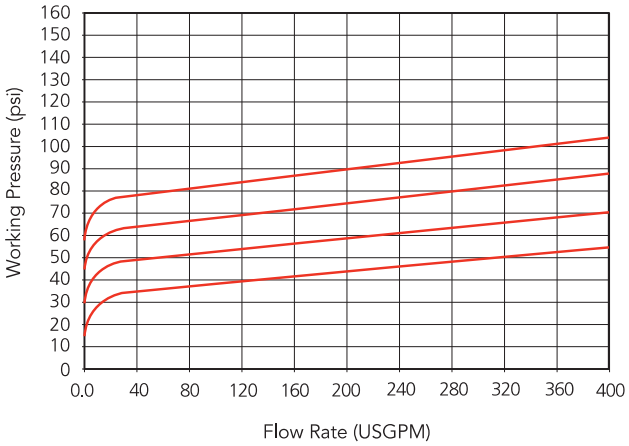
3" Valves / 7.5 to 150 psi set pressure range



4" Valves / 4 to 60 psi set pressure range



4" Valves / 7.5 to 90 psi set pressure range



CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

55 Guardsman Road, Thornhill, ON, L3T 6L2, Canada | ISO 9001:2008 Certified
tel.905.889.7890 | fax.905.889.8553 | request@chemline.com | chemline.com

CS-305-170 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VAPSPD351047	BPV9-532	DIA: 13 mm (1/2")	BACKPRESSURE VALVE	TYPE: BACK PRESSURE VALVE | 150#//MANUFACTURER : CHEMLINE//MODEL : SB12K005VCFx + SGK-005-002-P-G + P025-160-BM CONFIG L-U//CONNECTION TYPE : CHEMFLARE | 13 mm (1/2")//BODY : PVDF// SEAL | SEAT :VITON | // STEM : N/A			SULFURIC ACID DOSING SKID		

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PDF Published September 17, 2014

SB12 Series Back Pressure/Relief Valves

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

PVC PP PVDF

CRN Registered as Category C Fittings Consult Chemline

NSF[3] Certified to NSF/ANSI 61

SERIES: SB12

SIZES: 3/8" – 4"

ENDS: True Union Socket, Threaded or ChemFlare™[1] Spigot[2] Bodies with Plain, Socket, Threaded or Flanged ends

DIAPHRAGM: PTFE Bonded EPDM

SEALS: EPDM, FKM (Viton®)

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 upward against the piston allowing excess pressure to flow upwards through the orifice.

The SB12 Series has a built-in check valve function, desirable for dosing applications. It is not so sensitive as to open with every pulsation from a metering pump.

features

True Union Ends

- Easy installation and maintenance
- Eliminate chemical leakage problems common with old fashioned threaded connections

Long Cycling Life

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

Superior Performance in Dosing Systems

- Valves are hydraulically designed for very low hysteresis ("backlash") and to eliminate chatter
- Built-in check (non-return) function
- Valve opening depends on inlet pressure only and is uneffected by changes in downstream (back) pressure

CRN Registration numbers by province

- Ontario: OC10134.5
- Newfoundland: OC10134.50
- Alberta: OC10134.52
- Saskatchewan/Manitoba/Quebec: OC10134.56
- New Brunswick: OC10134.57
- Nova Scotia: OC10134.58
- P.E.I.: OC10134.59
- British Columbia: not required

technical

Set Pressure Ranges

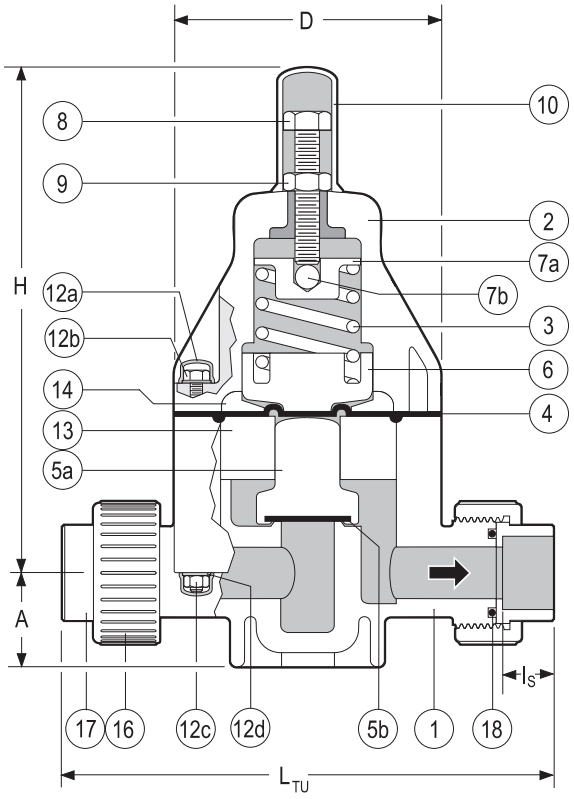
- 1/2" to 2" – 5 to 150 psi
- 2-1/2" and 3" – 7.5 to 150 psi
- 2-1/2" to 4" – 4 to 60 psi (optional)
- 4" – 7.5 to 90 psi

Maximum Viscosity

- 120cP is maximum recommended service viscosity

[1] For ChemFlare™ end connectors, consult Chemline.
[2] PP and PVDF spigot ends have DIN dimensions and will butt fuse directly to Chemline PP and PVDF piping systems.
[3] PVC valves with EPDM or FKM (Viton®) seals are certified under NSF/ANSI Standard 61 for contact with drinking water.

SB12 Series Back Pressure/Relief Valves 1/2" to 2"



True Union Body

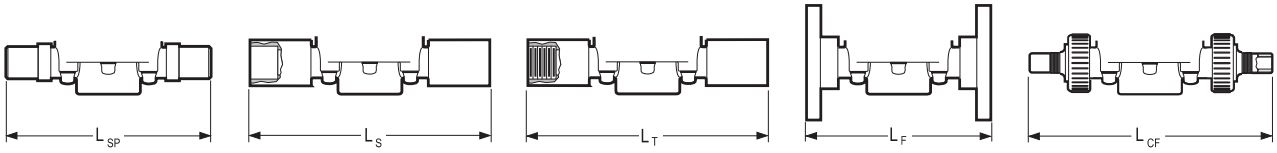
PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
1	Body	1	PVC, PP, PVDF
2	Bonnet	1	PPG
3	Spring	1	Galvanized Steel
4▲	Control Diaphragm	1	PTFE bonded EPDM
5a▲	Piston	1	PVC, PP, PVDF
5b▲	Seat	1	EPDM, FPM(Viton®)
6	Lower Spring Retainer	1	PPG
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	Spring Bolt Cap	1	PE
12a	Bolt/Nut Cap	8/12[1]	PE
12b	Hex Bolt	4/6[1]	304 SS
12c	Hex Nut	4/6[1]	304 SS
12d	Washer	8/12[1]	304 SS
13	Spacer Disc	1	PVC, PP, PVDF
14	Pressure Plate	1	PP
16	Union Nut	2	PVC, PP, PVDF
17	End Connector	2	PVC, PP, PVDF
18▲	Face O-Ring	2	EPDM, FPM(Viton®)

[1] 1/2" size / 3/4" to 2" sizes

OTHER ENDS



Spigot Body | Socket | Threaded | Flanged | ChemFlare™

DIMENSIONS INCHES

WEIGHTS LB.

Cv VALUES

			PVC								PP and PVDF						
Size	D	H	A	I_S	L_{TU}[2]	L_{SP}[3]	L_S	L_T	L_F	L_{CF}	A	L_{SP}[3]	L_{TU}[2]	PVC	PP	PVDF	USGPM Flow at 1 psi △P
3/8"	3.2	6.9	1.0	0.6	6.5	5.7	7.4	7.2	4.5	8.2	0.9	5.7	**	1.8	1.5	2.2	2.1
1/2"	3.2	6.9	1.0	0.6	6.8	5.7	8.0	7.8	6.3	8.3[4]	0.9	5.7	7.1	1.9	1.6	2.4	3.0
3/4"	4.2	8.0	1.5	0.7	8.3	6.9	9.3	8.9	7.4	9.7	1.4	6.9	8.4	4.1	3.5	4.6	6.6
1"	4.2	8.0	1.5	0.9	8.5	6.9	9.6	9.3	7.4	10.2	1.4	6.9	8.7	4.2	3.5	4.7	8.7
1-1/4"	5.8	10.3	2.2	1.0	10.9	8.8	11.6	11.2	9.2	13.5	2.1	8.8	10.9	11.0	9.0	12.0	18.0
1-1/2"	5.8	10.3	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"	5.8	10.3	2.2	1.5	11.3	9.6	12.9	12.0	10.0	–	2.1	8.8	13.2	11.4	9.4	12.4	21.4

[2] True Union bodies come standard with socket ends. Threaded union ends are available. ** Consult Chemline.

[3] Spigot bodies are used for non union socket, threaded or flanged ends. All spigot ends have metric dimensions and the PP and PVDF spigots butt fuse directly to Chemline PP and PVDF piping. [4] Tube size can be reduced to 1/4" tube, LCF = 7.74" for 1/4", 8.26" for 3/8".

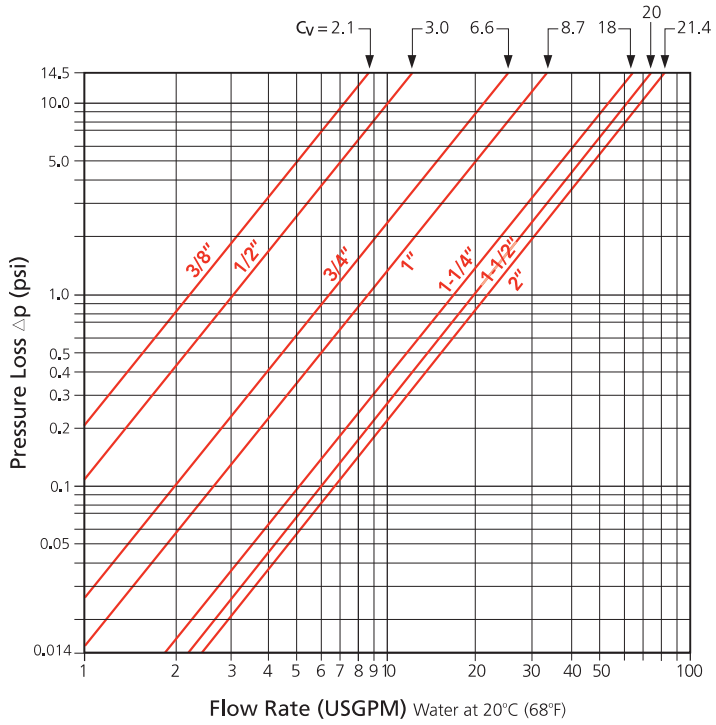
MAXIMUM PRESSURES PSI

	PVC				PP					PVDF					
Size	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
1/2"– 2"	150	105	60	15	150	90	60	37.5	15	150	100	60	45	30	15

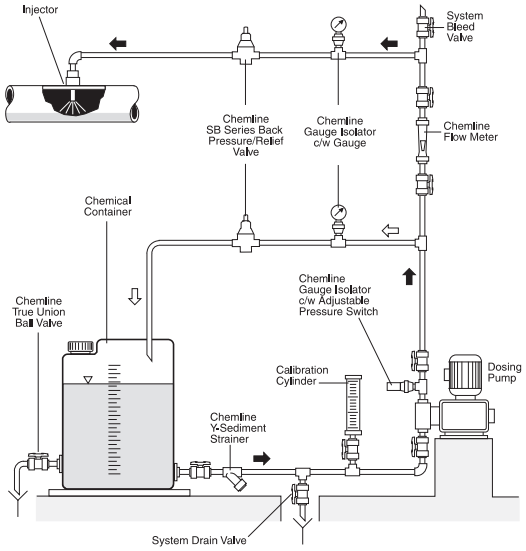
Temperature Ranges: PVC 0 to 50°C (32 to 122°F), **PP** 10 to 70°C (50 to 158°F), **PVDF** –30 to 100°C (–22 to 212°F).

SB12 Series Back Pressure/Relief Valves 1/2" to 2"

pressure loss nomogram for SB12 valves 3/8" to 2"

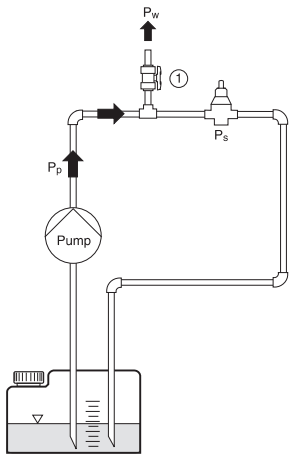


typical dosing system schematic



application of pressure relief valves

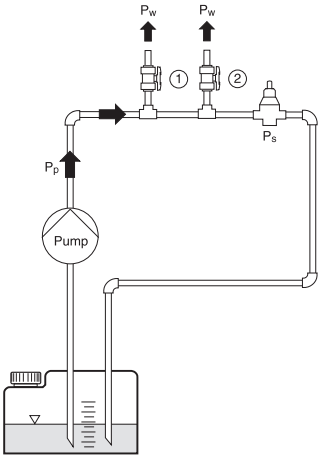
Constant System Pressure



$P_p \geq P_w$
$P_p \geq P_s$ → valve opens
$P_p \leq P_s$ → valve closed

P_w = Working Pressure
P_p = Pump Pressure
P_s = Set Pressure

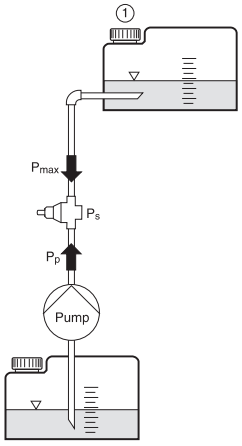
Consumer 1 and/or 2 Open, Valve Closes



$P_p \geq P_s$ → valve opens
$P_p \leq P_s$ → valve closed

Non-Return Valve

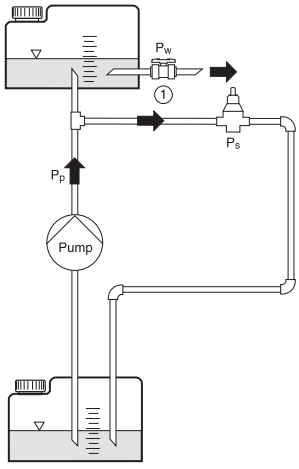
Container 1 is located above the pump



$P_s \geq P_{max}$
$P_p \geq P_s$ → valve opens
$P_p \leq P_s$ → valve closed

Overflow Valve

Pressure of container or application system should not exceed the maximum pressure value



$P_s \leq P_w$
$P_p \geq P_s$ → valve opens
$P_p \leq P_s$ → valve closed

SB12 Series Back Pressure/Relief Valves 1/2" to 2"

working pressure vs. flow rate

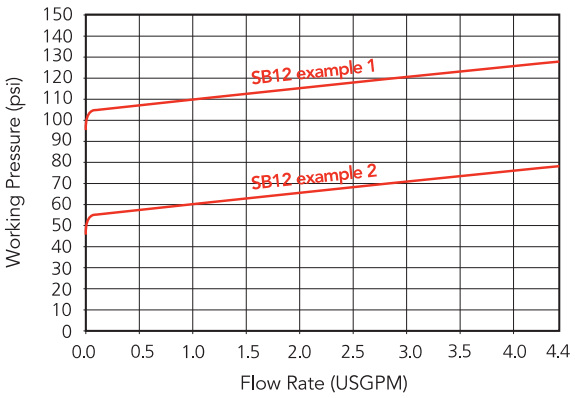
The curves show the relationship between the working pressure and the approximate flow rate through the valve for water at 20°C (68°F) . These values will vary depending on:

- The configuration of the piping and the pressure losses associated with it
- The fluid if not water at 20°C (68°F)
- Whether the pressure is rising or falling, hysteresis is approximately 4 psi for 1/2" to 2" valves. For valves 2-1/2" to 4", hysteresis is approximately 14.5 psi.

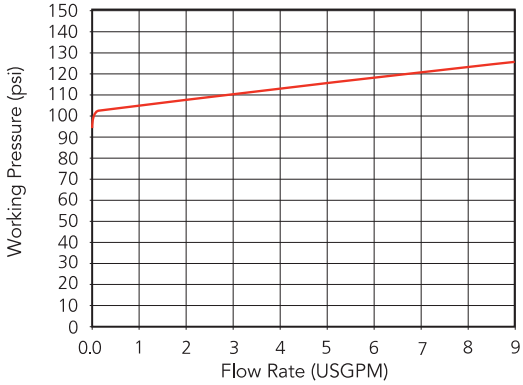
operation examples

1. The valve is set closed at 100 psi. At a pressure increase of 10 psi, a flow of approximately 1.0 USGPM will be reached.
   - set pressure = 100 psi
   - working pressure = 110 psi
   - opening pressure = approximately 104 psi
2. The valve is set closed at 50 psi. At a pressure increase of 10 psi, a flow of approximately 1.0 USGPM will be reached.
   - set pressure = 50 psi
   - working pressure = 60 psi
   - opening pressure = approximately 54 psi

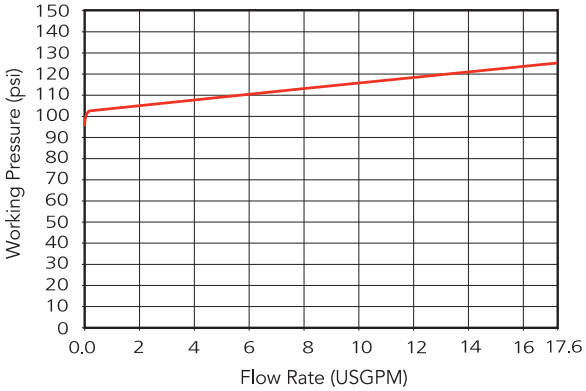
3/8" Valves



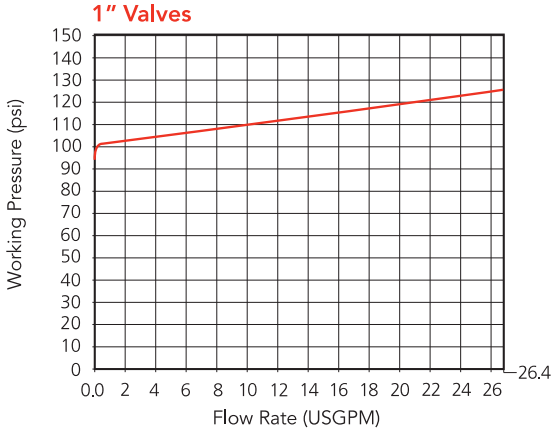
1/2" Valves



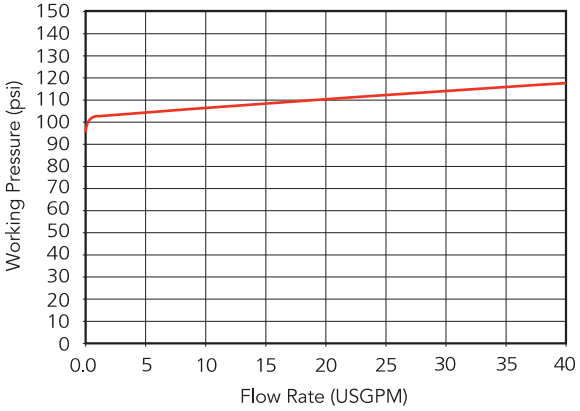
3/4" Valves



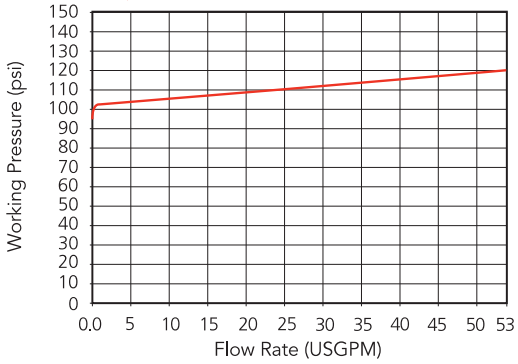
1" Valves



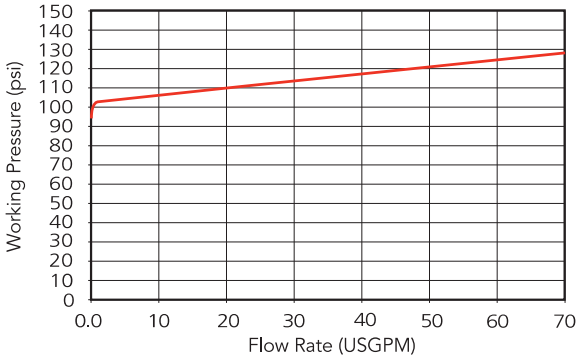
1-1/4" Valves



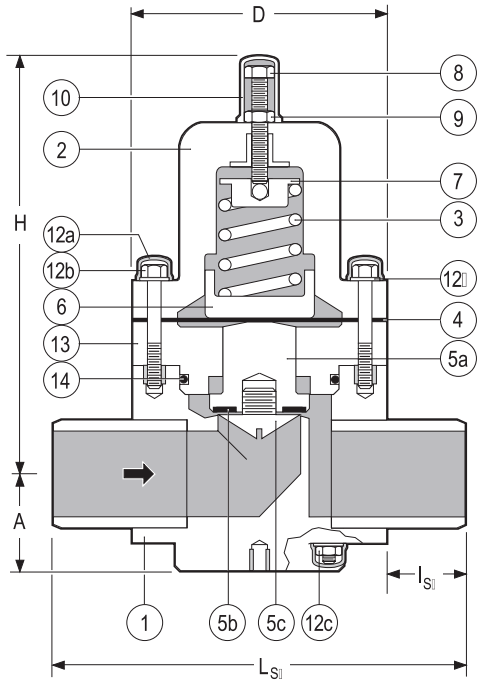
1-1/2" Valves



2" Valves



SB12 Series Back Pressure/Relief Valves 2-1/2" to 4"



Spigot Body

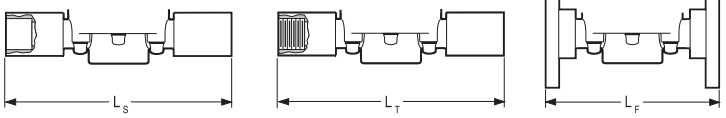
PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
1	Body	1	PVC, PP, PVDF
2	Bonnet	1	PPG
3	Spring	1	Galvanized Steel
4▲	Control Diaphragm	1	PTFE bonded EPDM
5a▲	Piston	2	PVC, PP, PVDF
5b▲	Seat	1	EPDM, FPM(Viton®)
5c▲	Seat Retainer	1	PVC, PP, PVDF
6	Lower Spring Retainer	1	PPG
7	Upper Spring Retauner	1	304 SS
8	Spring Tensioning Bolt	1	304 SS
9	Lock Nut	1	304 SS
10	Spring Bolt Cap	1	PE
12a	Hex Bolt/Nut Cap	20	PE
12b	Hex Bolt/Stud	12[1]	304 SS
12c	Hex Nut	20	304 SS
12d	Washer	20	304 SS
13	Spacer Disc	1	PVC, PP, PVDF
14	Spacer O ring	1	EPDM, FPM(Viton®)

[1] 2 large upper bolts, 2 shorter lower bolts, 8 studs

OTHER ENDS



Socket Threaded Flanged

ChemFlare™ Ends
- For connection to PFA tube. Leak-free connections for difficult services such as sodium hypochlorite

DIMENSIONS INCHES

WEIGHTS LB.

Cv VALUES

Size	PVC, PP & PVDF A	D	H	L_{SP}[2]	I_{SP}	PVC L_F	PVC	PP	PVDF	USGPM Flow at 1 psi △P
2-1/2"	2.7	6.9	11.1	11.2	2.1	12.2	20.9	15.4	24.6	41
3"	3.0	7.9	12.2	14.2	3.1	15.0	26.4	23.8	30.8	63
4"	3.7	9.8	14.2	16.5	3.3	16.9	33.0	26.4	37.4	98

[2] Plain spigot ends in PP & PVDF may be butt fused directly to Chemline PP & PVDF piping systems. Weights based on spigot bodies.

MAXIMUM PRESSURES PSI

Size	PVC 20°C 68°F	30°C 86°F	40°C 104°F	50°C 122°F	PP 20°C 68°F	30°C 86°F	40°C 104°F	50°C 122°F	60°C 140°F	70°C 158°F	PVDF 30°C 86°F	50°C 122°F	70°C 158°F	80°C 176°F	90°C 194°F	100°C 212°F
2-1/2"–4"	150	90	44	15	150	116	90	60	37.5	15	150	90	55	40	30	15

Temperature Ranges: PVC 0 to 50°C (32 to 122°F), **PP** 10 to 70°C (50 to 158°F), **PVDF** –30 to 100°C (–22 to 212°F).

ORDERING EXAMPLE

Chemline Back Pressure/ Relief Valves	SB12	A	005	V	U
Body Material	**A** – PVC	**B** – PP	**K** – PVDF		
Size	**003** – 3/8" **010** – 1" **020** – 2"	**005** – 1/2" **012** – 1-1/4" **025** – 2-1/2"	**007** – 3/4" **015** – 1-1/2" **030** – 3"	**040** – 4"		
Elastomers	**E** – EPDM	**V** – FPM (Viton®)				
Ends	**S** – Socket **CFx** – ChemFlare™	**T** – Threaded	**F** – Flanged **Blank** – Spigot (Butt)	**U** – Union Socket		

Example: Chemline SB 12 Series, PVC, 1/2" diameter, FPM (Viton®) seals, Union socket ends.
x = 4 for 1/4", **6** for 3/8", **8** for 1/2", **12** for 1" ID tube connections.

OPTIONS

- 4 to 60 psi Pressure Range springs for 2-1/2" to 4" valves
- **Integral Pressure Gauge** – for inlet and/or outlet
- Bodies in 316 Stainless Steel and PTFE

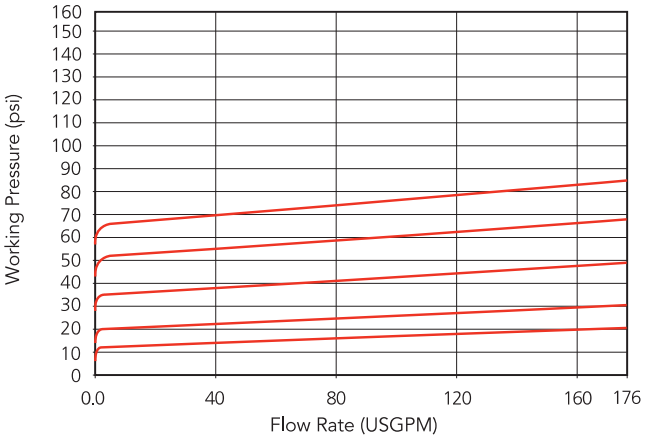
Optional Pressure Gauge
- For inlet and/or outlet

SB12 Series Back Pressure/Relief Valves 2-1/2" to 4"

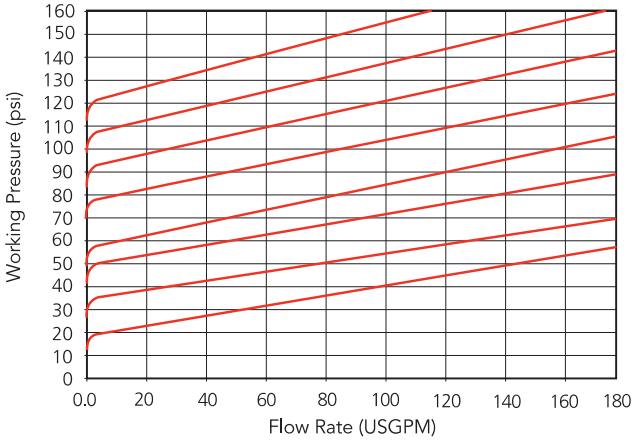
working pressure vs. flow rate

• Whether the pressure is rising or falling, hysteresis is approximately 14.5 psi for 2-1/2" to 4" valves

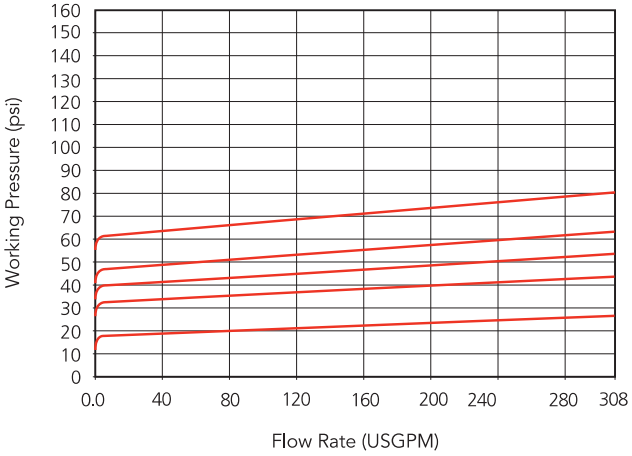
2-1/2" Valves / 4 to 60 psi set pressure range



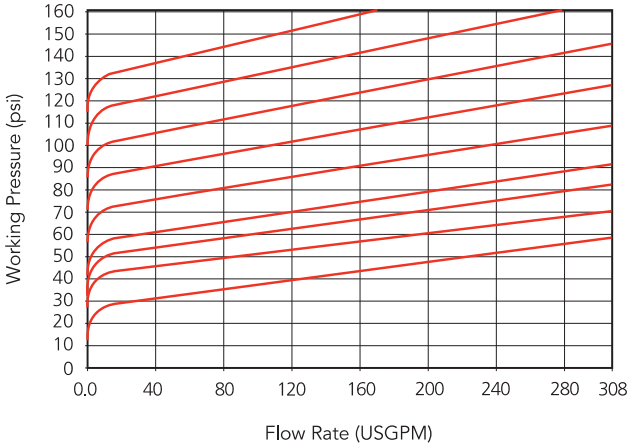
2-1/2" Valves / 7.5 to 150 psi set pressure range



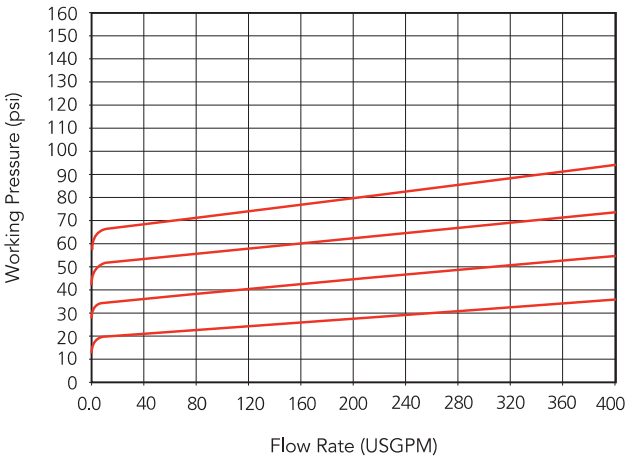
3" Valves / 4 to 60 psi set pressure range



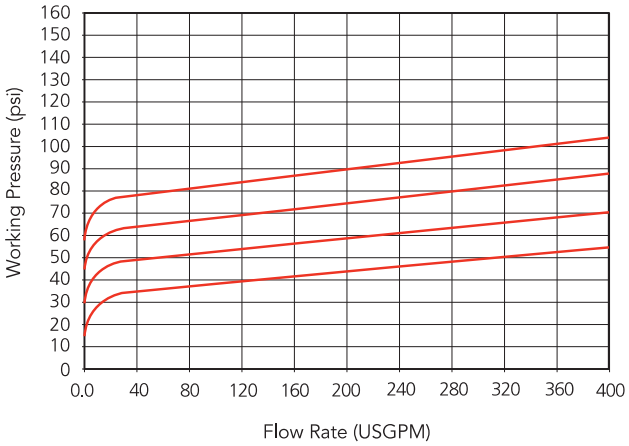
3" Valves / 7.5 to 150 psi set pressure range



4" Valves / 4 to 60 psi set pressure range



4" Valves / 7.5 to 90 psi set pressure range



CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

55 Guardsman Road, Thornhill, ON, L3T 6L2, Canada | ISO 9001:2008 Certified
tel.905.889.7890 | fax.905.889.8553 | request@chemline.com | chemline.com

PDF Published June 23, 2014

Gauge Isolators

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

PVC PP PVDF

CRN Registered Consult Chemline

NSF[4] Certified to NSF/ANSI 61

SERIES: SG

INLET CONNECTION: 1/4" or 1/2" Threaded[1]

INSTRUMENT CONNECTION: 1/4" or 1/2" Threaded

DIAPHRAGM: PTFE

[1] Other available inlet connections are 1/2" socket or 1/2" to 1" flanged.
[2] Other fluids are available for special applications such as chlorine service.
[3] Glass reinforced polypropylene.
[4] PVC isolators are certified under NSF/ANSI Standard 61 for contact with drinking water.

Chemline SG Series Gauge Isolators allow inexpensive pressure gauges, or any other pressure instrument to be used in corrosive services. The upper chamber (gauge side) is filled with a stable fluid such as glycol or glycerine[2]. A diaphragm separates it from the lower chamber which receives the media under pressure.

The 1/2" gauge connection allows use of the popular 4" and 4-1/2" diameter gauges. Pressure switches or transmitters may also be installed. Customers can easily fill isolators and install their own gauges.

features

Easy to Mount Gauges

- It is easy to fill an isolator and field mount a gauge. No special equipment is required.
- Will accept popular 4" and 4-1/2" diameter gauges

Provision for Fill Port

- Housing may be drilled and tapped by Chemline or customer for a threaded fill port. This is used for filling isolator using a vacuum filling station

High Chemical Resistance

- Choice of body materials for a wide range of applications
- PTFE bonded EPDM dished diaphragm for high chemical resistance and sensitivity

Heavy Duty Design for Safety

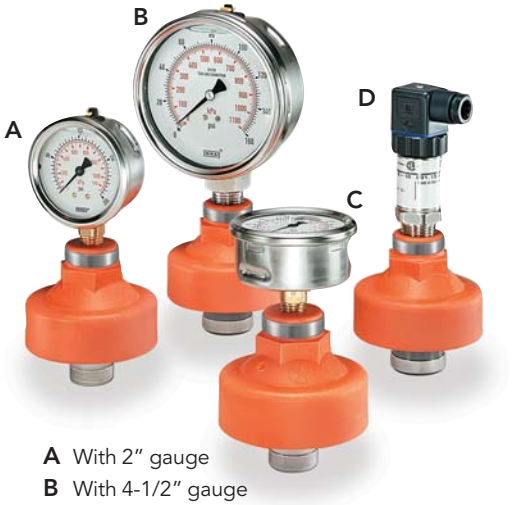
- PPG[3] top chamber
- Heavy wall connection ports

CRN Registration number by province

- Ontario: OH16085.5

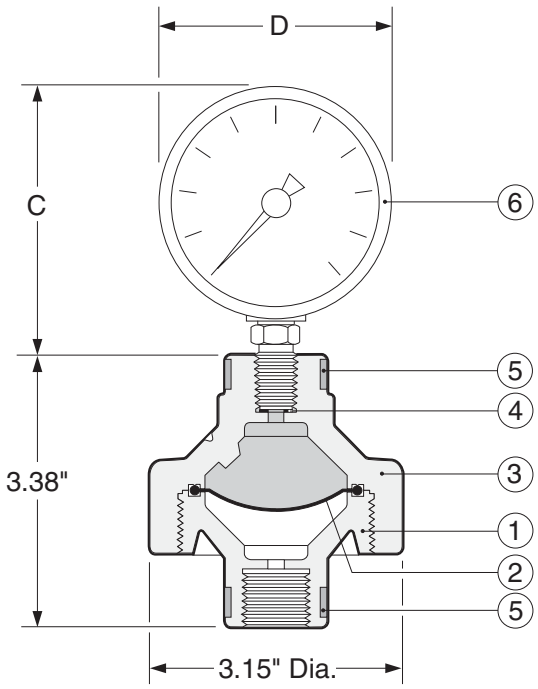
Optional Gauges

- Isolators are available alone or with gauge mounted and prefilled with glycol[2]



A With 2" gauge
B With 4-1/2" gauge
C With 2" back mount gauge
D With pressure transmitter

Gauge Isolators



PARTS

No.	Part	Pcs.	Materials
1	Body	1	PVC, PP, PVDF
2	Diaphragm	1	PTFE
3	Bonnet	1	PPG[1]
4	Gasket	1	EPDM
5	Stainless Steel Bands	2	304 SS
6	Optional Gauge	1	See below

[1]PPG = Glass reinforced polypropylene

OPTIONAL GAUGES

- Chemline offers the gauges listed below mounted to isolator and prefilled with glycol, glycerine or special fluid for chlorine applications. These gauges have dials and cases filled with either glycol (standard), glycerine or silicon for corrosion resistance and dampening.
- Chemline SG gauge isolators are not recommended for vacuum applications. They will not affect the gauge accuracy as low as approximately 3 psi. The accuracy depends on the process conditions and the gauge installed on it.

OTHER OPTIONS

- **Flanged** inlet connections
- **Threaded Fill Port** – drilled, tapped and plugged
- Chemline will mount any pressure instrument supplied free issue by customer

DIMENSIONS (Gauge Isolator with optional gauge installed) INCHES

Optional Gauge Ordering No.	Gauge Diameter	Gauge Connection	Housing	Bourdon Tube	Window	Accuracy	Dimensions C	Dimensions D(max.)
P025-xx	2-1/2"	1/4"	316 SS	Brass	Polycarbonate	±1.5% of span	3.1	2.5
P025-xx-SS	2-1/2"	1/4"	316 SS	316 SS	Polycarbonate	±1.5% of span	3.1	2.5
P025-xx-SS/BM	2-1/2" Back Mount	1/4"	316 SS	316 SS	Polycarbonate	±1.5% of span	1.6	2.5
P025-xx-BM	2-1/2" Back Mount	1/4"	316 SS	Brass	Polycarbonate	±1.5% of span	1.6	2.5
P040-xx-SS	4"	1/2"	316 SS	316 SS	Safety Glass	±1% of span	4.5	4.0
P045-xx-SS	4-1/2"	1/2"	PBTP Plastic[2]	316 SS	Acrylic	±0.5% of span	6.3	5.8

xx denotes the maximum gauge pressure i.e., 30, 60, 100, 160 or 200 psi. See data page for recommended working pressures.
[2] PBTP = glass filled polyester.

WORKING PRESSURES PSI

WEIGHTS

Material	10 – 20°C 50 – 68°F	30°C 86°F	40°C 104°F	50°C 122°F	60°C 140°F	70°C 158°F	80°C 176°F	90°C 194°F	100°C 212°F	120°C 248°F	Net Weights Pounds[3]
PVC	150	100	80	45	15	–	–	–	–	–	1.0
PP	150	125	100	80	65	45	–	–	–	–	0.7
PVDF	150	150	150	125	105	85	70	60	45	30	1.3

Temperature Ranges: PVC 0 to 60°C (32 to 140°F), **PP** 10 to 80°C (50 to 176°F), **PVDF** –30 to 120°C (–22 to 248°F).
NR = Not Recommended. [3] Weights are for unfilled 1/2" x 1/2" isolators without gauges. 1/2" x 1/4" isolators are 20% lighter.

ORDERING EXAMPLE

Chemline Gauge Isolators SG		A	005-	002	P	G
Body Material	**A** – PVC	**B** – PP	**K** – PVDF			
Inlet Size	**002** – 1/4"	**005** – 1/2"(Standard)				
Instrument Connection	**002** – 1/4"	**005** – 1/2"				
Diaphragm	**P** – PTFE bonded EPDM					
Filling & Mounting	**G** –Add only if isolator is supplied filled with glycol and gauge or pressure instrument is mounted by Chemline. Separate gauge item numbers are listed above.					

Example: Chemline SG Series Gauge Isolator, PVC, 1/2" x 1/4" FNPT inlet x instrument connections, PTFE diaphragm.

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Project name: AMARUQ

Project#: 5000218009

Document #: SPK_0004_PCH

by: GH

chkd: GP

appvd: CB

SULFURIC ACID DOSING SKID

CALIBRATION CYLINDER

OIM manual section: 4.3.4.5

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CS-500-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
PRIMARY FLUID	TOLBGU316608	CLY9-531	N/A	CALIBRATION CYLINDER	CALIBRATION CYLINDER/MANUFACTURER: PRIMARY FLUID/MODEL: ACS-2-250-GKV-F	N/A	N/A	SULFURIC ACID DOSING SKID		

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ACCUDRAW® Calibration Cylinders

Polypropylene

PVC

Glass

- PVC with removable "O" ring sealed top for easy cleaning

- yellow polypropylene level indicator float for high visibility

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

- translucent
- chemical resistant
- break resistant
- threaded, socket or flanged
- colored graduations and lettering
- PVC has dual scale USGPH & ml
- PVC sizes 100 - 20000 ml
- POLY sizes 100 - 4000 ml
- POLY meets ISO standards
- Glass sizes 100 - 20000 ml
- custom designs available

For detailed product information visit our website: primaryfluid.com

PRIMARY FLUID SYSTEMS INC.
Call Toll Free 1-800-776-6580
Tel (905) 333-8743 Fax (905) 333-8746
E-Mail: primary@primaryfluid.com
www.primaryfluid.com

ACCUDRAW® Calibration Cylinders

"For Accuracy That Counts"

For complete product information visit our website: primaryfluid.com

Flanged: Glass, PVC

Flanged: PVC

PV#4

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)
ACS = Glass*

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 # AC #1 - 1000 B

Type:
AC = Polypropylene
PV = PVC
ACS = Glass

Style:
1 = Bottom threaded conn. only
2 = Top and Bottom threaded conn.
3 = Bottom threaded conn. c/w removable vented dust cap
4 = Top/Bottom threaded conn. c/w removable "O" ring sealed top and float ring level indicator
**** Glass calibration cylinders available in Style 2 only***

Graduation Scale:
PP - ml only
PVC - ml and GPH
Glass - ml only

Std. connection is NPT thread
Optional: add suffix as follows
S = Socket weld connection (PVC only)
GTV = Glass/TFE construction
GKV = Glass/PVDF construction
GCV = Glass/CPVC construction
GSV = Glass/SS construction
B = BSP Thread
F = Flanged

Substitute **E** for **V** for **EPDM** wetted "O" ring seal

Sizes:		**Material**
100 =	100 ml (1.6 GPH)	PP, PVC, Glass
250 =	250 ml (4 GPH)	PP, PVC, Glass
500 =	500 ml (8 GPH)	PP, PVC, Glass
1000 =	1000 ml (16 GPH)	PP, PVC, Glass
2000 =	2000 ml (32 GPH)	PP, PVC, Glass
4000 =	4000 ml (64 GPH)	PP, PVC, Glass
6000 =	6000 ml	Glass only
8000 =	8000 ml	Glass only
10000 =	10000 ml (160 GPH)	PVC, Glass
20000 =	20000 ml (320 GPH)	PVC, Glass

Custom sizes and materials available.

ACCUDRAW® Calibration Cylinders

ACCUDRAW® Glass Calibration Cylinders ***are ideal for the calibration of metering pumps, batch systems and for handling hazardous chemicals.***

- **volumes calibrated in ml**
- **construction materials available include TFE, PVDF, CPVC and 316 stainless steel**
- **sealing "O" rings are Viton and Buna N**
- **outer shield of acrylic construction**
- **port connections in NPT, metric or flanged**
- **standard sizes 100 - 20,000 ml**
- **custom designs available to your specifications**

Sizing and Ordering Information: Glass Construction

Size	Conn.	Model # For TFE End Flgs	Model # For 316 S/S End Flgs	Model # For PVDF End Flgs	Model # For CPVC End Flgs
100 ml	1/2" NPT	ACS#2-100-GTV	ACS#2-100-GSV	ACS#2-100-GKV	ACS#2-100-GCV
250 ml	1/2" NPT	ACS#2-250-GTV	ACS#2-250-GSV	ACS#2-250-GKV	ACS#2-250-GCV
500 ml	1/2" NPT	ACS#2-500-GTV	ACS#2-500-GSV	ACS#2-500-GKV	ACS#2-500-GCV
1000 ml	1/2" NPT	ACS#2-1000-GTV	ACS#2-1000-GSV	ACS#2-1000-GKV	ACS#2-1000-GCV
2000 ml	1 " NPT	ACS#2-2000-GTV	ACS#2-2000-GSV	ACS#2-2000-GKV	ACS#2-2000-GCV
4000 ml	1" NPT	ACS#2-4000-GTV	ACS#2-4000-GSV	ACS#2-4000-GKV	ACS#2-4000-GCV
6000 ml	1" NPT	ACS#2-6000-GTV	ACS#2-6000-GSV	ACS#2-6000-GKV	ACS#2-6000-GCV
8000 ml	2" NPT	ACS#2-8000-GTV	ACS#2-8000-GSV	ACS#2-8000-GKV	ACS#2-8000-GCV
10000 ml	2" NPT	ACS#2-10000-GTV	ACS#2-10000-GSV	ACS#2-10000-GKV	ACS#2-10000-GCV
20000 ml	2" NPT	ACS#2-20000-GTV	ACS#2-20000-GSV	ACS#2-20000-GKV	ACS#2-20000-GCV

Cylinders are bolted together using stainless steel rods with Viton "O" rings for the glass seal and Buna N "O" rings for the acrylic seal. For EPDM "O" rings, subsititute "E" for "V".

Options available: (may affect price and delivery)

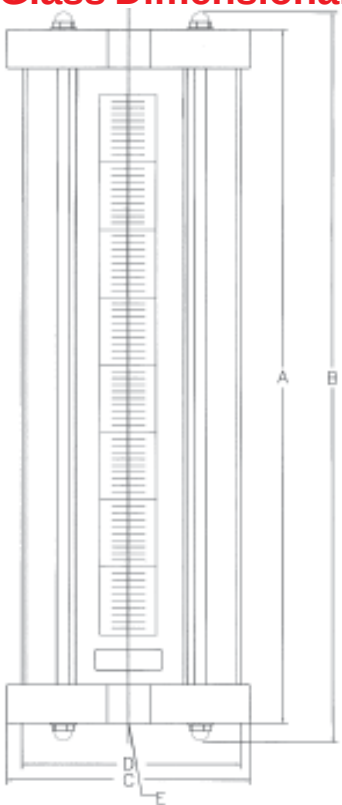
- **different type or size of thread connection, different "O" ring material, different flange material**

Descriptions:

TFE, PVDF and CPVC End Flanges:
Glass cylinder with acrylic outer shield and 3/4" thick (TFE, PVDF or CPVC) end flanges

316 S/S End Flanges:
Glass cylinder with acrylic outer shield and 1/2" thick 316 Stainless Steel end flanges

Glass Dimensional Information



Note: Cylinders are <u>not</u> pressure vessels.

Dimensions subject to change without notice.

Glass cylinders with TFE, PVDF or CPVC End Flanges

Size ml	DIV ml	A inches	B inches	C inches	D inches	E thread
100	1.00	10.00	11.00	3.00	2.50	1/2" FNPT
250	2.00	12.75	13.50	3.50	3.00	1/2" FNPT
500	5.00	14.50	15.50	4.00	3.50	1/2" FNPT
1000	10.00	16.75	17.75	4.75	4.25	1/2" FNPT
2000	20.00	18.75	19.75	5.50	5.00	1" FNPT
4000	25.00	22.50	23.50	6.50	6.00	1" FNPT
6000	50.00	20.13	21.16	8.00	7.50	1" FNPT
8000	50.00	24.63	25.66	8.00	7.50	2" FNPT
10000	50.00	30.13	31.16	8.00	7.50	2" FNPT
20000	200.00	43.25	44.25	9.00	8.50	2" FNPT

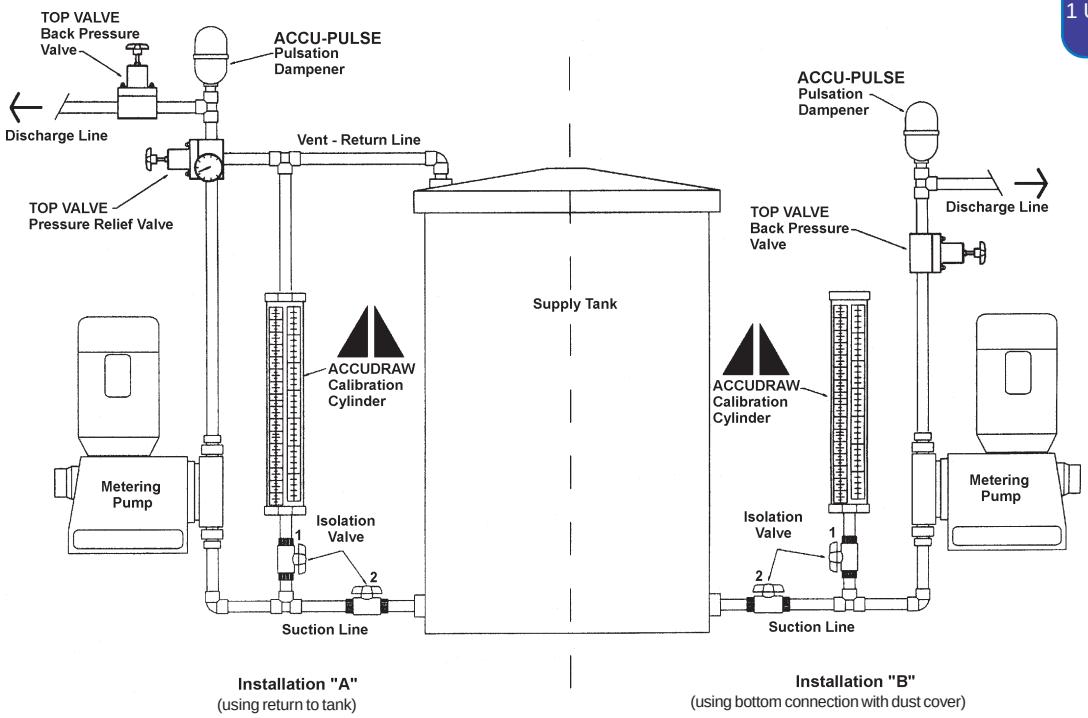
Glass cylinders with 316 Stainless Steel End Flanges

Size ml	DIV ml	A inches	B inches	C inches	D inches	E thread
100	1.00	9.50	10.50	3.00	2.50	1/2" FNPT
250	2.00	12.25	13.00	3.50	3.00	1/2" FNPT
500	5.00	14.00	15.00	4.00	3.50	1/2" FNPT
1000	10.00	16.25	17.25	4.75	4.25	1/2" FNPT
2000	20.00	18.25	19.25	5.50	5.00	1" FNPT
4000	25.00	22.00	23.00	6.50	6.00	1" FNPT
6000	50.00	19.63	20.66	8.00	7.50	1" FNPT
8000	50.00	24.13	25.16	8.00	7.50	2" FNPT
10000	50.00	29.63	30.66	8.00	7.50	2" FNPT
20000	200.00	42.75	43.75	9.00	8.50	2" FNPT

ACCUDRAW® Calibration Cylinders

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



Installation "A"
(using return to tank)

Installation "B"
(using bottom connection with dust cover)

Other available products at www.primaryfluid.com

TOP VALVE Back Pressure/Pressure Relief

- *long life diaphragm*
- *range of 15 - 350 PSIG*
- *air release, optional gauge port*
- *PVC, CPVC, PVDF, Teflon, polypropylene, stainless, Alloy 20 and Hastelloy C*
- *7 sizes 1/4" - 2" NPT*
- *color coded handles indicate size*
- *higher pressure & temperature available*

PFS Corporation Stops

Designed to inject chemical into the center stream of process.

- *isolation valve allows for ease of maintenance*
- *available in 6 materials of construction*
- *wetted components have comparable or greater chemical resistance than quill construction material*
- *standard and custom lengths available*
- *connection in NPT, metric or flanged*

Custom built in other sizes & materials.

ACCUPULSE Pulsation Dampeners

Designed to remove pulsatingflows from positive displacement pumps.

- *increase system efficiency and pump life; decrease maintenance and costs*
- *protect pipes, meters, valves and instrumentation from pulsation and vibration*
- *ensure meter accuracy, longevity and repeatability*
- *prevent foaming and splashing*
- *extensive range of materials and sizes with lightweight, compact design*

Distributed By:

PRIMARY FLUID SYSTEMS INC.

Call Toll Free 1-800-776-6580
Tel: (905) 333-8743
Fax: (905) 333-8746

Distribution Territories Available

E:Mail: primary@primaryfluid.com
www.primaryfluid.com

Project name: AMARUQ

Project#: 5000218009

Document #: SPK_0004_PCH

by: GH

chkd: GP

appvd: CB

SULFURIC ACID DOSING SKID

PULSATION DAMPENER

OIM manual section: 4.3.4.6

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CS-501-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
PRIMARY FLUID	PUSPPD203070	PD9-531	N/A	PULSATION DAMPENER	PULSATION DAMPENER/MANUF.: ACCU-PULSE// MODEL: API-PVDF-V-1-F	Vol.: 10 in3/Body Mtl: PVDF/Bellows Mtl: Viton/Size: 1/2" FLANGED	N/A	SULFURIC ACID DOSING SKID		

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ACCU-PULSE
Pulsation Dampeners

ACCU-PULSE Pulsation Dampeners have been developed to remove pulsating flows from positive displacement pumps providing:

- increased system efficiency and pump life
- protection of pipes, meters, valves and instrumentation from pulsation and vibration
- meter accuracy, longevity and repeatability
- prevention of foaming and splashing
- decreased maintenance and costs

Standard Features Include:

- lightweight, compact design
- extensive range of materials and sizes
- easy in-line maintenance
- 2 year warranty

For detailed product information visit our website: primaryfluid.com

PRIMARY FLUID SYSTEMS INC.

Call Toll Free 1-800-776-6580
Tel (905) 333-8743 Fax (905) 333-8746

E-Mail: primary@primary fluid.com
www.primaryfluid.com

ACCU-PULSE Pulsation Dampeners

Dampener Sizing Guide

Note: Separate sizing guide available for air operated double diaphragm pumps.

Standard Simplex Metering Pumps:

The following are general ranges for sizing ACCU-Pulse Pulsation dampeners for metering pump applications. Models stated are based on 10% pressure fluctuations and a Simplex single acting metering pump. For 5% pressure fluctuation, divide the Capacity per Stroke Range numbers in the chart below by 2.

To calculate cubic inches per stroke: $\frac{\text{gallons per minute}}{\text{strokes per minute}}$ = gallons per stroke

Gallons per stroke X 231 cu inches per gallon = cubic inch per stroke

Example: $\frac{.15}{100}$ = .0015 GPS **Therefore:** .0015 X 231 = 0.3465 Cubic inches per stroke = API Dome Top Dampener

Capacity per Stroke Range	ACCU-Pulse Dampener
0 to 0.22 Cubic Inches	API F Flat Top
0.23 to 0.75 Cubic Inches	API Dome Top
0.76 to 2.71 Cubic Inches	API IIF Flat Top
2.72 to 6.40 Cubic Inches	API II Dome Top
6.41 to 12.96 Cubic Inches	API IIIF Flat Top
12.97 to 27.89 Cubic Inches	API III Dome Top

Note:
For other pump factors, or residual pulsation, contact factory.

Ordering Information

Example: Part # AP - I - PVC - E - 1 - F

ACCU-PULSE
- AP = Standard 150/300 PSIG
- APH = High Pressure 1000/600 PSIG
- APX = High Pressure 4000 PSIG

Series
- I = 10 cu in capacity
- IF = 4 cu in capacity
- II = 85 cu in capacity
- IIF = 36 cu in capacity
- III = 370 cu in capacity
- IIIF = 175 cu in capacity
- IV = 1155 cu in capacity (AP only)
- 8 = 8 cu in capacity (APX only)
- 12 = 12 cu in capacity (APX only)
- 16 = 16 cu in capacity (APX only)
- 24 = 24 cu in capacity (APX only)

Body Material
- PP = Polypropylene
- PVC = Polyvinylchoride (not available in Series IV)
- PVDF = Polyvinylidene Fluoride
- S/S = 316L Stainless Steel
- ALL20 = Alloy 20 (not available in Series IV)
- HAST = Hastelloy C
- CS = Carbon Steel
- CPVC = Chlorinated Polyvinyl Chloride*

* (available in Series I only)

Optional Flanges
Add suffix -F for flanges

Size
- 0 = 3/8" npt(f) series I Std Metal
- 1 = 1/2" npt(f) series I Std Plastic
- 2 = 3/4" npt(f) series II Std All
- 3 = 1" npt(f) series II (Optional)
- 4 = 2" npt(f) series III
- 5 = 3" flanged series IV
- 6 = 4" flanged series IV

Bellows material
- N = Neoprene
- B = Buna-N
- H = Hypalon
- E = EPDM (Nordel)
- V = Viton
- T = Teflon
- S = Santoprene
- P = Polyvinylchloride

APX Series available ONLY with:
Body: 316L Stainless Steel
Size: 1/2" npt(f)
Bellows: Buna-N, EPDM & Viton

Note:
CRN certification available.
Food grade material available.
Other sizes and materials available.
Please contact factory.

For detailed product information visit our website: primaryfluid.com

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Fax: (905) 333-8746
E:Mail: primary@primaryfluid.com
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Distribution Territories Available

4 – DETAILED TECHNICAL DOCUMENTATION

4.3 – SHOP DRAWINGS

4.3.5 – POLYMER PREPARATION SYSTEM – HYDRA-POL 3500

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Project name:	AMARUQ
Project#:	5000218009
Document #:	SPK_0005_HYDP
by:	GH
chkd:	GP
appvd:	CB

SUBMITTAL PACKAGE

HYDRAPOL 3500

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Project name:	AMARUQ
Project#:	5000218009
Document #:	SPK_0005_HYDP
by:	GH
chkd:	GP
appvd:	CB

HYDRAPOL 3500

PROCESS DATASHEET

OIM manual section: 4.3.5.1

REFER TO 5000218009_PSDS_0005_HYDP_VWT

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Project name:	AMARUQ
Project#:	5000218009
Document #:	SPK_0005_HYDP
by:	GH
chkd:	GP
appvd:	CB

HYDRAPOL 3500

GENERAL ARRANGEMENT DRAWING

OIM manual section: 4.3.5.2

REFER TO 5000218009_GA_0005_HYDP_VWT

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Project name:	AMARUQ
Project#:	5000218009
Document #:	SPK_0005_HYDP
by:	GH
chkd:	GP
appvd:	CB

HYDRAPOL 3500

SUPPLIER TECHNICAL DATASHEETS

OIM manual section: 4.3.5.3

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CS-301-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VABLPV200253	V18-031	DIA: 38 mm (1-1/2")	ISOLATION VALVE - DRIVING WATER	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-015-E-S//CONNECTION TYPE : FLANGED | N/A//BODY : PVC (ASTM D1784)// SEAL | SEAT :PTFE | EPDM// STEM : PVC			HYDRAPOL 3500		

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PDF Published March 1, 2013

Type 21 Ball Valves

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

The Chemline Type 21 True Union Ball valve incorporates state of the art features for long term performance. This is a full port, full blocking True Union valve pressure rated at 16 bar (230 psi)[4]. Double stem o-rings and Safety Shear stem design provide for a high degree of safety on hazardous fluid applications. All sizes have an ISO standard actuator mounting platform integral to the valve body. This provides for sturdy and secure mounting of pneumatic or electric actuators.

PVC | CPVC | PP | PVDF

CRN Registered Consult Chemline

NSF[5] Certified to NSF/ANSI 61

SERIES: Type 21

SIZES: 3/8" – 4"

ENDS: Socket, Threaded, Flanged, Butt[1] or ChemFlare™

SEATS: PTFE

SEALS[2]: EPDM, FKM (Viton®), CPE[3]

features

Pressure rated to 230 psi[4]
- 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

Safety Shear Stem Design
- Stem has double o-rings
- Designed to hold full pressure even if stem breaks due to excessive torque

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.

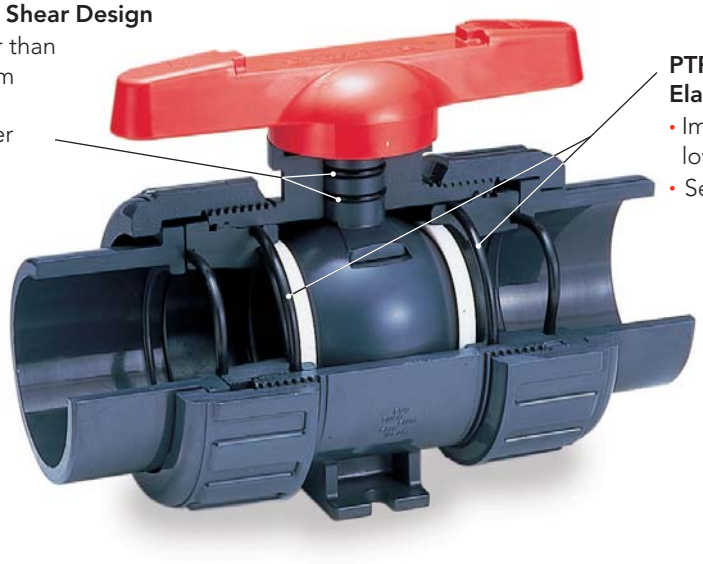
[1] Butt ends for fusion to Chemline metric PP, PVDF or ECTFE (Halar®) piping.
[2] Other materials are available.
[3] CPE=Chlorinated Polyethylene.
[4] PVC, CPVC and PVDF 1/2" to 2" are rated at 230 psi; 2-1/2" to 4" and all size PP valves are rated at 150 psi at 20°C.
[5] PVC valves with EPDM or FKM (Viton®) seals are certified under NSF/ANSI Standard 61 for contact with drinking water.

Type 21 Ball Valves

features

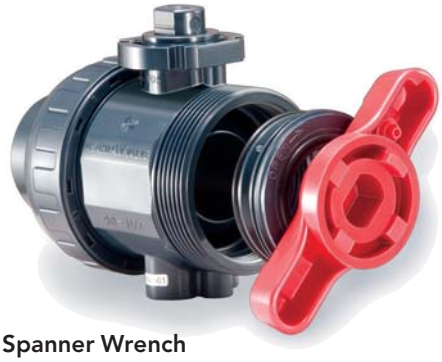
Double Stem O-Rings – Safety Shear Design

- 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.



PTFE Seats have Elastomer Cushions

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



Built in Spanner Wrench

- For removing or tightening the seat carrier
- All parts are replaceable

Integral Actuator Mounting Platform

- Actuation is easy. Electric or pneumatic actuators may be mounted in the field. Simply pull off the handle to reveal a standard ISO 5211 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.

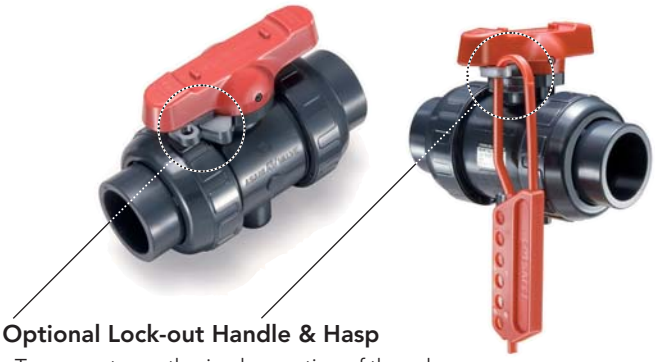
Base Mounting Pad

- Optional threaded inserts allow valves to be securely anchored
- Supplied standard with actuated valves

options + accessories

ChemFlare™ Ends

- For connection to PFA tube. Leak-free connections for difficult services such as sodium hypochlorite



Optional Lock-out Handle & Hasp

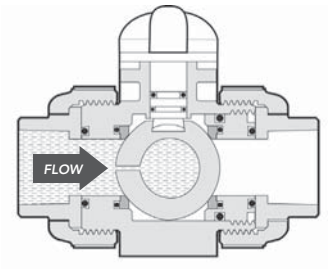
- To prevent unauthorized operation of the valve
- Used during maintenance shut-downs

One-piece moulded PVC and CPVC 6" socket ends

- Allows installation of 4" valve in 6" line
- Factory moulded, not fabricated with couplings and reducers cemented together
- Fixed to valve mechanically just like the one-piece moulded factory flanges

Different Colour Handles

- Choose a handle colour other than standard red for colour coding different services



Vented Ball

- For sodium hypochlorite services at any concentration
- Valve shown in closed position

electric + pneumatic actuation

Pneumatic and Electric Actuators

- A complete range of actuators and control accessories are available, mounted to valves using PPG plastic brackets and stainless steel couplings. Refer to separate data sheets.

Electromni® Electric

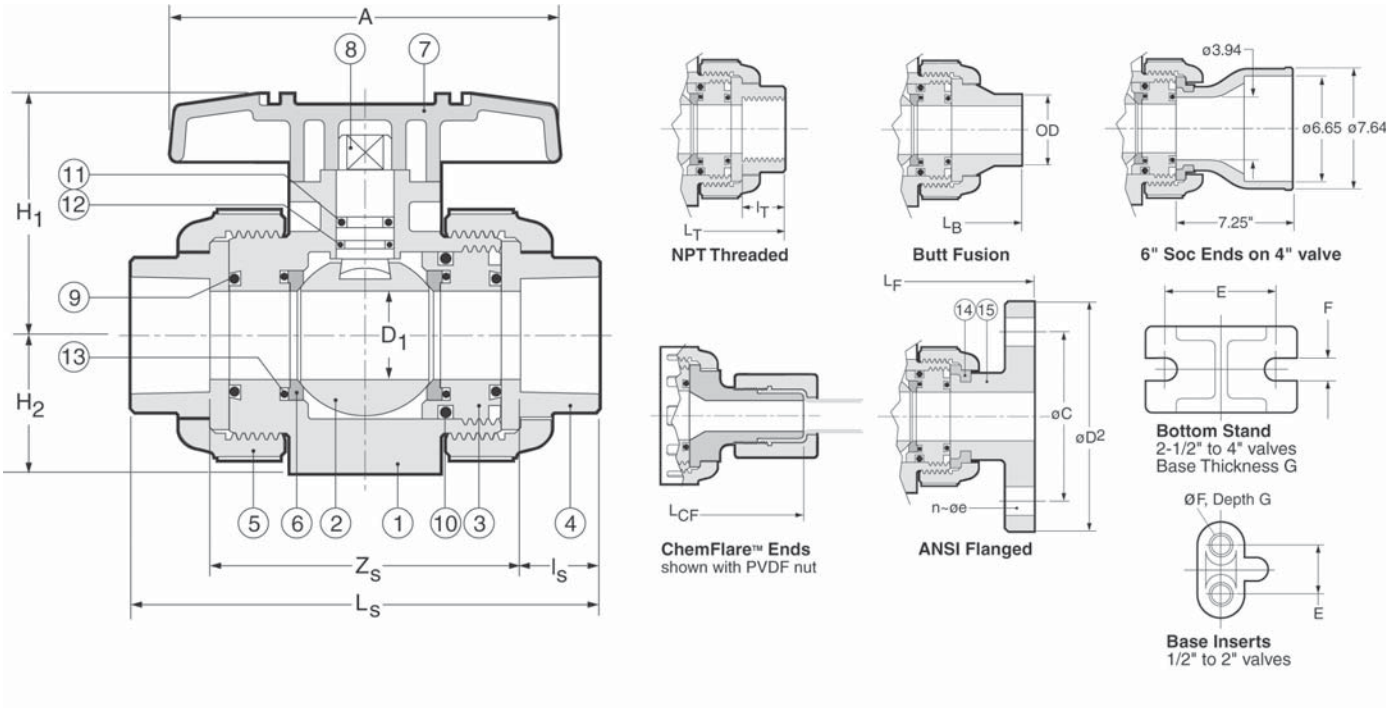
Q Series Electric

A Series Electric

V Series Electric
with Local Control Station

PA Series Pneumatic

Type 21 Ball Valves



PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
1	Body	1	PVC, CPVC, PP, PVDF
2	Ball	1	PVC, CPVC, PP, PVDF
3	Carrier[1]	1/2	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

[1] 1 carrier for sizes 1/2" to 2", 2 carriers for sizes 2-1/2" to 4"
[2] EPDM seals standard with PVC, CPVC, PP; FKM (Viton®) with PVDF valves
[3] 2 pcs 1/2" to 2", 6 pcs 2-1/2" to 4"

PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
8	Stem	1	PVC, CPVC, PP, PVDF
9▲	Face O-Ring[2]	2	EPDM, FKM (Viton®)
10▲	Carrier O-Ring[2]	2	EPDM, FKM (Viton®)
11▲	Upper Thicker Stem O-Ring[2]	1	EPDM, FKM (Viton®)
12▲	Lower Thinner Stem O-Ring[2]	1	EPDM, FKM (Viton®)
13	Seat Cushion[2]	2	EPDM, FKM (Viton®)
14	Flange Retainer[3]	2/6	PVDF
15	Flange	2	PVC, CPVC, PP, PVDF

DIMENSIONS INCHES

					End Connections														Valve Base		
					Socket			Threaded		Factory Flanged					Butt		ChemFlare™				
Size	D Bore	A	H_1	H_2	L_S	Z_S	l_S	l_T	L_T	L_F	D_2	C	n	e	L_B	OD	L_{CF}	Tube[4]	E	F[5]	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	.62	4.88	.79	6.12	1/2"	.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	4	.62	5.67	.98	6.52	3/4"	.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	4	.62	6.06	1.26	7.26	1"	.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	4	.62	6.85	1.57	9.58	1-1/4"	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	4	.62	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	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	4	.75	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	4	.75	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	8	.75	14.76	4.33	–	–	2.56	.43	.32

[4] ChemFlare™ ends are available for reduced tube sizes down to 1/4".
[5] Optional threaded inserts: 1/2" to 1" valves – UNC 1/4"-20; 1-1/4" to 2" valves – UNC 5/16"-18. 'Recoil' brand inserts require drilling before insertion.

Type 21 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 80°C (–4 to 176°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"	0.4	0.4	0.4	0.4	0.9	0.9	0.7	1.1
3/4"	0.7	0.7	0.7	0.9	1.3	1.5	1.1	1.5
1"	0.9	1.1	0.9	1.1	1.8	2.0	1.5	2.2
1-1/4"	1.5	1.5	1.3	1.8	2.6	2.9	2.0	3.3
1-1/2"	2.4	2.6	1.5	2.9	3.7	4.0	2.6	4.4
2"	4.0	4.4	2.6	4.9	5.5	6.0	4.0	8.2
2-1/2"	5.1	5.5	3.7	6.2	7.3	7.7	5.3	8.8
3"	8.2	8.8	5.5	9.9	10.1	11.0	7.5	12.6
4"	19.4	21.8	13.2	24.9	21.6	23.4	15.4	26.7

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

1. All True Union Ball Valves in PVC, CPVC, PP or PVDF shall be 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, FKM (Viton®) or CPE seals. Ball seats shall be PTFE with elastomer cushions for closure with minimum stem torques.
2. All valves will have Safety Shear stem design, blowout-proof with double o-rings for safety. The top o-ring groove shall be deeper so that if the stem breaks off under excessive torque the lower o-ring will remain intact and the valve will hold pressure.
3. All valves shall be full port and two-way blocking design.
4. All valves will be CRN (Canadian Registration Number) registered with TSSA.
5. PVC valves with EPDM or FKM (Viton®) seals shall be certified under NSF/ANSI Standard 61 for contact with drinking water.
6. All valves shall have chemical resistant labels permanently marked with manufacturing number to provide production level traceability.
7. 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).
8. CPVC compound shall have an ASTM cell classification 23567-A with a minimum suffix "A" designation for chemical resistance as per ASTM D-1784.
9. PP material will conform to ASTM D-4101 PP 021 B 67272 material requirements.
10. PVDF material shall be unpigmented conforming to ASTM D-3222 material requirements and to be USDA Title 21 Chapter 1 Part 177. 2510 requirements for contact with food.
11. Socket ends in PVC and CPVC shall be Schedule 80 and conform to ASTM D-2467.
12. Threaded ends shall be Schedule 80 and conform to ASTM D-2464.
13. Butt fusion ends in PP or PVDF will be compatible with Chemline PP or PVDF metric piping systems.
14. Flanged ends shall be ANSI Class 150 one-piece factory moulded (not fabricated) to ensure maximum strength and close tolerance end to end dimensions.

ORDERING EXAMPLE

Chemline True Union Ball Valves	21	A	020	E	S
Body Material	**A** – PVC **B** – PP	**C** – CPVC **K** – PVDF			
Size[1]	**002** – 1/4" **010** – 1" **025** – 2-1/2"	**003** – 3/8" **012** – 1-1/4" **030** – 3"	**005** – 1/2" **015** – 1-1/2" **040** – 4"	**007** – 3/4" **020** – 2" **060** – 6"	
Seals	**E** – EPDM	**V** – FKM (Viton®)	**C** – CPE	**B** – Nitrile	**A** – Aflas®
Ends	**S** – Socket	**T** – Threaded	**F** – Flanged	**B** – Butt[2]	**CF** – ChemFlare™

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

[1] 1/4" is normally the 3/8" valve reduced. 6" is 4" valve with 6" end connections.

[2] PP, PVDF and ECTFE (Halar®) metric butt fusion ends (1/2" to 4") connect to Chemline PP, PVDF and ECTFE (Halar®) piping systems.

OTHER OPTIONS & ACCESSORIES

- **Alternate O-Ring Seals**
- **Stem Extensions** made to any length
- **Limit Switches** – For open and/or closed position indication
- **Municipal Operating Nut**
- **Lubrication-free Valves** – Factory clean room assembled
- **Vented Ball** – For sodium hypochlorite applications

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

55 Guardsman Road, Thornhill, ON, L3T 6L2, Canada | ISO 9001:2008 Certified
tel.905.889.7890 | fax.905.889.8553 | request@chemline.com | chemline.com

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CS-301-150 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VABLPV303543	T9-621-V001	DIA: 75 mm (3")	ISOLATION VALVE - TANK DRAIN	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-030-E-S//CONNECTION TYPE : SOCKET | 75 mm (3")//BODY : PVC (ASTM D1784)// SEAL | SEAT :PTFE | EPDM// STEM : PVC			HYDRAPOL 3500		
CHEMLINE	VABLPV303543	T9-622-V001	DIA: 75 mm (3")	ISOLATION VALVE - TANK DRAIN	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-030-E-S//CONNECTION TYPE : SOCKET | 75 mm (3")//BODY : PVC (ASTM D1784)// SEAL | SEAT :PTFE | EPDM// STEM : PVC			HYDRAPOL 3500		
CHEMLINE	VABLPV303543	T9-622-V002	DIA: 75 mm (3")	ISOLATION VALVE - TANK OUTLET	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-030-E-S//CONNECTION TYPE : SOCKET | 75 mm (3")//BODY : PVC (ASTM D1784)// SEAL | SEAT :PTFE | EPDM// STEM : PVC			HYDRAPOL 3500		

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PDF Published March 1, 2013

Type 21 Ball Valves

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

The Chemline Type 21 True Union Ball valve incorporates state of the art features for long term performance. This is a full port, full blocking True Union valve pressure rated at 16 bar (230 psi)[4]. Double stem o-rings and Safety Shear stem design provide for a high degree of safety on hazardous fluid applications. All sizes have an ISO standard actuator mounting platform integral to the valve body. This provides for sturdy and secure mounting of pneumatic or electric actuators.

PVC | CPVC | PP | PVDF

CRN Registered Consult Chemline

NSF[5] Certified to NSF/ANSI 61

SERIES: Type 21

SIZES: 3/8" – 4"

ENDS: Socket, Threaded, Flanged, Butt[1] or ChemFlare™

SEATS: PTFE

SEALS[2]: EPDM, FKM (Viton®), CPE[3]

features

Pressure rated to 230 psi[4]
- 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

Safety Shear Stem Design
- Stem has double o-rings
- Designed to hold full pressure even if stem breaks due to excessive torque

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.

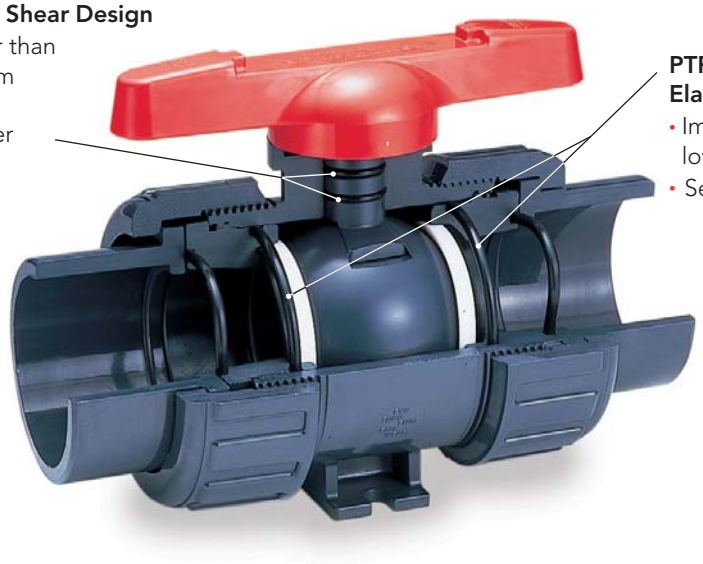
[1] Butt ends for fusion to Chemline metric PP, PVDF or ECTFE (Halar®) piping.
[2] Other materials are available.
[3] CPE=Chlorinated Polyethylene.
[4] PVC, CPVC and PVDF 1/2" to 2" are rated at 230 psi; 2-1/2" to 4" and all size PP valves are rated at 150 psi at 20°C.
[5] PVC valves with EPDM or FKM (Viton®) seals are certified under NSF/ANSI Standard 61 for contact with drinking water.

Type 21 Ball Valves

features

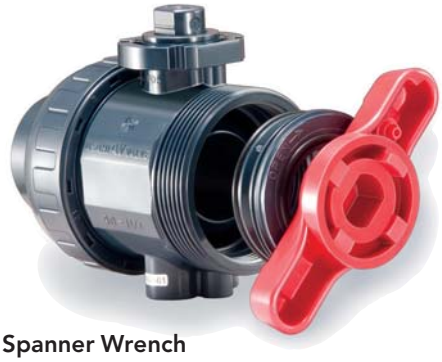
Double Stem O-Rings – Safety Shear Design

- 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.



PTFE Seats have Elastomer Cushions

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



Built in Spanner Wrench

- For removing or tightening the seat carrier
- All parts are replaceable

Integral Actuator Mounting Platform

- Actuation is easy. Electric or pneumatic actuators may be mounted in the field. Simply pull off the handle to reveal a standard ISO 5211 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.

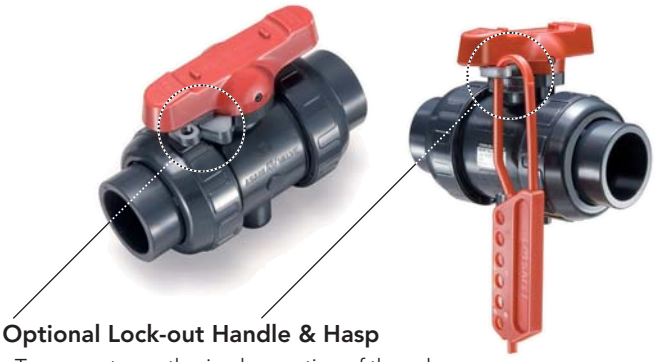
Base Mounting Pad

- Optional threaded inserts allow valves to be securely anchored
- Supplied standard with actuated valves

options + accessories

ChemFlare™ Ends

- For connection to PFA tube. Leak-free connections for difficult services such as sodium hypochlorite



Optional Lock-out Handle & Hasp

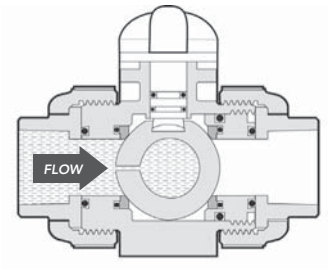
- To prevent unauthorized operation of the valve
- Used during maintenance shut-downs

One-piece moulded PVC and CPVC 6" socket ends

- Allows installation of 4" valve in 6" line
- Factory moulded, not fabricated with couplings and reducers cemented together
- Fixed to valve mechanically just like the one-piece moulded factory flanges

Different Colour Handles

- Choose a handle colour other than standard red for colour coding different services



Vented Ball

- For sodium hypochlorite services at any concentration
- Valve shown in closed position

electric + pneumatic actuation

Pneumatic and Electric Actuators

- A complete range of actuators and control accessories are available, mounted to valves using PPG plastic brackets and stainless steel couplings. Refer to separate data sheets.

Electromni® Electric

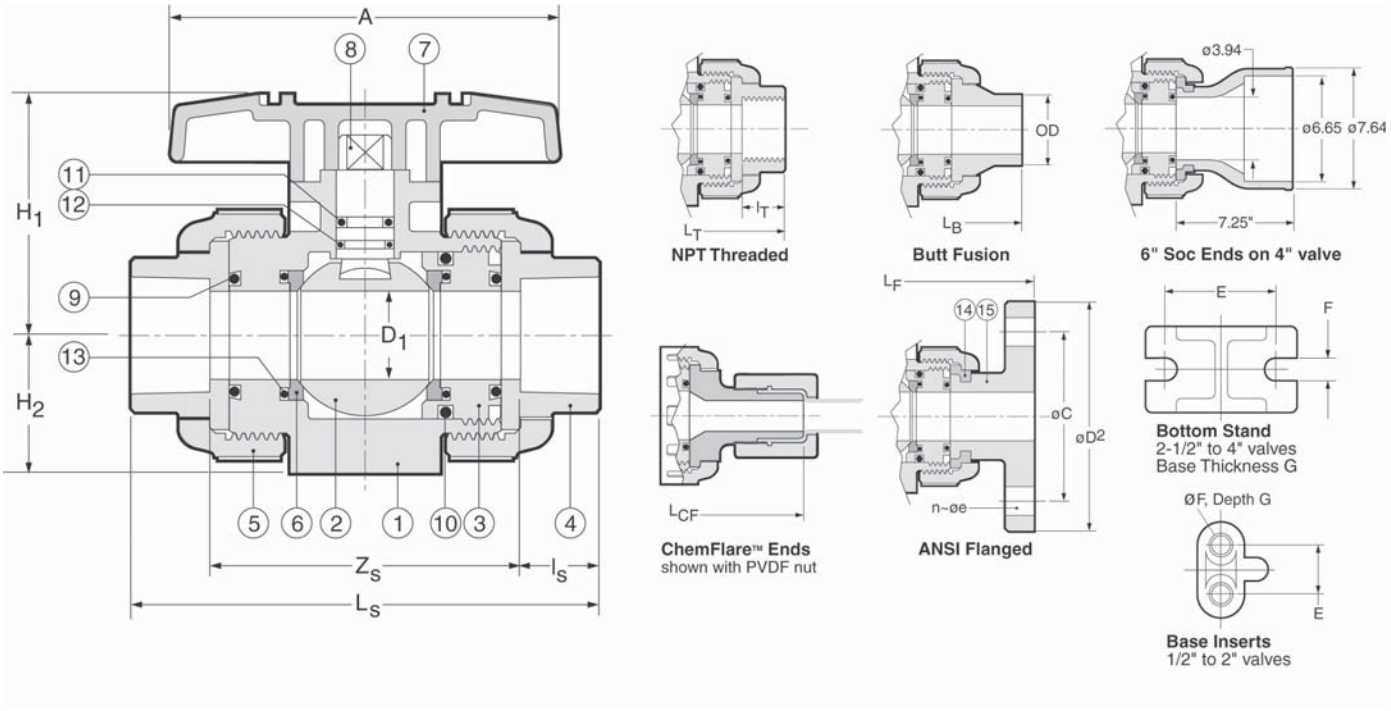
Q Series Electric

A Series Electric

V Series Electric
with Local Control Station

PA Series Pneumatic

Type 21 Ball Valves



PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
1	Body	1	PVC, CPVC, PP, PVDF
2	Ball	1	PVC, CPVC, PP, PVDF
3	Carrier[1]	1/2	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

[1] 1 carrier for sizes 1/2" to 2", 2 carriers for sizes 2-1/2" to 4"
[2] EPDM seals standard with PVC, CPVC, PP; FKM (Viton®) with PVDF valves
[3] 2 pcs 1/2" to 2", 6 pcs 2-1/2" to 4"

PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
8	Stem	1	PVC, CPVC, PP, PVDF
9▲	Face O-Ring[2]	2	EPDM, FKM (Viton®)
10▲	Carrier O-Ring[2]	2	EPDM, FKM (Viton®)
11▲	Upper Thicker Stem O-Ring[2]	1	EPDM, FKM (Viton®)
12▲	Lower Thinner Stem O-Ring[2]	1	EPDM, FKM (Viton®)
13	Seat Cushion[2]	2	EPDM, FKM (Viton®)
14	Flange Retainer[3]	2/6	PVDF
15	Flange	2	PVC, CPVC, PP, PVDF

DIMENSIONS INCHES

					End Connections														Valve Base		
					Socket			Threaded		Factory Flanged					Butt		ChemFlare™				
Size	D Bore	A	H_1	H_2	L_S	Z_S	l_S	l_T	L_T	L_F	D_2	C	n	e	L_B	OD	L_{CF}	Tube[4]	E	F[5]	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	.62	4.88	.79	6.12	1/2"	.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	4	.62	5.67	.98	6.52	3/4"	.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	4	.62	6.06	1.26	7.26	1"	.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	4	.62	6.85	1.57	9.58	1-1/4"	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	4	.62	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	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	4	.75	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	4	.75	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	8	.75	14.76	4.33	–	–	2.56	.43	.32

[4] ChemFlare™ ends are available for reduced tube sizes down to 1/4".
[5] Optional threaded inserts: 1/2" to 1" valves – UNC 1/4"-20; 1-1/4" to 2" valves – UNC 5/16"-18. 'Recoil' brand inserts require drilling before insertion.

Type 21 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 80°C (–4 to 176°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"	0.4	0.4	0.4	0.4	0.9	0.9	0.7	1.1
3/4"	0.7	0.7	0.7	0.9	1.3	1.5	1.1	1.5
1"	0.9	1.1	0.9	1.1	1.8	2.0	1.5	2.2
1-1/4"	1.5	1.5	1.3	1.8	2.6	2.9	2.0	3.3
1-1/2"	2.4	2.6	1.5	2.9	3.7	4.0	2.6	4.4
2"	4.0	4.4	2.6	4.9	5.5	6.0	4.0	8.2
2-1/2"	5.1	5.5	3.7	6.2	7.3	7.7	5.3	8.8
3"	8.2	8.8	5.5	9.9	10.1	11.0	7.5	12.6
4"	19.4	21.8	13.2	24.9	21.6	23.4	15.4	26.7

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

1. All True Union Ball Valves in PVC, CPVC, PP or PVDF shall be 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, FKM (Viton®) or CPE seals. Ball seats shall be PTFE with elastomer cushions for closure with minimum stem torques.
2. All valves will have Safety Shear stem design, blowout-proof with double o-rings for safety. The top o-ring groove shall be deeper so that if the stem breaks off under excessive torque the lower o-ring will remain intact and the valve will hold pressure.
3. All valves shall be full port and two-way blocking design.
4. All valves will be CRN (Canadian Registration Number) registered with TSSA.
5. PVC valves with EPDM or FKM (Viton®) seals shall be certified under NSF/ANSI Standard 61 for contact with drinking water.
6. All valves shall have chemical resistant labels permanently marked with manufacturing number to provide production level traceability.
7. 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).
8. CPVC compound shall have an ASTM cell classification 23567-A with a minimum suffix "A" designation for chemical resistance as per ASTM D-1784.
9. PP material will conform to ASTM D-4101 PP 021 B 67272 material requirements.
10. PVDF material shall be unpigmented conforming to ASTM D-3222 material requirements and to be USDA Title 21 Chapter 1 Part 177. 2510 requirements for contact with food.
11. Socket ends in PVC and CPVC shall be Schedule 80 and conform to ASTM D-2467.
12. Threaded ends shall be Schedule 80 and conform to ASTM D-2464.
13. Butt fusion ends in PP or PVDF will be compatible with Chemline PP or PVDF metric piping systems.
14. Flanged ends shall be ANSI Class 150 one-piece factory moulded (not fabricated) to ensure maximum strength and close tolerance end to end dimensions.

ORDERING EXAMPLE

Chemline True Union Ball Valves	21	A	020	E	S
Body Material	**A** – PVC **B** – PP	**C** – CPVC **K** – PVDF			
Size[1]	**002** – 1/4" **010** – 1" **025** – 2-1/2"	**003** – 3/8" **012** – 1-1/4" **030** – 3"	**005** – 1/2" **015** – 1-1/2" **040** – 4"	**007** – 3/4" **020** – 2" **060** – 6"	
Seals	**E** – EPDM	**V** – FKM (Viton®)	**C** – CPE	**B** – Nitrile	**A** – Aflas®
Ends	**S** – Socket	**T** – Threaded	**F** – Flanged	**B** – Butt[2]	**CF** – ChemFlare™

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

[1] 1/4" is normally the 3/8" valve reduced. 6" is 4" valve with 6" end connections.

[2] PP, PVDF and ECTFE (Halar®) metric butt fusion ends (1/2" to 4") connect to Chemline PP, PVDF and ECTFE (Halar®) piping systems.

OTHER OPTIONS & ACCESSORIES

- **Alternate O-Ring Seals**
- **Stem Extensions** made to any length
- **Limit Switches** – For open and/or closed position indication
- **Municipal Operating Nut**
- **Lubrication-free Valves** – Factory clean room assembled
- **Vented Ball** – For sodium hypochlorite applications

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PDF Published August 14, 2013

PA Series Pneumatic Actuators

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

for Chemline ball valves up to 6"
for Chemline butterfly valves up to 24"

MATERIAL: Epoxy and Rilsan® coated aluminum

SERIES: PAS – Spring Return
PAD – Double Acting

CONTROL PRESSURE: 40 to 120 psi

OUTPUT TORQUES: (AT 80 PSI AIR)
Spring Return[1]: up to 15,660 in.-lb.
Double Acting: up to 40,660 in.-lb.

PA Series on Type 21 True Union Ball Valve

[1] Based on Spring End torque, used for sizing on normally closed butterfly valves.
[2] See page 2 for details of coating process.

Chemline PA Series is part of the P Series family of quarter-turn pneumatic rack and pinion actuators designed for long cycling life in demanding industrial applications.

PA Series features aluminum bodies and end caps coated inside and out with a two part coating of cataphoresis epoxy then Rilsan polyamide. The result is a superior actuator with longer cycling life and durable abrasion and corrosion resistant surfaces.

Output torques are up to 15,660 in.-lbs. spring return[1] (SR) and 40,660 in-lbs. double acting (DA) with 80 psi control air. They will power all Chemline ball valves and butterfly valves up to 24" DA and 20" SR.

Chemline offers complete actuated ball and butterfly valves assembled and bench tested. Actuation services are also available for all quarter-turn metal valves.

features

Application Diversity
- Industrial Process
- Submersion
- Bleach or water washdown

Quality Built for Long Cycling Life
- Rated for over 1 million cycles
- Self-lubricating Rilsan® coating on inner cylinder surfaces for better wear than epoxy or anodizing
- Molybdenum grease-impregnated O-rings
- PTFE impregnated piston wear pads and wear rings
- Double O-ring shaft seals
- Minimum backlash with no play between parts
- Massive tooth engagement between racks and pinion

Corrosion Resistant
- Silicone-free aluminum alloy body and end caps
- 4-step pre-treatment process
- Cataphoresis layer for extra protection
- Self-lubricating Rilsan® coating[2] offers outstanding chemical and abrasion resistance

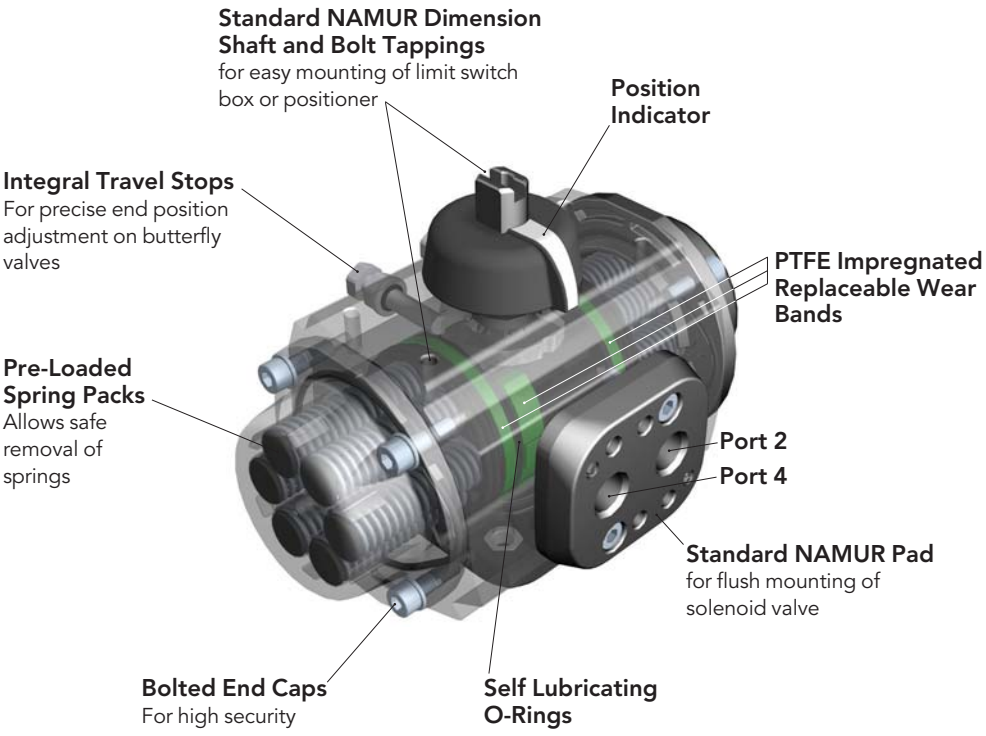
Standard Mounting Dimensions
- ISO 5211 bottom bolt circles and drives allow direct mounting to most valves
- NAMUR solenoid pad and VDI/VDE 3845 top shaft allow for mounting of all standardized accessories
- Standardized actuator mounting kits are available for many valve makes

Compact, Simple Design
- Dual-opposed rack and pinion design supplies high torque for its size and weight
- Air porting is integral, keeps design clean and simple

Integrated Travel Stops
- Permit adjustment of last 5 degrees of either open or closed position travel

Safety Spring Set
- Prevent dangerous release of spring tension during disassembly

PA Series Pneumatic Actuators



Standard ISO 5211 Bolt Pattern
for mounting to valve

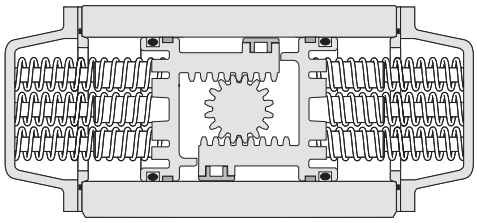
Double ISO 5211 Bolt Circles
on most models

ISO 5211 Star Drive Socket
for mouning flexibility on butterfly valves

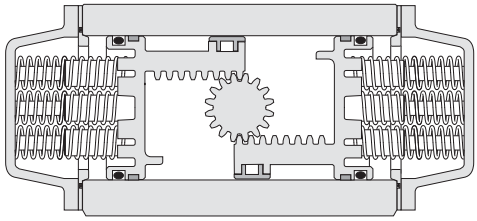
OPERATION–SPRING RETURN MODELS

Spring Cycle: Provided left port (4) is exhausted, the springs move pistons inward, turning the shaft 90° clockwise, as viewed from top of actuator.

Air Cycle: Air pressure to right port (2) moves pistons outward, compressing springs and turning the shaft 90° counter-clockwise, as viewed from top of actuator.



Spring End or Air Start Cycles



Spring Start or Air End Cycles

SPECIAL PROCESS FOR A SUPERIOR COATING

The aluminum body and end caps of the PA Series actuators are coated inside and out. First the aluminum actuator bodies and end caps undergo a four-step cleaning and passivation treatment.

The next step is epoxy coating by cationic electro deposition (cataphoresis). A 20 micron thick layer is applied to create a smooth chemical resistant coat which bonds into the aluminum crystalline structure.

The final step is application of a Rilsan 11 Polyamide coat up to 250 microns thick . Rilsan is a fully polymerized thermoplastic which provides outstanding chemical resistance to effluents, sea water, sea mist, hydrocarbons, solvents, and many chemicals. The final result is an actuator with a very smooth internal finish which offers long cycle life as well as durable, abrasion resistant external resistance to hostile chemical environments.

technical

WORKING TEMPERATURES: –32 to 90°C (–25 to 175°F)

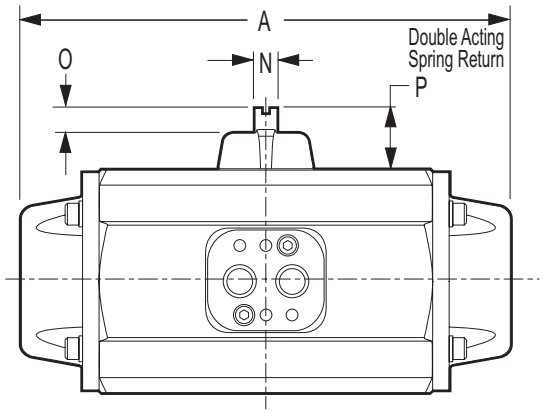
CONTROL PRESSURE: Control pressure range is minimum 40 to maxiumum 120 psi

CONTROL MEDIA: Actuator may be powered using air, water, natural gas or non-aggressive fluids

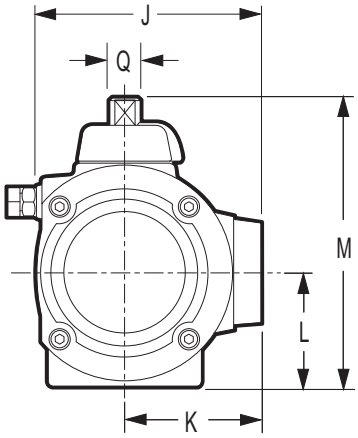
ENVIRONMENT: May be operated while submerged in water

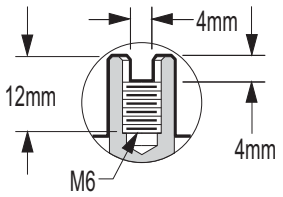
PA Series Pneumatic Actuators

Front View

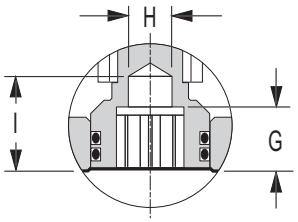


Side View

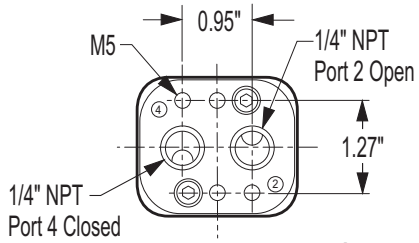




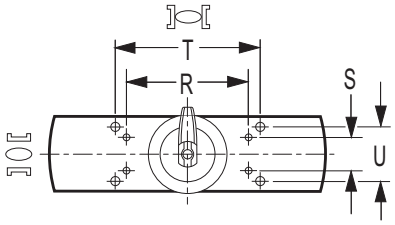
VDI/VDE 3845 Top Shaft



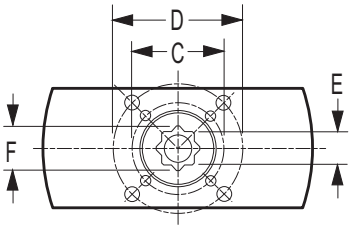
ISO 5211 Bottom Shaft



NAMUR Mounting Pad



VDI/VDE 3845 Top Detail



ISO 5211 Bottom Mount

DIMENSIONS INCHES

Size	Item No. DA	Item No. SR	A DA	A SR	ISO 5211 Bottom Mount C Dia.	C Thread	C Depth	D Dia.	D Thread	D Depth	ISO 5211 Bottom Shaft E	F	G	H	I
W	PADW	PASW	5.52	5.52	1.42 (F03)	M5	0.57	1.65 (F04)	M5	0.57	0.43	0.56	0.69	0.39	0.80
00	PAD00	PAS00	6.00	6.00	1.65 (F04)	M6	0.57	1.97 (F07)	M6	0.57	0.55	0.75	0.70	0.57	1.21
05	PAD05	PAS05	7.61	7.61	1.97 (F05)	M6	0.57	2.76 (F07)	M8	0.79	0.67	0.91	0.81	0.59	1.20
10	PAD10	PAS10	8.83	8.83	1.97 (F05)	M6	0.57	2.76 (F07)	M8	0.79	0.67	0.91	0.82	0.59	1.21
15	PAD15	PAS15	10.40	10.40	1.97 (F05)	M6	0.71	2.76 (F07)	M8	0.91	0.67	0.91	0.82	0.72	1.21
20	PAD20	PAS20	12.19	12.19	1.97 (F05)	M6	0.71	2.76 (F07)	M8	0.91	0.87	1.14	0.81	0.72	1.29
25	PAD25	PAS25	14.02	14.02	2.76 (F07)	M8	0.91	4.02 (F10)	M10	1.06	1.06	1.44	1.22	1.87	1.42
30	PAD30	PAS30	13.74	18.86	2.76 (F07)	M8	0.91	4.02 (F10)	M10	1.06	1.06	1.44	1.18	1.18	1.65
40	PADA40	PASR40	17.48	23.54	4.02 (F10)	M10	1.06	4.92 (F12)	M12	1.02	1.42	1.93	1.50	1.38	1.97
50	PADA50	PASR50	20.63	27.32	–	–	–	5.51 (F14)	M16	1.18	1.42	1.93	1.50	1.38	1.97
60	PAD60	PAS60	26.40	26.40	–	–	–	6.50 (F16)	M20	1.18	1.81	2.40	2.05	1.93	2.36
70	PAD70	PAS70	29.23	29.23	–	–	–	6.50 (F16)	M20	1.18	1.81	2.40	2.05	1.93	2.05

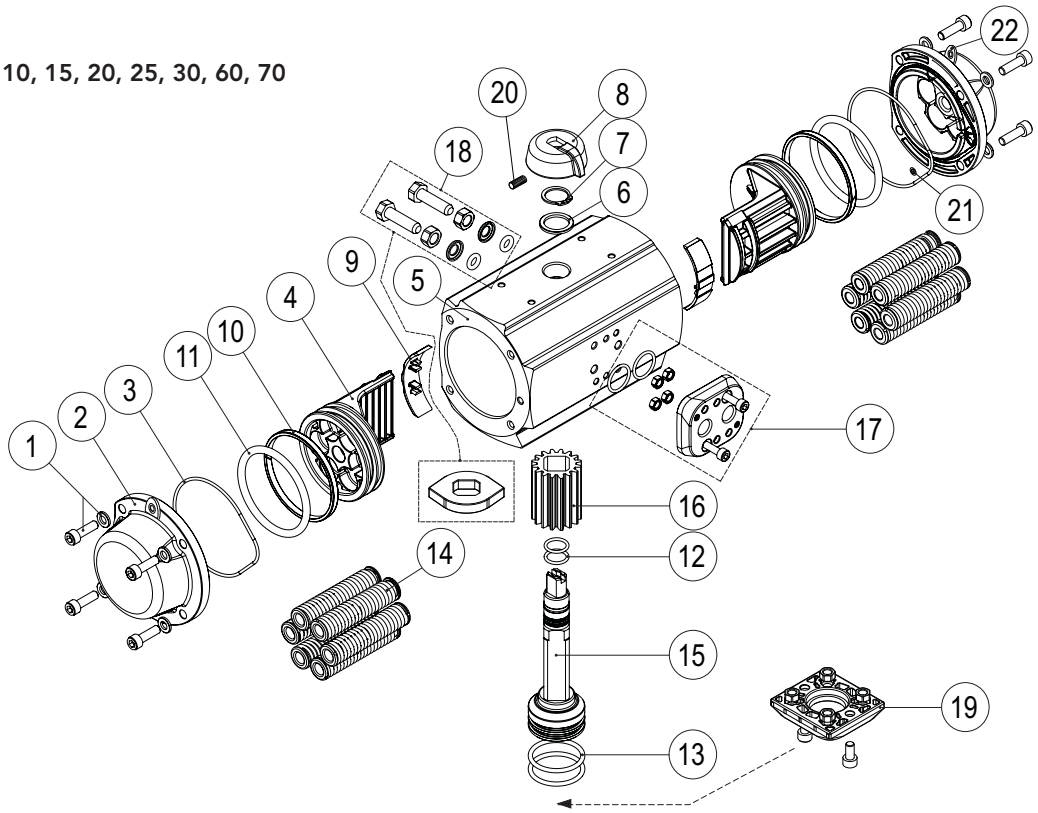
DIMENSIONS INCHES

Size	Item No. DA	Item No. SR	J	K	L	M	VDI/VDE 3845 Top Shaft N	O	P	Q	VDI/VDE 3845 Top Detail R	S	T	U
W	PADW	PASW	3.00	1.90	1.46	3.52	0.31	0.32	0.79 (ISO-1)	0.35	3.15	1.18	–	–
00	PAD00	PAS00	3.31	2.06	1.70	4.38	0.39	0.49	1.18 (ISO-2)	0.54	3.15	1.18	–	–
05	PAD05	PAS05	4.00	2.43	1.94	5.05	0.39	0.49	1.18 (ISO-2)	0.54	3.15	1.18	–	–
10	PAD10	PAS10	4.08	2.47	2.06	2.21	0.39	0.49	1.18 (ISO-2)	0.54	3.15	1.18	–	–
15	PAD15	PAS15	4.70	2.78	2.35	5.82	0.39	0.49	1.18 (ISO-2)	0.54	3.15	1.18	–	–
20	PAD20	PAS20	5.02	2.96	2.51	6.15	0.63	0.49	1.18 (ISO-2)	0.86	3.15	1.18	–	–
25	PAD25	PAS25	6.04	3.51	3.04	7.26	0.63	0.49	1.18 (ISO-2)	0.86	3.15	1.18	–	–
30	PAD30	PAS30	6.97	3.70	3.78	8.31	0.63	0.43	1.18 (ISO-2)	0.86	3.15	1.18	–	–
40	PADA40	PASR40	8.90	4.72	4.57	10.71	1.26	0.79	1.97 (ISO-4)	1.65	5.12	1.18	4.65	1.61
50	PADA50	PASR50	10.14	5.31	5.24	12.32	1.26	0.79	1.97 (ISO-4)	1.65	5.12	1.18	4.65	1.61
60	PAD60	PAS60	13.01	6.77	6.36	14.49	1.26	0.31	1.97 (ISO-4)	1.65	5.12	1.18	–	–
70	PAD70	PAS70	15.85	8.50	7.52	16.85	1.42	0.31	1.97 (ISO-4)	1.71	5.12	1.18	–	–

PA Series Pneumatic Actuators

SIZES

W, 00, 05, 10, 15, 20, 25, 30, 60, 70



PARTS

▲ Recommended Spare Parts

No.	Part	Size	Pcs.	Materials
1▲	Allen Screw & Washer	W to 25	8	304 SS
		30	12	
		40 to 60	16	
		70	20	
2	Cap (DA&SR)	W to 70	2	Aluminum Alloy coated w. cataphoresis and polyamide
3▲	Cap O-Ring	W to 70	2	Nitrile Buna-N
4	Piston	W	2	Polyarilamide
		00 to 25	2	Aluminum Alloy coated w. cataphoresis
		30 to 70	2	Aluminum Alloy
5	Cylinder	W to 70	1	Aluminum Alloy coated w. cataphoresis and polyamide
6	Washer	W to 70	1	Polyamide 6
7	Spring Clip	W	1	420 SS
		00 to 30	1	Steel coated with Nickel-PTFE
		40 to 70	1	Steel coated with cataphoresis
8	Position Indicator	W	1	Polyacetal
		00 to 30, 60	1	Polyamide
		40, 50, 70	1	Polypropylene
9	Piston Guide	00 to 25	2	Polyacetal
		30 to 40	4	PTFE-Bronze
		60	4	PTFE-Carbon
		50, 70	4	Nylon
10	Guide Ring	W	2	Polyacetal & Mb
		00 to 25	2	Polyacetal
		30 to 70	2	PTFE-Bronze
11▲	Piston O-Ring	W to 25	2	Nitrile Buna-N
		30 to 70	4	

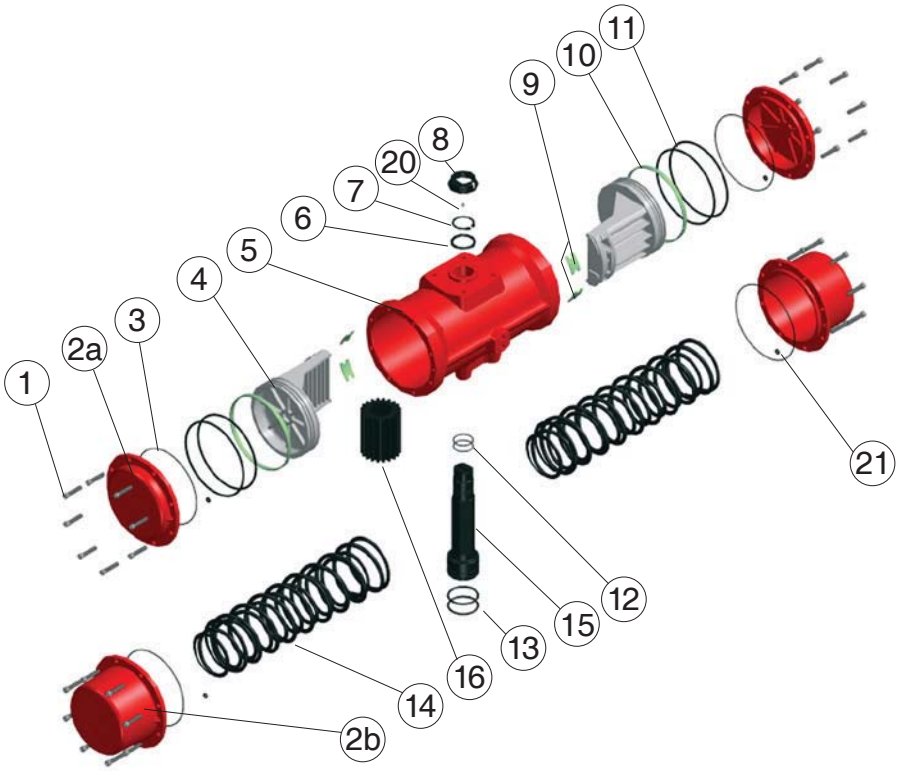
PARTS

▲ Recommended Spare Parts

No.	Part	Size	Pcs.	Materials
12▲	Upper Shaft O-Ring	W to 70	2	Nitrile Buna-N
13▲	Lower Shaft O-Ring	W to 70	2	Nitrile Buna-N
14	Spring Set	W to 25	1	DIN 17223-C passivated[1] Spring Steel and epoxy coated
		30 to 50	1	DIN 17223-C Spring Steel epoxy coated
		60 to 70	1	DIN 17223-C Spring Steel epoxy coated (preloaded)
15	Shaft	W	1	Polyamide with 303 SS insert and drive adapter
		00 to 70	1	Steel coated with cataphoresis
16	Gear	10 to 25, 70	1	Ball burnished Aluminum Alloy
		30 to 50	1	Alluminum Alloy coated with cataphoresis
17	Pneumatic Connection Plate Assembly	W to 30, 60, 70	1	50% glass filled Polyamide base plate, 304 SS bolts & nuts, Nitrile O-rings
18	Travel Stop Assembly	00 to 70	2	304 SS nuts & bolts, 303 SS bushings, Nitrile O-rings
19	Base Plate Assembly	W to 00	1	50% glass filled Polyamide base plate, 304 SS nuts & bolts
20	Threaded Pin	30 to 70	1	304 SS
21	Port Seal O-Ring	30 to 70	2	Nitrile Buna-N
22	Hoop	70	2	304 SS

[1] Trivalent Chromium Passivation.

SIZES
40 & 50



PARTS

▲ Recommended Spare Parts

No.	Part	Size	Pcs.	Materials
1▲	Allen Screw	40 and 50	16	304 SS
2a	Double Acting Cap	40 and 50	2	Aluminum Alloy coated with Rilsan epoxy and polyamide
2b	Spring Return Cap	40 and 50	2	Aluminum Alloy coated with Rilsan epoxy and polyamide
3▲	Cap O-Ring	40 and 50	2	Nitrile
4	Piston	40 and 50	2	Aluminum Alloy
5	Cylinder	40 and 50	1	Aluminum Alloy coated with Rilsan epoxy and polyamide
6	Washer	40 and 50	1	Polyamide
7	Spring Clip	40 and 50	1	Epoxy coated Steel
8	Position	40 and 50	1	Polypropylene

PARTS

▲ Recommended Spare Parts

No.	Part	Size	Pcs.	Materials
9	Piston Guide	40	4	PTFE-Bronze
		50	4	Polyamide
10	Guide Ring	40 and 50	2	PTFE-Bronze
11▲	Piston O-Ring	40 and 50	4	Nitrile
12▲	Upper Shaft O-Ring	40 and 50	2	Nitrile
13▲	Lower Shaft O-Ring	40 and 50	2	Nitrile
14	Spring Set	40 and 50	1	DIN 17223-C Spring Steel epoxy coated
15	Shaft	40 and 50	1	Epoxy coated Steel
16	Gear	40 and 50	1	Epoxy coated Aluminum Alloy
20	Threaded Pin	40 and 50	1	304 SS
21	Port Seal O-Ring	40 and 50	2	Nitrile

PA Series Pneumatic Actuators

OUTPUT TORQUES – DOUBLE ACTING INCH POUNDS

Item No.	Supply Pressure (psi)				
	40	60	80	100	120
PADW	62	103	137	172	209
PAD00	93	147	201	256	309
PAD05	188	295	401	506	612
PAD10	263	417	571	725	880
PAD15	442	690	939	1,187	1,437
PAD20	622	978	1,334	1,689	2,045
PAD25	1,128	1,734	2,342	2,948	3,601
PAD30	1,823	2,804	3,789	4,770	5,757
PADA40	4,708	7,124	9,549	11,963	14,392
PADA50	8,033	12,357	16,697	21,019	25,367
PAD60	13,135	20,499	27,883	35,242	42,648
PAD70	19,157	29,889	40,662	51,388	62,181

OUTPUT TORQUES – SPRING RETURN INCH POUNDS

Item No.	Number of Springs[1]	Spring Cycle		Air Cycle							
				Supply Pressure (psi)							
				60		80		100		120	
		Start	End	Start	End	Start	End	Start	End	Start	End
PASW	6	89	59	43	13	78	49	114	85	150	120
PAS00	6	146	98	48	1	103	55	157	109	211	163
PAS05	6	278	185	110	17	216	123	322	229	427	335
PAS10	6	404	273	145	14	299	168	453	322	608	477
PAS15	6	633	434	257	58	506	306	754	555	1,003	804
PAS20	6	927	582	397	52	752	408	1,107	763	1,462	1,118
PAS25	6	1,609	1,057	668	116	1,292	740	1,915	1,363	2,539	1,986
PAS30	4	2,422	1,592	1,212	382	2,196	1,366	3,181	2,350	4,165	3,334
PASR40	4	6,787	4,351	2,780	344	5,200	2,764	7,620	5,183	10,040	7,603
PASR50	4	10,673	6,404	5,966	1,697	10,297	6,028	14,628	10,359	18,690	14,690
PAS60	6	18,365	12,241	8,272	2,148	15,648	9,524	23,025	16,901	30,401	24,277
PAS70	6	31,320	15,660	14,262	1,398	25,012	9,352	35,763	20,103	46,513	30,853

[1] Standard Spring set. Higher torques for air operation can be obtained by removing springs. Consult Chemline.

WEIGHTS, AIR CONSUMPTION, CYCLE TIMES

Size	Double Acting						Spring Return				
	Item No.	Weight lbs.	Air Consumption (li)[2]		Cycle Time (sec.)		Item No.	Weight lbs.	Air Consumption (Standard litres)[2]	Cycle Time (sec.)	
			Open Port 2	Close Port 4	Open Port 2	Close Port 4				Open Port 2	Close Port 4
W	PADW	2.02	0.08	0.11	0.10	0.10	PASW	2.20	0.08	0.15	0.15
00	PAD00	3.09	0.15	0.18	0.15	0.15	PAS00	3.58	0.15	0.20	0.20
05	PAD05	5.67	0.28	0.37	0.20	0.20	PAS05	6.49	0.28	0.25	0.25
10	PAD10	6.79	0.35	0.45	0.25	0.25	PAS10	7.68	0.35	0.30	0.30
15	PAD15	9.25	0.65	0.82	0.30	0.30	PAS15	11.10	0.65	0.40	0.40
20	PAD20	12.36	0.80	1.05	0.40	0.40	PAS20	14.60	0.80	0.50	0.50
25	PAD25	20.50	1.5	2.0	0.50	0.50	PAS25	24.92	1.5	0.80	0.80
30	PAD30	20.02	2.1	1.9	0.60	0.60	PAS30	34.98	2.1	1.20	1.20
40	PADA40	38.72	5.3	5.3	1.20	1.02	PASR40	80.10	5.3	2.00	2.00
50	PADA50	67.50	10.5	7.0	2.00	2.00	PASR50	128.50	10.5	6.00	6.00
60	PAD60	106.48	19.5	20.7	4.00	4.00	PAS60	142.86	19.5	11.00	8.00
70	PAD70	171.74	31.0	30.0	6.00	6.00	PAS70	260.59	31.0	15.00	10.00

[2] 1 Liter = 61.02 cubic inches

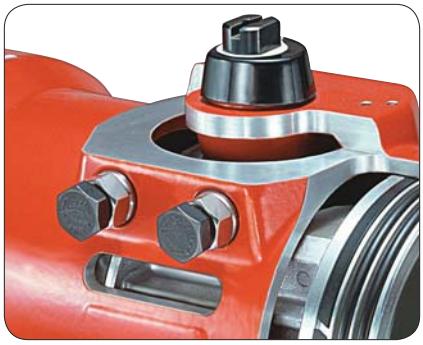
PA Series Options

END CAP TRAVEL STOPS

End cap travel stops are available on PA Series actuators, sizes 00 to 70. Two bolts in the actuator end caps act as adjustable travel stops for one end of travel, either the open position of a normally closed valve, or closed position of a normally open valve. They must be adjusted equally to apply balanced stopping pressure on both pistons. The **full length of piston travel is adjustable.**

INTEGRAL TRAVEL STOPS

Integral travel stops are **standard on PA Series actuators, sizes 00, 30, 60 and 70. They are optional on sizes 40 and 50.** Two bolts in the actuator body act as adjustable travel stops for both the open and closed valve end of travel. The bolt ends contact stops on the output shaft. They are **adjustable for the last 5 degrees of travel.**



RETAINED SPRING SET

Retained concentric spring packs prevent sudden release of spring tension during actuator end cap removal, preventing possible actuator damage or personal injury. They are available as an **option on sizes 40 and 50. All other sizes (W to 30, 60 and 70) have pre-loaded spring packs as standard.**

OPTION ITEM NUMBERS

Size	End Cap Travel Stops		Integral Travel Stops	Retained Spring Set
	Spring Return	Double Acting		
W	N/A	N/A	N/A	Standard
00	LP-00S	LP-00	Standard	Standard
05	LP-05S	LP-05	Standard	Standard
10	LP-10S	LP-10	Standard	Standard
15	LP-15S	LP-15	Standard	Standard
20	LP-20S	LP-20	Standard	Standard
25	LP-25S	LP-25	Standard	Standard
30	LP-30S	LP-30	Standard	Standard
40	LP-40S	LP-40	TR40 (Optional)	SM40 (Optional)
50	LP-50S	LP-50	TR50 (Optional)	SM50 (Optional)
60	LP-70S	LP-70	Standard	Standard
70	LP-70S	LP-70	Standard	Standard

PA Series Accessories

for all P series actuators

Accessories are supplied mounted to actuators and bench tested, or separately.

SOLENOID VALVES

Pilot solenoid valves control air supply air in and out of pneumatic actuators to open and close the valve and are electrically actuated. They are usually but not always mounted directly to the actuator. V Series Solenoid Valves are CSA/UL approved and designed for multi-million cycle life. These mount flush to P Series or any other NAMUR compliant pneumatic actuator. They are robust, reliable and corrosion resistant, offering high air flows and fast response. The same valve functions as both 5/2 way (for double acting actuators) and 3/2 way (for spring return actuators). Simply flip over the base plate which changes porting configurations. A screw type manual override is standard. Construction is glass reinforced polyamide body, nitrile seals, nickel plated ports and screws, and epoxy encapsulated coil. The electrical connection is a 3-pin DIN plug with 1/2" NPT for conduit connection. Grommet (cable gripper) and LED grommet (glows to indicate power) version plugs are also available. Versions are available in different voltages, also in intrinsically safe and explosion proof designs.

Solenoid Valves

LIMIT SWITCHES

Limit switches are for On and/or Off valve position feedback. YT Series Limit Switch Boxes are CSA/UL approved 2-position units which are easily mounted to P Series or any other NAMUR compliant rotary actuator. They are compact and robust, featuring quick-setting switch cams, high visibility position indicator beacon and a quick-access cover. Dual 1/2" NPT conduit entries and an 8-position terminal strip allow for wiring of a solenoid valve through the box. The standard model has an epoxy coated aluminum housing and single-pole double-throw switches rated for multi million cycles. An intrinsically safe version is available with inductive proximity switches. Also available are hazardous area enclosures. Another series is available with various BUS modules.

Limit Switches

DECLUTCHABLE GEAR OVERRIDE

The MO Series Manual Declutchable Gear Override allows manual valve/actuator operation of actuated valves in case supply pressure fails. The unit is mounted between the actuator and the valve mounting bracket. For normal powered operation the worm gear is disengaged by moving the lever bar upwards. Construction is epoxy coated cast iron housing with aluminum or welded steel hand wheel. These rugged units are suitable for indoor and outdoor use. The self-locking worm gear design offers safe and easy operation, positive manual positioning and long life.

Declutchable Gear Override

POSITIONERS

Valve positioners control actuator-valve position, responding to a signal from a process controller, usually electronic (most often 4–20mA) or sometimes pneumatic (3–15 psi). YT Series positioners are easy to mount directly to P Series actuators and other NAMUR compliant rotary actuators. They have epoxy coated aluminum enclosures and are also available in 316 stainless steel. All available models are attractively priced:

- **YT1200R 3–15 psi Pneumatic** – a conventional all-mechanical positioner
- **YT1300R 4–20 mA Electro-Pneumatic** – an electronic positioner designed for vibration resistance, better control and easy calibration
- **YT2300 4–20 mA Smart** – a fully digital positioner with intelligent functions like auto calibration, PID control, also theoretical and user defined characterized output. Options include alarms (switch or relay output), 4–20 mA transmitter for position feedback and HART digital communication protocol.

Positioners

AIR FILTER/REGULATOR

A filter/regulator is required to protect pneumatic equipment with small orifices from clogging due to debris and to protect from corrosion or fouling due to excess oil or condensed water in the air supply. Chemline **includes an air filter/regulator with all positioners** mounted to actuators. Chemline recommends they **also be supplied with all pilot solenoid valves.** The F/R-A is a one-piece air filter/regulator and pressure gauge with a GRP plastic body, polycarbonate filter bowl and polyethylene filter element. The filter bowl has a manual drain valve.

Air Filter/Regulator

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

55 Guardsman Road, Thornhill, ON, L3T 6L2, Canada | ISO 9001:2008 Certified
tel.905.889.7890 | fax.905.889.8553 | request@chemline.com | chemline.com

CS-301-501 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VABLPV346917	V18-032	DIA: 13 mm (1/2")	METERING VALVE - WETTING CONE	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : SM2-A-005-E-S//CONNECTION TYPE : SOCKET | 13 mm (1/2")//BODY : PVC (ASTM D1784)// SEAL | SEAT : | EPDM// STEM : N/A			HYDRAPOL 3500		
CHEMLINE	VABLPV346917	V18-033	DIA: 13 mm (1/2")	METERING VALVE - WETTING CONE	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : SM2-A-005-E-S//CONNECTION TYPE : SOCKET | 13 mm (1/2")//BODY : PVC (ASTM D1784)// SEAL | SEAT : | EPDM// STEM : N/A			HYDRAPOL 3500		

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PDF Published October 18, 2017

Metering Ball Valves

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

Chemline SM Series Metering Ball Valve is designed for fine linear flow control of chemicals or clean fluids. The ball is solid with graduated V-groove cut on the outside surface. Precise linear flow control is accomplished through 180° rotation of the handle. With a positioning electric actuator, this becomes an inexpensive control valve. If higher C_V values are required, refer to SP Series Proportional ball valves.

PVC PP

SERIES: SM2
SIZES: 1/2" – 1"
ENDS: Threaded, Socket, Butt[1] or ChemFlare™ [2]
SEATS: PTFE
O-RINGS: EPDM, FPM (Viton®)

Integral 180° Scale with 5° Increments
- Linear flow control and settable flow rates

features

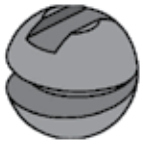
Precise Linear Flow Control
- Provided by a special V-groove ball and wide handle travel (0° to 180°)

Full Size Range
- 6 valves sizes 1/2" to 2" offers a large selection of C_V values

High End Ball Valve Features
- Full Blocking design
- Double Stem O-Rings for safety
- PTFE seats with elastomer cushion
  – Automatically compensates for seat wear or expansion
- 230 psi pressure rated (PVC)

Low Stem Torques
- Due to floating ball design and cushioned PTFE seats

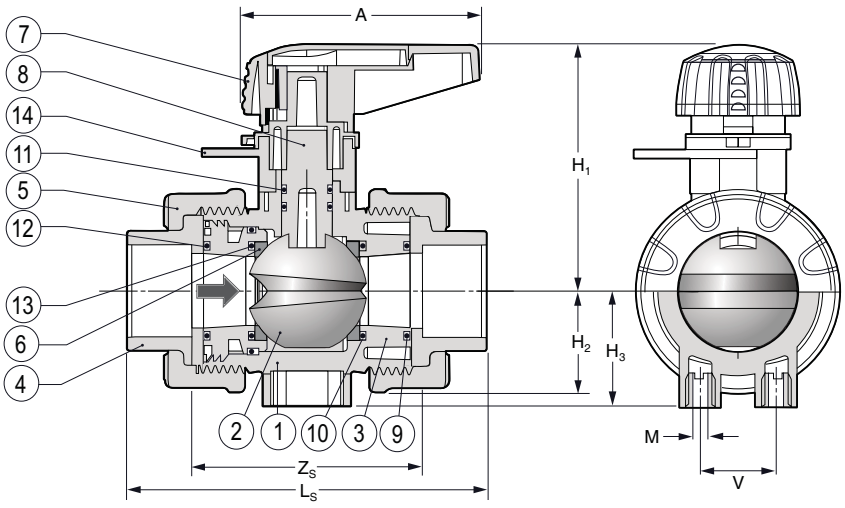
Bidirectional
- Works with flow in either direction



Ball Detail

[1]Butt ends for fusion to Chemline metric PP piping.
[2]For ChemFlare™ end connectors, consult Chemline.

Metering Ball Valves



PARTS

No.	Part	Pcs.	Materials
1	Body	1	PVC, PP, PVDF
2	Ball	1	PVC, PP, PVDF
3	Carrier	1	PVC, PP, PVDF
4	End Connector	2	PVC, PP, PVDF
5	Union Nut	5	PVC, PP, PVDF
6	Ball Seat	2	PTFE
7	Handle	1	PVC
8	Stem	1	PVC, PP, PVDF
9	Carrier Face O-Ring	1	EPDM, FPM(Viton®)
10	Carrier O-Ring	1	EPDM, FPM(Viton®)
11	Stem O-Ring[1]	2	EPDM, FPM(Viton®)
12	Face O-Ring	1	EPDM, FPM(Viton®)
13	Seat Cushion[1]	2	EPDM, FPM(Viton®)
14	Position Indicator Scale	1	PVC

DIMENSIONS INCHES

							PVC			PP		
Size	A	H_1	H_3	H	M	V	Z_s	L_s	H_2	Z_s	L_s	H_2
1/2″	2.62	2.48	1.10	2.50	M5	0.98	2.48	3.74	0.99	2.64	3.74	1.06
3/4″	3.21	3.03	1.20	2.70	M5	0.98	2.83	4.33	1.16	3.03	4.29	1.18
1″	3.21	3.39	1.60	3.00	M6	1.02	3.11	4.84	1.39	3.27	4.69	1.57

ELECTRICALLY OR PNEUMATICALLY ACTUATED

The metering ball valve becomes a proportional control valve with the addition of a Q or E Series electric or P Series pneumatic actuator with 4-20 mA positioner

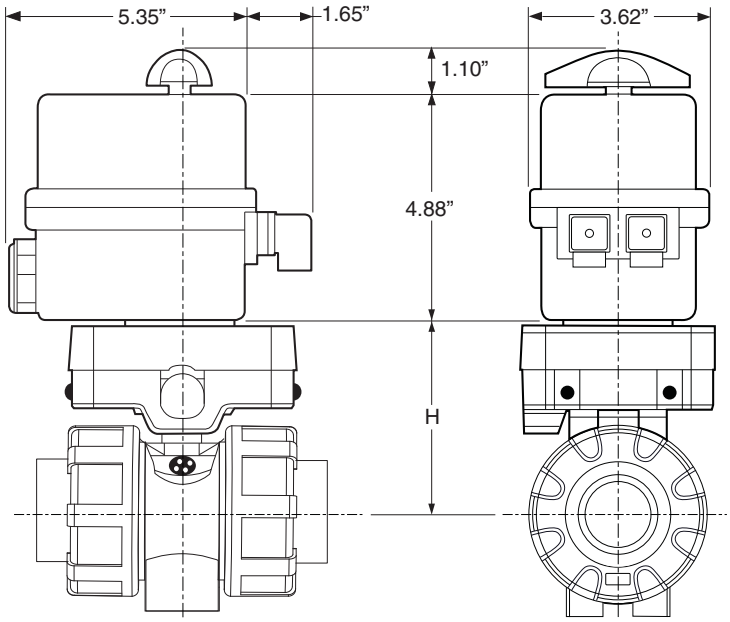
- Thermoplastic housing and mounting bracket
- Manual override
- Position indication
- Mechanical travel stops
- Different voltages are available

Q Series Electric

E Series Electric

P Series Pneumatic

E Series Electric Actuator on a SM2 Valve



Side View

Port View

Metering Ball Valves

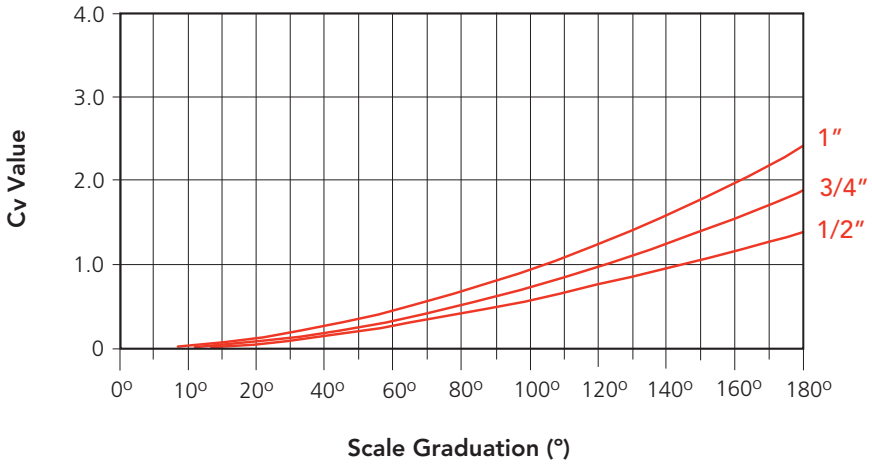
WORKING PRESSURES PSI

NET WEIGHTS LB. Cv VALUES

Size	PVC 20°C 68°F	PVC 40°C 104°F	PVC 60°C 140°F	PP 20°C 68°F	PP 40°C 104°F	PP 60°C 140°F	PP 80°C 176°F	PVC	PP	USGPM Flow at 1 psi △P
1/2″	230	130	30	150	100	65	20	0.35	0.29	1.4
3/4″	230	130	30	150	100	65	20	0.60	0.44	1.9
1″	230	130	30	150	100	65	20	0.84	0.64	2.3

Temperature Ranges: PVC 0 to 60°C (32 to 140°F), PP 0 to 95°C (32 to 203°F)

Cv VALUE vs. VALVE OPENING



SAMPLE SPECIFICATION

1. All low flow control valves, 1/2″ to 1″, will be Chemline SM Series metering ball valves.
2. Body material will be PVC or PP, and o-rings will be EPDM or FPM (Viton®).
3. Body will be full blocking design with double stem o-rings for safety, rated at 230 psi maximum working pressure for PVC and 150 psi for PP material.
4. Ball will be floating design, molded solid with a V-groove for linear flow control over a 180° range of handle rotation.
5. Seats will be PTFE with elastomer cushions for positive closure with minimum stem torques and automatic compensation for seat wear and expansion.
6. Position indicating scale will be 0° to 180° with 5° increments for fine flow control and settable flow rates.
7. End connections will be 1/2″ to 1″ ANSI socket or FNPT threaded or 150 lb flanged or butt fusion for Chemline metric PP pipe or ChemFlare™ for PFA tubing.

ORDERING EXAMPLE

Chemline Metering Ball Valves	SM2	A	010	E	S
Valve Material	**A** – PVC	**B** – PP			
Size	**005** – 1/2″	**007** – 3/4″	**010** – 1″		
Seals	**E** – EPDM	**V** – FPM (Viton®)			
Ends	**S** – Socket	**T** – Threaded	**B** – Butt[1]	**CF** – ChemFlare™	

Example: SM2 Series Ball Valve, PVC, 1″, EPDM seals, socket ends.

[1] PP metric butt fusion ends (1/2″ to 2″) connect to Chemline PP piping systems.

VACUUM RATING

- 29.9 inches mercury

OPTIONS & ACCESSORIES

- **Reduced Ends**
- **Electric or Pneumatic Actuator with Positioner**
  – Operates as a linear control valve

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

55 Guardsman Road, Thornhill, ON, L3T 6L2, Canada | ISO 9001:2008 Certified
1.800.930.2436 (CHEM) | fax.905.889.8553 | request@chemline.com | chemline.com

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CS-302-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VABLPV303191	CV9-621	DIA: 50 mm (2")	CHECK VALVE - LIQUID POLYMER	TYPE: CHECK | 150 PSI//MANUFACTURER : CHEMLINE//MODEL : BTA020EC//CONNECTION TYPE : COMBO | 2"//BODY : PVC// SEAL | SEAT :EPDM | // STEM : N/A			HYDRAPOL 3500		

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PDF Published March 1, 2013

Ball Check & Foot Valves

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

The economical and versatile Chemline Ball Check Valve is the most popular type of non-return valves for pipe sizes under 6". A wide selection of body and seat materials, and end connections are available for many different applications. It has good flow capacity and will handle many slurry and suspended solid services. This valve works in both horizontal and vertical lines. The Foot Valve is for end of line services such as sumps.

PVC | CPVC | PP | PVDF

CRN Registered Consult Chemline

NSF[3] Certified to NSF/ANSI 61

SERIES: BT: True Union Check
BC: Single Union Check
FT: True Union Check
FV: Single Union Check

SIZES: 1/2" – 4"

ENDS: Threaded, Socket, Flanged, Butt[1] or ChemFlare™[2]

SEAT/SEALS: EPDM, FKM (Viton®), PTFE coated FKM (Viton®)

features

- **True Union to 2"**
- **Full Port to 4"**
- **NSF Certified[3]**
- **Built-in Union Design** – For easy installation and maintenance
- **Free Floating Ball** – The only moving part
- **Uniseat/Seal** – Easily removable
- **May be used either horizontally or vertically**
- **Excellent flow characteristics**
- **Low seating and opening pressures**

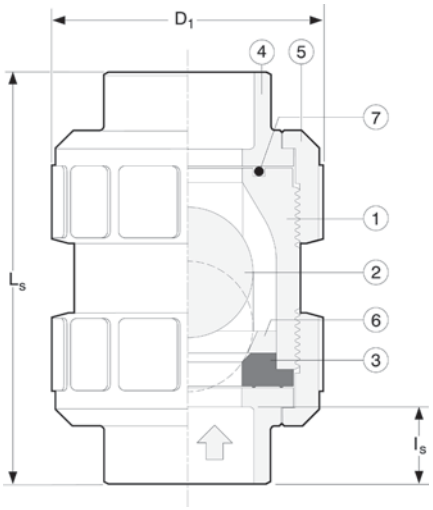
True Union Check
1/2" to 2" in all materials

Single Union Check
1/2" to 4" in PVC
2-1/2" to 4" in CPVC, PP and PVDF

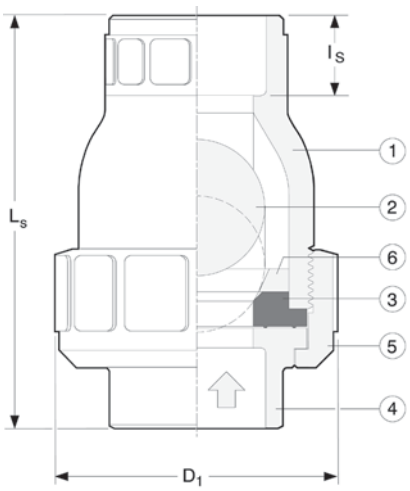
Foot Valve is light weight and has a low profile basket

[1] PP and PVDF Butt fusion ends (available 1/2" to 2") connect to Chemline PP and PVDF piping systems.
[2] For ChemFlare™ end connectors, consult Chemline.
[3] PVC valves with EPDM or FKM (Viton®) seals are certified under NSF/ANSI Standard 61 for contact with drinking water.

Ball Check Valves



True Union Valve



Single Union Valve

PARTS

▲ Recommended Spare Parts

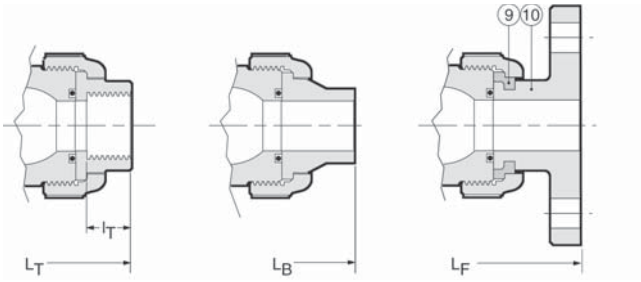
No.	Part	Pcs. T/U	Pcs. S/U	Materials
1	Body	1	1	PVC, CPVC, PP, PVDF
2	Ball	1	1	PVC, CPVC, PP, PVDF
3▲	Uniseat/Seal[1]	1	1	EPDM, FKM(Viton®), PTFE coated FKM (Viton®)
4	End Connector	2	1	PVC, CPVC, PP, PVDF
5	Union Nut	2	1	PVC, CPVC, PP, PVDF
6	Stop Ring	1	1	PVC, CPVC, PP, PVDF
7	Face O-Ring	1	1	EPDM, FKM(Viton®)
9	Flange Retainer[2]	2	1	PVDF
10	Factory Flange[3]	2	1	PVC, CPVC, PP, PVDF

[1] Standard seals are EPDM in PVC, CPVC and PP valves, PTFE coated FKM (Viton®) in PVDF valves. Coating is .002" thick.

[2] True Union: 2 pcs 1/2" to 2", 6 pcs 1-1/2" to 4" Single Union: 1 pcs 1/2" to 2", 3 pcs 2-1/2" to 4".

[3] True Union flanged valves have two factory flanges. Single Union valves have one factory flange and one fabricated flange. Consult Chemline for details on fabricated type.

UNION END CONNECTIONS



NPT Threaded

Butt Fusion PP and PVDF

Factory Flanged

DIMENSIONS INCHES

WEIGHTS LB.

Size	D_1	I_s	I_T	True Union PVC & CPVC L_T	L_S	L_F	True Union PP & PVDF L_T	L_B	L_F	Single Union PVC L_T	L_S	L_F	True Union Socket or Butt PVC	CPVC	PP	PVDF	Single Union PVC
1/2"	1.9	0.69	0.59	3.4	3.4	5.1	3.4	4.0	5.1	3.2	3.4	5.6	0.3	0.3	0.2	0.3	0.2
3/4"	2.4	0.72	0.67	4.1	3.9	6.1	4.1	4.4	6.1	3.8	3.7	6.6	0.5	0.5	0.3	0.6	0.4
1"	2.8	0.88	0.79	4.5	4.4	6.5	4.5	4.8	6.5	4.2	4.3	7.3	0.7	0.8	0.4	0.9	0.6
1-1/4"	3.1	0.94	0.87	5.0	4.9	6.6	5.0	5.9	6.6	6.2	6.3	12.3	1.1	1.2	0.7	1.5	1.5
1-1/2"	3.7	1.09	0.98	5.9	5.9	7.6	5.9	5.8	7.6	5.6	5.7	9.1	1.6	1.7	1.0	2.0	1.3
2"	4.2	1.16	1.10	7.0	6.8	8.4	7.0	6.5	8.4	6.5	6.5	10.5	2.2	2.4	1.4	2.7	1.8

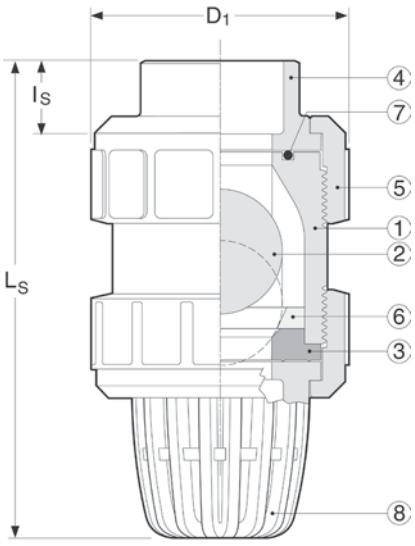
DIMENSIONS INCHES

WEIGHTS LB.

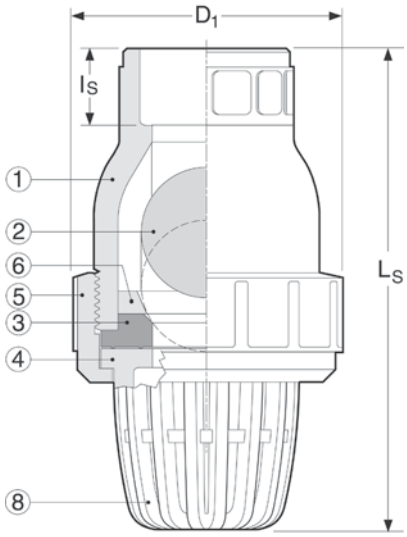
Size	D_1	I_s[4]	I_T	Single Union PVC & CPVC L_T	L_S	L_F	Single Union PP & PVDF L_T	L_B	L_F	Single Union PVC	CPVC	PP	PVDF
2-1/2"	6.0	2.10	2.17	10.0	10.4	14.3	8.7	*	*	5.7	6.2	*	*
3"	6.0	1.88	1.38	8.7	9.6	12.2	8.7	*	*	5.1	5.5	3.3	6.3
4"	8.3	2.00	1.77	12.1	12.2	15.0	12.1	*	*	12.7	13.9	8.1	15.7

[4] Consult Chemline.

Foot Valves



True Union Valve



Single Union Valve

PARTS

▲ Recommended Spare Parts

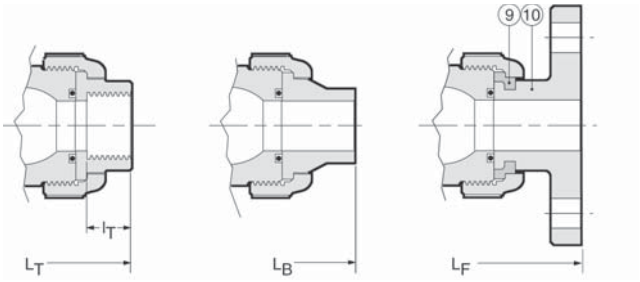
No.	Part	Pcs. T/U	Pcs. S/U	Materials
1	Body	1	1	PVC, CPVC, PP, PVDF
2	Ball	1	1	PVC, CPVC, PP, PVDF
3▲	Uniseat/Seal[1]	1	1	EPDM, FKM(Viton®), PTFE coated FKM (Viton®)
4	End Connector	2	1	PVC, CPVC, PP, PVDF
5	Union Nut	2	1	PVC, CPVC, PP, PVDF
6	Stop Ring	1	1	PVC, CPVC, PP, PVDF
7	Face O-Ring	1	1	EPDM, FKM(Viton®)
8	Foot Valve Basket	1	1	PVC, CPVC, PP, PVDF
9	Flange Retainer[2]	3	0	PVDF
10	Factory Flange[3]	1	0	PVC, CPVC, PP, PVDF

[1] Standard seals are EPDM in PVC, CPVC and PP valves, PTFE coated FKM (Viton®) in PVDF valves. Coating is .002" thick.

[2] True Union: 1 pc 1/2" to 2", 3 pcs 2-1/2" to 4".

[3] True Union valves have factory flanges. Single Union have fabricated flanges. Consult Chemline for details on fabricated type.

END CONNECTIONS FOR TRUE UNION VALVE



NPT Threaded

Butt Fusion PP and PVDF

Factory Flanged

DIMENSIONS INCHES

WEIGHTS LB.

Size	D_1	I_s Soc	I_T Thd	True Union PVC & CPVC L_T	True Union PVC & CPVC L_S	True Union PVC & CPVC L_F	Single Union PVC L_T	Single Union PVC L_S	Single Union PVC L_F	Single Union PVC Socket
1/2"	1.9	0.69	0.59	2.8	2.9	3.7	3.5	3.7	4.7	0.3
3/4"	2.4	0.72	0.67	3.3	3.3	4.4	4.1	4.2	5.4	0.4
1"	2.8	0.88	0.79	3.7	3.7	4.8	4.5	4.8	6.1	0.8
1-1/4"	3.7	0.94	0.87	*	*	*	*	*	*	1.8
1-1/2"	3.7	1.09	0.98	5.4	5.4	6.3	6.8	7.0	8.5	1.7
2"	4.2	1.16	1.10	6.4	6.4	7.2	7.4	7.6	9.3	2.1
2-1/2"	6.0	2.10	2.17	–	–	–	*	*	*	7.4
3"	6.0	1.88	1.38	–	–	–	11.6	12.1	14.2	7.1
4"	8.3	2.00	1.77	–	–	–	14.7	15.0	17.4	15.7

* Consult Chemline for dimensions.

For CPVC (2-1/2" to 4"), PP and PVDF Foot Valve lengths, consult Chemline.

Ball Check & Foot Valves

WORKING PRESSURES PSI

Size	PVC	CPVC				Polypropylene			PVDF			
	0-50°C 32-122°F	0-50°C 32-122°F	60°C 140°F	80°C 176°F	90°C 194°F	–20-30°C –4-90°F	60°C 140°F	80°C 176°F	–20-60°C –4-140°F	80°C 176°F	90°C 194°F	100°C 212°F
1/2″	150	150	115	85	60	150	90	60	150	120	110	85
3/4″	150	150	115	85	60	150	90	60	150	120	110	85
1″	150	150	115	85	60	150	90	60	150	120	110	85
1-1/4″	150	150	115	85	60	150	90	60	150	120	110	85
1-1/2″	150	150	115	85	60	150	90	60	150	120	110	85
2″	150	150	115	85	60	150	90	60	150	120	110	85
2-1/2″	100	100	90	60	45	100	60	45	100	90	60	45
3″	100	100	90	60	45	100	60	45	100	90	60	45
4″	100	100	90	60	45	100	60	45	100	90	60	45

Maximum Temperatures: PVC 0 to 60°C (32 to 140°F), **CPVC** 0 to 95°C (32 to 203°F), **PP** –20 to 90°C (–4 to194°F), **PVDF** –40 to 100°C (–40 to 212°F)

MINIMUM SEATING AND OPENING PRESSURE PSI

Size	Vertical Piping		Horizontal Piping	
	Open	Seating	Open	Seating
1/2″	0.7	2.8	0.1	2.8
3/4″	0.7	4.3	0.1	4.3
1″	0.7	4.3	0.1	4.3
1-1/4″	1.4	4.3	0.3	4.3
1-1/2″	1.4	4.3	0.3	4.3
2″	1.4	4.3	0.3	4.3
2-1/2″	1.4	2.8	0.3	2.8
3″	1.4	2.8	0.3	2.8
4″	1.4	2.8	0.3	2.8

Cv VALVES

Check Valves
6.5
17.
25.
86.
86.
130.
280.
280.
500.

VACUUM RATING

- 29.9 inches mercury
- Maximum recommended velocity 5 m/s

SAMPLE SPECIFICATION

All Ball Check valves in PVC, CPVC, PP or PVDF shall be Chemline BT or BC Series or equal with EPDM [FKM (Viton®) or PTFE coated FKM (Viton®)] seats and union ends. Sizes 1/2″ to 2″ shall be slip-out True Union style, sizes 2-1/2″ to 4″ shall be single union. The elastomer uniseat/seal shall function as both the ball seat and the union seal. Ball Check valves shall be rated 150 psi up to 2″ and 100 psi for sizes 2-1/2″ to 4″.

ORDERING EXAMPLE

Chemline Ball Check/Foot Valves	BT	A	020	E	S
Valve Type	**BT** – True Union Ball Check **BC** – Single Union Ball Check **FV** – Single Union Foot Valve **FT** – True Union Foot Valve				
Body Material	**A** – PVC **C** – CPVC **B** – PP **K** – PVDF				
Size	**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″				
Seals	**E** – EPDM **V** – FKM (Viton®) **T** – PTFE coated FKM (Viton®)				
Ends	**S** – Socket **T** – Threaded **F** – Flanged **B** – Butt[1] **CF** – ChemFlare™				

Example: Ball Check Valve, PVC, 2″, with EPDM seat, socket ends.

[1] PP and PVDF metric butt fusion ends (1/2″ to 2″) connect to Chemline PP and PVDF piping systems.

OPTIONS & ACCESSORIES

- **PTFE coated Uniseat/Seal**
- **Spring Loaded Ball** – Assists ball to seat faster

55 Guardsman Road, Thornhill, ON, L3T 6L2, Canada | ISO 9001:2008 Certified
tel.905.889.7890 | fax.905.889.8553 | request@chemline.com | chemline.com

CS-304-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
TECKNO VALVE	VASDBR352335	SV18-032	N/A	SOLENOID VALVE - DRIVING WATER	TYPE: SOLENOID VALVE//MANUFACTURER : ASCO//MODEL : EF8210G022-120VAC//CONNECTION TYPE : THREADED | 38 mm (1 1/2") | 38 mm (1 1/2")//BODY : BRASS// SEAL | SEAT : | // STEM : N/A	ACTING : PILOT	NORMALLY : FERMÉ/CLOSED	HYDRAPOL 3500		

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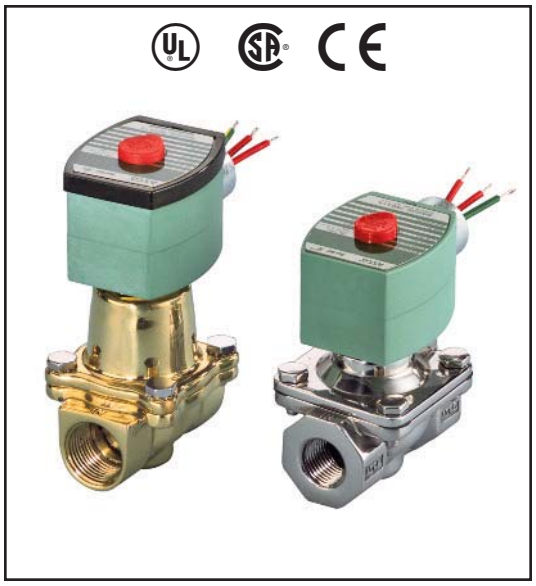
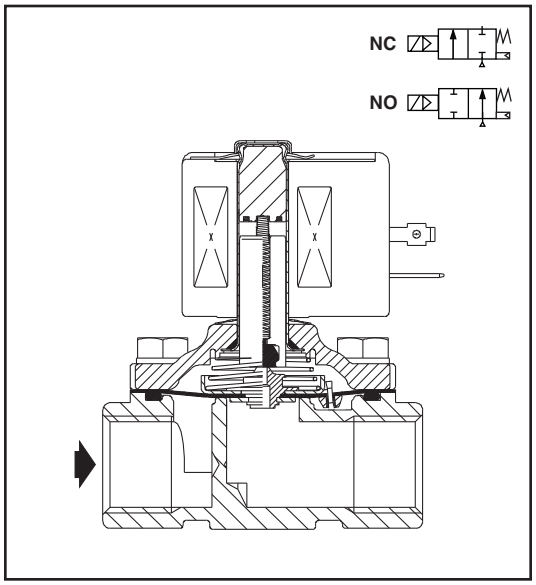
Features

- Wide range of pressure ratings, sizes, and resilient materials provide long service life and low internal leakage
- High flow valves for liquid, corrosive, and air/inert gas service
- Industrial applications include:
  - Car wash
  - Laundry equipment
  - Air compressors
  - Industrial water control
  - Pumps





Construction

Valve Parts in Contact with Fluids		
Body	Brass	304 Stainless Steel*
Seals and Discs	NBR or PTFE	
Disc-Holder	PA	
Core Tube	305 Stainless Steel	
Core and Plugnut	430F Stainless Steel	
Springs	302 Stainless Steel	
Shading Coil	Copper	Silver

*Catalog Numbers 8210G127, 8210G129, 8210G132, 8210G133 have 316L Stainless Steel bodies.

Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part Number			
		AC			General Purpose		Explosionproof	
	DC Watts	Watts	VA Holding	VA Inrush	AC	DC	AC	DC
F	-	6.1	16	40	238210	-	238214	-
F	11.6	10.1	25	70	238610	238710	238614	238714
F	16.8	16.1	35	180	272610	97617	272614	97617
F	-	17.1	40	93	238610	-	238614	-
F	-	20	43	240	99257	-	99257	-
F	-	20.1	48	240	272610	-	272614	-
F	30.8	-	-	-	-	501695	-	501696
H	40.6	-	-	-	-	238910	-	238914

Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz). 6, 12, 24, 120, 240 volts DC. Must be specified when ordering.
Other voltages available when required.

Solenoid Enclosures

Standard: RedHat II - Watertight, Types 1, 2, 3, 3S, 4, and 4X; RedHat - Type I.

Optional: RedHat II - Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9; Red-Hat - Explosionproof and Watertight, Types 3, 4, 4X, 7, and 9.

(To order, add prefix "EF" to catalog number, except Catalog Numbers 8210B057, 8210B058, and 8210B059, which are not available with Explosionproof enclosures.)
See Optional Features Section for other available options.

Nominal Ambient Temp. Ranges

RedHat II/RedHat AC: 32˚F to 125˚F (0˚C to 52˚C)
RedHat II DC: 32˚F to 104˚F (0˚C to 40˚C)
RedHat DC: 32˚F to 77˚F (0˚C to 25˚C)
(104˚F/40˚C occasionally)
8210G227 AC: 32˚F to 130˚F (0˚C to 54˚C)
DC: 32˚F to 90˚F (0˚C to 32˚C)
Refer to Engineering Section for details.

Approvals

UL listed as indicated. CSA certified.
RedHat II meets applicable CE directives.
Refer to Engineering Section for details.

ATEX/IECEx certified with prefix "EV" as listed. *Refer to Optional Features Electrical Section for details.*

Specifications (English units)

Pipe Size (in)	Orifice Size (in)	Cv Flow Factor	Operating Pressure Differential (psi)							Max. Fluid Temp. °F		Brass Body			Stainless Steel Body			Watt Rating/ Class of Coil Insulation ⑦	
				Max. AC			Max. DC												
			Min.	Air-Inert Gas	Water	Light Oil @ 300 SSU	Air-Inert Gas	Water	Light Oil @ 300 SSU	AC	DC	Catalog Number	Const. Ref. ④	UL ⑤ Listing	Catalog Number	Const. Ref. ④	UL ⑤ Listing	AC	DC
NORMALLY CLOSED (Closed when de-energized), NBR or PTFE ② Seating																			
3/8	3/8	1.5	①	150	125	-	40	40	-	180	150	8210G073 ③	1P	●	8210G036 ③	1P	●	6.1/F	11.6/F
3/8	5/8	3	0	150	150	-	40	40	-	180	150	8210G093	5D	❍	-	-	-	10.1/F	11.6/F
3/8	5/8	3	5	200	150	135	125	100	100	180	150	8210G001 ▼	6D	❍	-	-	-	6.1/F	11.6/F
3/8	5/8	3	5	300	300	300	-	-	-	175	-	8210G006 ✓	5D	❍	-	-	-	17.1/F	-
1/2	7/16	2.2	①	150	125	-	40	40	-	180	150	8210G015 ③	2P	●	8210G037 ③	2P	●	6.1/F	11.6/F
1/2	5/8	4	0	150	150	-	40	40	-	180	150	8210G094 ✓	5D	❍	-	-	-	10.1/F	11.6/F
1/2	5/8	4	0	150	150	125	40	40	-	175	150	-	-	-	8210G087 ✓	7D	●	17.1/F	11.6/F
1/2	5/8	4	5	200	150	135	125	100	100	180	150	8210G002 ▼	6D	❍	-	-	-	6.1/F	11.6/F
1/2	5/8	4	5	300	300	300	-	-	-	175	-	8210G007	5D	❍	-	-	-	17.1/F	-
1/2	3/4	4	5	-	300	-	-	300	-	130	90	8210G227	5D	❍ †	-	-	-	17.1/F	40.6/H
3/4	5/8	4.5	0	150	150	125	40	40	-	175	150	-	-	-	8210G088 ✓	7D	●	17.1/F	11.6/F
3/4	3/4	5	5	125	125	125	100	90	75	180	150	8210G009 ▼	9D	❍	-	-	-	6.1/F	11.6/F
3/4	3/4	5	0	150	150	-	40	40	-	180	150	8210G095 ✓	8D	❍	-	-	-	10.1/F	11.6/F
3/4	3/4	6.5	5	250	150	100	125	125	125	180	150	8210G003 ▼	11D	❍	-	-	-	6.1/F	11.6/F
3/4	3/4	6	0	350	300	200	200	200	200	200	180	8210G026 ② ‡ ◆	40P/10D	●	-	-	-	16.1F	30.8/F
1	1	13	0	150	125	125	135	120	120	180	180	8210G054 ‡ ◆	41D/31D	●	8210G089 ‡ ◆	45D/15D	●	16.1/F	30.8/F
1	1	13	5	150	150	100	125	125	125	180	150	8210G004 ▼	12D	❍	-	-	-	6.1/F	11.6/F
1	1	13.5	0	300	225	115	-	-	-	200	-	8210G027 ‡	42P	●	-	-	-	20.1/F	-
1	1	13.5	10	300	300	300	-	-	-	175	-	8210G078 ②	13P	-	-	-	-	17.1/F	-
1 1/4	1 1/8	15	0	150	125	125	135	120	120	180	180	8210G055 ‡ ◆	43D/32D	●	-	-	-	16.1/F	30.8/F
1 1/4	1 1/8	15	5	150	150	100	125	125	125	180	150	8210G008 ▼	16D	❍	-	-	-	6.1/F	11.6/F
1 1/2	1 1/4	22.5	0	150	125	125	135	120	120	180	180	8210G056 ‡ ◆	44D/33D	●	-	-	-	16.1/F	30.8/F
1 1/2	1 1/4	22.5	5	150	150	100	125	125	125	180	150	8210G022 ▼	18D	●	8210G127	-	-	6.1/F	11.6/F
2	1 3/4	43	5	150	125	90	50	50	50	180	150	8210G100	20P	●	8210G129	-	-	6.1/F	11.6/F
2 1/2	1 3/4	45	5	150	125	90	50	50	50	180	150	8210G101	21P	●	-	-	-	6.1/F	11.6/F
NORMALLY OPEN (Open when de-energized), NBR Seating (PA Disc-Holder, except as noted)																			
3/8	5/8	3	0	150	150	125	125	125	80	180	150	8210G033	23D	●	-	-	-	10.1/F	11.6/F
3/8	5/8	3	5	250	200	200	250	200	200	180	180	8210G011 ⑧ ⑨	39D	●	-	-	-	10.1/F	11.6/F
1/2	5/8	4	0	150	150	125	125	125	80	180	150	8210G034 ✓	23D	●	-	-	-	10.1/F	11.6/F
1/2	5/8	3	0	150	150	100	125	125	80	180	150	-	-	-	8210G030 ✓	37D	●	10.1/F	11.6/F
1/2	5/8	4	5	250	200	200	250	200	200	180	180	8210G012 ⑧ ⑨	39D	●	-	-	-	10.1/F	11.6/F
3/4	3/4	5.5	0	150	150	125	125	125	80	180	150	8210G035 ✓	25D	●	-	-	-	10.1/F	11.6/F
3/4	5/8	3	0	150	150	100	125	125	80	180	150	-	-	-	8210G038 ✓	38D	●	10.1/F	11.6/F
3/4	3/4	6.5	5	-	-	-	250	200	200	-	180	8210C013	24D	●	-	-	-	-	16.8/F
3/4	3/4	6.5	5	250	200	200	-	-	-	180	-	8210G013	46D	●	-	-	-	16.1/F	-
1	1	13	0	125	125	125	-	-	-	180	-	8210B057 ⑥ ⑩	34D	●	-	-	-	20/F	-
1	1	13	5	-	-	-	125	125	125	-	180	8210D014	26D	●	-	-	-	-	16.8/F
1	1	13	5	150	150	125	-	-	-	180	-	8210G014	47D	●	-	-	-	16.1/F	-
1 1/4	1 1/8	15	0	125	125	125	-	-	-	180	-	8210B058 ⑥ ⑩	35D	●	-	-	-	20/F	-
1 1/4	1 1/8	15	5	-	-	-	125	125	125	-	180	8210D018	28D	●	-	-	-	-	16.8/F
1 1/4	1 1/8	15	5	150	150	125	-	-	-	180	-	8210G018	48D	●	-	-	-	16.1/F	-
1 1/2	1 1/4	22.5	0	125	125	125	-	-	-	180	-	8210B059 ⑥ ⑩	36D	●	-	-	-	20/F	-
1 1/2	1 1/4	22.5	5	-	-	-	125	125	125	-	180	8210D032	29D	●	-	-	-	-	16.8/F
1 1/2	1 1/4	22.5	5	150	150	125	-	-	-	180	-	8210G032	49D	●	8210G132	-	-	16.1/F	-
2	1 3/4	43	5	-	-	-	125	125	125	-	150	8210 103	30P	●	-	-	-	-	16.8/F
2	1 3/4	43	5	125	125	125	-	-	-	180	-	8210G103	50P	●	8210G133	-	-	16.1/F	-
2 1/2	1 3/4	45	5	-	-	-	125	125	125	-	150	8210 104	27P	●	-	-	-	-	16.8/F
2 1/2	1 3/4	45	5	125	125	125	-	-	-	180	-	8210G104	51P	●	-			16.1/F	-

① 5 psi on Air; 1 psi on Water.
② Valve provided with PTFE main disc.
③ Valve includes Ultem (G.E. trademark) piston.
④ Letter "D" denotes diaphragm construction; "P" denotes piston construction.
⑤ ❍ Safety Shutoff Valve; ● General Purpose Valve.
Refer to Engineering Section (Approvals) for details.

⑥ Valves not available with Explosionproof enclosures.
⑦ On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.
⑧ AC construction also has PA seating.
⑨ No disc-holder.
⑩ Stainless steel disc-holder.
† UL listed for fire protection systems per UL429A.

‡ DC constructions must have solenoid mounted vertical and upright.
✓ ATEX/IECEx certified with prefix "EV".
▼ ATEX/IECEx certified for DC only with prefix "EV".
◆ Not available in 6 Volt DC. EF and HB prefix only.

Specifications (Metric units)

Pipe Size (in)	Orifice Size (mm)	Kv Flow Factor (m^3/hr)	Operating Pressure Differential (bar)							Max. Fluid Temp. ˚C		Brass Body			Stainless Steel Body			Watt Rating/ Class of Coil Insulation ⑦	
				Max. AC			Max. DC												
			Min.	Air-Inert Gas	Water	Light Oil @ 300 SSU	Air-Inert Gas	Water	Light Oil @ 300 SSU	AC	DC	Catalog Number	Const. Ref. ④	UL ⑤ Listing	Catalog Number	Const. Ref. ④	UL ⑤ Listing	AC	DC
NORMALLY CLOSED (Closed when de-energized), NBR or PTFE ② Seating																			
3/8	10	1.3	①	10	9	-	3	3	-	82	65	8210G073 ③	1P	●	8210G036 ③	1P	●	6.1/F	11.6/F
3/8	16	2.6	0	10	10	-	3	3	-	82	65	8210G093	5D	❍	-	-	-	10.1/F	11.6/F
3/8	16	2.6	0.3	14	10	9	9	7	7	82	65	8210G001 ▼	6D	❍	-	-	-	6.1/F	11.6/F
3/8	16	2.6	0.3	21	21	21	-	-	-	79	-	8210G006 ✓	5D	❍	-	-	-	17.1/F	-
1/2	11	1.9	①	10	9	-	3	3	-	82	65	8210G015 ③	2P	●	8210G037 ③	2P	●	6.1/F	11.6/F
1/2	16	3.4	0	10	10	-	3	3	-	82	65	8210G094 ✓	5D	❍	-	-	-	10.1/F	11.6/F
1/2	16	3.4	0	10	10	9	3	3	-	79	65	-	-	-	8210G087 ✓	7D	●	17.1/F	11.6/F
1/2	16	3.4	0.3	14	10	9	9	7	7	82	65	8210G002 ▼	6D	❍	-	-	-	6.1/F	11.6/F
1/2	16	3.4	0.3	21	21	21	-	-	-	79	-	8210G007	5D	❍	-	-	-	17.1/F	-
1/2	19	3.4	0.3	-	21	-	-	21	-	54	32	8210G227	5D	❍ †	-	-	-	17.1/F	40.6H
3/4	16	3.9	0	10	10	9	3	3	-	79	65	-	-	-	8210G088 ✓	7D	●	17.1/F	11.6/F
3/4	19	4.3	0.3	9	9	9	7	6	5	82	65	8210G009 ▼	9D	❍	-	-	-	6.1/F	11.6/F
3/4	19	4.3	0	10	10	-	3	3	-	82	65	8210G095 ✓	8D	❍	-	-	-	10.1/F	11.6/F
3/4	19	5.6	0.3	17	10	7	9	9	9	82	65	8210G003 ▼	11D	❍	-	-	-	6.1/F	11.6/F
3/4	19	5.1	0	24	21	14	14	14	14	93	82	8210G026 ② ‡ ◆	40P/10D	●	-	-	-	16.1F	30.8/F
1	25	11	0	10	9	9	9	8	8	82	82	8210G054 ‡ ◆	41D/31D	●	8210G089 ‡ ◆	45D/15D	●	16.1/F	30.8/F
1	25	11	0.3	10	10	7	9	9	9	82	65	8210G004 ▼	12D	❍	-	-	-	6.1/F	11.6/F
1	25	11.5	0	21	16	8	-	-	-	93	-	8210G027 ‡	42P	●	-	-	-	20.1/F	-
1	25	11.5	0.7	21	21	21	-	-	-	79	-	8210G078 ②	13P	-	-	-	-	17.1/F	-
1 1/4	29	13	0	10	9	9	9	8	8	82	82	8210G055 ‡ ◆	43D/32D	●	-	-	-	16.1/F	30.8/F
1 1/4	29	13	0.3	10	10	7	9	9	9	82	65	8210G008 ▼	16D	❍	-	-	-	6.1/F	11.6/F
1 1/2	32	19.5	0	10	9	9	9	8	8	82	82	8210G056 ‡ ◆	44D/33D	●	-	-	-	16.1/F	30.8/F
1 1/2	32	19.5	0.3	10	10	7	9	9	9	82	65	8210G022 ▼	18D	●	8210G127	-	-	6.1/F	11.6/F
2	44	37	0.3	10	9	6	3	3	3	82	65	8210G100	20P	●	8210G129	-	-	6.1/F	11.6/F
2 1/2	44	39	0.3	10	9	6	3	3	3	82	65	8210G101	21P	●	-	-	-	6.1/F	11.6/F
NORMALLY OPEN (Open when de-energized), NBR Seating (PA Disc-Holder, except as noted)																			
3/8	16	2.6	0.0	10	10	9	9	9	6	82	65	8210G033	23D	●	-	-	-	10.1/F	11.6/F
3/8	16	2.6	0.3	17	14	14	17	14	14	82	82	8210G011 ⑧ ⑨	39D	●	-	-	-	10.1/F	11.6/F
1/2	16	3.4	0	10	10	9	9	9	6	82	65	8210G087 ✓	7D	●	-	-	-	10.1/F	11.6/F
1/2	16	2.6	0	10	10	7	9	9	6	82	65	-	-	-	8210G087 ✓	7D	●	10.1/F	11.6/F
1/2	16	3.4	0.3	17	14	14	17	14	14	82	82	8210G012 ⑧ ⑨	39D	●	-	-	-	10.1/F	11.6/F
3/4	19	4.7	0	10	10	9	9	9	6	82	65	8210G087 ✓	7D	●	-	-	-	10.1/F	11.6/F
3/4	16	2.6	0	10	10	7	9	9	6	82	65	-	-	-	8210G087 ✓	7D	●	10.1/F	11.6/F
3/4	19	5.6	0.3	-	-	-	17	14	14	-	82	8210C013	24D	●	-	-	-	-	16.8/F
3/4	19	5.6	0.3	17	14	14	-	-	-	82	-	8210G013	46D	●	-	-	-	16.1/F	-
1	25	11	0	9	9	9	-	-	-	82	-	8210B057 ⑥ ⑩	34D	●	-	-	-	20/F	-
1	25	11	0.3	-	-	-	9	9	9	-	82	8210D014	26D	●	-	-	-	-	16.8/F
1	25	11	0.3	10	10	9	-	-	-	82	-	8210G014	47D	●	-	-	-	16.1/F	-
1 1/4	29	13	0	9	9	9	-	-	-	82	-	8210B058 ⑥ ⑩	35D	●	-	-	-	20/F	-
1 1/4	29	13	0.3	-	-	-	9	9	9	-	82	8210D018	28D	●	-	-	-	-	16.8/F
1 1/4	29	13	0.3	10	10	9	-	-	-	82	-	8210G018	48D	●	-	-	-	16.1/F	-
1 1/2	32	19.5	0	9	9	9	-	-	-	82	-	8210B059 ⑥ ⑩	36D	●	-	-	-	20/F	-
1 1/2	32	19.5	0.3	-	-	-	9	9	9	-	82	8210D032	29D	●	-	-	-	-	16.8/F
1 1/2	32	19.5	0.3	10	10	9	-	-	-	82	-	8210G032	49D	●	8210G132	-	-	16.1/F	-
2	44	37	0.3	-	-	-	9	9	9	-	65	8210 103	30P	●	-	-	-	-	16.8/F
2	44	37	0.3	9	9	9	-	-	-	82	-	8210G103	50P	●	8210G133	-	-	16.1/F	-
2 1/2	44	39	0.3	-	-	-	9	9	9	-	65	8210 104	27P	●	-	-	-	-	16.8/F
2 1/2	44	39	0.3	9	9	9	-	-	-	82	-	8210G104	51P	●	-	-	-	16.1/F	-

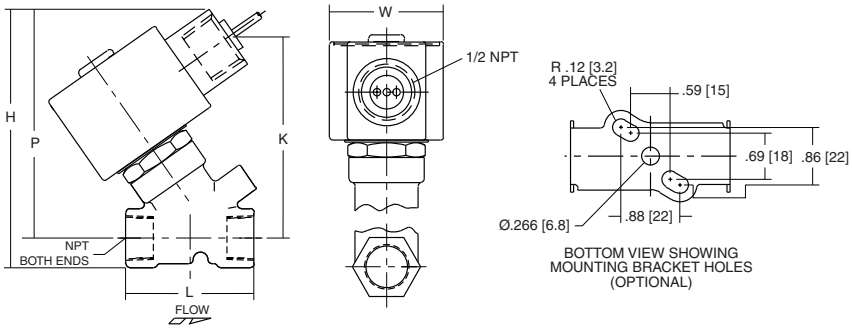
① 0.3 bar on Air; 0.0 bar on Water.
② Valve provided with PTFE main disc.
③ Valve includes UItem (G.E. trademark) piston.
④ Letter "D" denotes diaphragm construction; "P" denotes piston construction.
⑤ ❍ Safety Shutoff Valve; ● General Purpose Valve.
Refer to Engineering Section (Approvals) for details.
⑥ Valves not available with Explosionproof enclosures.
⑦ On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.
⑧ AC construction also has PA seating.
⑨ No disc-holder.
⑩ Stainless steel disc-holder.
† UL listed for fire protection systems per UL429A.
‡ DC constructions must have solenoid mounted vertical and upright.
✓ ATEX/IECEx certified with prefix "EV".
▼ ATEX/IECEx certified for DC only with prefix "EV".
◆ Not available in 6 Volt DC. EF and HB prefix only.

Dimensions: inches (mm)

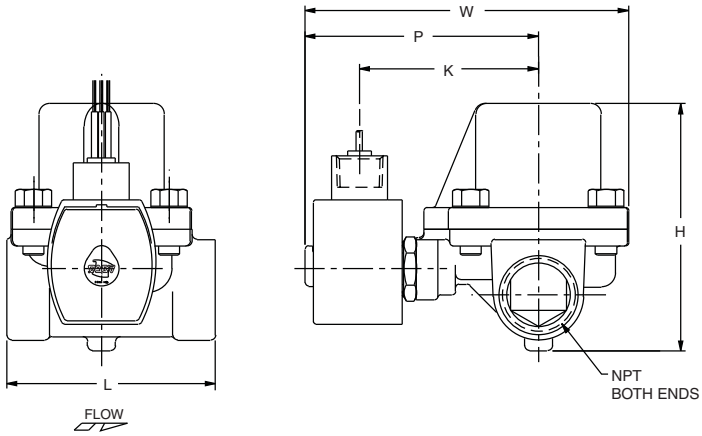
Const. Ref.		H	K	L	P	W
1*	in	3.85	3.00	1.91	3.41	1.69
	mm	98	76	49	87	43
2*	in	4.17	3.25	2.28	3.63	1.69
	mm	106	83	58	92	43
5	in	3.84	2.31	2.75	3.28	2.28
	mm	98	59	70	83	58
6*	in	3.38	1.94	2.75	2.80	2.28
	mm	86	49	70	71	58
7	in	4.19	2.50	2.81	3.47	2.39
	mm	106	64	71	88	61
8	in	4.13	2.47	2.81	3.44	2.29
	mm	105	63	71	87	58
9*	in	3.66	2.10	2.81	2.96	2.28
	mm	93	53	71	75	58
10*	in	5.20	3.40	2.80	4.50	2.50
	mm	131	86	71	114	62
11*	in	4.16	2.66	3.84	3.52	2.75
	mm	106	68	98	89	70
12	in	5.64	3.15	3.75	4.01	3.36
	mm	143	80	95	102	85
13	in	4.44	3.22	3.75	4.19	5.81
	mm	113	82	95	106	147
15*	in	5.20	3.30	3.80	4.40	3.80
	mm	133	83	98	111	98
16	in	5.64	3.15	3.66	4.01	3.56
	mm	143	80	93	102	90
18*	in	6.11	3.30	4.38	4.16	3.92
	mm	155	84	111	106	100
20*	in	7.33	3.71	5.06	4.57	4.87
	mm	186	94	129	116	124
21*	in	7.33	3.71	5.50	4.57	4.87
	mm	186	94	140	116	124
23	in	4.35	2.65	2.75	3.79	2.28
	mm	110	67	70	96	58
24	in	5.06	X	3.78	4.44	2.75
	mm	129	X	96	113	70
25	in	4.64	2.81	2.81	3.94	2.28
	mm	118	71	71	100	58
26	in	6.53	X	3.75	4.91	3.19
	mm	166	X	95	125	81
27	in	8.22	X	5.50	5.47	4.87
	mm	209	X	140	139	124
28	in	6.53	X	3.66	4.91	3.19
	mm	166	X	93	125	81
29	in	7.03	X	4.38	5.06	4.40
	mm	179	X	111	129	112

* DC dimensions slightly larger.
IMPORTANT: Valves may be mounted in any position, except as noted in specifications table.

Const. Ref. 1, 2



Const. Ref. 13



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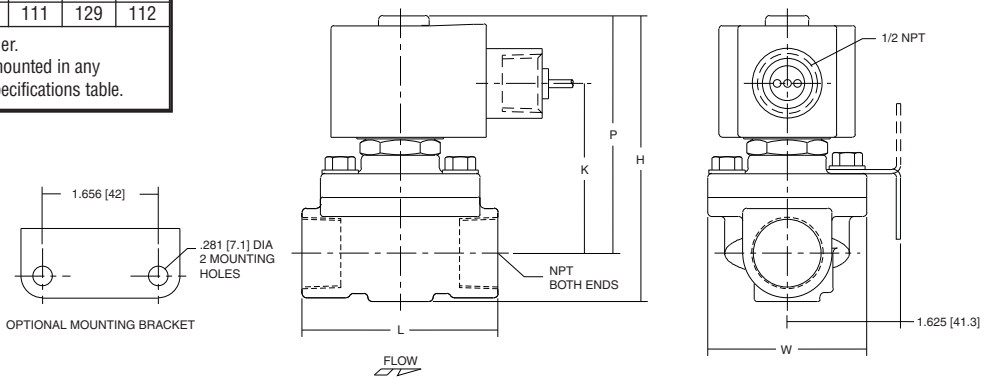
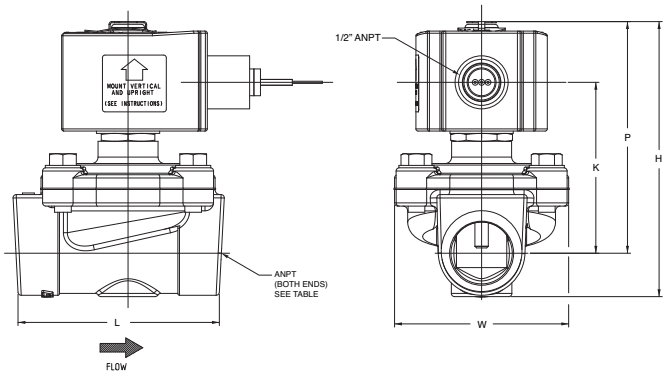


Dimensions: inches (mm)

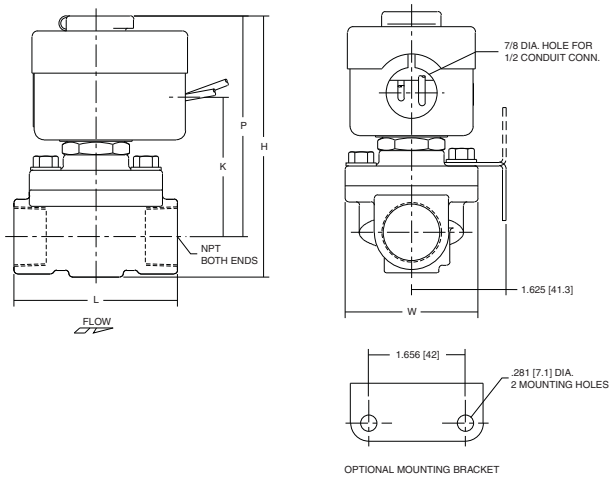
Const. Ref.		H	K	L	P	W
30	in	8.22	X	5.06	5.47	4.87
	mm	209	X	129	139	124
31	in	5.13	3.19	3.76	4.32	3.27
	mm	130	81	95	110	83
32	in	5.60	3.44	3.66	4.57	3.27
	mm	142	87	93	116	83
33	in	5.92	3.66	4.51	4.80	3.89
	mm	150	93	115	122	99
34	in	6.91	X	3.75	6.09	3.25
	mm	176	X	95	155	83
35	in	7.34	X	3.66	6.34	3.25
	mm	186	X	93	161	83
36	in	7.66	X	4.38	6.56	3.91
	mm	1.95	X	111	167	99
37	in	4.61	2.75	2.81	3.89	2.39
	mm	117	70	71	99	61
38	in	4.61	2.75	2.81	3.89	2.39
	mm	117	70	71	99	61
39	in	5.42	2.31	2.75	4.86	3.80
	mm	138	59	70	123	97
40	in	5.20	3.29	2.81	4.50	2.28
	mm	132	83	71	114	58
41	in	5.13	3.10	3.75	4.32	3.25
	mm	130	79	95	110	83
42	in	6.43	4.40	3.93	5.62	3.25
	mm	163	112	100	143	83
43	in	5.57	3.35	3.66	4.57	3.25
	mm	142	85	93	116	83
44	in	5.90	3.57	4.38	4.79	3.91
	mm	150	91	111	122	99
45	in	5.26	3.17	3.75	4.38	3.84
	mm	134	81	95	111	98
46	in	4.95	3.10	3.84	4.31	2.75
	mm	126	79	98	110	70
47	in	6.43	3.59	3.75	4.81	3.52
	mm	163	91	95	122	90
48	in	6.43	3.59	3.66	4.81	3.73
	mm	163	91	93	122	95
49	in	6.91	3.75	4.38	4.96	4.40
	mm	176	95	111	126	112
50	in	8.13	4.15	5.06	5.37	4.87
	mm	207	105	129	136	124
51	in	8.13	4.15	5.50	5.37	5.18
	mm	207	105	140	136	132

IMPORTANT: Valves may be mounted in any position, except as noted in specifications table.

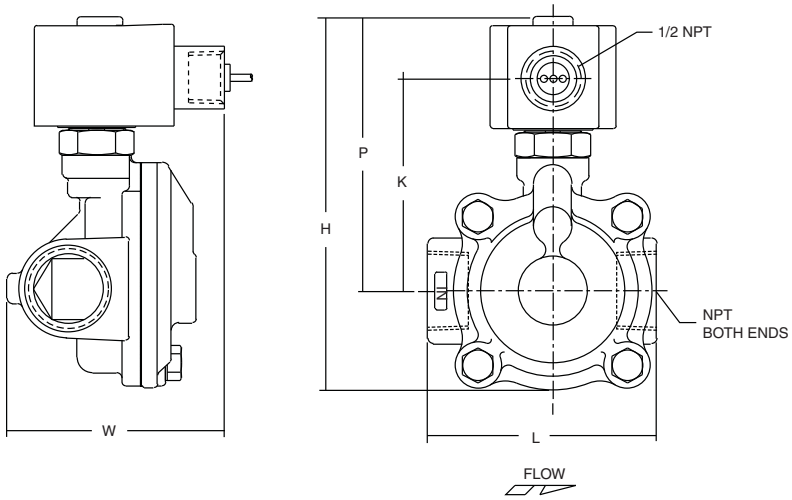
Const. Ref. 10, 15, 31, 32, 33



Const. Ref. 24, 34, 35, 36

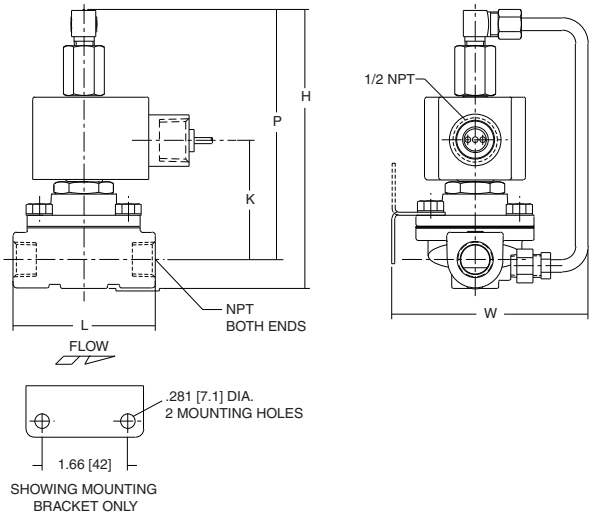


Const. Ref. 12, 16, 26, 28, 47, 48

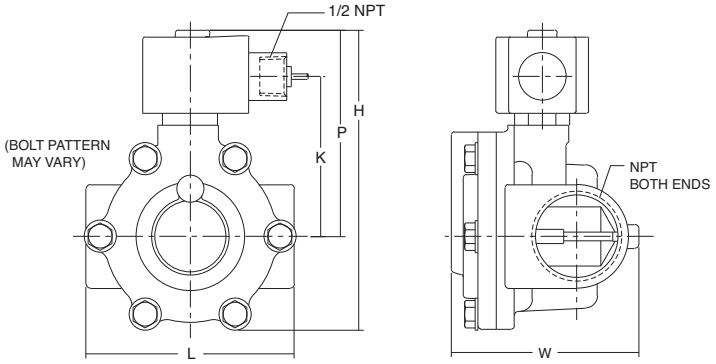


Dimensions: inches (mm)

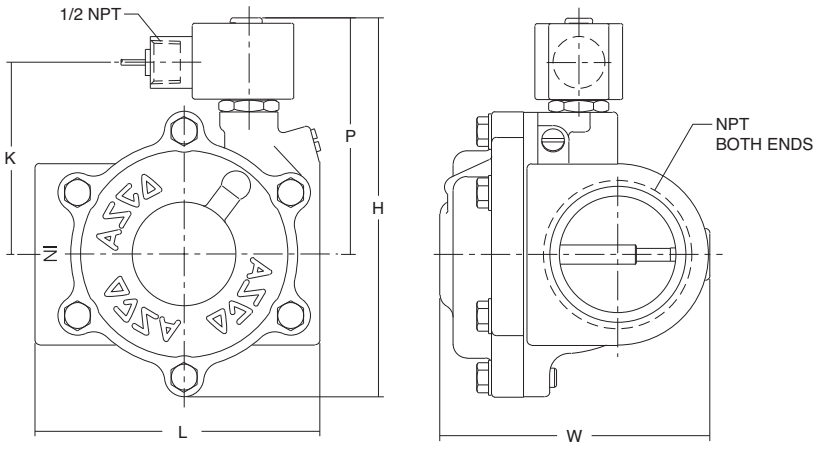
Const. Ref. 39



Const. Ref. 18, 29, 49



Const. Ref. 20, 21, 27, 30, 50, 51



CS-304-500 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VASDBR330455	T9-621-V002	N/A	Actuated Transfer Valve	TYPE: SOLENOID VALVE//MANUFACTURER : ASCO//MODEL : 8345G001-120VAC//CONNECTION TYPE : THREADED | 6 mm (1/4") | 6 mm (1/4")//BODY : BRASS// SEAL | SEAT :NBR | // STEM : N/A	ACTING :	NORMALLY :	HYDRAPOL 3500		

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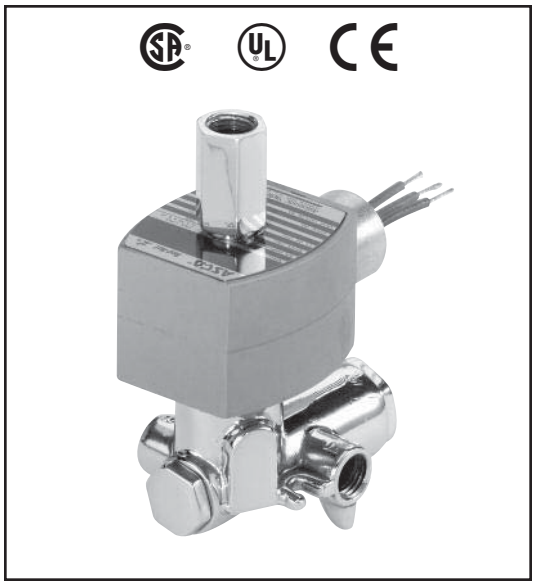
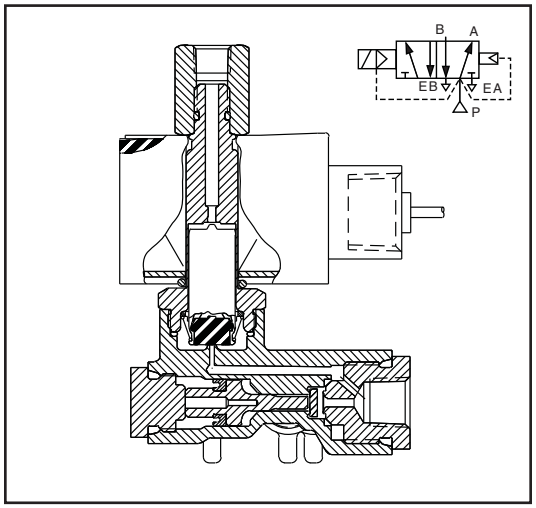
Features

- Compact valves for general service applications
- Low-cost, 4-way valve when low flow is sufficient
- Mountable in any position





Construction

Valve Parts in Contact with Fluids		
Body	Brass	316 Stainless Steel
Seals and Disc	NBR and PA	
Core Tube	305 Stainless Steel	
Core and Plugnut	430F Stainless Steel	
Springs	302 Stainless Steel	
Shading Coil	Copper	Silver
Piston	PA	

Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part Number					
		AC			General Purpose		Explosionproof (EF)		Explosionproof (EV)	
	DC Watts	Watts	VA Holding	VA Inrush	AC	DC	AC	DC	AC	DC
F	11.6	10.1	25	50	238610	238710	238614	238714	274614	274714

Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz).
6, 12, 24, 120, 240 volts DC. Must be specified when ordering.
Other voltages are available when required.

Solenoid Enclosures

Standard: Watertight, Types 1, 2, 3, 3S, 4, and 4X.

Optional: Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9. (To order, add prefix "EF" or, for Explosionproof Stainless Steel trim and hub on Brass-Bodied valves, add "EV" to catalog number.)

See Optional Features Section for other available options.

Nominal Ambient Temp. Ranges

AC: 32˚F to 125˚F (0˚C to 52˚C)
DC: 32˚F to 104˚F (0˚C to 40˚C)

Refer to Engineering Section for details.

Approvals

CSA certified. UL listed as General Purpose Valve.
EV8345G081 solenoid only UL approved.
Meets applicable CE directives.
Refer to Engineering Section for details.

ATEX/IECEx certified with prefix "EV" as listed.
Refer to Optional Features Electrical Section for details.

Important

A Minimum Operating Pressure Differential must be maintained between the pressure and exhaust ports. Supply and exhaust piping must be full area, unrestricted. ASCO flow controls and other similar components must be installed in the cylinder lines only.

Refer to Engineering Section for details.

ASCO®

Specifications (English units)

Pipe Size (in)	Orifice Size (in)		Cv Flow Factor		Operating Pressure Differential (psi)							Max. Fluid Temp. ˚F		Brass Body	Stainless Steel Body		Watt Rating/ Class of Coil Insulation	
					Max. AC				Max. DC									
	Press.	Exh.	Inlet	Exh.	Min.	Air-Inert Gas	Water	Lt. Oil @ 50 SSU	Air-Inert Gas	Water	Lt. Oil @ 50 SSU	AC	DC	Catalog Number	Catalog Number	Const. Ref.	AC	DC
SINGLE SOLENOID																		
1/4	1/16	3/32	.09	.09	10	150	150	150	100	100	100	180	104	8345G001 ①	EV8345G081 ①	1	10.1/F	11.6/F
SINGLE SOLENOID AIR-ONLY CONSTRUCTION - Exhaust to Atmosphere																		
1/4	1/16	3/32	.09	.09	10	150	-	-	100	-	-	180	104	8345H003	-	1	10.1/F	11.6/F

① ATEX/IECEx certified with prefix "EV".

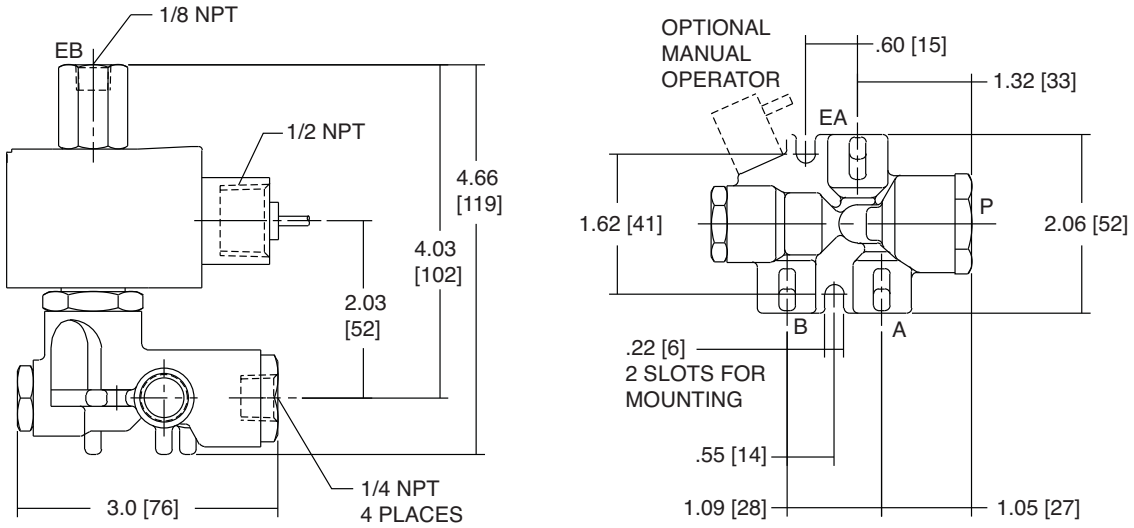
Specifications (Metric units)

Pipe Size (in)	Orifice Size (mm)		Kv Flow Factor (m^3/h)		Operating Pressure Differential (bar)							Max. Fluid Temp. ˚C		Brass Body	Stainless Steel Body		Watt Rating/ Class of Coil Insulation	
					Max. AC				Max. DC									
	Press.	Exh.	Inlet	Exh.	Min.	Air-Inert Gas	Water	Lt. Oil @ 50 SSU	Air-Inert Gas	Water	Lt. Oil @ 50 SSU	AC	DC	Catalog Number	Catalog Number	Const. Ref.	AC	DC
SINGLE SOLENOID																		
1/4	2	2	.08	.08	0.7	10	10	10	7	7	7	82	40	8345G001 ①	EV8345G081 ①	1	10.1/F	11.6/F
SINGLE SOLENOID AIR-ONLY CONSTRUCTION - Exhaust to Atmosphere																		
1/4	2	2	.08	.08	0.7	10	-	-	7	-	-	82	40	8345H003	-	1	10.1/F	11.6/F

① ATEX/IECEx certified with prefix "EV".

Dimensions inches (mm)

Const. Ref. 1



CS-304-507 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
TECKNO VALVE	VASDBR352337	SV18-031	N/A	SOLENOID VALVE - FEEDER	TYPE: SOLENOID VALVE//MANUFACTURER : ASCO//MODEL : EF8345G001-120VAC//CONNECTION TYPE : THREADED | 6 mm (1/4") | 6 mm (1/4")//BODY : BRASS// SEAL | SEAT :NBR | // STEM : N/A	ACTING :	NORMALLY :	HYDRAPOL 3500		

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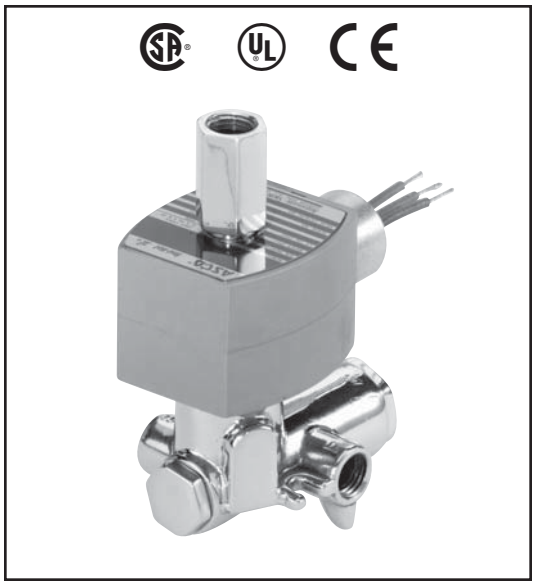
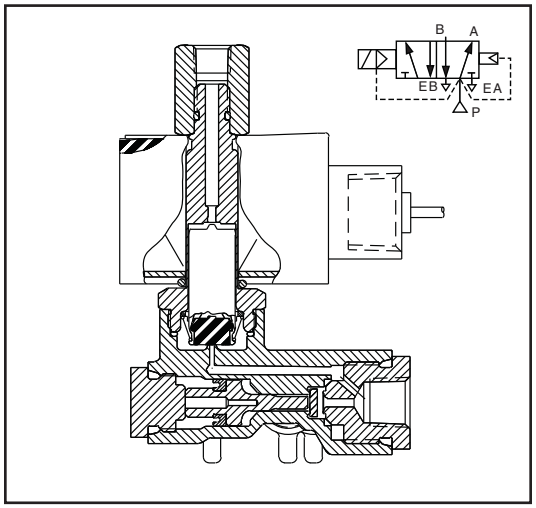
Features

- Compact valves for general service applications
- Low-cost, 4-way valve when low flow is sufficient
- Mountable in any position





Construction

Valve Parts in Contact with Fluids		
Body	Brass	316 Stainless Steel
Seals and Disc	NBR and PA	FKM, PA and UR
Core Tube	305 Stainless Steel	
Core and Plugnut	430F Stainless Steel	
Springs	302 Stainless Steel	
Shading Coil	Copper	Silver
Piston	PA	

Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part Number					
		AC			General Purpose		Explosionproof (EF)		Explosionproof (EV)	
	DC Watts	Watts	VA Holding	VA Inrush	AC	DC	AC	DC	AC	DC
F	11.6	10.1	25	50	238610	238710	238614	238714	274614	274714

Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz). 6, 12, 24, 120, 240 volts DC. Must be specified when ordering.
Other voltages are available when required.

Solenoid Enclosures

Standard: Watertight, Types 1, 2, 3, 3S, 4, and 4X.

Optional: Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9. (To order, add prefix "EF" or, for Explosionproof Stainless Steel trim and hub on Brass-Bodied valves, add "EV" to catalog number.)

See Optional Features Section for other available options.

Nominal Ambient Temp. Ranges

AC: 32˚F to 125˚F (0˚C to 52˚C)
DC: 32˚F to 104˚F (0˚C to 40˚C)

Refer to Engineering Section for details.

Approvals

CSA certified. UL listed as General Purpose Valve.
EV8345G081 solenoid only UL approved.
Meets applicable CE directives.

Refer to Engineering Section for details.

Important

A Minimum Operating Pressure Differential must be maintained between the pressure and exhaust ports. Supply and exhaust piping must be full area, unrestricted. ASCO flow controls and other similar components must be installed in the cylinder lines only.

Refer to Engineering Section for details.

ASCO®

Specifications (English units)

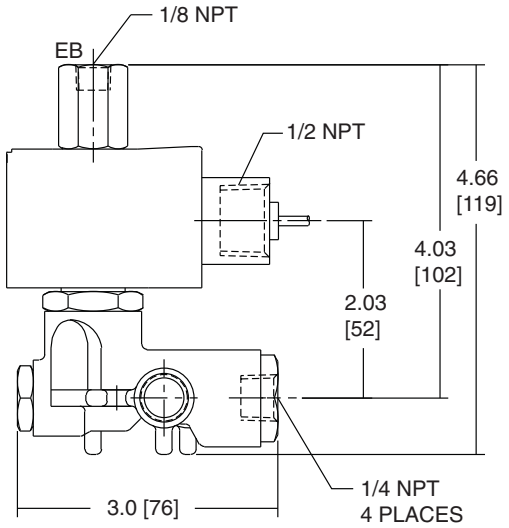
Pipe Size (ins.)	Orifice Size (ins.)		Cv Flow Factor		Operating Pressure Differential (psi)							Max. Fluid Temp. ˚F		Brass Body	Stainless Steel Body		Watt Rating/ Class of Coil Insulation	
					Max. AC				Max. DC									
	Press.	Exh.	Inlet	Exh.	Min.	Air-Inert Gas	Water	Lt. Oil @ 50 SSU	Air-Inert Gas	Water	Lt. Oil @ 50 SSU	AC	DC	Catalog Number	Catalog Number	Const. Ref.	AC	DC
SINGLE SOLENOID																		
1/4	1/16	3/32	.09	.09	10	150	150	150	100	100	100	180	104	8345G001	EV8345G081	1	10.1/F	11.6/F
SINGLE SOLENOID AIR-ONLY CONSTRUCTION - Exhaust to Atmosphere																		
1/4	1/16	3/32	.09	.09	10	150	-	-	100	-	-	180	104	8345H003	-	1	10.1/F	11.6/F

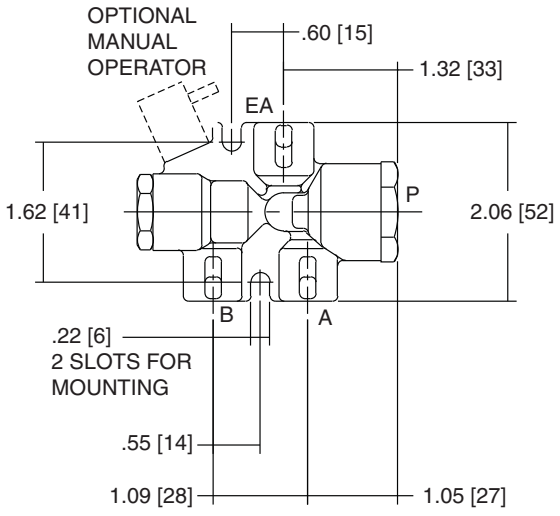
Specifications (Metric units)

Pipe Size (ins.)	Orifice Size (mm)		Kv Flow Factor (m3/h)		Operating Pressure Differential (bar)							Max. Fluid Temp. ˚C		Brass Body	Stainless Steel Body		Watt Rating/ Class of Coil Insulation	
					Max. AC				Max. DC									
	Press.	Exh.	Inlet	Exh.	Min.	Air-Inert Gas	Water	Lt. Oil @ 50 SSU	Air-Inert Gas	Water	Lt. Oil @ 50 SSU	AC	DC	Catalog Number	Catalog Number	Const. Ref.	AC	DC
SINGLE SOLENOID																		
1/4	2	2	.08	.08	0.7	10	10	10	7	7	7	82	40	8345G001	EV8345G081	1	10.1/F	11.6/F
SINGLE SOLENOID AIR-ONLY CONSTRUCTION - Exhaust to Atmosphere																		
1/4	2	2	.08	.08	0.7	10	-	-	7	-	-	82	40	8345H003	-	1	10.1/F	11.6/F

Dimensions inches (mm)

Const. Ref. 1





CS-405-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
E&H	IECNPS201999	LT9-621	N/A	TANKS LEVEL TRANSMITTER	LEVEL TRANSMITTER // E&H // Model : PMC131-C22F1D12 Cerabar T PMC131 capacitive.membrane: ceramic. :: Longterm stable + overload resistant. Output: 4-20mA passive, 2-wire. Linearity +/- 0.5% sensor range.	Electrical Connection:C2 Plug ISO4400 NPT1/2, NEMA4X + CSA GP Process Connection:2 Thread ANSI MNPT1/2 FNPT1/4, 304 Sensor Seal:F FKM Viton	Additional Option:1 Basic version Meas. Range; Sensor Overload Limit:D12 0...200mbar/20kPa gauge; 5bar/500kPa	HYDRAPOL 3500		rev1
E&H	IECNPS201999	LT9-622	N/A	TANKS LEVEL TRANSMITTER	LEVEL TRANSMITTER // E&H // Model : PMC131-C22F1D12 Cerabar T PMC131 capacitive.membrane: ceramic. :: Longterm stable + overload resistant. Output: 4-20mA passive, 2-wire. Linearity +/- 0.5% sensor range.	Electrical Connection:C2 Plug ISO4400 NPT1/2, NEMA4X + CSA GP Process Connection:2 Thread ANSI MNPT1/2 FNPT1/4, 304 Sensor Seal:F FKM Viton	Additional Option:1 Basic version Meas. Range; Sensor Overload Limit:D12 0...200mbar/20kPa gauge; 5bar/500kPa	HYDRAPOL 3500		rev1

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Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

Cerabar T PMC131, PMP131, PMP135

Process pressure measurement
Pressure transducer with ceramic and metallic sensors
For absolute pressure and gauge pressure measurement up to 400 bar (6000 psi); Extremely stable, overload-resistant and reliable

Application

The Cerabar T is a pressure transducer for measuring absolute pressure and gauge pressure in gases, vapors, liquids and dusts.
Hygienic and threaded connections are available as process connections.

Your benefits

This compact pressure transducer impresses with its well-engineered construction:

- High reproducibility and long-term stability.
- Finely graduated measuring ranges from vacuum up to 400 bar (6000 psi)
- Ceraphire® ceramic sensor: corrosion-proof, abrasion-proof and extremely overload-resistant
- Deployed for pressure monitoring up to SIL 2 as per IEC 61508/IEC 61511-1
- Sensors
  - Dry capacitance ceramic sensor (Ceraphire®) for measuring ranges up to 40 bar (600 psi): overload-resistant, vacuum-proof, stable against alternating load
  - Piezoresistive sensor with metallic process isolating diaphragm for measuring ranges up to 400 bar (6000 psi)

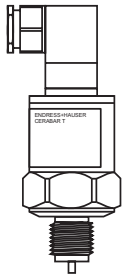
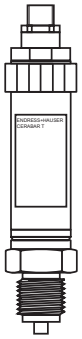
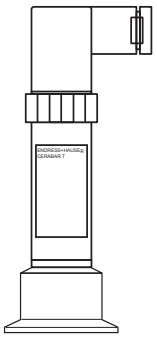
TI00415P/00/EN/19.15
No. 71289985

Endress+Hauser
People for Process Automation

Table of contents

Function and system design

Device selection

Cerabar T – Product family	PMC131	PMP131	PMP135
	 P01-PMC131xx-14-xx-xx-xx-000	 P01-PMP131xx-14-xx-xx-xx-000	 P01-PMP135xx-14-xx-xx-xx-000
	With capacitive measuring cell and ceramic process isolating diaphragm (Ceraphire®)	With piezoresistive measuring cell and metallic process isolating diaphragm	With piezoresistive measuring cell and metallic process isolating diaphragm for hygienic applications
Field of application	Absolute pressure and gauge pressure	Absolute pressure and gauge pressure	Absolute pressure and gauge pressure in hygienic processes
Output	– Current output 4 to 20 mA	– Current output 4 to 20 mA – Voltage output 0 to 10 V – Switch output PNP	– Current output 4 to 20 mA – Switch output PNP
Process connections	Thread: – G ½ – ½ MNPT and ¼ FNPT – G ½, bore 11 mm (0.43 in)	Thread: – G ½ – ½ MNPT and ¼ FNPT – ½ MNPT, bore 11.4 mm (0.45 in) – G ¼ – ¼ MNPT, bore 3.5 mm (0.14 in) – M 20 x 1.5	Hygiene: – Clamp DN 22 (¾") – Tri-Clamp DN 25 to 38 (1" to 1½") – Tri-Clamp DN 40 to 51 (2") – G 1 – SMS 1½"
Measuring ranges	from –1 to 0 bar (–15 to 0 psi) / –100 to 0 kPa up to 0 to 40 bar (0 to 600 psi) / 0 to 4 MPa	0 to 1 bar (0 to 15 psi) / 0 to 100 kPa up to 0 to 400 bar (0 to 6000 psi) / 0 to 40 MPa	0 to 1 bar (0 to 15 psi)/0 to 100 kPa up to 0 to 40 bar (0 to 600 psi) / 0...4 MPa
Process temperature range	–20 to +100 °C (-4 to +212 °F)	–25 °C to +70 °C (-13 to +158 °F)	–25 to +100 °C (-13 to +212 °F), +135 °C (275 °F) for max. 1 hour

Measuring principle

PMC131

The process pressure causes a slight deflection of the ceramic process isolating diaphragm of the sensor. The pressure-proportional change in capacitance is measured at the electrodes of the ceramic sensor. The ceramic sensor is a dry sensor, i.e. no fill fluid is required for the pressure transfer. This makes the sensor completely suitable for vacuums. Extremely high stability, comparable with the material Alloy, is achieved by using ultrapure Ceraphire® as the ceramic.

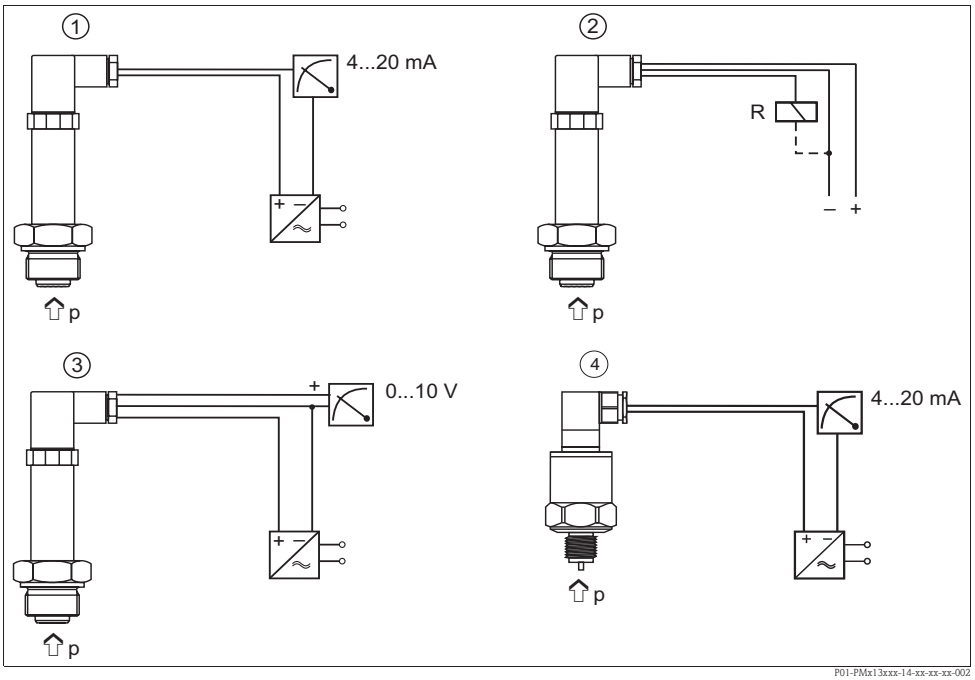
PMP131 and PMP135 with analog output

The process pressure acting upon the metallic process isolating diaphragm of the sensor is transmitted to a resistance bridge via a fluid. The pressure-proportional change of the bridge output voltage is measured and processed further.

PMP131 and PMP135 with switch output

The process pressure acting upon the metallic process isolating diaphragm of the sensor is transmitted to a resistance bridge via a fluid. A differential amplifier creates a standard signal from the pressure-proportional change in output voltage of the bridge. A comparator with an adjustable hysteresis compares this signal with the pre-set switch point and then activates the transistor output.

Measuring system



1 PMP131, PMP135: current output with transmitter power supply unit, e.g. RN 221N from Endress+Hauser
2 PMP131, PMP135: switch output with load, e.g. PLC, DCS, relay
3 PMC131: voltage output with transmitter power supply unit, e.g. RIA452 from Endress+Hauser
4 PMC131: current output with transmitter power supply unit, e.g. RN 221N from Endress+Hauser

Input

Measured variable

Absolute pressure or gauge pressure

Measuring range

up to 400 bar (6000 psi), → 🖹 21, "Ordering information" section

Output

Analog output (PMC131, PMP131, PMP135)

Output signal

Current output 4...20 mA, 2-wire version (PMC131, PMP131, PMP135)
Voltage output 0...10 V, 3-wire version (PMP131)

Load

PMC131
R_{Lmax} [Ω] ≤ (U_S – 11 V) / 0.02 A

PMP131 and PMP135 (current output)
R_{Lmax} [Ω] ≤ (U_S – 12 V) / 0.02 A (R_{Lmax}: Maximum load resistance, U_S: Supply voltage)

PMP131 (voltage output)
Load resistance RLmax ≥5 kΩ, current consumption ≤6 mA

Switch output (PMP131, PMP135)

Output signal

PNP switch output (positive voltage signal), rate depends on power supply voltage

Output current

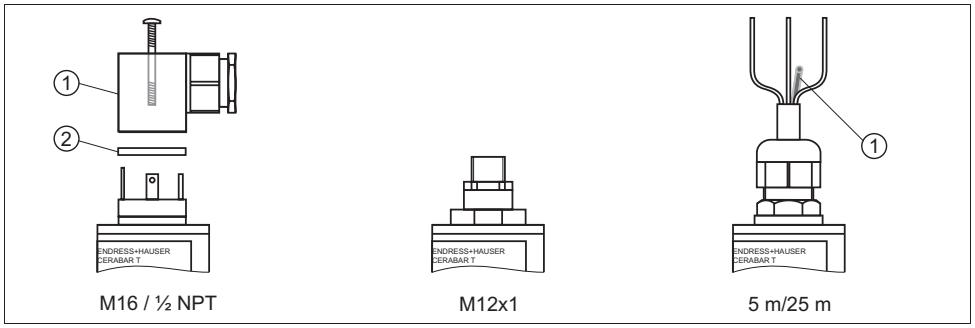
- Switch status ON: I_a ≤ 500 mA

	■ Switch status OFF: $I_a \leq 1$ mA
Power	max. 6 W
Switch frequency	max. 10 Hz
Input PLC	■ Input resistance $R_i \leq 2$ kΩ ■ Input current $I_i \geq 10$ mA
Inductive loads	To prevent electrical interference, only operate an inductive load (relays, contactors, solenoid valves) when directly connected to a protective circuit (free-wheeling diode or capacitor).

Power supply

PMC131

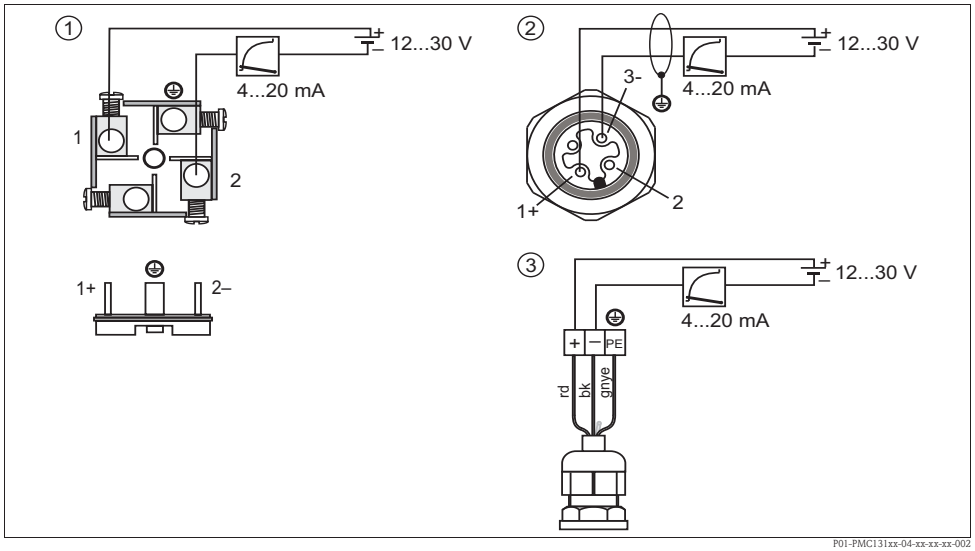
Plug/cable connection



P01-PMC131xx-04-xx-xx-xx-001

Plug M 16 x 1.5 (DIN 43650/A), ½ NPT	Plug M 12x1	5 m (16 ft) / 25 m (82 ft) cable
① Plug-in housing		① Reference pressure line
② Gasket		

Electrical connection: Analog/current output

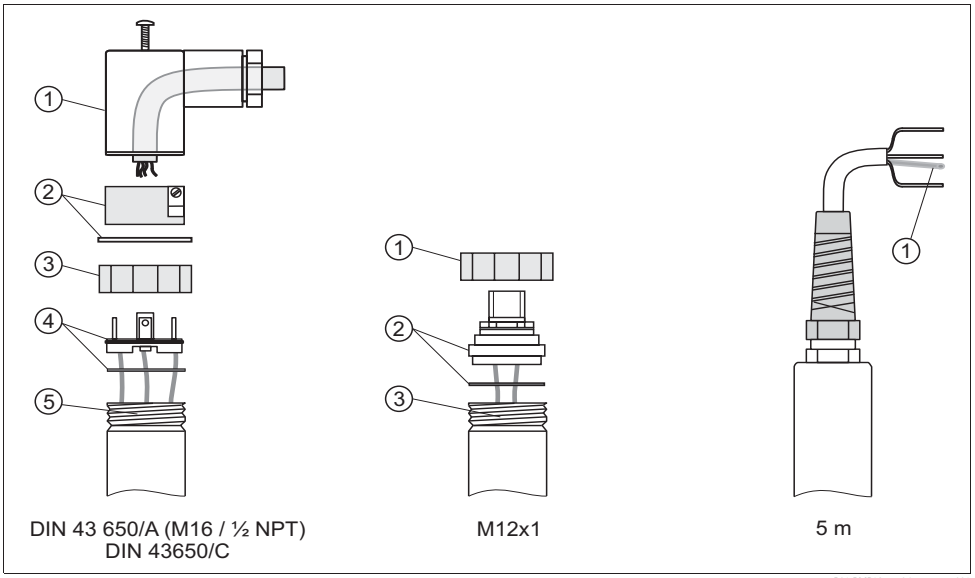


P01-PMC131xx-04-xx-xx-xx-002

1 Plug M 16 x 1.5 (DIN 43650/A), ½ NPT
2 Plug M 12 x 1
3 Cable (rd = red, bk = black, gnye = green-yellow)

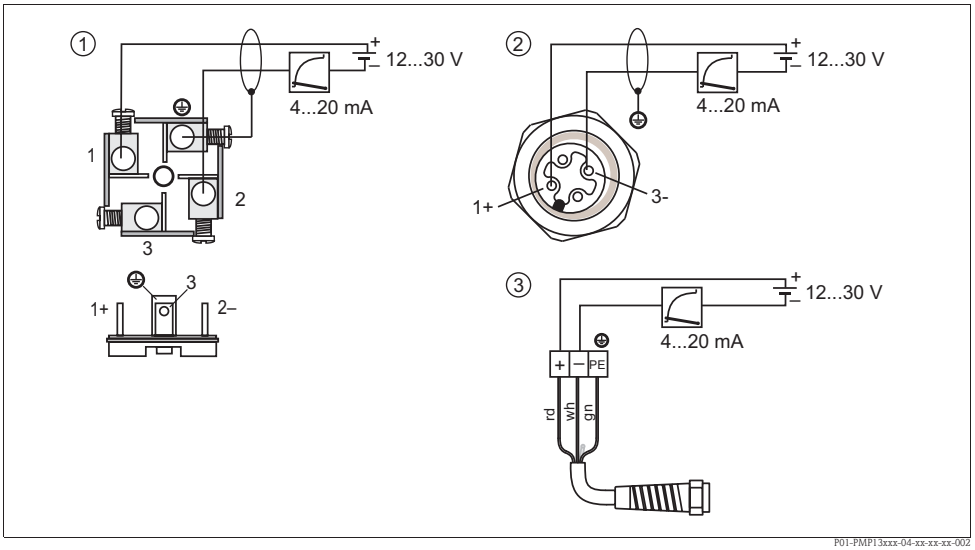
PMP131 and PMP135

Plug/cable connection



Plug M 16 x 1.5 (DIN 43650/A), ½ NPT Plug DIN 43650/C	Plug M 12x1	5 m (16 ft) cable, only analog output
① Plug-in housing	① Coupling nut	① Reference pressure line
② Plug-in jack with gasket	② Connector with gasket	
③ Coupling nut	③ Operating potentiometer (inner)	
④ Plug with O-ring		
⑤ Operating potentiometer (inner)		

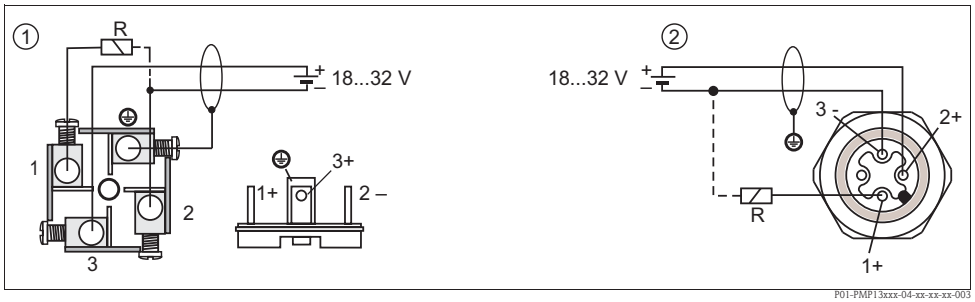
Electrical connection: Analog/current output



1 Plug M 16 x 1.5 (DIN 43650/A), ½ NPT and plug DIN 43650/C
2 Plug M 12 x 1
3 Cable (rd = red, wh = white, gn = green)

For electrical connection provided by customer use only shielded cable

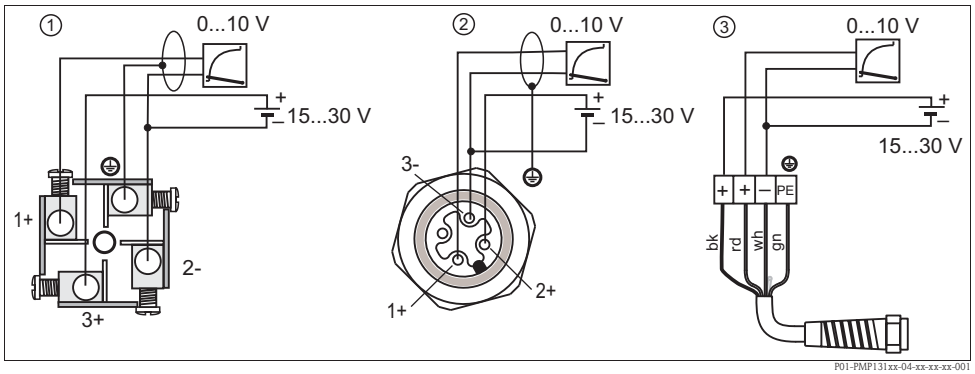
Electrical connection (switch output)



1 Plug M 16 x 1.5 (DIN 43650/A), ½ NPT
2 Plug M 12 x 1
R External load, e.g. relay, programmable logic controller, distributed control system

For electrical connection provided by customer use only shielded cable

PMP131 Electrical connection: Analog-/voltage output



1 Plug M 16 x 1,5 (DIN 43650/A), ½ NPT and plug DIN 43 650/C
2 Plug M 12 x 1
3 Cable (rd = red, wh = white, gn = green)

For electrical connection provided by customer use only shielded cable

Supply voltage

PMC131
11 to 30 V DC

PMP131 and PMP135 (current output, 2-wire version)

- For non-hazardous areas: 12 to 30 V DC
- Ex i: no-load voltage ≤ 26 V DC, short-circuit current ≤ 100 mA, power consumption ≤ 0.8 W

PMP131 (voltage output, 3-wire version)

- 15...30 V DC

PMP131 and PMP135 (switch output)

- 18 to 32 V DC, current consumption without load < 20 mA, with reverse polarity protection

Residual ripple

- Analog output: max. 5 % of supply voltage
- Switch output: max. 10 % of supply voltage

Cable entry

→ 📄 21, "Ordering information" section.

Performance characteristics

Reference operating conditions

as per DIN IEC 60770, T_U = 25 °C (77 °F)

Long-term stability

≤ 0.15 % of URL per year

Reference accuracy
Analog output

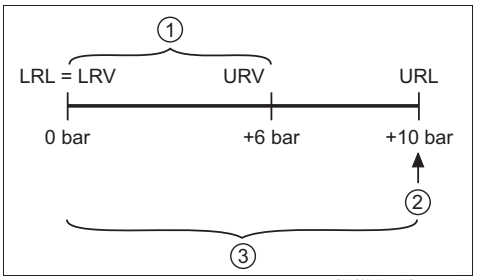
The reference accuracy comprises the non-linearity according to limit point setting, hysteresisand non-reproducibility as per IEC 60770.

PMC131

- ≤ 0.5 % of nominal value x TD
  (extended specifications apply to customer-specific measuring ranges)

Example: PMC131 version "A1R"
- Nominal value = 10 bar (150 psi)
- Upper range value (URV) = 6 bar (90 psi)
- Lower range value (LRV) = 0 bar

Turn down (is set at factory):
- Nominal value / (URV – LRV) | =
  10 bar (150 psi)/6 bar (90 psi) = 10:6



P01-PMx13xxx-05-xx-xx-xx-001

Example: PMC131 version "A1R"
set span: 0 to 6 bar (0 to 90 psi);
nominal value = 10 bar (150 psi)

1 Span set and calibrated at the factory (measuring range)
2 Nominal value ≙ Upper Range Limit (URL)
3 Sensor measuring range
LRL Lower Range Limit
URL Upper Range Limit
LRV Lower Range Value
URV Upper Range Value

PMP131 and PMP135

- ≤ 0.5 % of URL

Switch point

PMP131 and PMP135

- Deviation: ≤ 1 % of URL
- Non-reproducibility: ≤ 0.5 % of URL

Rise time (T90)

PMC131
20 ms

PMP131 and PMP135
2 to 5 ms

Thermal change in the zero output and the output span

PMC131

For customer-specific measuring-ranges: values are doubled

Zero output, –20 to +85 °C (-4 to +185 °F):
- typically 1.5 % of nominal value

Output span, –20 to +85 °C (-4 to +185 °F):
- Nominal value 0.4 to 40 bar (6 to 600 psi): typically 0.8 % of nominal value
- Nominal value 0.1 to 0.2 bar (1.5 to 3 psi): typically 1.0 % of nominal value

Temperature coefficient (T_K) for lower range value and span

PMP131 and PMP135 (analog output)

Zero output:
- typically: 0.2 % of URL/10 K
- max.: 0.5 % of URL/10 K
- Nominal value ≤ 6 bar (90 psi): by 0.1 % of URL/10 K higher

Output signal:
- typically: 0.2 % of URL/10 K
- max.: 0.5 % of URL/10 K

PMP131 and PMP135 (switch output)

Switch point:
- typically: 0.2 % of URL/10 K
- max.: 0.5 % of URL/10 K

Operating conditions (installation)

Orientation

anywhere

Installation instructions

PMP131
Process connection G ½ flush-mounted, max. torque 40 Nm (29.5 lbf ft)

Location dependence

PMC131
without influence

PMP131 and PMP135
Position-dependent zero point shift can be corrected by potentiometer setting, → 17.

Operating conditions (environment)

Ambient temperature range

PMC131
–20 to +85 °C (-4 to +185 °F)

PMP131 and PMP135

- For non-hazardous areas: –25 to +70 °C (-13 to +158 °F)
- Ex i: –25 to +65 °C (-13 to +149 °F)

Storage temperature range

PMC131
–50 to +100 °C (-58 to +212 °F)

PMP131 and PMP135
–40 to +85 °C (-40 to +185 °F)

Climate class

PMC131
4K4H as per DIN EN 60721-3

PMP131 and PMP135
4Z
with Z = 70 °C (158 °F) as per VDI/VDE 3540

Degree of protection

PMC131
- Plug M 16 x 1,5 (DIN 43650/A), ½ NPT: IP 65/NEMA 4X
- Plug M12x1: IP 65/ NEMA 4
- Cable: IP 68/NEMA 6P (1 mWS/24 h)

PMP131 and PMP135
- Plug M 16 x 1,5 (DIN 43650/A), ½ NPT: IP 65/NEMA 4X
- Plug M 12x1 and gauge pressure sensors: IP 65/NEMA 4X
- Plug M 12x1 and absolute pressure sensors: IP 68/NEMA 6P (1 mWS/24 h)
- Cable: IP 68/NEMA 6P (1 mWS/24 h)

Vibration resistance

4M5 as per DIN EN 60721-3

Electromagnetic compatibility

EMC in accordance with all the relevant requirements of the EN 61326 series. Details are provided in the Declaration of Conformity.

Operating conditions (process)

Process temperature range

PMC131

- –20 to +100 °C (-4 to 212 °F)
- Devices for oxygen application: –10 to +60 °C (14 to 140 °F)
  (Version "S" for feature 30 "Sensor gasket")

PMP131
–25 to +70 °C (-13 to +158 °F)

PMP135
–25 to +100 °C (-13 to 212 °F), +135 °C (275 °F) for max. 1 hour

Extreme jumps in temperature can result in temporary measuring errors. Temperature compensation takes effect after several minutes. Internal temperature compensation is faster the smaller the temperature jump and the longer the time interval.

Overload resistance

→ 📄 21, "Ordering information" section.

Vacuum resistance

PMC131

URV	Vacuum resistance	Version
0...100 mbar (0...1.5 psi)	700 $mbar_{abs}$ (10.5 psi_{abs})	D10
20 mbar (0.3 psi)		D3W
100 mbar (1.5 psi)		D31
1.5 psi (100 mbar)		V6F
0...1.5 psi (0...100 mbar)		Q4D
15 inH_2O		W6N
30 inH_2O		W6R
0...200 mbar (0...3 psi)	500 $mbar_{abs}$ (7.5 psi_{abs})	D12
200 mbar (3 psi)		D38
50 inH_2O		S4N
80 inH_2O		W6O
all other versions	0 $mbar_{abs}$	

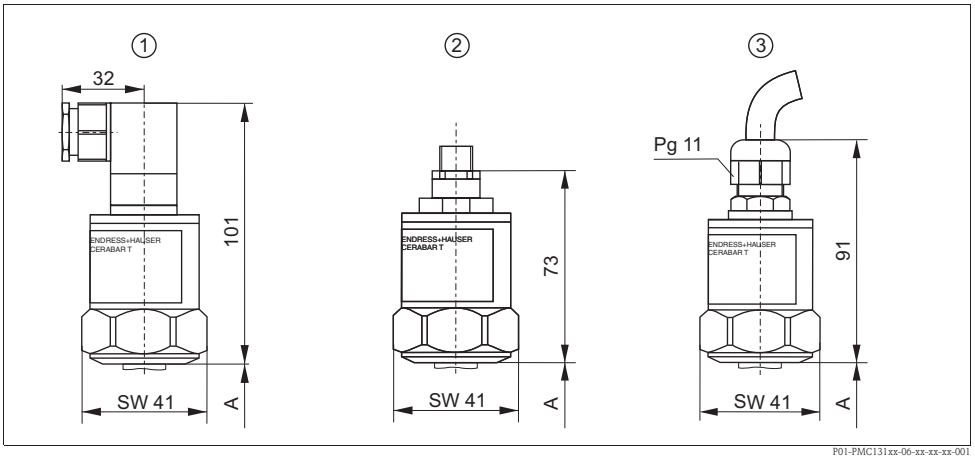
PMP131 and PMP135
10 $mbar_{abs}$ (0.15 psi_{abs})
The vacuum resistance applies for the measuring cell under reference operating conditions.

Pressure specifications

- The MWP (maximum working pressure) of the device is specified on the nameplate. It depends on the weakest element, with regard to pressure, of the selected components. See the following sections:
  – → 📄 21 ff, "Ordering information" section, feature 50 "Measuring range; MWP; Nominal value; OPL" or "Sensor range; MWP; OPL".
  – → 📄 12 ff, "Mechanical construction" section.
  The MWP specification on the nameplate is based on a reference temperature of +20 °C (68 °F) and can be present over an unlimited period of time.
- The test pressure corresponds to the overload limit of the measuring device (Over Pressure Limit OPL) and must only be present for a limited period of time.

Mechanical construction

PMC131 Housing

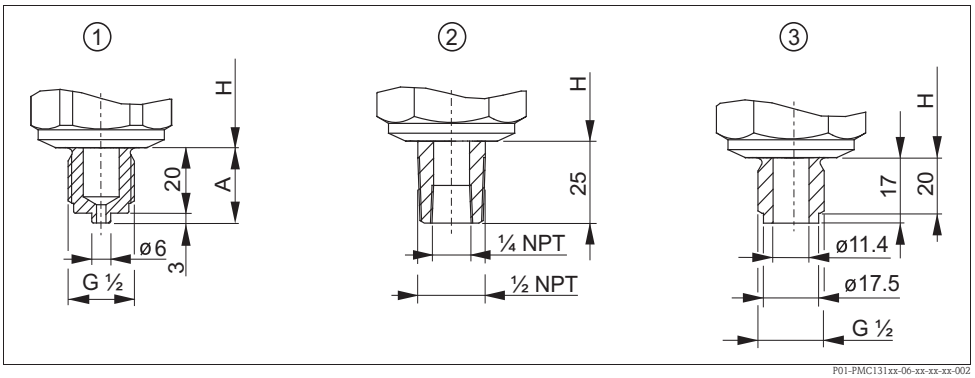


Housing PMC131; Material AISI 304 (1.4301)

1 Versions A1, A2, B1, C1, C2: Plug M 16 or ½ NPT (ISO 4400), IP 65
2 Versions A5, B5, C5: Plug M 12, IP 65
3 Versions A3, A4, B3, C3: 5 m (16 ft) or 25 m (82 ft) cable, IP 68

→ See the following diagram for the height of process connection A

PMC131 Process connections

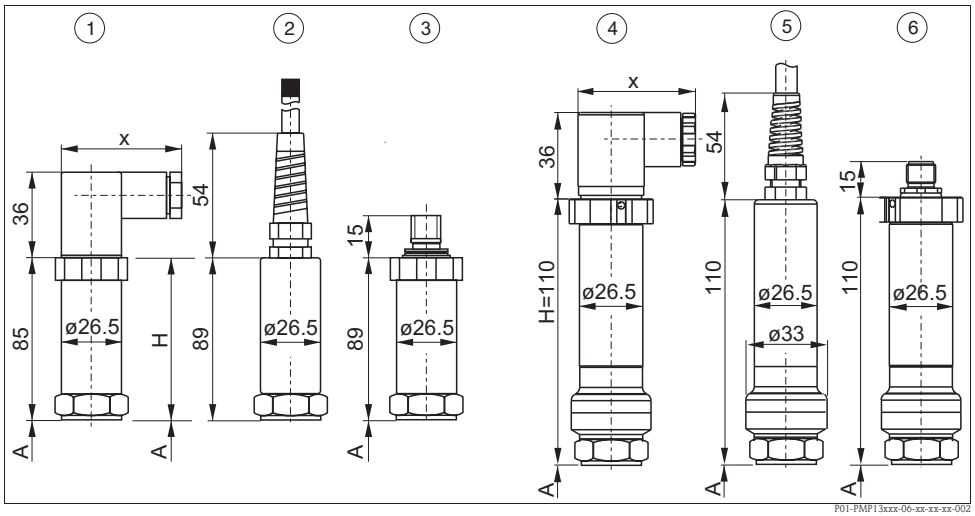


Process connections PMC131; Material AISI 304 (1.4301)

1 Version 1: Thread ISO 228 G ½
2 Version 2: Thread ANSI ½ MNPT ¼ FNPT
3 Version 5: Thread ISO 228 G ½, bore 11.4 mm (0.45 in)

→ See respective housing for installation height H (previous figure)

PMP131 and PMP135
Housings

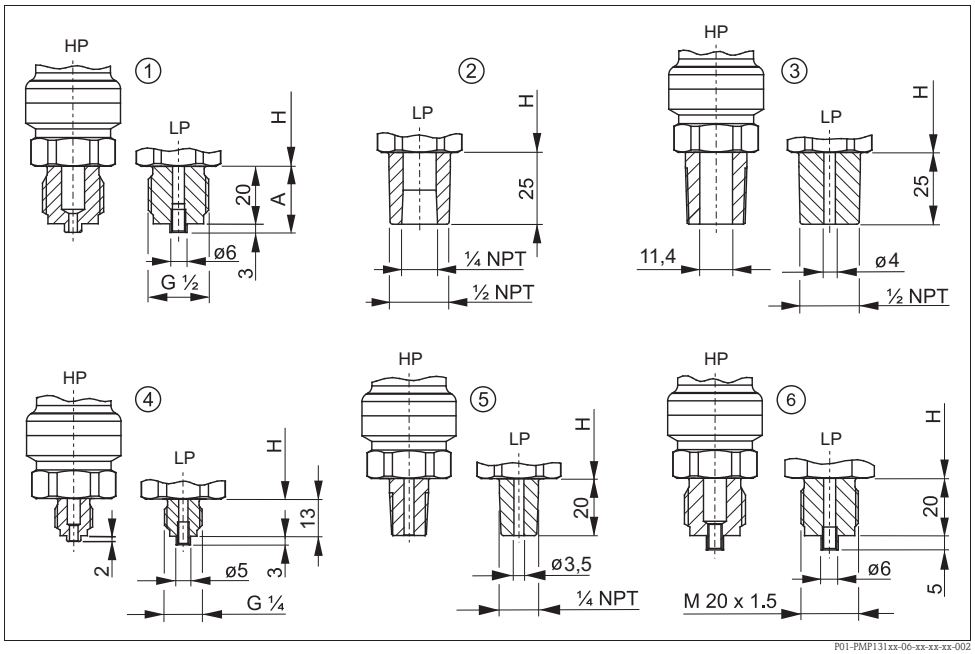


Housings PMP131 and PMP135; Material AISI 304 (1.4301)

1...3 PMP131 and PMP135 with sensor range up to 60 bar (900 psi)
4...6 PMP131 with sensor range up to 400 bar (6000 psi)
1 + 4 Versions A1, A2: Plug M 16 (DIN 43650/A) or ½ NPT (ISO 4400), IP 65; dimension x = 52 mm (2.05 in)
Version A5: Plug DIN 43650/C, IP 65; dimension x = 42 mm (1.65 in)
2 + 5 Version A3: 5 m (16 ft) cable, IP 68
3 + 6 Version A4: Plug M 12, IP 65

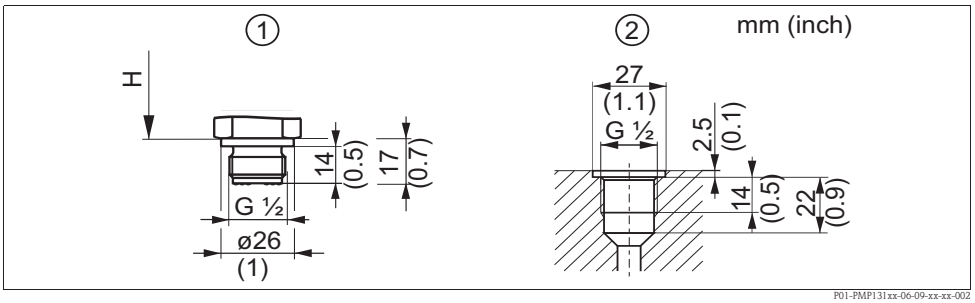
→ See the following figure for the dimensions of process connection A

PMP131 Process connections



Process connections PMP131; Material AISI 304 (1.4301)
HP: process connections from 100 to 400 bar (1500 psi to 6000 psi). LP: lower measuring ranges.

1 Version 1: Thread ISO 228 G ½
2 Version 2: Thread ANSI ½ MNPT ¼ FNPT
3 Version 3: Thread ANSI ½ MNPT, bore 11.4 mm (0.45 in) female
4 Version 4: Thread ISO 228 G ¼
5 Version 5: Thread ANSI ¼ MNPT, bore 3.5 mm (0.14 in) female
6 Version 6: Thread M 20 x 1.5
→ See respective housing for installation height H (figure above)
→ Process connections with AF 27 mm

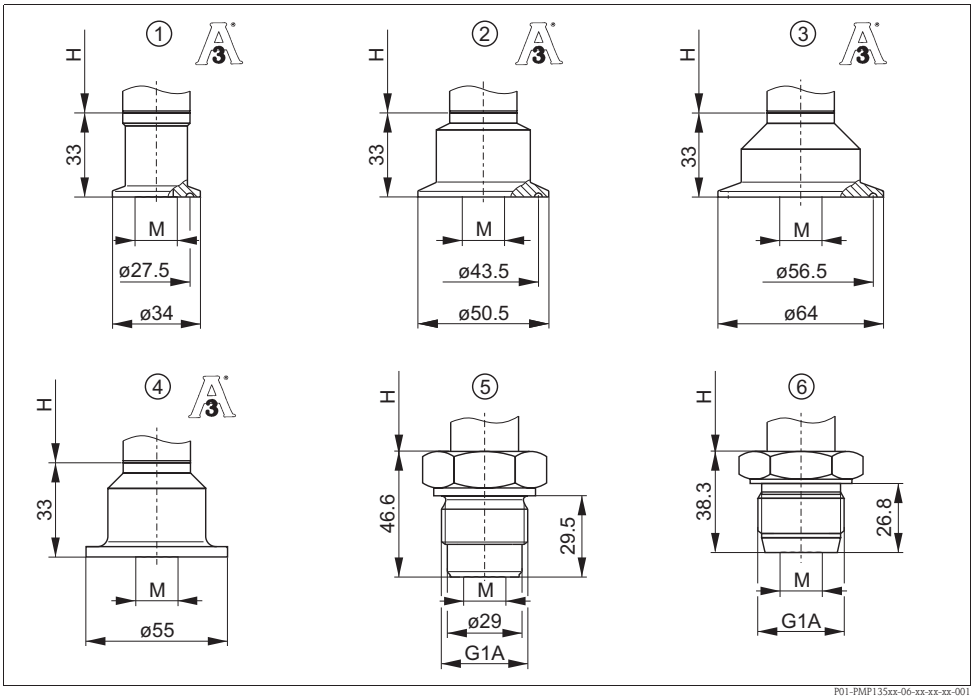


Process connection PMP131; Material AISI 304 (1.4301)

1 Version B: Thread ISO 228 G ½, Seal seat as per DIN 3852-A, AISI 304, flush-mounted
2 Dimensions for tapped hole G ½ as per DIN 3852-11 form X

→ See respective housing for installation height H

PMP135 Process connections



Process connections PMP135; Material AISI 316L (1.4435); Surface roughness of the surfaces in contact with the media $R_a \leq 0.8\,\mu m$
M = Diaphragm diameter 17.2 mm (0.68 in)

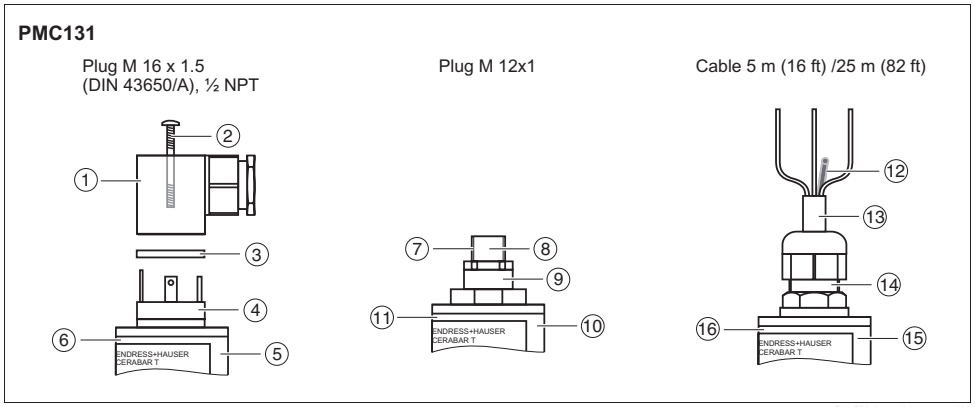
1 Version F: Clamp DN18-22 ¾" (DIN 32676), 3A, EHEDG
2 Version G: Tri-Clamp 1" to 1½" (ISO 2852) or DN 25 to DN 40 (DIN 32676), 3A, EHEDG
3 Version H: Tri-Clamp 2" (ISO 2852) or DN 50 (DIN 32676), 3A, EHEDG
4 Version S: SMS 1½" PN 25, 3A, EHEDG
5 Version N : G1A (ISO 228), with sealing surface for flush-mounted installation
3A and EHEDG approval in combination with o-ring seal and welding neck 52001051 (see → 26)
6 Version M: G1A (ISO 228), with metallic sealing taper, flush-mounted

→ See respective housing for installation height H

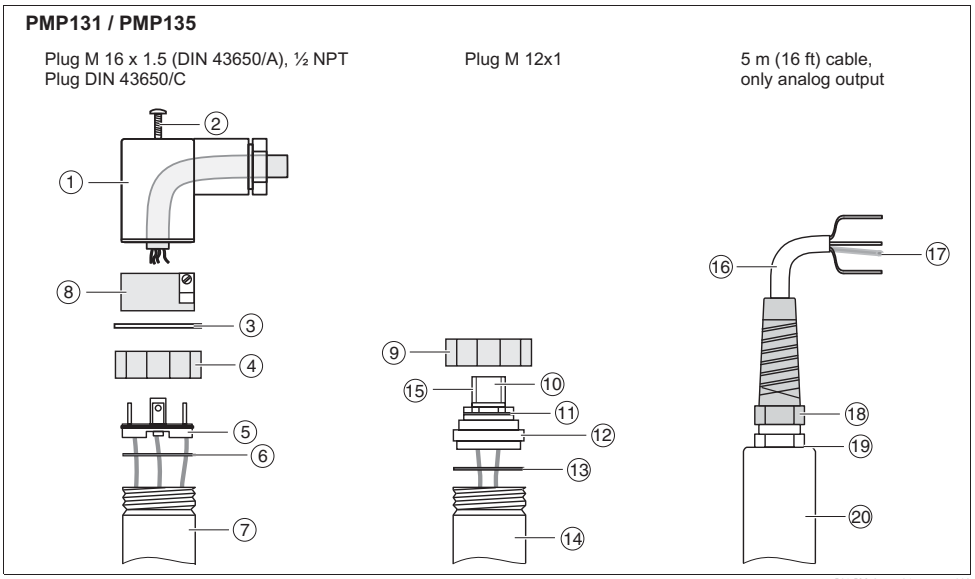
Weights

- PMC131: approx. 0.32 kg (0.71 lbs)
- PMP131:
  approx. 0.24 kg (0.53 lbs) up to 60 bar (870 psi),
  approx. 0.32 kg (0.71 lbs) up to 400 bar (5800 psi)
- PMP135: approx. 0.34 kg (0.75 lbs)

Material (not wetted) **Housing**



Item number	Component part	Material
1	Plug housing	PA6 GF
2	Flat sealing	NBR
3	Screw M3 x 35	A2
4	Connection cover	PBT-FR
5	O-ring	NBR
6	Housing	1.4301
7	O-ring for connector	FKM
8	Inner connector	PA
9	M12 connector	GD-Zn, nickel-plated
10	O-ring	NBR
11	Housing	1.4301
12	Hose	PA
13	Cable	PE
14	Gland	PBT
15	O-ring	NBR
16	Housing	1.4301



Item number	Component part	Material
1	Plug housing	PA6 GF
2	Screw M3 x 35	A2
3	Flat sealing	NBR
4	Coupling nut	PA
5	Cover plug	PA66 GF
6	O-ring	NBR
7	Housing	1.4301
8	Plug	PA66 GF
9	Coupling nut	PA
10	Inner connector	PA
11	O-ring	NBR
12	M12 connector	GD-Zn, nickel-plated
13	O-ring	NBR
14	Housing	1.4301
15	O-ring for connector	FKM
16	Cable	PUR
17	Hose	PA
18	Anti-jackknife	PA
19	O-ring	NBR
20	Housing	1.4301

Fill oil:

- PMP131: Tegiloxan 3
- PMP135: Mineral oil, FDA number 21-CFR 178.3570

Material (wetted)

Note!
The wetted device components are listed in the "Mechanical construction" (→ 12 ff) and "Ordering information" (→ 21 ff) sections.

Process connection

- PMC131/PMP131: AISI 304 (1.4301)
- PMP135: AISI 316L (1.4435)

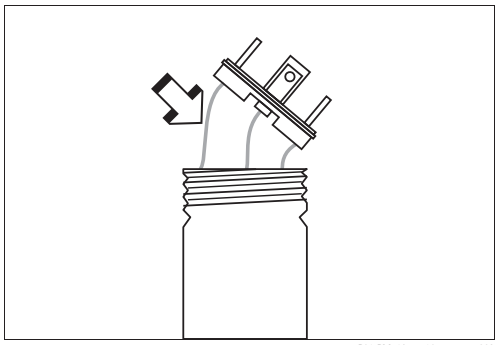
Process isolating diaphragm

- PMC131: Ceraphire® (99,9 % Al_2O_3). The US Food & Drug Administration (FDA) has no objections to the use of ceramics made from aluminum oxide as a surface material in contact with foodstuffs. This declaration is based on the FDA certificates of our ceramic suppliers.
- PMP131, PMP135: AISI 316L (1.4435)

Operating elements

Operating elements

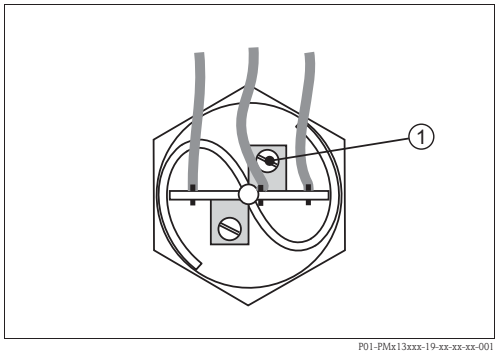
Position of operating elements



P01-PMx13xxx-19-xx-xx-xx-003

The potentiometer for operating the Cerabar T PMP131 and PMP135 with analog or switch output is located below the base of the plug.

Analog output: Zero point adjustment

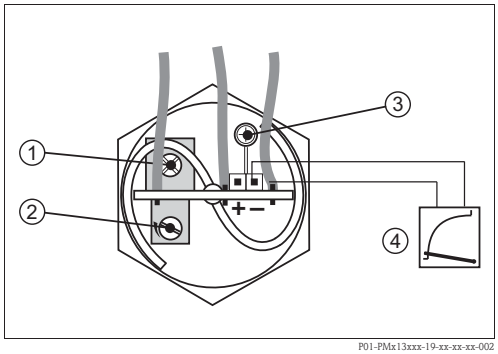


P01-PMx13xxx-19-xx-xx-xx-001

The zero point can be corrected for the Cerabar T PMP131 and PMP135 with analog output and plug version.

1 Potentiometer for zero point correction by ±5 % of URL

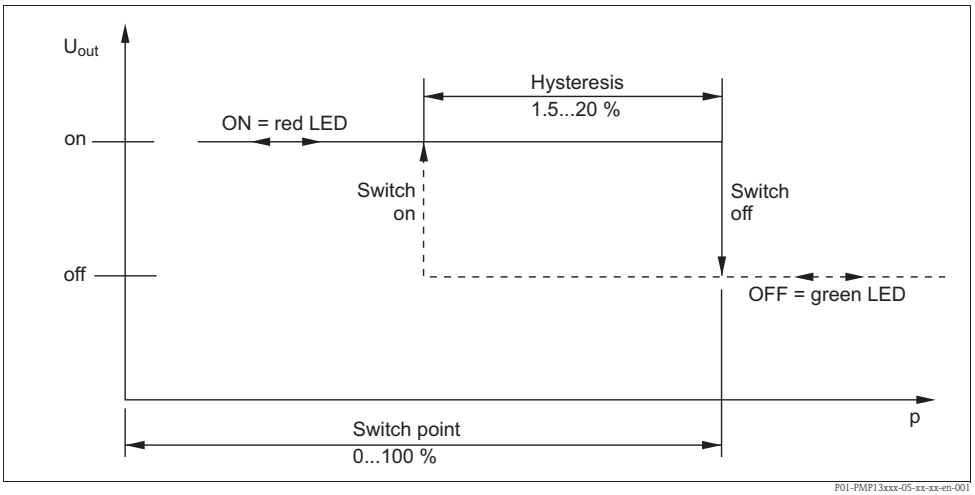
Switch output: Switch point and hysteresis adjustment



P01-PMx13xxx-19-xx-xx-xx-002

For the Cerabar T PMP131 and PMP135 with switch output, both the switch point and hysteresis can be adjusted.
This can also be carried out at atmospheric pressure using the enclosed test cable and a voltmeter.

1 Hysteresis adjustment 1.5 to 20 % of URL; Factory setting 10 % of URL
2 Switch point adjustment 0 to 100 % of URL; Factory setting 50 % of URL
3 LED color code for checking the switch status: green = off; red = on
4 Connect voltmeter to test pins: 0 to 1 V corresponds to 0 to 100 % of URL



Instructions for switch point and hysteresis (the percentage values refer to the URL)

U_a Output voltage
p Acting pressure

Certificates and approvals

CE mark

The device meets the legal requirements of the EC directives. Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.

Ex approvals

All explosion protection data are given in separate documentation which is available upon request. The Ex documentation is supplied as standard with all devices approved for use in explosion hazardous areas.
See also → 27, "Safety Instructions" section.

Pressure Equipment Directive (PED)

This measuring device corresponds to Article 3 (3) of the EC directive 97/23/EC (Pressure Equipment Directive) and has been designed and manufactured according to good engineering practice.

Functional safety SIL 2

The Cerabar T PMP131 and PMP135 pressure transducers with 4 to 20 mA electronics have been assessed by an independent body according to the standards IEC 61508/IEC 61511-1. These devices can be used for monitoring process pressure up to SIL 2.
→ For a detailed description of safety functions with Cerabar T, settings and characteristic quantities for functional safety, see the "Functional Safety Manual – Cerabar T SD00160P".

Suitability for hygenic processes

All materials in contact with foodstuffs comply with framework Regulation (EC) 1935/2004. The device is available with hygienic process connections (overview: see order code).

Caution!
Risk of contamination if incorrect seals and parts are used!

- To avoid the risk of contamination, when installing the device comply with the design principles of EHEDG, Guideline 37 "Hygienic Design and Application of Sensors" and Guideline 16 "Hygienic Pipe Couplings".
- Suitable assemblies and seals must be used to ensure hygienic design in accordance with 3-A SSI and EHEDG specifications.
- The leak-proof connections can be cleaned with the cleaning methods typical of this industry (CIP and SIP). Attention must be paid to the pressure and temperature specifications of the sensor and process connections for CIP and SIP processes (clean in place/sterilize in place).

TSE Certificate of Suitability

Cerabar T PMP135
The following applies to wetted device components: They do not contain any materials derived from animals. No auxiliaries or operating materials derived from animals are used in production or processing. Process wetted device components are listed in the “Mechanical construction” and “Ordering information” sections.

Standards and guidelines

DIN EN 60770 (IEC 60770):
Transmitters for controlling in systems used in industrial process technology
Part 1: Methods for evaluating the operating behavior.

DIN EN 61003-1, Edition:1993-12
Systems used in industrial process technology;
Devices with analog inputs and two-point or multi-point behavior;
Part 1: Methods for evaluating the operating behavior.

DIN 16086:
Electrical pressure measuring devices, pressure sensors, transmitters, pressure measuring devices
Terms, specifications in data sheets.

IEC 60529
Degrees of protection provided by enclosures (IP-Code).

EN 61326:
Electrical equipment for control technology and laboratory application – EMC requirements.

IEC 61010
Safety requirements for electrical equipment for measurement, control and laboratory use.

NAMUR
Association for Standards for Control and Regulation in the Chemical Industry.

Registered trademarks

Ceraphire®
Registered trademark of Endress+Hauser GmbH+Co. KG, Maulburg, Germany
(→ see also www.endress.com/ceraphire)

Ordering information

PMC131

This overview does not mark options which are mutually exclusive.

10	Electrical connection:
A1	Plug ISO 4400, M 16, IP 65/NEMA 4X
A2	Plug ISO 4400, ½ NPT, IP 65/NEMA 4X
A3	5 m cable, IP 68/NEMA 6P
A4	25 m cable, IP 68/NEMA 6P
A5	Plug M 12, IP 65/NEMA 4
B1	Plug ISO 4400, M 16, IP 65, ATEX II 3 G EEx nA II T4
B3	5 m cable, IP 68, ATEX II 3 G EEx nA II T4
B5	Plug M 12, IP 65, ATEX II 3 G EEx nA II T4
C1	Plug ISO 4400, M 16, NEMA 4X, CSA GP
C2	Plug ISO 4400, ½ NPT, NEMA 4X, CSA GP
C3	5m cable, IP 68/NEMA 6P, CSA GP
C5	Plug M12, IP 65/NEMA 4, CSA GP

20	Process connection:
1	Thread ISO 228 G ½, AISI 304
2	Thread ANSI ½ MNPT ¼ FNPT, AISI 304
5	Thread ISO 228 G ½ bore 11 mm, AISI 304

30	Sensor seal:
E	EPDM
F	FKM Viton
S	FKM Viton, oxygen application

40	Additional options:
1	Without additional equipment
S	GL (German Lloyd) marine certificate
2	Final inspection report

50	Measuring range; MWP; Nominal value; OPL:	Measuring range	MWP (Maximum Working Pressure)	Nominal value	OPL (Over Pressure Limit)
	Sensors for gauge pressure				
	A1G	0 to 1 bar / 0 to 100 kPa	6.7 bar	1 bar	10 bar / 1 MPa
	A1H [1)]	0 to 1.6 bar / 0 to 160 kPa	12 bar	2 bar	18 bar / 1.8 MPa
	A1K	0 to 2 bar / 0 to 200 kPa	12 bar	2 bar	18 bar / 1.8 MPa
	A1Q	0 to 4 bar / 0 to 400 kPa	16.7 bar	4 bar	25 bar / 2.5 MPa
	A1R 1)	0 to 6 bar / 0 to 600 kPa	26.7 bar	10 bar	40 bar / 4 MPa
	A1S	0 to 10 bar / 0 to 1 MPa	26.7 bar	10 bar	40 bar / 4 MPa
	A1T 1)	0 to 16 bar / 0 to 1.6 MPa	26.7 bar	20 bar	40 bar / 4 MPa
	A1V	0 to 20 bar / 0 to 2 MPa	26.7 bar	20 bar	40 bar / 4 MPa
	A1W 1)	0 to 25 bar / 0 to 2.5 MPa	40 bar	40 bar	60 bar / 6 MPa
	A1X	0 to 40 bar / 0 to 4 MPa	40 bar	40 bar	60 bar / 6 MPa
	A3C 1)	–1 to 0 bar / –100 to 0 kPa	6.7 bar	2 bar	10 bar / 1 MPa
	A3E 1)	–1 to 1 bar / –100 to 100 kPa	6.7 bar	2 bar	10 bar / 1 MPa
	A3G 1)	–1 to 3 bar / –100 to 300 kPa	16.7 bar	4 bar	25 bar / 2.5 MPa
	A3K 1)	–1 to 9 bar / –100 to 900 kPa	26.7 bar	10 bar	40 bar / 4 MPa
	A3N 1)	–1 to 15 bar / –0.1 to 1.5 MPa	26.7 bar	20 bar	40 bar / 4 MPa
	D10	0 to 100 mbar / 0 to 10 kPa	2.7 bar	0.1 bar	4 bar / 400 kPa
	D12 1)	0 to 200 mbar / 0 to 20 kPa	3.3 bar	0.2 bar	5 bar / 500 kPa
	D14	0 to 400 mbar / 0 to 40 kPa	5.3 bar	0.4 bar	8 bar / 800 kPa
	D3W	–20 to 20 mbar / –2 to 2 kPa	2.7 bar	0.2 bar	4 bar / 400 kPa
	D31 1)	–100 to 100 mbar / –10 to 10 kPa	3.3 bar	0.2 bar	5 bar / 500 kPa
	D38 1)	–200 to 200 mbar / –20 to 20 kPa	3.3 bar	0.4 bar	5 bar / 500 kPa
	D39 1)	–300 to 300 mbar / –30 to 30 kPa	5.3 bar	1 bar	8 bar / 800 kPa

PMC131	Order code

→ For continuation of ordering information of PMC131, see the following page.

1) Span set and calibrated at the factory

PMC131 (continued)

50	Measuring range; MWP; Nominal value; OPL:			
	Measuring range	**MWP (Maximum Working Pressure)**	**Nominal value**	**OPL (Over Pressure Limit)**
	Sensors for gauge pressure			
Q4D	0 to 1.5 psi	40 psi	1.5 psi	60 psi
Q4F 1)	0 to 5 psi	80 psi	6 psi	120 psi
Q4H	0 to 15 psi	100 psi	15 psi	150 psi
Q4K	0 to 30 psi	180 psi	30 psi	270 psi
Q4N 1)	0 to 50 psi	250 psi	60 psi	375 psi
Q4R	0 to 150 psi	400 psi	150 psi	600 psi
Q4S	0 to 300 psi	400 psi	300 psi	600 psi
Q4T 1)	0 to 500 psi	600 psi	600 psi	900 psi
V6F 1)	–1.5 to 1.5 psi	50 psi	3 psi	75 psi
V6N 1)	–15 to 15 psi	100 psi	30 psi	150 psi
V6R 1)	–15 to 30 psi	250 psi	60 psi	375 psi
V6S	–15 to 60 psi	250 psi	60 psi	375 psi
V6V	–15 to 150 psi	400 psi	150 psi	600 psi
S4N 1)	0 to 50 inH_2O	50 psi	3 psi	75 psi
S4Q 1)	0 to 100 inH_2O	80 psi	6 psi	120 psi
W6N 1)	–15 to 15 inH_2O	40 psi	3 psi	60 psi
W6O 1)	–80 to 80 inH_2O	50 psi	6 psi	75 psi
W6R 1)	–15 to 30 inH_2O	50 psi	3 psi	75 psi
	Sensors for absolute pressure			
A2G	0 to 1 bar / 0 to 100 kPa	6.7 bar	1 bar	10 bar / 1 MPa
A2H 1)	0 to 1.6 bar / 0 to 160 kPa	12 bar	2 bar	18 bar / 1.8 MPa
A2K	0 to 2 bar / 0 to 200 kPa	12 bar	2 bar	18 bar / 1.8 MPa
A2Q	0 to 4 bar / 0 to 400 kPa	16.7 bar	4 bar	25 bar / 2.5 MPa
A2R 1)	0 to 6 bar / 0 to 600 kPa	26.7 bar	10 bar	40 bar / 4 MPa
A2S	0 to 10 bar / 0 to 1 MPa	26.7 bar	10 bar	40 bar / 4 MPa
A2T 1)	0 to 16 bar / 0 to 1.6 MPa	26.7 bar	20 bar	40 bar / 4 MPa
A2V	0 to 20 bar / 0 to 2 MPa	26.7 bar	20 bar	40 bar / 4 MPa
A2W 1)	0 to 25 bar / 0 to 2.5 MPa	40 bar	40 bar	60 bar / 6 MPa
A2X	0 to 40 bar / 0 to 4 MPa	40 bar	40 bar	60 bar / 6 MPa
D20 1)	0 to 100 mbar / 0 to 10 kPa	3.3 bar	0.2 bar	5 bar / 500 kPa
D22	0 to 200 mbar / 0 to 20 kPa	3.3 bar	0.2 bar	5 bar / 500 kPa
D24	0 to 400 mbar / 0 to 40 kPa	5.3 bar	0.4 bar	8 bar / 800 kPa
R4D 1)	0 to 1.5 psi	50 psi	3 psi	75 psi
R4F 1)	0 to 5 psi	80 psi	6 psi	120 psi
R4H	0 to 15 psi	100 psi	15 psi	150 psi
R4K	0 to 30 psi	180 psi	30 psi	270 psi
R4N 1)	0 to 50 psi	250 psi	60 psi	375 psi
R4R	0 to 150 psi	400 psi	150 psi	600 psi
R4S	0 to 300 psi	400 psi	300 psi	600 psi
R4T 1)	0 to 500 psi	600 psi	600 psi	900 psi

995	Marking	
	1	Tagging (TAG), see additional spec.

PMC131		Complete order code

1) Span set and calibrated at the factory

PMP131

This overview does not mark options which are mutually exclusive.

10	Electrical connection:
A1	Plug ISO 4400, M 16, IP 65/NEMA 4X (DIN 43650/A)
A2	Plug ISO 4400, ½ NPT, IP 65/NEMA 4X
A3	5 m cable, IP 68/NEMA 6P
A4	Plug M 12, IP 65/NEMA 4X
A5	Plug DIN 43650/C, IP65, NEMA 4X

20	Process connection:
B	Thread ISO 228 G ½, Seal seat as per DIN 3852, AISI 304, flush-mounted
1	Thread ISO 228 G ½, AISI 304
2	Thread ANSI ½ MNPT ¼ FNPT, AISI 304
3	Thread ANSI ½ MNPT bore 11.4 mm, AISI 304
4	Thread ISO 228 G ¼, AISI 304
5	Thread ANSI ¼ MNPT bore 3.5 mm, AISI 304
6	Thread M 20 x 1.5

30	Output:
0	Analog current output 4 to 20 mA, SIL
D	Analog current output 4 to 20 mA, SIL, ATEX II 1/2 G Ex ib IIC T6
1	Analog current output 4 to 20 mA, SIL, ATEX II 2 G Ex ib IIC T6
5	Analog current output 4 to 20 mA, SIL, ATEX II 3 G EEx nA II T6
2	Switch output PNP, 3-wire
3	Switch output PNP, 3-wire, ATEX II 3 G EEx nA II T6
6	Analog voltage output 0...10 V

40	Additional options:
1	Without additional equipment
S	GL/RINA marine approval
2	Final inspection report

50	Sensor range; MWP; OPL:		
	Sensor range	**MWP (maximum working pressure)**	**OPL (over pressure limit)**
	Sensors for gauge pressure		
A1G	0 to 1 bar / 0 to 100 kPa	2.7 bar	4 bar / 400 kPa
A1H	0 to 1.6 bar / 0 to 160 kPa	4 bar	6.4 bar / 640 kPa
A1N	0 to 2.5 bar / 0 to 250 kPa	6.7 bar	10 bar / 1 MPa
A1Q	0 to 4 bar / 0 to 400 kPa	10.7 bar	16 bar / 1.6 MPa
A1R	0 to 6 bar / 0 to 600 kPa	16 bar	24 bar / 2.4 MPa
A1S	0 to 10 bar / 0 to 1 MPa	25 bar	40 bar / 4 MPa
A1T	0 to 16 bar / 0 to 1.6 MPa	25 bar	64 bar / 6.4 MPa
A1W	0 to 25 bar / 0 to 2.5 MPa	25 bar	100 bar / 10 MPa
A1X	0 to 40 bar / 0 to 4 MPa	60 bar	160 bar / 16 MPa
A1Z	0 to 60 bar / 0 to 6 MPa	60 bar	240 bar / 24 MPa
A70	0 to 100 bar / 0 to 10 MPa	100 bar	400 bar / 40 MPa
A71	0 to 160 bar / 0 to 16 MPa	160 bar	600 bar / 60 MPa
A73	0 to 250 bar / 0 to 25 MPa	250 bar	600 bar / 60 MPa
A74	0 to 400 bar / 0 to 40 MPa	400 bar	600 bar / 60 MPa
Q4H	0 to 15 psi	40 psi	60 psi
Q4K	0 to 30 psi	100 psi	150 psi
Q4N	0 to 50 psi	160 psi	240 psi
Q4R	0 to 150 psi	400 psi	600 psi
Q4S	0 to 300 psi	400 psi	1500 psi
Q4T	0 to 500 psi	1000 psi	2400 psi
Q4V	0 to 1000 psi	1000 psi	3600 psi
Q70	0 to 1500 psi	1500 psi	6000 psi
Q73	0 to 3000 psi	3000 psi	9000 psi
Q74	0 to 6000 psi	6000 psi	9000 psi

PMP131	Order code

→ For continuation of ordering information of PMP131, see the following page.

PMP131 (continued)

50					Sensor range; MWP; OPL:			
						Sensor range **Sensors for absolute pressure**	**MWP (maximum working pressure)**	**OPL (over pressure limit)**
					A2G	0 to 1 bar / 0 to 100 kPa	2.7 bar	4 bar / 400 kPa
					A2H	0 to 1.6 bar / 0 to 160 kPa	4 bar	6.4 bar / 640 kPa
					A2N	0 to 2.5 bar / 0 to 250 kPa	6.7 bar	10 bar / 1 MPa
					A2Q	0 to 4 bar / 0 to 400 kPa	10.7 bar	16 bar / 1.6 MPa
					A2R	0 to 6 bar / 0 to 600 kPa	16 bar	24 bar / 2.4 MPa
					A2S	0 to 10 bar / 0 to 1 MPa	25 bar	40 bar / 4 MPa
					A2T	0 to 16 bar / 0 to 1.6 MPa	25 bar	64 bar / 6.4 MPa
					A2W	0 to 25 bar / 0 to 2.5 MPa	25 bar	100 bar / 10 MPa
					A2X	0 to 40 bar / 0 to 4 MPa	60 bar	160 bar / 16 MPa
					A2Z	0 to 60 bar / 0 to 6 MPa	60 bar	240 bar / 24 MPa
					B70	0 to 100 bar / 0 to 10 MPa	100 bar	400 bar / 40 MPa
					B71	0 to 160 bar / 0 to 16 MPa	160 bar	600 bar / 60 MPa
					B73	0 to 250 bar / 0 to 25 MPa	250 bar	600 bar / 60 MPa
					B74	0 to 400 bar / 0 to 40 MPa	400 bar	600 bar / 60 MPa
					R4H	0 to 15 psi	40 psi	60 psi
					R4K	0 to 30 psi	100 psi	150 psi
					R4N	0 to 50 psi	160 psi	240 psi
					R4R	0 to 150 psi	400 psi	600 psi
					R4S	0 to 300 psi	400 psi	1500 psi
					R4T	0 to 500 psi	1000 psi	2400 psi
					R4V	0 to 1000 psi	1000 psi	3600 psi
					R70	0 to 1500 psi	1500 psi	6000 psi
					R73	0 to 3000 psi	3000 psi	9000 psi
					R74	0 to 6000 psi	6000 psi	9000 psi

995						Marking	
						1	Tagging (TAG), see additional spec.

PMP131							Complete order code

PMP135

This overview does not mark options which are mutually exclusive.

10	**Electrical connection:**	
	A1	Plug ISO 4400, M 16, IP 65/NEMA 4X
	A2	Plug ISO 4400, ½ NPT, IP 65/NEMA 4X
	A3	5 m cable, IP 68/NEMA 6P
	A4	Plug M 12, IP 65/NEMA 4X

20	**Process connection:**	
	F	Clamp ISO 2852, DN 22 (¾"), AISI 316L, 3A, DIN 32676 DN 20, EHEDG, 3A
	G	Tri-Clamp ISO 2852, DN 25 to 38 (1" to 1½"), AISI 316L, 3A, DIN 32676 DN 25 to 40, EHEDG, 3A
	H	Tri-Clamp ISO 2852, DN 40 to 51 (2"), AISI 316L, 3A, DIN 32676 DN 50, EHEDG, 3A
	M	Thread ISO 228, G 1, with metallic sealing taper, AISI 316L, flush-mounted, adapter 52005087
	N	Thread ISO 228, G 1, with sealing surface for flush-mounted installation, AISI 316L, adapter 52001051 EHEDG, 3A (3A and EHEDG approval in combination with o-ring seal and welding neck)
	S	SMS 1½", PN 25, AISI 316L, EHEDG, 3A

30	**Output:**	
	0	Analog 4 to 20 mA, SIL
	D	Analog 4 to 20 mA, SIL, ATEX II 1/2 G Ex ib IIC T6
	1	Analog 4 to 20 mA, SIL, ATEX II 2 G Ex ib IIC T6
	5	Analog 4 to 20 mA, SIL, ATEX II 3 G EEx nA II T6
	2	Switch output PNP, 3-wire
	3	Switch output PNP, ATEX II 3 G EEx nA II T6

40	**Additional options:**	
	1	Basic version
	C	EN10204-3.1 material (wetted parts) inspection certificate
	D	Final inspection report + EN10204-3.1 material (wetted parts) inspection certificate
	2	Final inspection report

50	**Sensor range; MWP; OPL:**			
		Sensor range	**MWP (maximum working pressure)**	**OPL (over pressure limit)**
		Sensors for gauge pressure		
	A1G	0 to 1 bar / 0 to 100 kPa	2.7 bar	4 bar / 400 kPa
	A1H	0 to 1.6 bar / 0 to 160 kPa	4 bar	6.4 bar / 640 kPa
	A1N	0 to 2.5 bar / 0 to 250 kPa	6.7 bar	10 bar / 1 MPa
	A1Q	0 to 4 bar / 0 to 400 kPa	10.7 bar	16 bar / 1.6 MPa
	A1R	0 to 6 bar / 0 to 600 kPa	16 bar	24 bar / 2.4 MPa
	A1S	0 to 10 bar / 0 to 1 MPa	25 bar	40 bar / 4 MPa
	A1T	0 to 16 bar / 0 to 1.6 MPa	25 bar	64 bar / 6.4 MPa
	A1W	0 to 25 bar / 0 to 2.5 MPa	25 bar	100 bar / 10 MPa
	A1X	0 to 40 bar / 0 to 4 MPa	60 bar	160 bar / 16 MPa
	Q4H	0 to 15 psi	40 psi	60 psi
	Q4K	0 to 30 psi	100 psi	150 psi
	Q4N	0 to 50 psi	160 psi	240 psi
	Q4R	0 to 150 psi	400 psi	600 psi
	Q4S	0 to 300 psi	400 psi	1500 psi
	Q4T	0 to 500 psi	1000 psi	2400 psi
		Sensors for absolute pressure		
	A2G	0 to 1 bar / 0 to 100 kPa	2.7 bar	4 bar / 400 kPa
	A2H	0 to 1.6 bar / 0 to 160 kPa	4 bar	6.4 bar / 640 kPa
	A2N	0 to 2.5 bar / 0 to 250 kPa	6.7 bar	10 bar / 1 MPa
	A2Q	0 to 4 bar / 0 to 400 kPa	10.7 bar	16 bar / 1.6 MPa
	A2R	0 to 6 bar / 0 to 600 kPa	16 bar	24 bar / 2.4 MPa
	A2S	0 to 10 bar / 0 to 1 MPa	25 bar	40 bar / 4 MPa
	A2T	0 to 16 bar / 0 to 1.6 MPa	25 bar	64 bar / 6.4 MPa
	A2W	0 to 25 bar / 0 to 2.5 MPa	25 bar	100 bar / 10 MPa
	A2X	0 to 40 bar / 0 to 4 MPa	60 bar	160 bar / 16 MPa
	R4H	0 to 15 psi	40 psi	60 psi
	R4K	0 to 30 psi	100 psi	150 psi
	R4N	0 to 50 psi	160 psi	240 psi
	R4R	0 to 150 psi	400 psi	600 psi
	R4S	0 to 300 psi	400 psi	1500 psi
	R4T	0 to 500 psi	1000 psi	2400 psi

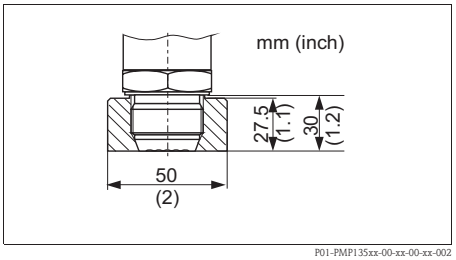
995	**Marking**	
	1	Tagging (TAG), see additional spec.

PMP135		Complete order code

Accessories

Welding neck with sealing taper

- Welding neck for flush-mounted installation of the process connection G1 A with metallic sealing taper (PMP135, version M)
  Material: AISI 316L (1.4435)
  Order number: 52005087
- with inspection certificate 3.1
  Order number: 52010171

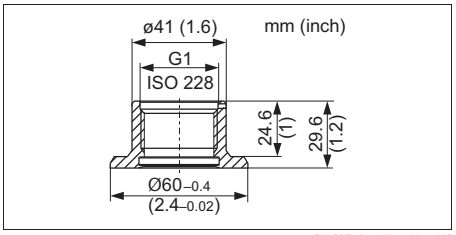


P01-PMP135xx-00-xx-00-xx-002

- Pressure sensor dummy for welding the welding neck without any problems with order number 52005087 or 52010171
  Material: CuZn
  Order number: 52005272

Welding neck with sealing surface

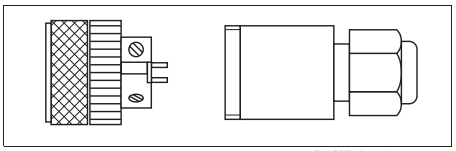
- Welding neck for flush-mounted installation of the process connection G1 A with sealing surface (PMP135, version N)
  Material: AISI 316L (1.4435)
  Gasket (enclosed): silicone O-ring
  Order number: 52001051
- Optional with inspection certificate 3.1
  Order number: 52011896



P01-PMP13xxx-00-xx-00-xx-005

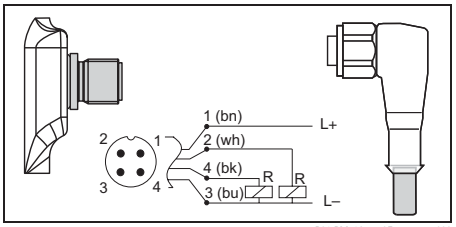
Plug-in jack

- Plug-in jack M 12x1, straight
  Self-made connection to M 12x1 housing plug
  Material: Handle body PA; Coupling nut CuZn, nickel-plated, degree of protection (inserted): IP 67
  Order number: 52006263


P01-PMP13xxx-00-xx-00-xx-003

Connecting cable

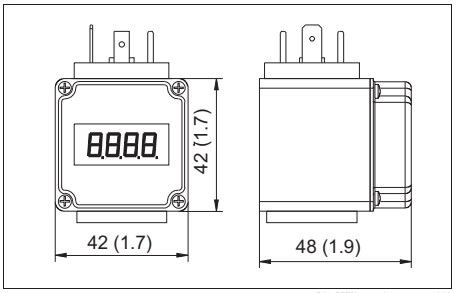
- Cable, 4 x 0.34 mm² (AWG 21) with M12 socket, elbowed, screw plug, length 5 m (16 ft), sprayed cable
  Materials: Body PUR
  Coupling nut: Cu Zn/Ni, brass, nickeled
  Cable: PVC
  Protection: IP 67 (fully locked)
  order number: 52010285



P01-PMx13xxx-07-xx-xx-xx-000

Plug-on display PHX20/PHX21

- Plug-on display for electrical connections
  – PMC131 version A1, A2, B1, C1, C2
  – PMP131/135 version A1, A2.
  4-digit red LED display for looping into 4 to 20 mA circuit via elbow plug ISO4400, rotatable in 90° steps, programmable via 2 keys
  Display range: –1999 to +9999
  Degree of protection: IP 65
  Material: Housing Pa6 GF30, front screen PMMA
  Voltage drop: ≤5 V (corresponds to max. 250 Ω load)
  Approval for PHX21: ATEX II 2G
  Order number PHX20: 52022914
  Order number PHX21: 52022915



P01-PHX2xxxx-06-xx-xx-xx-002

Documentation

Field of Activities

- Pressure measurement, powerful measuring devices for process pressure, differential pressure, level and flow: FA00004P/00/EN

Technical Information

- EMC test procedures: TI00241F/00/EN

Operating Instructions

- Cerabar T PMC131: KA00085P/00/A3
- Cerabar T PMP131: KA00103P/00/A3
- Cerabar T PMP135: KA00198P/00/A3

Functional Safety Manual (SIL)

- Cerabar T PMP131, PMP135: SD00160P/00/EN

Safety Instructions

Certificate/Type of protection	Device	Documentation	Version in the order code
ATEX II 3 G EEx nA II T4 [1]	PMC131	– XA00191P	B1, B3, B5
ATEX II 1/2 G Ex ib IIC T6 ATEX II 2 G Ex ib IIC T6 ATEX II 3 G EEx nA II T6 [1]	PMP131, PMP135	– XA00142P – XA00191P	D 1 3, 5

1) In the event of applications in a Zone 2 explosive atmosphere (EEx nA explosion protection) protect the housing from impact.

Instruments International

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Endress+Hauser

People for Process Automation

TI00415P/00/EN/19.15
71289985
CCS/FM+SGML 9.0

71289985

CS-413-300 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
TECKNO VALVE	IMPSGG300380	PI18-031	DIA. CADRAN: 2.5"	SERVICE WATER PRESSURE GAUGE	PRESSURE GAUGE/MANUFACTURER: ASHCROFT// MODEL: 25-1009SWL-02L-160PSIG// 1/4''	N/A	N/A	HYDRAPOL 3500		rev1

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ASHCROFT®

Duralife® Pressure Gauge
Type 1009, ASME B 40.1
Grade 1A (±1% of span)

DESIGNED FOR SAFETY AND LONGER LIFE

- ***5-year limited warranty***
- ***Patented PowerFlex™ movement isolates movement from shock and vibration for longer life***
- ***All stainless, all-welded construction for long life***
- ***ASME Grade 1A, 1% accuracy full scale***
- ***True Zero™ pointer indication – no stop pin to mask false zero reading – ensures safety and process control***

The following Table is *not* for conversion purposes.

STANDARD RANGES [3][4][5]

Pressure psi	kg/cm² - bar	kPa
0/15	0/1	0/100
0/30	0/1.6	0/160
0/60	0/2.5	0/250
0/100	0/4	0/400
0/160	0/6	0/600
0/200	0/10	0/1000
0/300	0/16	0/1600
0/400	0/25	0/2500
0/600	0/40	0/4000
0/800	0/60	0/6000
0/1000	0/100	0/10,000
0/1500	0/160	0/16,000
0/2000	0/250	0/25,000
0/3000	0/400	0/40,000
0/4000	0/600	0/60,000
0/5000	0/1000	0/100,000
0/6000		
0/7500		
0/10,000		
0/15,000		
Vacuum		
30 in./0 in.Hg	–1/0	–100/0
Compound		
30 in.Hg/15 psi	–1/0/1.5	–100/0/150
30 in.Hg /30 psi	–1/0/3	–100/0/300
30 in.Hg /60 psi	–1/0/5	–100/0/500
30 in.Hg /100 psi	–1/0/9	–100/0/900
30 in.Hg /150 psi	–1/0/15	–100/0/1500
30 in.Hg /300 psi	–1/0/24	–100/0/2400

- ***New PLUS!™ Performance Option:***
  - ***Liquid-filled performance in a dry gauge***
  - ***Fights vibration and pulsations without liquid-fill headaches***
  - ***See pages 6-7 for details***
  - ***Order as option XLL***

OTHER FEATURES:

Available in 2½˝ and 3½˝ dial sizes, Duralife® pressure gauges are liquid fillable and field convertible for panel mounting. Both zero and span adjustments are standard.

The gauge is available dry, liquid-filled weatherproof or hermetically sealed and *now* with *PLUS!™* performance option. A five year limited warranty is standard with the Duralife® 1009.

BOURDON SYSTEM SELECTION[1]

Ordering Code	Bourdon Tube & Tip Material[1]	Socket Material	Tube Type	Range Selection Limits (psi)	NPT Conn.[6]
AW	316 stainless steel	Bronze	C-Tube	Vac/600	¼
AW	316 stainless steel	Bronze	Helical	1000	¼
SW	316 stainless steel	316 stainless steel	C-Tube	Vac/600	¼ & ½[2]
SW	316 stainless steel	316 stainless steel	Helical	800/15,000	¼ & ½[2]

(1) For selection of the correct Bourdon system material, see the media application table on page 243.
(2) ½ NPT available 3½˝ lower SW system only.
(3) Type 1009 gauges may be ordered with metric single-scale dial: kPa,bar or kg/cm².
(4) Dual-scale dials will be supplied with standard metric inner scale and equivalent psi outer scale or with standard psi inner scale and equivalent metric outer scale–please specify.
(5) Special logos and scales available upon request.
(6) ¼˝ JIS, BSP or DIN threads available on SW systems.

TO ORDER THIS 1009 DURALIFE PRESSURE GAUGE:

Select: 35 1009 SW (L) 02L XXX 1000#

1. Dial size–2½˝, 3½˝
2. Case type–1009
3. Tube and socket material
4. Liquid filled (glycerin), leave blank if dry
5. Connection size–⅛ (01), ¼ (02) ½ (04)
6. Connection location–Lower (L), Back (B)
7. Optional Features–see page 176
8. Standard pressure range–1000 psi

Accessories: see pages 233-238

Consult factory for guidance in product selection
Phone (203) 385-0217, Fax (203) 385-0602 or
visit our web site at www.ashcroft.com

DRESSER Instruments

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ASHCROFT®
Trust the shield.™

Type 310, 315 All-Welded "Mini" Diaphragm Seal

PRODUCT FEATURES

- Compact size to fit space-restricted areas
- Designed to protect transducers, mini-switches and 3½″ or smaller pressure gauges from corrosion, plugging or freeze-up
- All-welded metal construction prevents leakage of process media
- Rated for 2500 psi at 100°F
- Fill/bleed connection is standard
- Available with male process connection (Type 310)

The compact size of the Ashcroft® 310 mini-seal allows it to fit into space-restricted areas and is designed to protect transducers, mini-switches, and 3½" or smaller dial size pressure gauges from corrosion, plugging or freeze- up. All welded metal construction prevents leakage of process media. It is rated for 2500 psi at 100°F and has a 316L stainless steel top housing standard. Lower housing materials include 316L stainless steel or Hastelloy C. Diaphragm materials include 316L stainless, Hastelloy C or Tantalum. ¼ NPT or ½ NPT process connection sizes are available.

PRODUCT SPECIFICATIONS

Model Number:	Type 310, 315
Process Connection Size:	¼″, ½″ (⅛″, ¾″, 1″- 310 only) (see table A)
Instrument Connection Size:	⅛, ¼ NPT
Diaphragm Material:	316L SS, Hastelloy C276, Tantalum, Monel
Bottom Housing Materials:	316L SS, Hastelloy C276, Monel, Hastelloy B
Filling Fluid:	Glycerin, Silicone, Halocarbon, Syltherm

Ashcroft Inc., 250 East Main Street, Stratford, CT 06614 USA
Tel: 203-378-8281 • Fax: 203-385-0408
email: info@ashcroft.com • www.ashcroft.com

Type 310, 315 All-Welded "Mini" Diaphragm Seal

Table A – Process Connection

Process Connection	Size	Code
Threaded – male NPT*	⅛	01
Threaded – male NPT*	¼	02
Threaded – male NPT*	½	04
Threaded – male NPT*	¾	06
Threaded – male NPT*	1	08
Threaded – female NPT†	¼	25
Threaded – female NPT†	½	50

*Available in Type 310 only.
†Available in Types 310 & 315.

Pressure Ratings – All 2500 psi except flanged seals are per ASME B 16.5, temperature limit determined by diaphragm, bottom housing and/or filling fluid.

Table B – Type

Description	Code
All-welded mini-seal	310
All-welded midi-seal w/flushing connection	315

Table C – Diaphragm Materials

Materials	Code
316L stainless steel	S
Hastelloy C-276	H
Tantalum	U
Monel	P

Table D – Housing Materials

Bottom(1)	Code	Top(2)
316L SS	S	316L SS
Hastelloy C-276	H	316L SS
Monel	M	Monel

(1) Other bottom housing materials on application.
(2) Top housing material is 316L SS (standard). Monel mini-seal standard with monel top housing.

Table E – Instrument Connection

Instrument Connection	Size	Code
Threaded – female NPT	¼	02T
Threaded – female NPT	⅛	01T

NOTES:
(1) For use with most 3½″ and smaller gauges. Movementless gauge 4½″ (exception).
(2) Other bottom housing materials on application.
(3) Top housing material is 316L SS (standard). Monel mini-seal standard with monel top housing.
(4) Not available with monel bottom housing.

Table F – Filling Fluid

Fill	Service	Connection to Instrument	Temperature Range °F	Code
Glycerin	Pressure	Direct Only	0/400	CG
Silicone	Pressure/Vacuum	Direct or Flexible Line	–40/600	CK
Halocarbon	Pressure/Vacuum in presence of strong oxidizing agent	Direct or Flexible Line	–70/300	CF
Syltherm	Pressure	Direct or Flexible Line	–40/750	HA

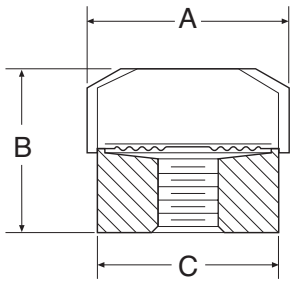
Monel is a registered trademark of Huntington Alloys, Inc.
Hastelloy is a registered trademark of Cabot Corp.
Halocarbon is a registered trademark of Halocarbon Products
GYLON 3510 is a registered trademark of Garlock Inc.

HOW TO ORDER:

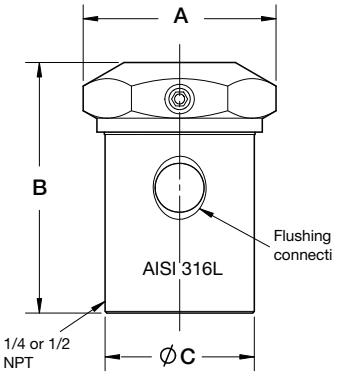
1. **From Table A...** select PROCESS CONNECTION (e.g., 1/4″ process code 25)
2. **From Table B...** select TYPE (310)
3. **From Table B...** select DIAPHRAGM MATERIAL. (e.g., 316L stainless steel–code S)
4. **From Table C...** select BOTTOM HOUSING MATERIAL. (e.g., 316 stainless steel–code S)
5. **From Table D...** select INSTRUMENT CONNECTION size. (e.g., 1/4 NPT–code 02T)
6. **From Table E...** select FILLING FLUID, if diaphragm seal will be attached to instrument. (e.g., Glycerin–code CG)

Coded order: **25-310SS-02T-CG**

Dimension



Types 310 mini-seal – Threaded ¼, ½, ¾, NPT



Types 315 mini-seal – Threaded ¼, ½, ¾, NPT

	A		B		C	
	in	mm	in	mm	in	mm
Type 310	1.75	(38)	.81	(30)	1.34	(34)
Type 315	1.73	(44)	2.25	(57.2)	1.34	(34)

Ashcroft Inc., 250 East Main Street, Stratford, CT 06614 USA
Tel: 203-378-8281 • Fax: 203-385-0408
email: info@ashcroft.com • www.ashcroft.com

CS-434-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
LUMEN	IEPOPS201955	PSL18-031	N/A	SERVICE WATER PRESSURE SWITCH	PRESSURE SWITCH/MANUFACTURER: ALLEN BRADLEY// MODEL: 836T-T253J	1/4" FNPT female pipe connection	Adjustable Range : 12-150 psi	HYDRAPOL 3500		rev1

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Bulletin 836T Pressure Controls

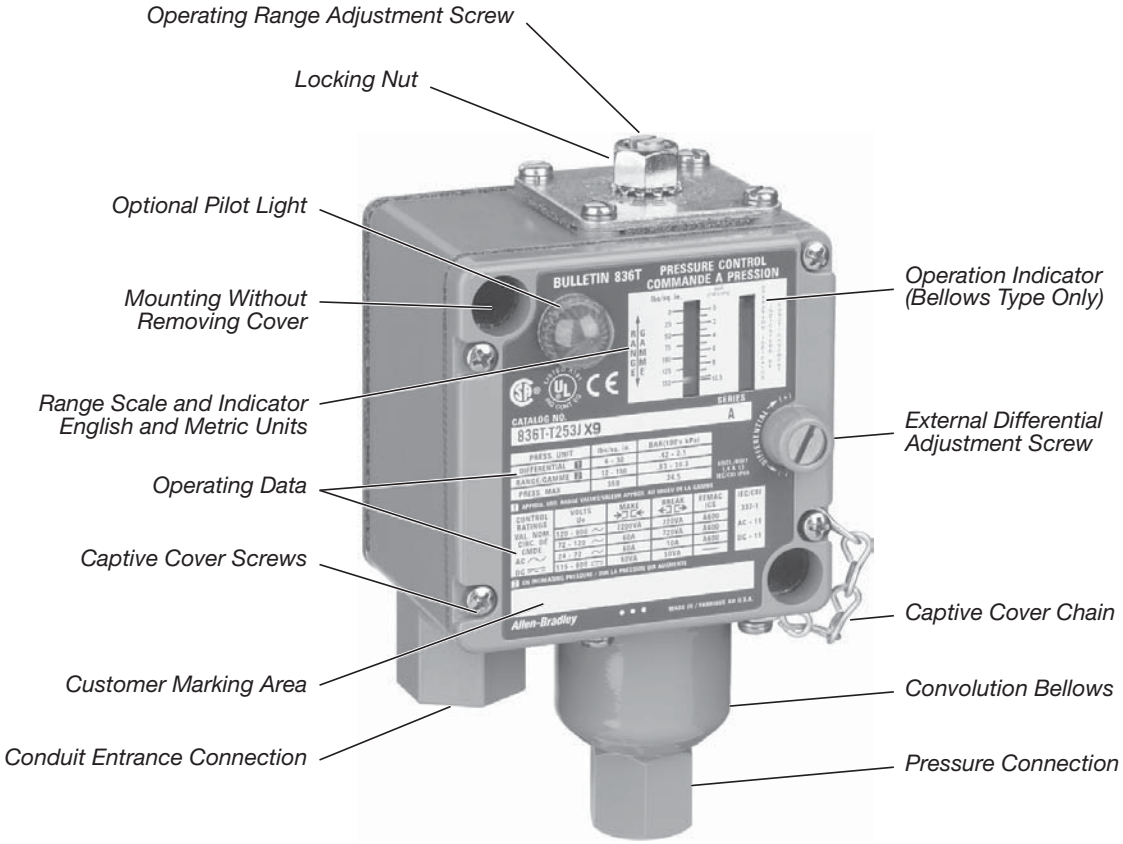
- Operating ranges from 30 in. Hg vacuum…5000 psi
- Independently adjustable range and differential
- Copper alloy and stainless steel bellows
- 2- and 4-Circuit contact block
- Pressure difference controls available
- 1/4 in. and 3/8 in. N.P.T. and O-ring straight thread connections
- Type 4 & 13 and Type 7 & 9 and 4 & 13 combination enclosures

Table of Contents

Standards Compliance and Certification

(For file and guide numbers, see page 13-44)

Product Overview



Bulletin 836T Style T Bellows Type Enclosure Type 1, 4 & 13, IEC IP66

Description

Bulletin 836T Pressure Controls are control circuit devices designed to meet the traditional requirements of the transportation, machine tool, and other heavy-duty industries. Allen-Bradley Bulletin 836T Pressure Controls can be used in pneumatic and hydraulic applications. The copper alloy bellows actuators can be used with air, water, oil, vapor, and other non-corrosive gases and liquids. Type 316 stainless steel bellows are available for more corrosive gases, vapors, and fluids.

A rugged stainless steel cylinder and stainless steel piston assembly is used for the higher-pressure coolant and hydraulic oil applications. May also be used with water and water-based fluids. The controls feature snap-action precision switches equipped with silver contacts. A relatively friction-free mechanism provides consistent operation regardless of mounting position. Devices are designed to allow easy adjustment of pressure settings.

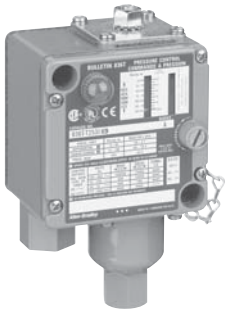
Allen-Bradley Bulletin 836T Pressure Controls are used in many types of applications with adjustable ranges from 30 in. Hg vacuum…5000 psi. They can be used to control pneumatic systems and maintain a pressure tank within a preset and constant pressure range. They can be used to detect over-pressures of gases and liquids to prevent damage to valuable equipment. Pressure controls can also detect low pressure to protect equipment from loss of coolants and lubrication.

Bulletin 836T Pressure Controls are offered in a variety of styles to fit a wide range of applications. The devices are available with either a Type 1, 4 & 13, or 7 & 9 and 4 & 13 combined enclosure. They are available with two-circuit or four-circuit contact blocks. Accessories and modifications are available to tailor the devices to meet most application requirements.

Applications

- Machine tools
- Machine hydraulic pressures
- Material clamping fixtures
- Lubricant and coolant pressures
- Compactor ram pressures
- Air compressors

Style T — Pressure Control



Style T

- Independently adjustable operating range and differential
- Single bellows or piston operation

Copper Alloy Bellows

- 1/4 in. N.P.T. female pipe connection
- Adjustable operating range — 30 in. Hg vacuum…650 psi
- Maximum line pressure — up to 1300 psi
- Occasional surge pressure — up to 1600 psi

Type 316 Stainless Steel Bellows

- 1/4 in. N.P.T. female pipe connection
- Adjustable operating range — 30 in. Hg vacuum…375 psi
- Maximum line pressure — up to 600 psi
- Occasional surge pressure — up to 600 psi

Piston

- 3/8 in. N.P.T. female pipe connection
- SAE 7/16-20 UNF-2B thread O-ring boss seal
- SAE 9/16-18 UNF-2B thread O-ring boss seal
- Adjustable operating range — 40…5000 psi
- Occasional surge pressure — up to 15,000 psi

Style D — Pressure Difference Control

Style D

- Independently adjustable system difference range and differential
- Two-bellows operation, one bellows connected to each system

Copper Alloy Bellows

- 1/4 in. N.P.T. female pipe connection
- Adjustable system difference range — 1…70 psi
- Maximum line pressure — up to 600 psi
- Occasional surge pressure — up to 650 psi

Type 316 Stainless Steel Bellows

- 1/4 in. N.P.T. female pipe connection
- Adjustable system difference range — 1…70 psi
- Maximum line pressure — up to 500 psi
- Occasional surge pressure — up to 500 psi

Technical Terms

Adjustable operating range — Total span within which the contacts can be adjusted to trip and reset.

Trip setting — Higher pressure setting at which value the contacts transfer from their normal state to a change state.

Reset setting — Lower pressure setting at which value the contacts return to their normal state.

Adjustable differential — Difference between the trip and reset values

Minimum differential — When the differential is set to the lowest possible difference between trip and reset.

Maximum differential — When the differential is set to the highest possible difference between trip and reset.

Max. occasional surge pressure — Maximum surge pressure that can be applied to the actuator. Surges or ransients can occur during start-up and shut-down of a machine or system. Expressed in milliseconds, complex electronic instrumentation is required to measure the varying amplitude, frequency, and duration of this wave form. Extreme surges that occur approximately 8 times in a 24-hour period are negligible.

Maximum line pressure — Maximum sustained pressure that can be applied to the actuator without permanent damage. The control should not be cycled at this pressure. **Note:** Does not apply to piston type controls.

psi — Pounds per square inch gauge (positive pressure). Devices listed are in gauge pressure units which use atmospheric pressure as a reference. Atmospheric pressure at sea level is approximately 14.7 psi or 30 in. Hg.

Vacuum — Inches of mercury (in. Hg) vacuum (negative pressure).

Operating range adjustment screw — This screw is used to adjust the trip setting by varying the force of the main spring.

Differential adjustment screw — This screw is used to adjust reset setting by varying the force of the differential blade spring.

Pressure media — There are many types of pressure media that can be controlled. Examples include air, water, hydraulic fluids, and other types of gases and liquids. The type of media and the maximum system pressure will determine the type of actuator used for the pressure control application. See page 13-33.

Pressure connection — Common standard types of pressure connections used in control systems are 1/4 in. and 3/8 in. N.P.T. female pipe threads. SAE 7/16 and SAE 9/16 O-ring boss seals are also available (piston versions only).

Contact configuration — Bulletin 836T controls are available with either a 2-circuit or 4-circuit contact block. See page 13-31.

Style D

Style D — pressure difference controls adjustable system difference range — The adjustable operating range for a pressure difference control.

System difference pressure bushing — This bushing is used to adjust the trip setting by varying the force on the main spring.

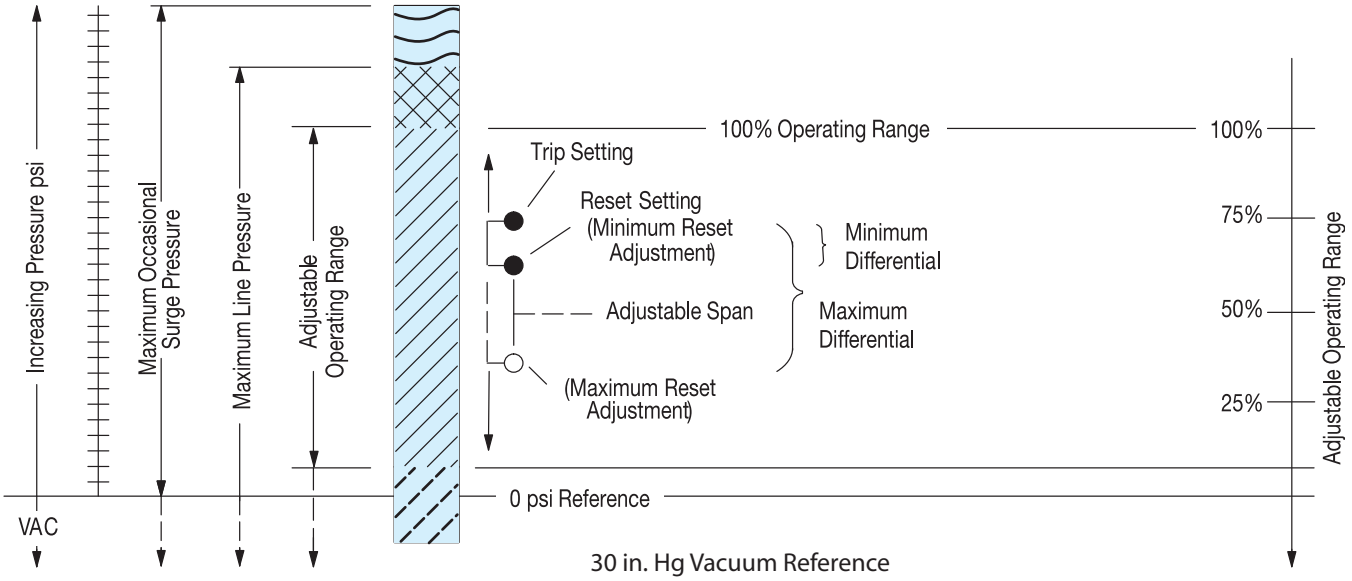
Trip setting — Desired difference in pressure between the two bellows at which value the contacts transfer from their normal state to a changed state. This occurs in one of the following conditions:

- The pressure in the bottom bellows is higher than the pressure in the top bellows by a value equal to the trip setting.
- The pressure in the bottom bellows remains constant and the pressure in the top bellows decreases by a value equal to the trip setting.

Reset setting — Predetermined normal difference in pressure between the two bellows, at which value the contacts return to their normal state. This occurs in one of the following conditions:

- The pressure in the bottom bellows is lower than the top bellows.
- The pressure in the bottom bellows remains constant and the pressure in the top bellows increases.

Figure 1
Graphics to illustrate technical terms



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Preferred availability cat. nos. are printed in **bold**

Allen-Bradley

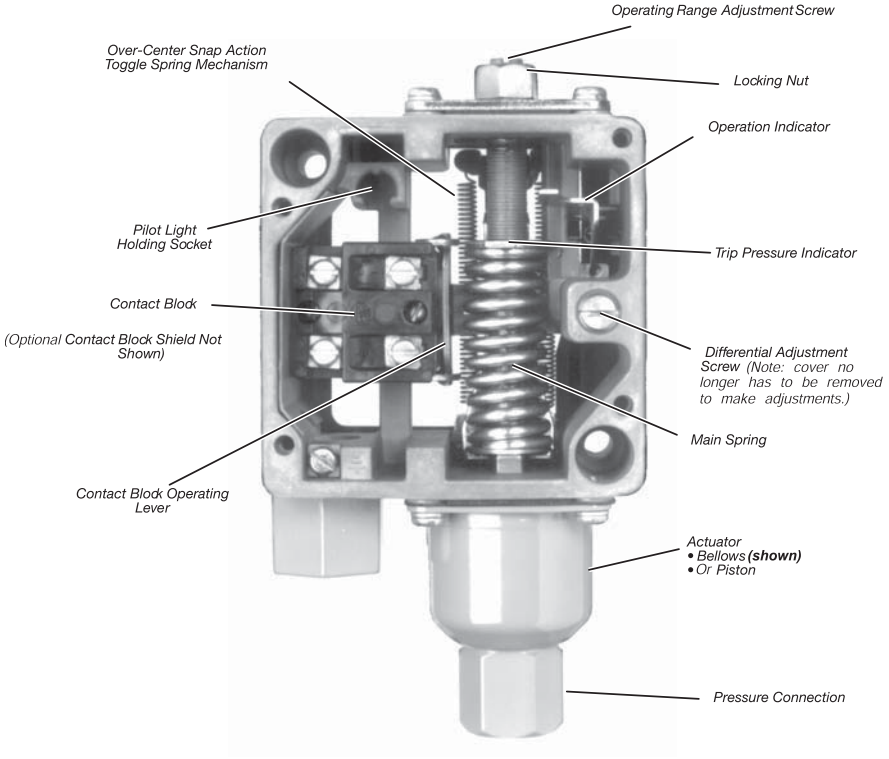
Theory of Operation

Bulletin 836T Pressure Controls are designed to open or close electrical circuits in response to changes in pneumatic (air or gas) or hydraulic (oil or non-corrosive liquids) pressure. Piston controls are not intended for use with air or water. Figure 2 shows the basic operating mechanism.

Pressure is applied to the actuator which can be either a bellows or piston type. As pressure rises, the actuator exerts force on the main spring. When the threshold force of the main spring is overcome, levers transfer the motion to the contact block, displacing the contacts — this is referred to as the trip setting. The unique lever design amplifies the actuator motion, providing shorter stroke, which results in maximizing bellows life.

The lever assembly also includes a virtually friction-free over-center toggle arrangement, providing positive snap action to the contact block for long contact life. As pressure falls, force on the differential spring increases and contacts return to their normal state — this is referred to as reset setting. Varying the force of the main spring (by turning the operating range adjustment screw) determines when the contacts will trip. Varying the force of the differential spring (by turning the differential adjustment screw) determines when the contacts will reset. Setting trip and reset values determines the operating parameters of the application.

Figure 2
Basic mechanical structure



Applications for Control

Pressure controls can be used to either control or monitor a machine or process. Figure 3 shows a typical control application. Here, pressure is controlled within predetermined high and low values. Figure 4 shows a typical monitoring application. Here, pressure is monitored between a high and low value, signaling when a preset limit has been exceeded.

Figure 3
Typical control application

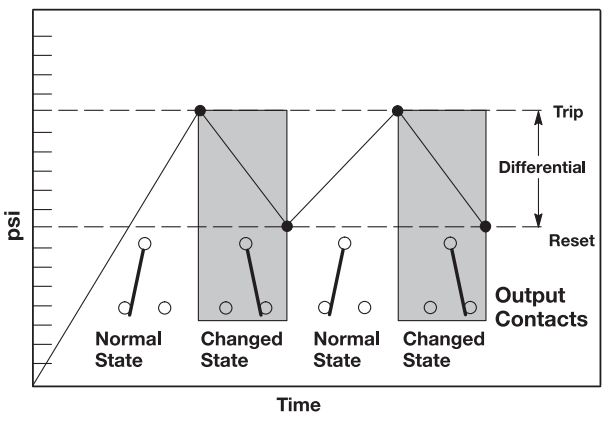
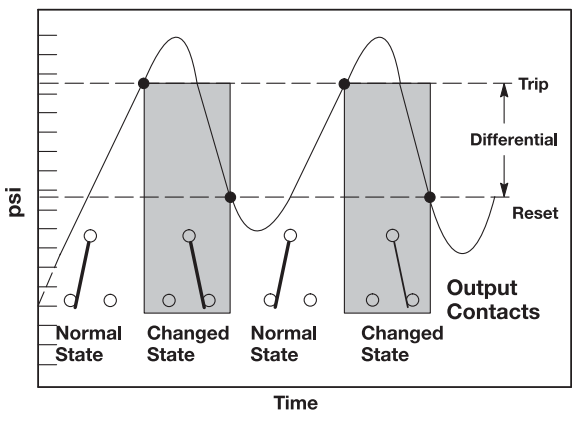


Figure 4
Typical monitoring application



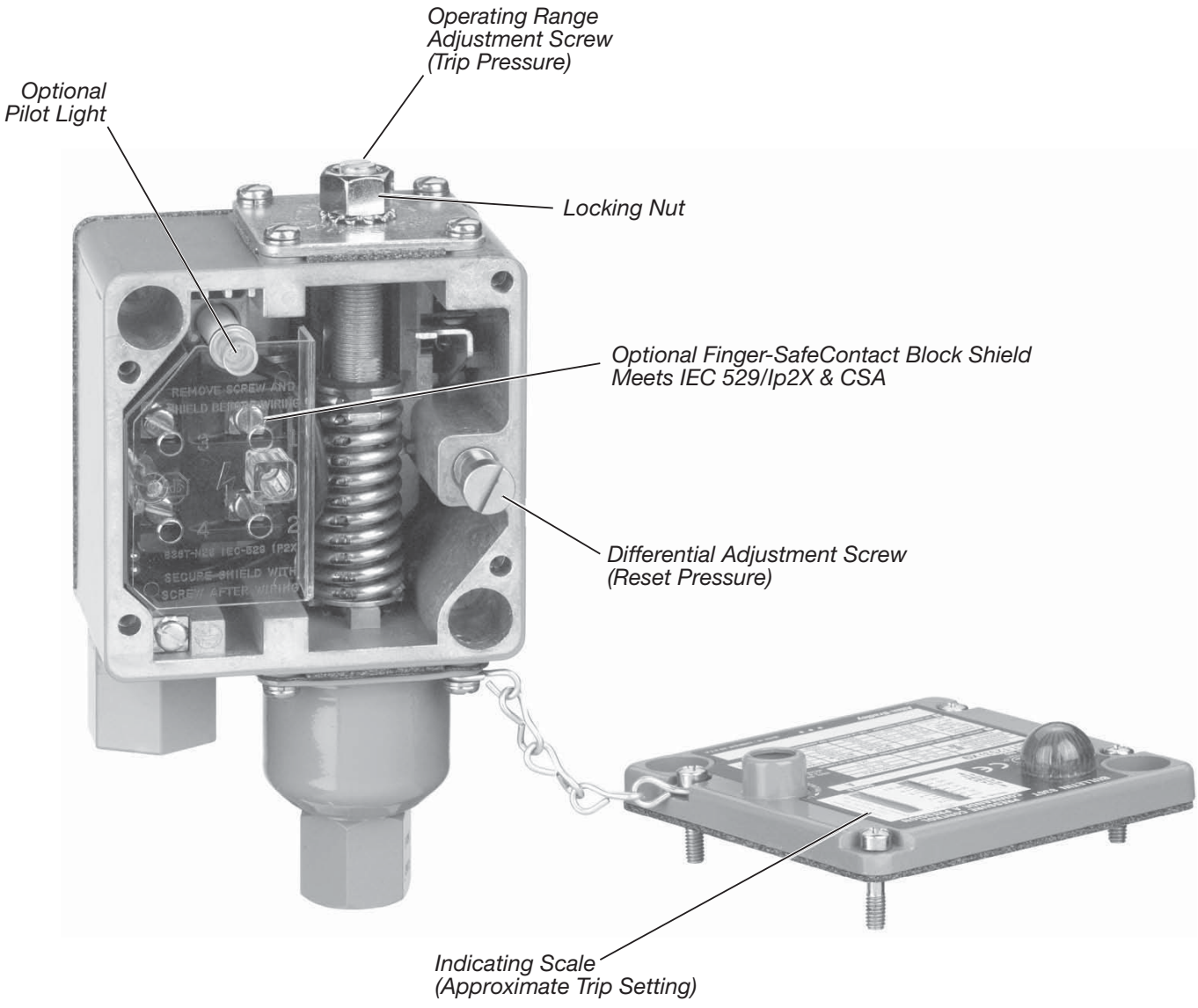
Control Setting — Style T Pressure Controls

Allen-Bradley controls are designed for ease of setting to help minimize installation time. Standard pressure controls shipped from the factory are set at the maximum operating range and minimum differential. By using a pressure gauge and following these simple directions, the control can be set to the specific requirements for each application. See Figure 5.

Step 1 — Adjust trip setting
The trip setting is controlled by the operating range adjustment screw and is adjusted externally. After loosening the lock nut, the trip setting is set by turning the operating range adjustment screw counterclockwise to lower the trip setting or clockwise to raise the trip setting. The approximate trip setting is shown on the indicating scale. When the proper setting is reached, simply tighten the lock nut.
Note: Turning the operating range adjustment screw will cause both the trip and reset settings to change in virtually equal increments.

Step 2 — Adjust reset setting
The reset setting is controlled by an external differential adjustment screw. The reset setting is set by turning the differential adjustment screw clockwise to increase the differential or counterclockwise to decrease the differential.
Note: Adjusting the differential has little or no affect on the trip setting.

Figure 5
Trip and reset adjustment for pressure controls



Control Setting — Style D Pressure Difference Controls

Standard pressure difference controls shipped from the factory are set at the maximum adjustable difference range and minimum differential. Remove the front cover and use a pressure gauge to make the following adjustments. See Figure 6.

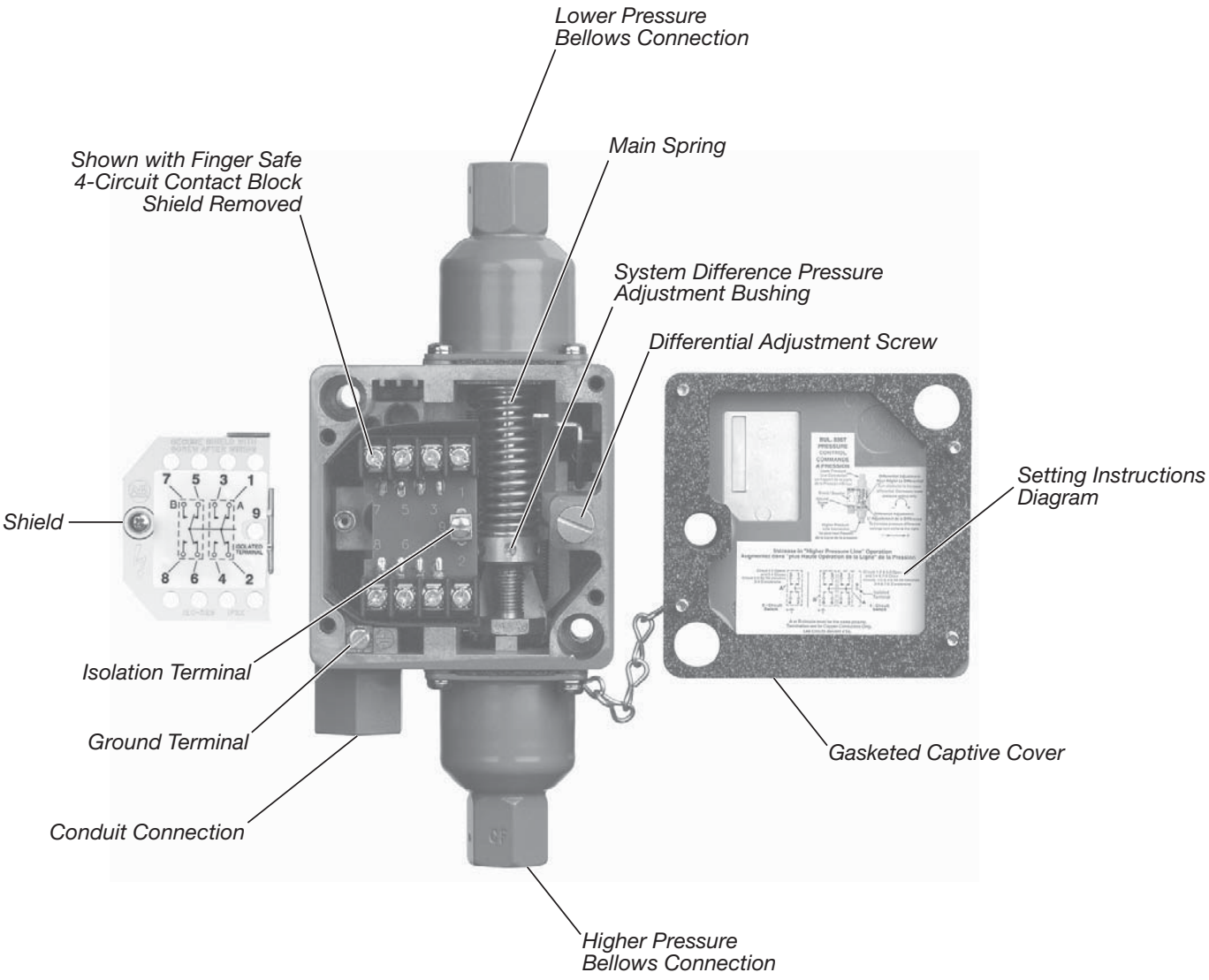
Step 1 — Adjust trip setting (difference pressure)

The trip setting is controlled by the system difference pressure bushing and is adjusted internally. With no pressure (open to atmosphere) applied to top bellows, apply a constant pressure to bottom bellows equal to the desired difference in pressure at which the contacts are to trip. Insert a 1/8 in. diameter rod into a hole in the bushing and turn bushing to the left. Continue to turn bushing until the mechanism trips; circuit 1-2 will open. At this value, the trip setting is set at the pressure which is being applied to the bottom bellows.
Note: Turning the system difference pressure bushing will cause both the trip and reset settings to change in virtually equal increments.

Step 2 — Adjust reset setting (differential pressure)

The reset setting is controlled by differential adjustment screw (this adjustment can be made with the cover on). The reset setting is adjusted by turning the differential adjustment screw clockwise to increase the differential or counterclockwise to decrease the differential.
Note: Adjusting the differential has little or no affect upon the trip setting (difference pressure).

Figure 6
Trip and reset adjustment for pressure difference controls — 4-circuit contact block

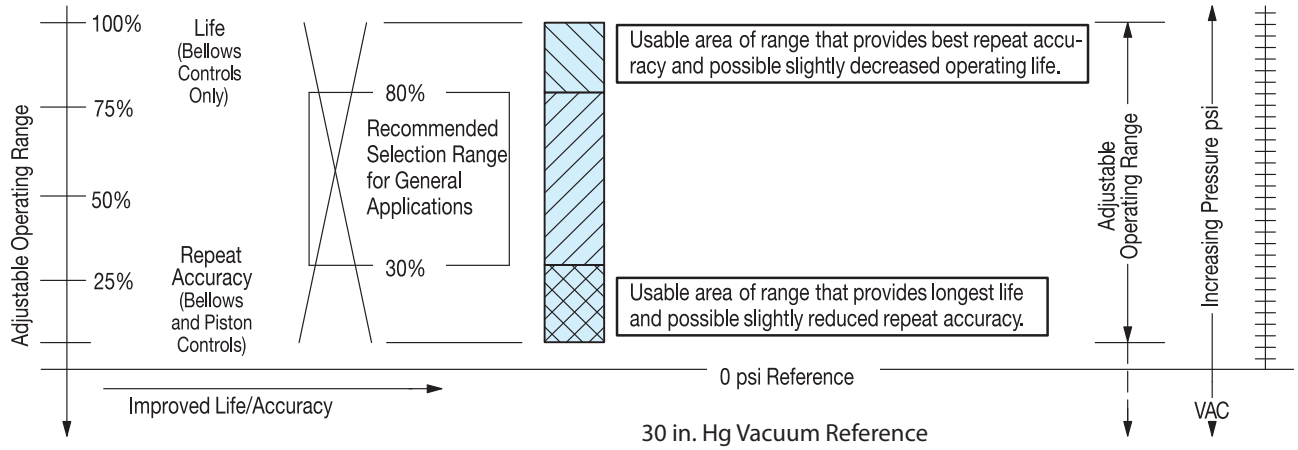


Repeat Accuracy and Mechanical Life

The design and construction of Bulletin 836T Pressure Controls provide a typical repeat accuracy equal to or better than the values shown in the repeat accuracy table below. Repeat accuracy is based on percent of maximum range, evaluated from test data and calculated using the formula per ICS 2-225 standards. Repeat accuracy and mechanical life of bellows type controls is graphically illustrated in Figure 7. The life curve does not apply to piston type controls.

For general applications, controls selected where the contacts operate between 30% and 80% of the operating range and where the maximum line and surge pressures do not exceed the specified values will provide excellent life and repeat accuracy. For more specific applications, it is important to note that the controls are designed to operate below or above these values. However, there may be a small trade-off between the factors of repeat accuracy and mechanical life.

Figure 7
Repeat accuracy versus mechanical life graph



Repeat Accuracy

Type	Typical Characteristics (% of Maximum Range) ✶
Bellows	± 1%
Piston with seal	± 5% ❄
Piston without seal	± 3%

✶ Evaluation made from test data and calculated using formula per ICS 2-225 standards.

❄ Seal adds additional friction and value shown takes into consideration initial breakaway frictional force incurred during start-up or infrequent cycle operation. On continual cycle operation the repeat accuracy approaches ±3%.

Conversion Factors (Rounded)

psi x 703.1 = mmH_2O
psi x 27.68 = in. H_2O
psi x 51.71 = mm/Hg
psi x 2.036 = in. Hg
psi x 0.0703 = kg/cm^2
psi x 0.0689 = bar
psi x 68.95 = mbar
psi x 6895 = Pa
psi x 6.895 = kPa

Note: psi - pounds per square inch (gauge).
H_2O at 39.2 °F
Hg at 32 °F

Mounting without Removing Cover

Bulletin 836T controls can be mounted without removing the front cover. This helps prevent foreign materials from entering the opened enclosure during the interval between mounting and wiring of the control.

Factory Set Pressure Controls

Rockwell Automation will factory set pressure controls to customer specified values. Unspecified pressure controls shipped from the factory are set at the maximum operating range and minimum differential. See Factory-Set Pressure Controls, page 13-44.

Temperature Range

The temperature range at +32 °F (0 °C) or below is based on the absence of freezing moisture, water, or other fluids that may solidify and impede the operation of the control. Temperature ratings:

Operating: –22… +150 °F (–30…+66 °C)
Storage: –22…+200 °F (–30…+93 °C)

Contacts

Bulletin 836T controls feature 2- and 4-circuit contact blocks for added control circuit flexibility. Two-circuit contact blocks have one normally open contact and one normally closed contact and may be arranged for single-pole double-throw operation or separate circuit operation having the same polarity. Four-circuit contact blocks may be arranged for double-pole double-throw operation or separate circuit operation having the same polarity.

2-Circuit Contact Ratings — NEMA A600 (ICS 2-125)

AC						DC	
Maximum AC Voltage	A		Continuous Carrying Current	VA		Maximum Voltage	[A]
	Make	Break		Make	Break		
120	60	6.00	10	7200	720	115…125	0.4
240	30	3.00	10	7200	720	230…250	0.2
480	15	1.50	10	7200	720	550…600	0.1
600	12	1.20	10	7200	720	—	—

IEC 337-1					
Maximum Operational Voltage U_e	Utilization Category	Maximum Continuous Current I_{th}	Volts U_e	Rated Operational Current Make	Rated Operational Current Break
AC600	AC-11	10	120…600 AC	7200 VA	720 VA
		10	72…120 AC	60 A	720 VA
DC600	DC-11	10	24…72 AC	60 A	10 A
		—	115…600 DC	50 VA	50 VA

4-Circuit Contact Ratings — NEMA B150 (ICS 2-125)

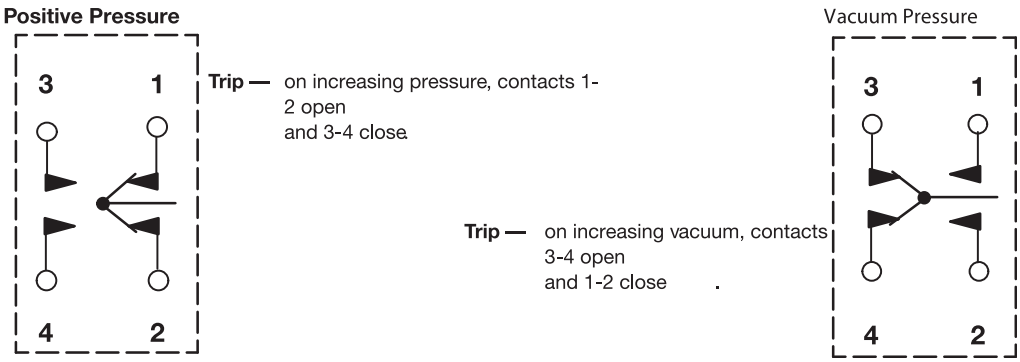
AC						DC	
Maximum AC Voltage	A		Continuous Carrying Current	VA		Maximum Voltage	[A]
	Make	Break		Make	Break		
120	30	3.00	5	3600	360	115…120	0.33
240	27.5	2.80	5	6600	660	230…240	0.17

IEC 337-1					
Maximum Operational Voltage U_e	Utilization Category	Maximum Continuous Current I_{th}	Volts U_e	Rated Operational Current Make	Rated Operational Current Break
AC150	AC-11	5	72…120 AC	30 A	360 VA
		5	24…72 AC	30 A	3 A
DC150	DC-11	—	115…240 DC	40 VA	40 VA

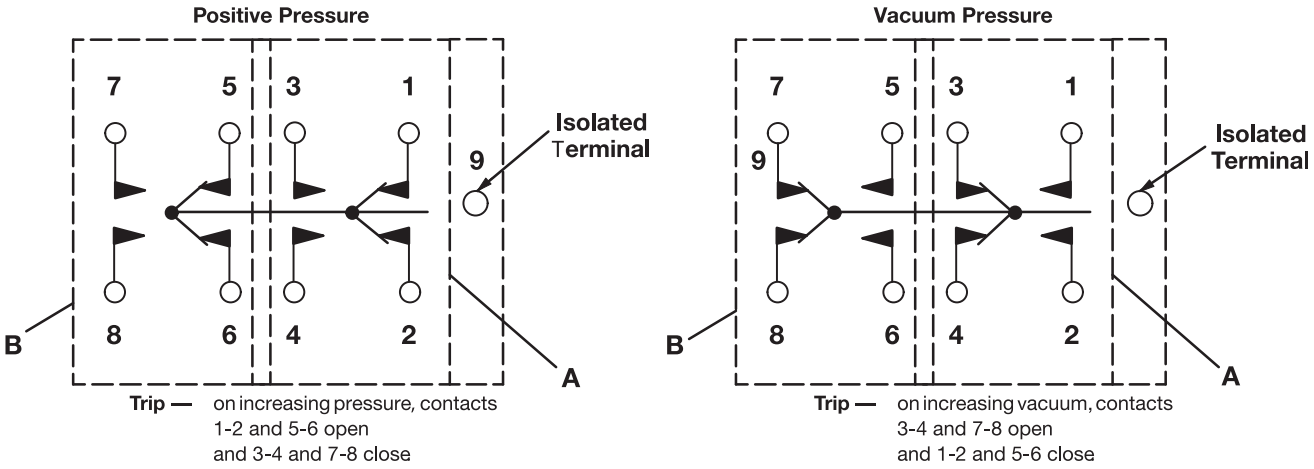
Note: NEMA does not rate contacts to switch low voltage and current. Bulletin 836T Styles T and D Pressure Controls are supplied with silver contacts. The devices are designed to deliver high force snap action to the contacts. This provides exceptional contact fidelity at 24V DC I/O card current level entry when the integrity of the enclosure is maintained.

Contact Wiring Configurations

2-Circuit Contact Blocks



4-Circuit Contact Blocks



Note: Circuits A and B are electrically isolated from one another.
A or B circuits must be the same polarity.

Nameplate with Removable Paint Mask

The masks are convenient for the many users who repaint controls to match the machine or color code equipment. Saves costly time-consuming hand masking necessary so as not to conceal product functional specifications and approval listings. This feature is standard on most controls at no additional cost. The paint mask feature cannot be supplied on controls with pilot lights. They are also not available on those devices where it is necessary to remove the mask and add suffix modifications to the catalog number or specific customer identification in the space provided.

Figure 8
Removable paint mask

Cover with Transparent Mask and Instruction Label in Place

Cover with Mask Partially Removed

Pressure Control Selection

The selection table below is an overview of the five types of Bulletin 836T Pressure Controls Rockwell Automation offers. Each type of control is suitable for use on many types of applications. Pressure ranges, pressure connections, enclosure types, and the compatibility of the actulator with different types of pressure media are given to assist in the selection of which type of control to use.

836T				
Actuator Type	Copper Alloy Bellows	Type 316 Stainless Steel Bellows	Piston Type Without Seal	Piston Type With Seal
Adjustable operating ranges	30 in. Hg vacuum…650 psi	30 in. Hg vacuum…375 psi	40…5000 psi	80…5000 psi
Adjustable differentials	2…125 psi	2…90 psi	20…650 psi	40…650 psi
Maximum line pressures	up to 1300 psi	up to 600 psi	—	—
Occasional surge pressures	up to 1600 psi	up to 600 psi	up to 15,000 psi	up to 15,000 psi
Pressure Media				
Air	•	•		
Water	•	•	•	•
Hydraulic fluids	•	•	•	•
Corrosive liquids ∗		•		
Non-corrosive liquids	•	•	•	•
Corrosive gases ∗		•		
Non-corrosive gases	•	•		
Enclosures				
Type 1, 4 & 13	•	•	•	•
Type 7 & 9 and 4 & 13, IP66	•	•	•	•
Pipe Connections				
Standard pressure connection	1/4 in. N.P.T. female pipe thread	1/4 in. N.P.T. female pipe thread	3/8 in. N.P.T. female pipe thread SAE 7/16-20 UNF-2B thread O-ring boss seal SAE 9/16-18 UNF-2B thread O-ring boss seal	3/8 in. N.P.T. female pipe thread SAE 7/16-20 UNF-2B thread O-ring boss seal SAE 9/16-18 UNF-2B thread O-ring boss seal

∗ Corrosive liquids and gases must be compatible with Type 316 Stainless Steel Bellows.

Note: Pressure difference controls are supplied with either copper alloy or stainless steel bellows. See Product Selection on page 13-39 and page 13-40 for details.

Ordering Bulletin 836T Pressure Controls

When ordering Bulletin 836T Pressure Controls, consider the following:

- Device style
- Adjustable operating range
- Adjustable differential
- Maximum line pressure
- Occasional surge pressure
- Pressure media
- Enclosure type
- Pressure connection

How to Order

Step 1: Basic Device
Select a catalog number for the basic device.....**See pages 13-35…13-40.**

Step 2: Modifications
If required, add the appropriate modification suffix code(s) to the catalog number of the basic device.....**See page 13-41.**

Step 3: Accessories
If required, order accessories.....**See page 13-42.**

Step 4: Factory Options
Factory-set pressure controls.....**See page 13-44 .**

Catalog Number Explanation

Note: Catalog number must not include blank spaces.

836T –	T	25	1	J	X40	X15
	a	*b*	*c*	*d*	*e*	*f*

a

Style of Device	
Code	Description
T	Pressure control
D	Pressure difference control

b

Operator Type		
Code	Style	Description
25	T	Copper alloy bellows
26	T	Type 316 stainless steel bellows
30	T	Piston without seal
35	T	Piston with seal
40	T	Piston with seal (independent trip and reset adjustment)
45	D	Copper alloy bellows
46	D	Type 316 stainless steel bellows

c

Pressure Specifications
See “Pressure Specifications” on pages 13-35…13-40

d

Enclosure Type	
Code	Description
J	1, 4 & 13 Industrial use
E	7 & 9 and 4 & 13 Combined hazardous locations

e

Contact Block Type	
Code	Description
None	2-circuit contact block - standard
X40	4-circuit contact block

f

Modification 1
Add suffix codes in descending order whenever possible. (Optional. See page 13-41.)

Product Selection

Style T — Type 1, 4 & 13 with Pilot Light Option

Style T — Type 1, 4 & 13 with Pilot Light, Range Locking Cap, and 5-Pin Mini-Receptacle

Style T Pressure Controls with Copper Alloy Bellows∗ — S.P.D.T. 2-Circuit Contact Block

Standard Pressure Controls shipped from the factory are set at the maximum operating range and minimum differential.

Pressure Specifications				Enclosure Type	
	Adjustable Differential [psi] (Approximate Mid-Range Values)	Maximum psi		Type 1, 4 & 13	Type 7 & 9 and 4 & 13 ‡
Adjustable Operating Range [psi]		Line Pressure	Occasional Surge Pressure❄	Cat. No.	Cat. No.
30 in. Hg vacuum…35	2…7	80	90	**836T-T251J**	836T-T251E
6…75	3…15	200	220	**836T-T252J**	836T-T252E
12…150	6…30	350	450	**836T-T253J**	836T-T253E
20…300	10…55	600	750	**836T-T254J**	836T-T254E
40…450	20…90	900	1200	**836T-T255J**	836T-T255E
60…650	30…125	1300	1600	**836T-T256J**	836T-T256E

Style T Pressure Controls with Copper Alloy Bellows∗ — D.P.D.T. 4-Circuit Contact Block

Standard Pressure Controls shipped from the factory are set at the maximum operating range and minimum differential.

Pressure Specifications				Enclosure Type	
	Adjustable Differential [psi] (Approximate Mid-Range Values)	Maximum psi		Type 1, 4 & 13	Type 7 & 9 and 4 & 13 ‡
Adjustable Operating Range [psi]		Line Pressure	Occasional Surge Pressure❄	Cat. No.	Cat. No.
30 in. Hg vacuum…35	2.2…7	80	90	836T-T251JX40	836T-T251EX40
6…75	4.5…15	200	220	**836T-T252JX40**	836T-T252EX40
12…150	9…30	350	450	**836T-T253JX40**	836T-T253EX40
20…300	15…55	600	750	836T-T254JX40	836T-T254EX40
40…450	30…90	900	1200	836T-T255JX40	836T-T255EX40
60…650	45…125	1300	1600	836T-T256JX40	836T-T256EX40

∗ Copper alloy bellows may be used on water or air, and other liquids or gases not corrosive to this alloy.

❄ Transients (pulses) can occur in a system prior to reaching a steady-state condition. Surge pressures within published values generated during startup or shutdown of a machine or system, not exceeding eight times in a 24-hour period, are negligible.

‡ The combined Type 7 & 9 and 4 & 13 hazardous gas and dust service enclosure is supplied with special gasket and O-ring seal to diminish/exclude moisture, fluids, and dust from entering the enclosure. Enclosure is rated for the following environments:
CLASS I Groups C,D
CLASS II Groups E,F,G
CLASS III

Ordering Modifications

Modifications are ordered by adding the appropriate modification suffix code to the catalog number of the basic device. Add suffix codes to the catalog number in descending order.

Item	Description	Suffix Code
Oxygen/nitrous oxide service	Bellows and fittings specially prepared for oxygen and nitrous oxide service. Devices tested with pure oxygen, bellows plugged for protection from contamination and a tag warning against contamination is applied.	X2
External adjustment sealed	The 836T external adjustment is sealed, requiring cover removal to adjust differential (includes contact block shield)	X3
Tamper resistant setting	Range and differential adjustments are factory sealed. Price includes factory setting charge.∗	X4
SAE 7/16-20 UNF thread O-ring boss seal (piston type pressure control)	Female SAE straight thread O-ring seal designed to prevent leaks and minimize loss of hydraulic fluids.	X6
SAE 9/16-18 UNF thread O-ring boss seal (piston type pressure control)		X7
Neon pilot light 120V AC	A high-intensity neon pilot light for 120V AC, 60 Hz applications is available and can be wired for ON or OFF operation. The current rating is 1.0 mA.❄	X9
Red LED pilot light 24V DC	A high-intensity LED 24V DC pilot light is available to meet the requirements of the automotive, machine tool builders, and other industries. The current rating is 22 mA and can be wired for ON or OFF operation.❄	X15
Green LED pilot light 24V DC		X18
Special diaphragm assembly (piston type pressure control)	Diaphragm is made of Viton® and Nomex® fabric. Required when phosphate ester base and other adverse hydraulic fluids are present. Use on Catalog Numbers **836T-T300J** through **836T-T303J** series controls.	X25
Special diaphragm and O-ring assembly (piston type pressure control)	Diaphragm is made of Viton® and Nomex® fabric, O-ring is made of Viton® . Required when phosphate esterbase and other adverse hydraulic fluids are present. Use on Catalog Numbers **836T-T350J, -T351J, -T352J, -T353J** and **-T400J** series controls.	X26
Viton® enclosure gaskets	Special enclosure gaskets made of Viton® are available for applications where the standard gasket materials are not fluid compatible. Viton® is generally specified by the user for use with existing and newly developed coolants and hydraulic fluids to maintain enclosure integrity. These include cover, backplate, cover, and bellows or piston gaskets. **Note**: Viton® enclosure gaskets are often used with special diaphragm assemblies **(X25 or X26)**. See description above.	X29
5-Pin mini-type receptacle without pilot light❄	Select the desired pin wiring configuration from the diagrams on pages 13-45…13-47. Rated at 8 A, 600V.	See pages 13-45…13-47.
5-Pin mini-type receptacle with prewired pilot light❄	Select the desired pin wiring, pilot light wiring, and voltage from the diagrams on pages 13-45…13-47. Includes receptacle and pilot light. Rated at 8 A, 600V.	See pages 13-45…13-47.
5-Pin micro-connect receptacle without pilot light❄	Select the desired pin wiring configuration from the diagrams on pages 13-45…13-47. Add number "1" to the suffix number immediately following the letter "X." **Example: "X19" becomes "X119."** Rated at 3 A, 300V. Pin/Wiring Code: 1 – Red with white tracer, 2 – Red, 3 – Green (Gnd), 4 – Red with yellow tracer, 5 – Red with Black Tracer	See pages 13-45…13-47.
5-Pin micro-connect receptacle with prewired pilot light❄	Select the desired pin wiring configuration and pilot light (X9 or X15, see above for specifications) from the diagrams on pages 13-45…13-47. Add number "1" to the Suffix Number immediately following the letter "X." **Example: "X12X9" becomes "X121X9."** Rated at 3 A, 300V. Pin/Wiring Code: 1 – Red with white tracer, 2 – Red, 3 – Green (Gnd), 4 – Red with yellow tracer, 5 – Red with black tracer	See pages 13-45…13-47.
Additional optional receptacles and wiring❄	For assistance, please consult your local Rockwell Automation sales office or Allen-Bradley distributor.	

∗ See paragraph entitled “Factory-Set Pressure Controls” on page 13-44.
❄ Not available on the Type 7 & 9 and 4 & 13 combined enclosed devices.

Ordering Accessories

Accessories are ordered as separate catalog numbers. Select the required accessories from the accessories table below.

Item	Description	Type	Cat. No.
External fixed pulsation snubbers	Controls are supplied as standard with an internal pulsation snubber. However, a control properly selected and used within the adjustable range values, yet having a short bellows life, is a good indication of the presence of extreme surge pressures. External fixed pulsation snubbers are available to provide **additional** dampening when extreme pulsations or surges are present. Recommended if more than eight line surges occur in a 24-hour time period.	Snubber for bellows control 1/4-18 N.P.T. thread	**836-N7**
		Snubber for piston control 3/8-18 N.P.T. thread	**836T-N8**
Selectable element pulsation snubbers	Controls are supplied as standard with an internal pulsation snubber. However, a control properly selected and used within the adjustable range values, yet having a short bellows life, is a good indication of the presence of extreme surge pressures. Selectable element pulsation snubbers are supplied with five different elements to provide a selectable balance between maximizing pressure control life and minimizing control response time. Pulsation snubbers are supplied with the mid-range element already mounted and four other color-coded porosity elements included in the package. See "Selectable Pulsation Snubber Porosity Elements" table on this page for porosity specifications.	Snubber for bellows control 1/4-18 N.P.T. thread	**836-N40**
		Snubber for piston control 3/8-18 N.P.T. thread	**836T-N41**
	Female SAE straight thread O-ring seal designed to prevent leaks and minimize loss of hydraulic fluids. Use on applications with a pressure range of 550…5000 psi.	SAE 7/16-20 UNF-2B thread O-ring boss seal for piston controls	836T-N49
		SAE 9/16-18 UNF-2B thread O-ring boss seal for piston controls	**836T-N50**
Selectable pulsation snubber porosity elements	Package consists of five porosity elements and complete instructions. Elements are color-coded for easy identification. Elements are available in five different porosities for a wide range of applications. See selectable pulsation snubber porosity elements table.		See Table on this page
Locking cap	Deters unauthorized tampering of range setting. Once installed, the locking cap can be removed with a screwdriver to re-adjust the control.	—	**836T-N13**
Isolation trap with two 1/4 in. male pipe fittings	An isolation trap is available for high-temperature media applications from 150…600 °F or corrosive applications compatible with Type 316 stainless steel tubing and fittings. The isolation coil is inserted between the bellows of the pressure control and the elevated temperature line of the system. The isolation trap will fill with condensed water or can be filled with water or suitable fluid when installed. A silicone buffer fluid is available in a convenient dispenser. Copper alloy lower and higher pressure range bellows can be applied to many applications using the isolation trap. The silicone buffer fluid is used to isolate many corrosive substances from coming in contact with the bellows. The isolation trap is rated at 3000 psi working pressure. Not available for piston-type controls. See photo on this page.		836-N25
Isolation trap with one 1/4 in. male and one 1/4 in. female pipe fittings			836-N26
2 oz. of buffer fluid to fill bellows and tubing			836-N27
Metric electrical entry conduit adapters	BS 20 mm thread adapter		**836T-N36**
	Pg 13.5 thread adapter		836T-N37

Selectable Pulsation Snubber Porosity Elements

Recommended Type of Service	Color Code	Porosity	Cat. No.
Viscous fluids (over 500 SSU)∗	None	Coarser	836-N43
Medium type oils (225…500 SSU)∗	Black		**836-N44**
Water and light oils (30… 225 SSU)∗	Brown		**836-N45**
Low viscosity fluids (under 30 SSU)∗	Green		**836-N46**
Air and other gases	Red	Finer	**836-N47**
One of each of the above	—	Assorted	836-N48

∗ Saybolt Seconds Universal (SSU) — units of viscosity measurement.

Note: Color code is located on end of element.

Isolation Trap and Silicone Buffer Fluid

Fixed Pulsation Snubbers

Male/Female Pipe Threads

Selectable Element Pulsation Snubbers

Male/Female Pipe Threads

Pulsation Snubbers

Conversion Kits

Ordering Conversion Kits

Conversion Kits are ordered by adding the appropriate suffix code to the catalog number of the basic device. Select the required conversion kits from the table below.

Conversion Kits

Item	Description	Suffix Code
Neon pilot light conversion kit	Converts standard control to control with 120V AC neon pilot light. Not available on Type 7 & 9 devices. Kit includes pilot light and cover assembly.	N9
Red LED pilot light conversion kit	Converts standard control to control with 24V DC LED pilot light; has a 22 mA current rating. Not available on Type 7 & 9 devices. Kit includes pilot light and cover assembly.	N15
Green LED pilot light conversion kit	Converts standard control to control with 24V DC LED pilot light; has a 22 mA current rating. Not available on Type 7 & 9 devices. Kit includes pilot light and cover assembly.	N18

Example:
To convert a **Cat. No. 836T-T301J** to a **Cat. No. 836T-T301JX15**, order **Cat. No. 836T-T301JN15**.

Renewal Parts

Ordering Renewal Parts

Renewal Parts are ordered as separate catalog numbers. Select the required renewal parts from the table below.

Renewal Parts

Item	Description	Cat. No.
2-Circuit contact block renewal kit	Allows renewal of worn contacts for Bulletin 836T controls.	**836T-N1**
4-Circuit contact block renewal kit	Allows renewal of worn contacts for Bulletin 836T controls.	836T-N2
Renewal seals for piston-type controls	For use on Cat. No. 836T-T350J.	836T-N20
	For use on Cat. No. 836T-T351J.	836T-N21
	For use on Cat. No. 836T-T352J and 836T-T400J.	836T-N22
	For use on Cat. No. 836T-T353J.	836T-N23

Factory-Set Pressure Controls

Ordering factory-set pressure controls

- When a specific factory setting is requested, the specific terminal connections must be specified — e.g., N.O. or N.C. It must also be specified whether the contact operation is occurring on either increasing or decreasing pressure. For example:

Normally Closed (N.C.) contacts to open at∗ psi increasing pressure and close at∗ psi decreasing pressure.

—OR—

Normally Open (N.O.) contacts to close at∗ psi increasing pressure and open at∗ psi decreasing pressure.

- If minimum differential is not critical and the inherent minimum differential satisfies the application, specify the factory setting as follows:

Normally Closed (N.C.) contacts to open at∗ psi increasing pressure minimum differential.

—OR—

Normally Open (N.O.) contacts to close at∗ psi increasing pressure minimum differential.

Quality analog test gauges§ are used when applying requested factory settings to these rugged industrial grade pressure controls. (Gauges are calibrated and accuracy is traceable to the The National Institute of Standards and Technology.)

The actual requested setting is applied to the control by reading the set point directly from the test gauge being used. However, traceable gauge tolerance variance between source and user, and possible severe shock during shipping and installation, may contribute to the factory settings deviating slightly from the specified values. Slight recalibration can easily be accomplished upon final installation to meet specific requirements for the more demanding applications.

When installed, the controls will perform with a repeat accuracy as established in the paragraph entitled “Repeat Accuracy" (see page 13-54). Special service is available to factory-set controls on digital laboratory instruments, up to 600 psi, when required for more critical applications. An additional charge may be added for this service contingent upon setting tolerance and quantity. Please contact your local Rockwell Automation sales office or Allen-Bradley distributor.

∗ Specify psi (pounds per square inch) or, in. Hg vac (inches of mercury vacuum).

❄ Per ANSI B40.1 Grade 2A (0.5% accuracy full scale), Grade 3A (0.25% accuracy full scale).

If not specified, setting tolerances will be as shown in the table below.

Pressure Range	Tolerance
30 in. Hg Vac....0	+/- 1 in. Hg vac.
> 0...100 psi	+/- 1 psi
> 100...300 psi	+/- 2 psi
> 300...500 psi	+/- 5 psi
> 500...1000 psi	+/- 10 psi
> 1000...5000 psi	+/- 50 psi

Standards Compliance

- UL508
- UL698, 1604 (Haz. Loc.)
- CSA 22,2 No. 14
- NEMA ICS-2

Certifications

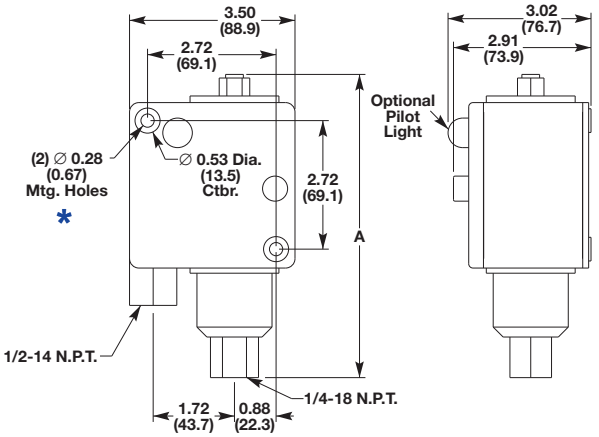
File and Guide Numbers

	UL		CSA	
	File Number	Guide Number	File Number	Class
Bulletin 836T	E14842	NKPZ	LR1234	3211-03
	E53048 (Haz. Loc.)	NOWT	LR11924 (Haz. Loc.)	3218-05
	Hazardous Location enclosure devices are not CE compliant. All other enclosed devices are CE compliant.			

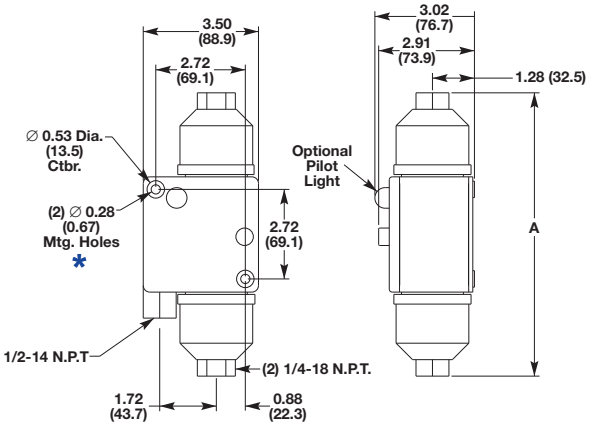
Approximate Dimensions and Shipping Weights

Dimensions in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.

Type 4 & 13 (Bellows)



Approximate Shipping Weight 3-1/2 lbs. (1.6 kg)

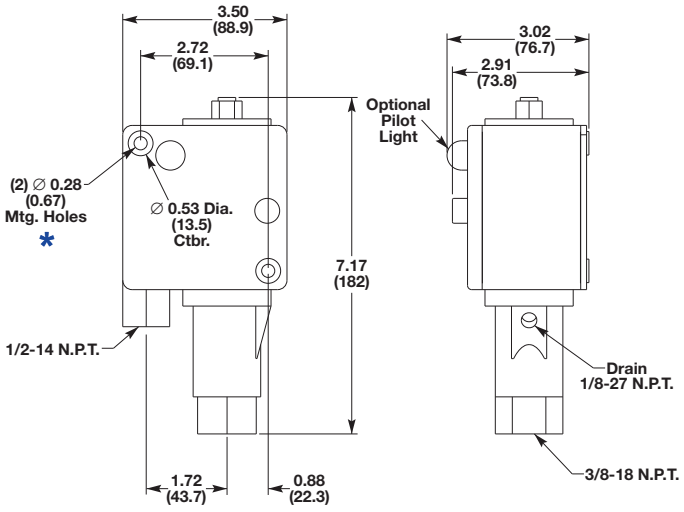


Approximate Shipping Weight 4 lbs. (1.8 kg)

Cat. No.	A Dimensions	Cat. No.	A Dimensions	Cat. No.	A Dimensions	Cat. No.	A Dimensions
836T-T251J	6.65 (169)	**836T-T254J**	6.95 (176)	**836T-D450J**	8.60 (218)	836T-D460J	8.60 (218)
836T-T260J		**836T-T255J**					
—	—	**836T-T256J**	7.09 (180)	**836T-D451J**	8.14 (207)		
836T-T252J	6.41(163)	**836T-T262J**	7.33 (186)	**836T-D452J**		**836T-T252J**	8.5 (216)
836T-T253J		**836T-T263J**	7.25 (184)			836T-D463J	10.06 (256)
836T-T261J				**836T-D453J**	9.5 (241)		

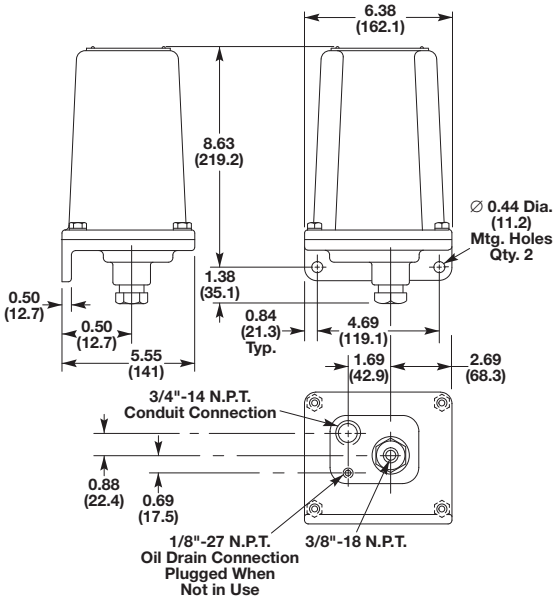
Type 4 & 13 (Piston)

(Does not include Dual Bellows Devices)



Approximate Shipping Weight 4.5 lbs. (2.0 kg)

Type 4 & 13 and 7 & 9 Bellows and Piston Type



Approximate Shipping Weight 10 lbs. (4.5 kg)

∗ (2) mounting screws are required: 3/16 x 20 x 2 in. Counterbore depth is 1-1/8 in. Overall depth of mtg hole (front to back) is 2-1/4 in.

Cat. No.	
836T-T300J	836T-T350J
	836T-T351J
836T-T301J	836T-T352J
836T-T302J	836T-T353J
836T-T303J	836T-T400J

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CS-451-200 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
E&H	IESWLE5204819	LSL9-621	ENCLOSURE: 110 x 218 mm, SHAFT:	HOPPER LOW LEVEL SWITCH	LEVEL SWITCH // MANUF: E&H// MODEL :FTE31-C6DB11 Soliswitch FTE31, thread NPT Level limit switch, Paddel. Solid >= 100 g/dm3. 1x relay double pole change over switch.	Housing: Plastics PBT, IP65 NEMA4 Rod: steel 1.4305 (303). 1x Cable entry NPT 1/2. Appval:C CSA DIP Cl. II,III, Div.1, Gr.EFG Power : 24VDC relay	Paddel; Additional Option:1 316Ti; basic version Version:1 Basic version B Marking: 71072711: TAG on device	HYDRAPOL 3500		rev1

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Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

Soliswitch FTE31

Level Limit Switch
Economical paddle limit switch
For application in dust hazardous explosive areas

Application areas

The universal paddle level limit switch FTE 31 is used as a full, empty and demand alarm on silos containing solids. Its construction and materials make the unit suitable for use in the food industry.
The unit is suitable as a level limit switch in dust explosion hazardous areas.
Typical applications are level detection in:

- Cereals
- Sugar
- Cacao
- Animal feeds
- Washing powders
- Chalk
- Dry plaster
- Cement
- Granulates
- Wood chips

Features and benefits

- Simple operation
- Proven principle
- Slip clutch
- Ingress protection to IP 65 / NEMA 4x / Type 4x

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51002384

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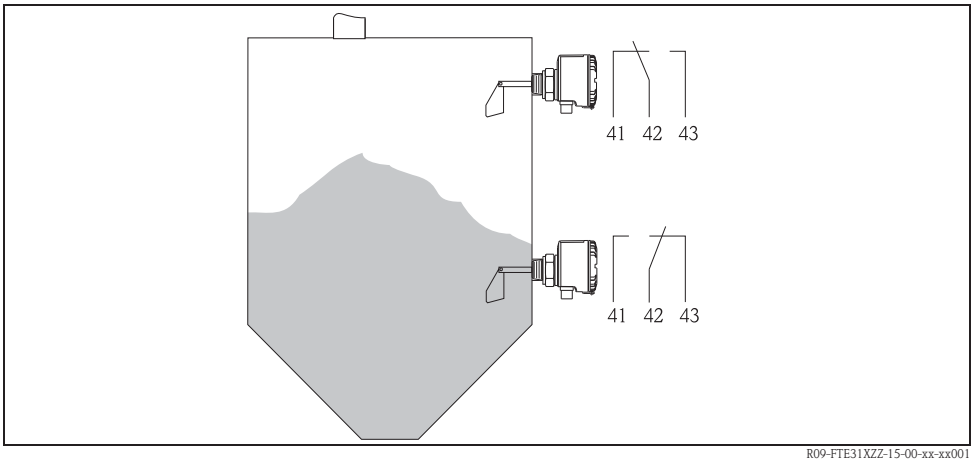
Function and system construction

Measurement principle

The shaft and paddle are driven using a reduction gear and synchronous motor. If the paddle is stopped by material covering it, the hinged motor in the housing moves from the rest to the switch position. This movement operates two switch contacts, the first is for external level indication and the second switches the power off to the motor.
The paddle starts to rotate once the medium level falls below the paddle, the hinged motor returns to its rest position and the two contacts switch to normal operation. Intermittent loads that operate against or even in the same direction of rotation are evened out by using a slip clutch.



Level measurement changeover contact

System

Complete level measurement limit switch, paddle, shaft with synchronous motor and slip clutch, single pole double throw switch.

Input values

Measurement value

Level of solids

Range

Variable types dependent on:
- Installation point
- Length of shaft or rope

Output values

Output signal

Binary, once the set level is reached the micro switch contact changes.

Output circuit

Connectable load:
≤ 250 VAC, 10 A nominal current, 3 A on motor

Switch output

Potential free changeover contact (SPDT)

Switch delay

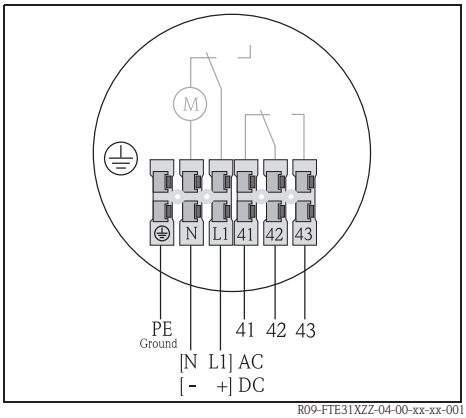
Approx. 2 seconds

Mechanical life time

min. 500 000 switch cycles

Power supply

Electrical connection



Terminal layout FTE31

AC	DC	
PE		Earth (ground) connection
N	-	Power connection
L	+	Power connection
41		Normally closed contact
42		Common contact
43		Normally open contact

Cable entry

Power supply and signal cable (in-/output):
- Thread for cable gland [½" NPT]

Power supply

Standard:
- 230 V AC, 50/60 Hz (±10%)

Option:
- 115 V AC, 50/60 Hz (±10%)
- 20...28 V DC

Power consumption

AC: P < 4,5 VA; DC: P < 3,5 W

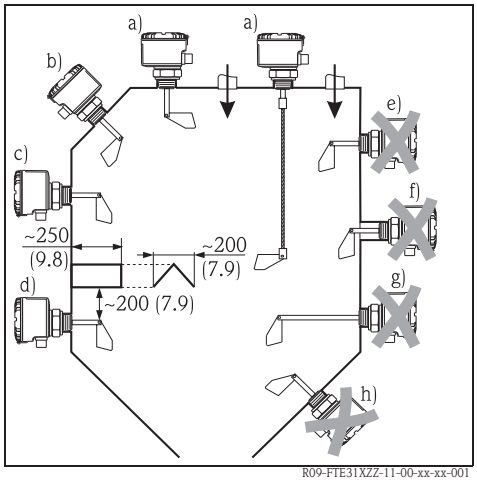
Current requirement

DC: $I_{max} \leq 66$ mA

Installation conditions

Installation hints

Installation position:
- horizontal up to shaft length > 300 mm (11.8") or vertical (see diagram)
- side load on the shaft max. 60 N
- Load on the rope max. 1500 N



Installation of the FTE31 paddle level limit switch, dimensions in mm (inch).

Correct installation	Incorrect installation
a) Vertical from top of silo	e) In dierction of solids flow
b) Angled from the top	f) Installation coupling too long
c) From the side	g) Horizontal with shaft length > 300 mm
d) With protective cover against falling solids	h) Angled from below

The FTE31 paddle limit switch can be installed in solids silos as shown under points a, b, c and d.

Environment conditions

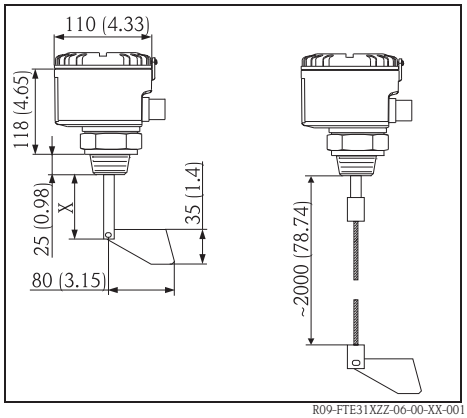
Ambient temperature	- 20 °C ... + 60 °C (-4 °F ... + 140 °F)
Storage temperature	- 20 °C ... + 60 °C (-4 °F ... + 140 °F)
Ingress protection	■ IP 65 / NEMA 4x / Type 4x with closed cover ■ IP 20 / NEMA 1 with open cover
Vibration protection	IEC 654-3, dimension V.S.1 (v<3 mm/s, 1<f<150 Hz)
EMC	To EN 61 326, Class B
Protection class	I
Over voltage protection category	II
Altitude	Up to 2000 m (6560 ft) above sea level.

Process conditions

Material temperature range	- 20 °C ... + 80 °C (-4 °F ... 176 °F)
Operating pressure range	0.5 bar ... 1.8 bar (7.25 PSI ... 26.1 PSI)
Material conditions	Solids - grain size ≤ 50 mm (1.97")
Product density (solids weight)	100 g/l

Mechanical construction

Model/dimensions



Construction of the compact unit - dimensions in mm (inch).

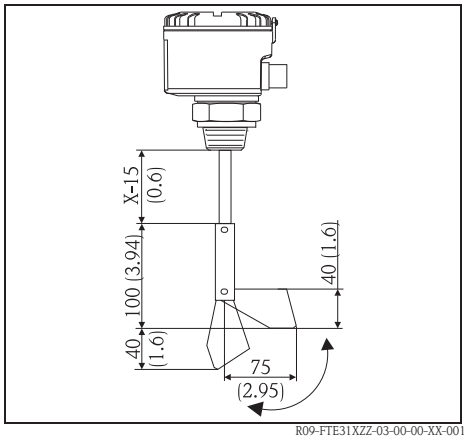
Shaft variations:

Standard shaft X = 75 mm (2.95")
Special length X:
100 mm (3.94"), 200 mm (7.87"), 300 mm (11.8"), 400 mm (15.75"), 500 mm (19.7"), 600 mm (23.6")

Rope version:

Rope length approx. 2000 mm (78.7"), can be shortened.

Caution!
If the shaft length is > 300 mm (11.8") the FTE31 can only be installed vertically downwards.



Hinged paddle - dimensions in mm (inch)

Option hinged paddle:

The paddle is hinged so that it can be easily mounted through a threaded mounting boss. Because it is spring loaded the paddle retuns to its normal operation once inside the vessel. Removal of the unit is always possible.

The hinged paddle can be mounted to both the solid shaft as well as the rope extension versions.

Weight	approx. 1 kg (2.2 lb)
Materials	Housing, cover and process connection: – VALOX 553 plastic with 30% fibre glass. Shaft: – Corrosion resistant steel 1.4435 Paddle: – Corrosion reseitant steel 1.4435 Option: – Process connection - corrosion resistant steel 1.4435 – Rope extension- corrosion resistant1.4571 with corrosion resistant steel 1.4305 weight – Hinged paddle - corrosion resistant steel 1.4435 O-ring seal: – NBR Shaft sealing ring: – NBR Perbunan Cable entries NPT ½": – Nickel plated brass
Shaft bearing	High performance friction bearing - maintenance free
Shaft revolution	approx. 1 revolution per minute
Process connection	Threaded boss - thread NPT 1¼" or NPT 1½"
Electrical connection	Plug-in terminals 2.5 mm^2 (14 AWG) solid core, 1.5 mm^2 (16 AWG) stranded with ferrule

Certification

CE approval	The measurement system fulfils the requirements demanded by the EU regulations. Endress+Hauser acknowledges successful unit testing by adding the CE mark.
FM	DIP Class II, Div. 1+2, Groups E, F, G and Class III
CSA	DIP Class II, Div. 1+2, Groups E, F, G and Class III

Ordering information

Soliswitch FTE31, Thread NPT

Approval:							
A	Non-hazardous area						
B	FM DIP Cl. II, III, Div. 1, Gr. EFG						
C	CSA DIP Cl. II, III, Div. 1, Gr. EFG						
		Power supply:					
		1	230 V AC, relay 250 V AC, 100 mA-10 A				
		2	115 V AC, relay 250 V AC, 100 mA-10 A				
		3	20...28 V DC, relay 250 V AC, 100 mA-10 A				
		4	230 V AC, relay PLC 48 V DC, 10 mA-100 mA				
		5	115 V AC, relay PLC 48 V DC, 10 mA-100 mA				
		6	20...28 V DC, relay PLC 48 V DC, 10 mA-100 mA				
				Process connection:			
				A	Thread NPT 1¼", Valox553 (PBT)		
				B	Thread NPT 1¼", 316L		
				C	Thread NPT 1½", Valox553 (PBT)		
				D	Thread NPT 1½", 316L		
						Version:	
						A	Shaft 100 mm
						B	Shaft 200 mm
						C	Shaft 300 mm
						D	Shaft 400 mm, vertical installation
						E	Shaft 500 mm, vertical installation
						F	Shaft 600 mm, vertical installation
						Y	Other
						1	Shaft 75 mm, compact
						2	Rope 2 m, 316, shortable
							Paddle; Additionla option:
						1	316Ti; basic version
						2	316L; fold-away, w/o signal lamp
FTE31-							⇐ **Ordercode**

This ordering information can give an overview about the available order options. The Endress+Hauser sales organization can provide detailed ordering information and information on the order code.

Accessories

Hinged paddle for retro-fitting
Order no. 50089768

Further documentation

Short form operating manual KA094R/09/a3

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Endress+Hauser
People for Process Automation

CS-504-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
SHUTTE&KOERTING	EJGUEJ200372	IJ9-621	N/A	EDUCTOR	MANUFACTURER: SHUTTE&KOERTING / MODEL: 2"- Fig264 PVC Eductor	N/A	N/A	HYDRAPOL 3500		

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Schutte & Koerting

Water Jet Eductors

Introduction

The Water Jet Eductor is a type of ejector which utilizes the kinetic energy of a pressurized liquid to entrain another liquid, mix the two, and discharge the mixture against a counter pressure. Ejectors of this type are used throughout industry for pumping and mixing operations.

Application

Water jet eductors have numerous uses in the plant such as lifting, pumping, mixing and agitation of liquids, granular solids and slurries. Some specific applications are: draining flooded areas, emptying tanks and sumps, pumping and mixing operations in oil treating systems, dewatering sand and coal barges, introducing anti-knock agents and coloring additives into gasoline, continuous blending, acidifying, causticizing of oils, producing emulsions, pumping food products, pumping sand and filter clay, tank mixing, and various proportioning operations. As an example of eductor performance in a typical use, a jet eductor measuring 8½" in length will empty a 500 gallon water tank in less than half an hour, using water at 60 psig, as the sole source of motive power.

Features

Self Priming Eductors require no priming and can be used for either continuous or intermittent operation.
Simple and Reliable Since the basic eductor has no moving parts to wear or break, only periodic inspection is required.
Corrosion and Erosion Resistant Because they can be made from most materials, or coated with corrosion resistant materials, eductors can be made resistant to the corrosive effects of the liquids handled and the environment.
Automatic Control Units can be adapted for automatic operation by means of a regulating spindle or a snap valve and float arrangement.
Non-Electrical Eductors can be used in hazardous locations where electrically operated alternatives would require expensive explosion-proofing.
Easy to Install Either threaded or flanged connections are available. Units are compact, relatively light and can be adapted to a variety of piping configurations.
Low Cost Water eductors are inexpensive in relation to the work they do.

Construction

Water Jet Eductors consist of only three basic components: a converging nozzle, a diffuser (or venturi) and a body to hold these parts in their proper relative positions and provide a suction chamber.

Converging Nozzle | Diffuser (or Venturi) | Body - holds diffuser and nozzle in position

Jet ejectors can be made from most workable materials, such as: cast iron, bronze, stainless steel, aluminum, polyvinyl chloride, polyester fiberglass, Phenolic Fiberglass Reinforced Plastic (FRP), Teflon[2] and Hastelloy[3].

A variety of types and sizes are available as noted on the following pages. Certain variables such as pressure, temperature, viscosity, density, operating conditions of suction and discharge fluids, and desired results must be considered in determining the type of eductor best suited to your needs. S&K engineers will work with you to select the proper eductor for your application.

Request Performance Data Supplement 2M for operating characteristics of water jet eductors.

Index

Fig. 264 and Fig. 266 Water Jet Eductors

S&K Fig. 264 and Fig. 266 Water Jet Eductors are designed for liquid pumping and mixing operations and for the handling of some solids where requirements do not necessitate capacities greater than those obtained with sizes up to and including 6". They are considered the standard eductors within this size range. Typical applications begin on page 12.

In operation, pressure liquid enters the eductor through the pressure nozzle and produces a high velocity jet. This jet action creates a vacuum in the line which causes the suction liquid to flow up into the body of the eductor where it is entrained by the pressure liquid. Both liquids are thoroughly mixed in the throat of the eductor and are discharged against back pressure. The streamlined body with no pockets permits the pressure liquid to move straight through the eductor and reduces the possibility of solids in the suction material collecting and clogging. In addition, pressure drop in the suction chamber is held to a minimum.

Accompanying Bulletin 2M Supplement Performance Data provides performance information.

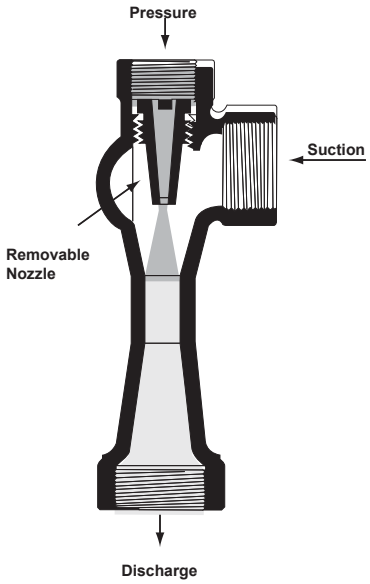


Fig 1. FIG. 264 EDUCTOR
Eductors of this type have streamlined bodies with threaded pipe connections. They are made in sizes ranging from 1/2" to 3" and are stocked in these sizes in ductile iron and bronze and Fig. 316 stainless steel. They are stocked in sizes from 1/2", 2", and 3" in PVC. Other materials are available on order.

Fig. 2. FIG. 264 EDUCTOR

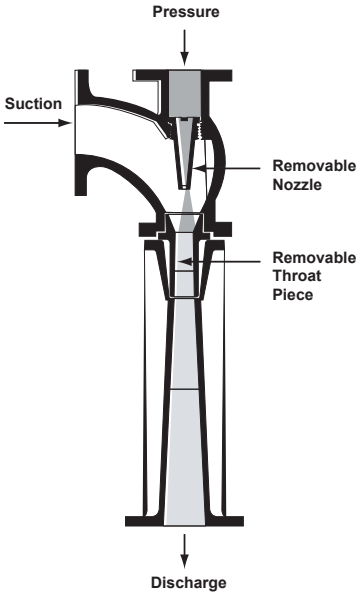


Fig. 3. FIG. 266 EDUCTOR.
These eductors are similar to Fig. 264 Eductors except that they have flanged connections and removable throat bushings along with removable nozzles. They are supplied in cast iron, bronze-mounted in 4" and 6" sizes. Other materials can be supplied on special order.

Table 1. Sizes and Dimensions, Fig. 264 and Fig. 266 Water Jet Eductors

Size In Inches	Connections In Inches		Wgt. In Lbs.	Working Pressures						Dimensions in Inches			Max. Round Particle Size In Inches
	Suction Disch.	Pressure		Cast Iron		Bronze		Stainless Steel		A	B	C	
				Motive psi	Body psi	Motive psi	Body psi	Motive psi	Body psi				
Fig. 264 Eductor													
1/2	1/2	3/8	3/4	150	125	125	100	600	500	1 1/16	2 9/16	1 1/8	1/16
3/4	3/4	1/2	1 1/4	125	125	100	100	500	500	1 3/8	3 3/8	1 1/4	1/8
1	1	3/4	2	150	150	150	125	600	600	1 1/2	4 3/16	1 5/8	5/32
1 1/2	1 1/2	1	4	150	100	125	90	600	400	2	6 1/2	2	5/16
2	2	1 1/4	6	150	100	125	85	600	400	2 1/4	7 5/8	2 1/4	3/8
2 1/2	2 1/2	1 1/2	11	200	150	200	125	600	300	2 11/16	9 1/4	3 1/8	3/8
3	3	2	20	250	150	225	125	600	400	3 1/8	11 1/4	3 1/2	13/16
Fig. 266 Eductor													
4	4	2 1/2	100	125	125	-	-	-	-	4 3/8	19 1/4	7 13/16	1
6	6	4	180	125	125	-	-	-	-	6 1/16	28 3/8	9 1/8	1 1/8

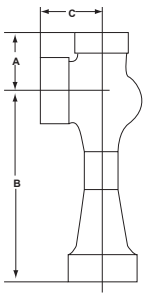


Fig. 264

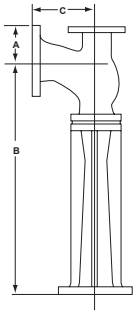


Fig. 266

Schutte & Koerting • 2510 Metropolitan Drive • Trevose, PA 19053 • USA • tel: (215) 639-0900 • fax: (215) 639-1597 • www.s-k.com • sales@s-k.com

Fig. 264 PVC and Kynar Water Jet Eductors

Fig. 264 PVC and Kynar Eductors offer resistance to many corrosive media. PVC Eductors are not recommended, however, for acetone, ketones, ether, esters, aromatic hydrocarbons or chlorinated hydrocarbons. A table of recommended uses is available on request. Maximum temperature rating is 150°F. Kynar Eductors will handle PVC applications including those mentioned above. Kynar's temperature limitation is 250°F. Pressure ratings are given in Table 2.

Fig. 264 PVC and Kynar Eductors operate on the same principle as do all other S&K Eductors. Performance characteristics with water are shown in Bulletin 2M Supplement Technical Data. For performance with other liquids, contact S&K.

Nozzles and diffusers are not removable on these eductors. Sizes 1" and smaller are of molded construction.

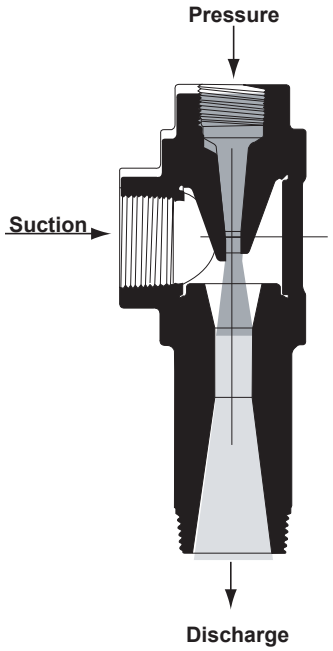


Fig. 4. FIG. 264 PVC EDUCTOR.
Sizes from 1 1/2" up are designed as shown here and in Fig. 5. On these sizes, the pressure and suction connections are female and the discharge connection is male. All connections are threaded.

Fig. 5. FIG. 264 PVC EDUCTOR.

Table 2. Sizes, Dimensions, and Particle Size Data, Fig. 264 Water Jet Eductor

Size in Inches	Connections in Inches		Wgt. In Lbs.	Dimensions in Inches			Working Pressure (psig) at 75°F	Max. Round Particle Sizes (in inches) Eductors will Handle
	Suction Disch.	Pressure		A	B	C		
1/2s	1/2s	3/8s	1/2	1 7/16	3 1/4	1 7/16	325	1/16
1/2	1/2	3/8	1/2	1 7/16	3 1/4	1 7/16	325	1/16
3/4	3/4	1/2	1/2	1 11/16	3 1/2	1 11/16	275	1/8
1	1	3/4	1/2	1 7/8	3 11/16	1 7/8	250	5/32
1 1/2	1 1/2	1	1 1/2	2 9/16	5 11/32	2 1/16	200	5/16
2	2	1 1/4	2 1/2	3 1/32	6 21/32	2 5/32	185	3/8
3	3	2	6 3/4	4 1/8	9 1/2	3 7/8	165	13/16

s = denotes smaller internals.

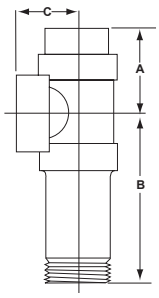


Fig. 6. FIG. 264 KYNAR EDUCTOR.
1/2" to 1" Design. Sizes 1/2", 3/4", and 1" look like this. All connections are female and are threaded.

Fig. 2645 Automatic Eductor

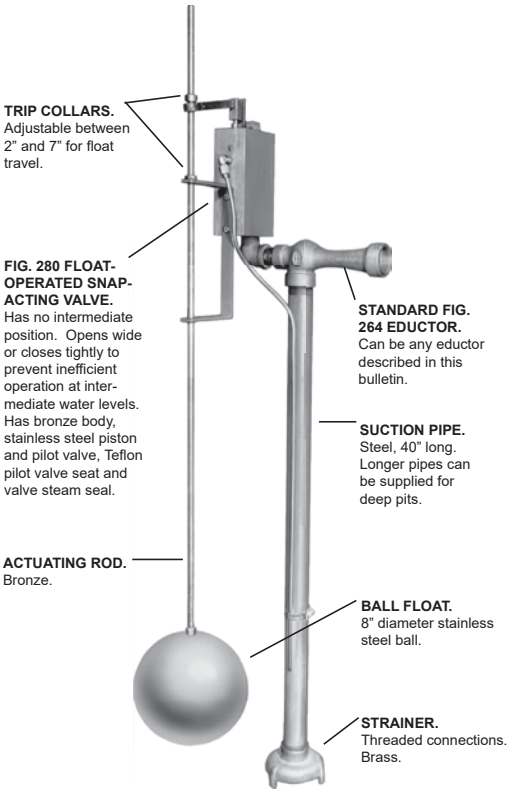
Fig. 2645 Automatic Water Jet Eductors are used to pump out sumps (pits, tanks, etc.) where liquid accumulates slowly but must be evacuated when it reaches a predetermined level.

As the liquid in the sump (basin, tank, cellar, bilge, etc.) accumulates, it raises the ball float until the upward action of the float opens the snap-acting valve, admitting motive fluid into the pressure connection of the eductor.

The jet action of the motive fluid creates a vacuum in the eductor and entrains the suction fluid, discharging both fluids under pressure. As the suction fluid is thus pumped out, the sump level drops to a point where the snap-acting valve shuts off. No further pumping action takes place until the sump again fills to the operating level.

Operation of the Fig. 2645 Eductor is completely automatic. It is self-operated, requires no electrical connections or any external power other than the motive fluid. The snap-acting valve and ball float are the only moving parts. The full assembly is so compact it can be installed in tanks as small as 13 1/2" diameter.

For performance information, see accompanying Bulletin 2M Supplement Performance Data.



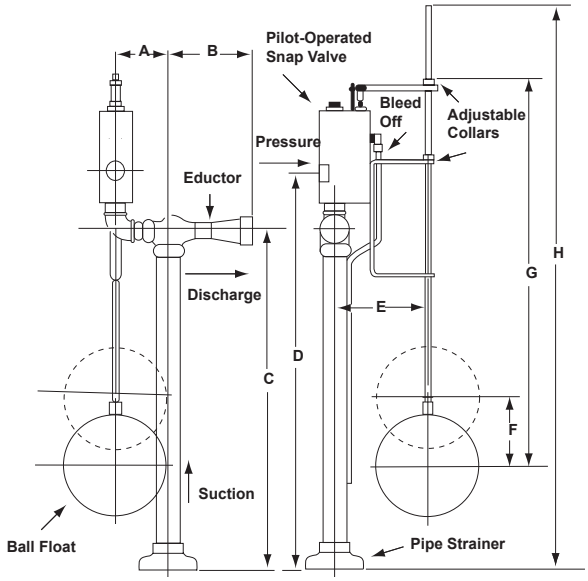


Table 3. Sizes and Dimensions, Fig. 2645 Automatic Eductor

Eductor Size In Inches	Connections In Inches N.P.T.		Wgt. In Lbs.	Working Pressure (Bronze)		Dimensions in Inches							
	Suc.-Disch.	Pressure (Snap-Valve)		Motive* (psig)	Body (psig)	A	B	C	D	E	F	G	H
3/4	3/4	1	24	100	100	3 11/16	3 3/8	41	44 7/8	7 5/6	5 3/8	47 1/8	60
1	1	1	26	150	125	4 5/16	4 3/16	41	44 7/8	7 5/6	5 3/8	47 1/8	60
1 1/2	1 1/2	1	32	125	90	4 1/8	6 1/2	41	44 7/8	7 5/6	5 3/8	47 1/8	60
2	2	2	43	125	85	6 1/4	7 5/8	38 3/8	43 15/16	7 7/16	5 3/8	47 1/8	60
2 1/2	2 1/2	2	65	200	125	6 11/16	9 1/4	38 3/8	43 15/16	7 7/16	5 3/8	47 1/8	60
3	3	2	81	200	125	6 3/8	11 1/4	38 3/8	43 15/16	7 7/16	5 3/8	47 1/8	60

*Minimum motive pressure for all Fig. 2645 Eductors: 40 psig

Fig. 265 Liquid Jet Eductor

Fig. 265 Liquid Jet Eductor is similar in design to the Fig. 264 Water Jet Eductor and is made for liquid pumping and mixing operations and for handling some solids where requirements do not necessitate capacities greater than those obtained with sizes up to and including 3". Typical applications begin on page 12.

The Fig. 265 Liquid Jet Eductor provides higher discharge pressures and higher suction flow capacities than other standard eductors.

In operation, pressure liquid enters the eductor through the pressure nozzle and produces a high velocity jet. This jet action creates a vacuum in the line which causes the suction liquid to flow up into the body of the eductor where it is entrained by the pressure liquid. Both liquids are thoroughly mixed in the throat of the eductor and are discharged against back pressure. The streamlined body with no pockets permits the pressure liquid to move straight through the eductor and reduces the possibility of solids in the suction material collecting and clogging. In addition, pressure drop in the suction chamber is held to a minimum.

Accompanying Bulletin 2M Supplement Performance Data provides performance information.

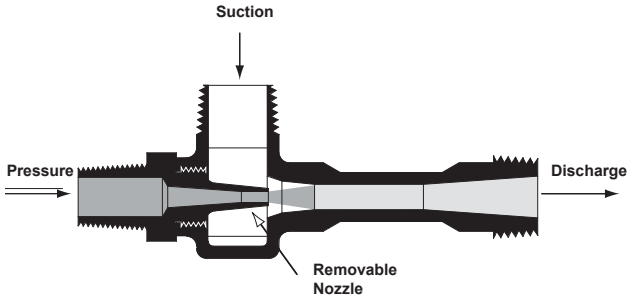


Fig 8. FIG. 265 LIQUID JET EDUCTOR
Eductors of this type have streamlined investment cast bodies with threaded NPT male pipe connections. They are made in sizes ranging from 3/4" to 3" and are stocked in these sizes in Fig. 316 stainless steel. Other materials are available on order.

Fig. 9. FIG. 265 EDUCTOR.

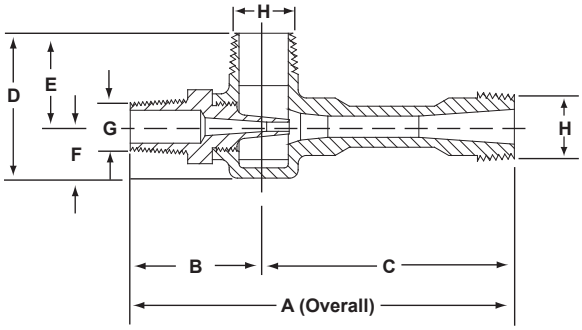


Table 265. Sizes and Dimensions, Fig. 265 Liquid Jet Eductor

Size (In Inches)	Wgt.	Dimensions						Connections	
		A	B	C	D	E	F	G	H
3/4	1	5 7/8	2	3 7/8	2 1/4	1 1/2	3/4	3/8	3/4
1	2	7 1/8	2 1/4	4 7/8	2 3/4	1 3/4	1	1/2	1
1 1/2	4	11	2 3/4	8 1/4	3 21/32	2 1/2	1 5/16	1	1 1/2
2	8	14 3/8	3 1/8	11 1/4	5	2 7/8	2 1/8	1 1/4	2
3	30	23 7/8	4	19 7/8	8	5	3	2	3

Fig. 242 Condensate and Mixing Eductor

Fig. 242 Water Jet Eductors are designed to mix two liquids intimately in various proportions in operations where the pressure liquid is the greater proportion of the mixture. Typical applications include: removal of condensate; mixing gasoline with acid; blending and proportioning chemical solutions; and diluting acids and alkali.

In operation, the pressure liquid issues from the nozzle at high velocity and entrains the suction liquid. The extreme turbulence in the throat of the eductor mixes the two liquids, blending and emulsifying thoroughly and completely. Colloidal suspensions can also be produced.

Entrainment ratio is dependent upon the eductor design. Close regulation within the design limits is usually obtained by a valve in the suction liquid line.

The pressure drop between the pressure liquid and the discharge should be at least 10 psi to give adequate mixing, and the difference between the discharge pressure and the suction pressure should not exceed 75% of the difference between the operating pressure and the suction pressure.

When used for removal of condensate, the eductor should be installed three feet below the condensate level at the drain of the condenser. For performance information, see Technical Data Supplement to Bulletin 2M.

Fig. 10. FIG. 242 EDUCTOR.

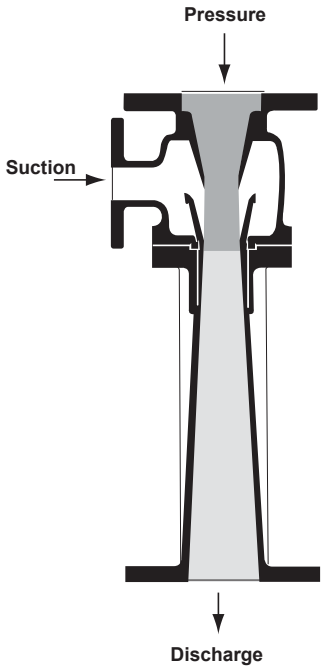


Fig. 11. FIG. 242 EDUCTOR.
The 242 is the flanged type Condensate and Mixing Eductor. This style, too, is made in bronze or cast iron, bronze mounted, but can be supplied in other materials. Nozzles and throat bushings are removable.

Table 4. Sizes and Dimensions, Fig. 242 Condensate and Mixing Eductor

Size No.	Connection in Inches			Dimensions in Inches			Weight in Lbs.
	Pressure	Suction*	Discharge	A	B	C	
2	2	1 - 2	2	4 3/4	11 3/4	3 3/4	50
2 1/2	2 1/2	1 1/4 - 2 1/2	2 1/2	3 1/2	15 1/4	4	60
3	3	2 - 3	3	4	17 15/16	4 5/8	70
4	4	2 - 4	4	5 9/16	20 3/8	5 1/2	80
6	6	3 - 6	6	6 1/4	29	6	270
8	8	4 - 8	8	14 1/16	35 1/2	7 13/16	450

*Note: Suction connection may vary to suit conditions.

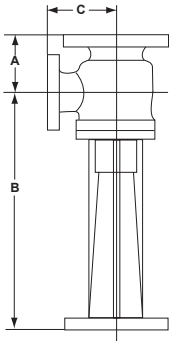


Fig. 258 and Fig. 268 Tank Mixing Eductors

Fig. 258 and Fig. 268 Tank Mixing Eductors are used to agitate liquid, dissolve powdered solids in liquid, and to mix two or more liquids intimately within a tank or other vessel without the use of baffles or moving parts inside the tank. These units take the place of mechanical agitators.

The 268 is used in preference to the 258 in operations where it is desirable to start mixing from a shallow level or where uniform local agitation is required over large, shallow tank area. Typical applications of each are shown in the application section beginning on page 12.

Fig. 258 and 268 Eductors are operated by a flow of pressure liquid through the nozzle. As shown in the sectional drawings, the motive liquid entrains suction liquid, the two are mixed intimately in the venturi, and the mixture is discharged into the tank. Pressure liquid can be taken from the tank by means of a pump or it can be a new liquid. Standard, stock units are designed to entrain 3 gallons of suction fluid for each gallon of motive fluid. (Special designs of the 258 Eductor can be made to give 1 to 1 ratio.)

Normally, the tank is filled by means of the eductors. Mixing occurs as soon as the level of liquid in the tank covers the suction of the eductor. In addition to the mixing obtained between suction and motive fluids in the eductor, the jet action of the discharge from the eductor serves to agitate the tank and prevents stratification.

If a drawing or sketch of the mixing tank is furnished, S&K will recommend and quote on the proper type of distribution system.

Performance information is given in accompanying Performance Data, Bulletin 2M Supplement. Similar units using steam as motive fluid for heating, circulating and mixing are described in Bulletin 3A as “Fig. 314” units.

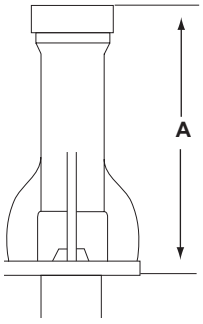
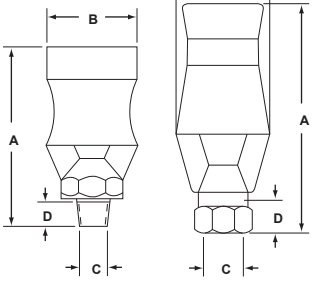


Table 5. Sizes and Dimensions, Fig. 258 Tank Mixing Eductor

Size in Inches	Connections in Inches		Wgt. in Lbs.	Dimensions in Inches
	Disch.	Pressure		A
1/2	1	1/2	2	5 1/2
3/4	1 1/2	3/4	6	8 1/2
1	2	1	22 1/2	12 5/16
1 1/4	2 1/2	1 1/4	29	11 1/8
1 1/2	3	1 1/2	36 1/2	15 7/8
2	4*	2	78	19 5/8
3	6*	3	ON APPL.	28 13/16
4	†	4*		†
5	†	5*		†
6	†	6*		†

*Flanged Connection
† Varies with performance and application
Note: A discharge flange is not supplied on large fabricated units unless required by the application.
(See Fig. 16 for dimensions of Fig. 268 Eductor).



Sizes 3/8, 3/4 Sizes 1 1/2, 2, 3

Table 5-A. Sizes and Dimensions, Fig. 268 Tank Mixing Eductor

Size in Inches	A	B	C	D	Wgt. in Lbs.
3/8	3 3/4	1 3/4	3/8	7/16	3/4
3/4	5 1/4	2 3/8	3/4	9/16	2 1/2
1 1/2	8 13/16	4 1/16	1 1/2	13/16	6 1/4
2	12 1/4	5 13/16	2	45/64	22
3	17	8 1/8	3	15/16	48

Fig. 258 and Fig. 268 Tank Mixing Eductors

Fig. 12. FIG. 258 TANK MIXING EDUCTOR.

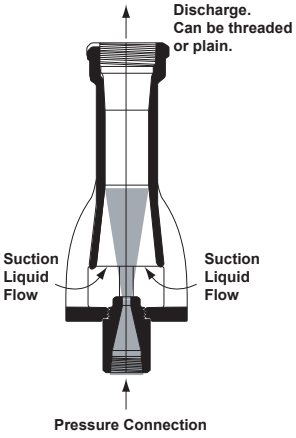


Fig. 13. FIG. 258 TANK MIXING EDUCTOR.
Standard units are made in cast iron and bronze but can be made in many other materials on special order. Large sizes can be fabricated instead of cast.

Fig. 14. FIG. 268 TANK MIXING EDUCTOR. 3/8" and 3/4" sizes.

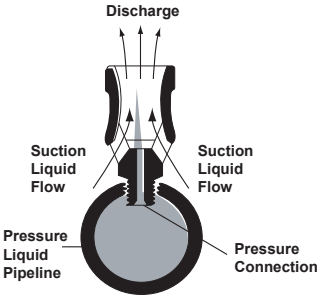


Fig. 15. FIG. 268 TANK MIXING EDUCTOR.
This design is used for 3/8" (3 3/4" overall length and 1 3/4" overall width), and 3/4" (5 1/4" overall length and 2 3/8" overall width) pressure connection sizes. It is threaded directly into threads tapped into the 1 1/2" diameter or larger pressure liquid pipeline. It is cast in one piece and is stocked in cast iron, bronze and 316 stainless steel. Other materials can be supplied on special order.

Fig. 17. FIG. 268 TANK MIXING EDUCTOR. 1 1/2" size and over.

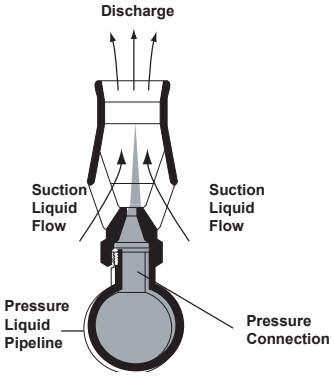


Fig. 16. FIG. 268 TANK MIXING EDUCTOR.
This design is used for 1 1/2" (8 7/8" overall length x 4 1/8" overall width), 2" (12 1/4" overall length x 5 7/8" overall width) and 3" (17" overall length x 8 1/8" overall width) pressure connection sizes. All are cast in one piece and have female thread connections for installation on nipples welded into the pressure liquid piping. The 1 1/2" and 2" sizes are stocked in cast iron, bronze, and 316 stainless steel. The 3" size is stocked in cast iron and stainless steel only. Other materials can be supplied on special order.

Fig. 254 and Fig. 267 and Fig. 227 Hopper-Equipped Eductors

Fig. 254 and Fig. 267 Hopper-Type Eductors are made for handling slurries or dry solids in granular form and are used extensively for ejecting sludges from tank bottoms, for pumping sand from filter beds and for washing and conveying granular materials. Typical materials handled include: borax, charcoal, diatomaceous earth, lime, mash, fly ash, rosin, rock and granulated salt, sand, dry sawdust, light soda ash, dry sodium nitrate, powdered sulphur, wheat and many others.

A typical application of Fig. 254 Eductor is shown in the application section of this bulletin, beginning on page 12. the material from adhering to the sides of the hopper and keep it moving down into the eductor. Pressure water, passing through the eductor nozzle, entrains the sand, sludge or other materials and discharges into the piping system.

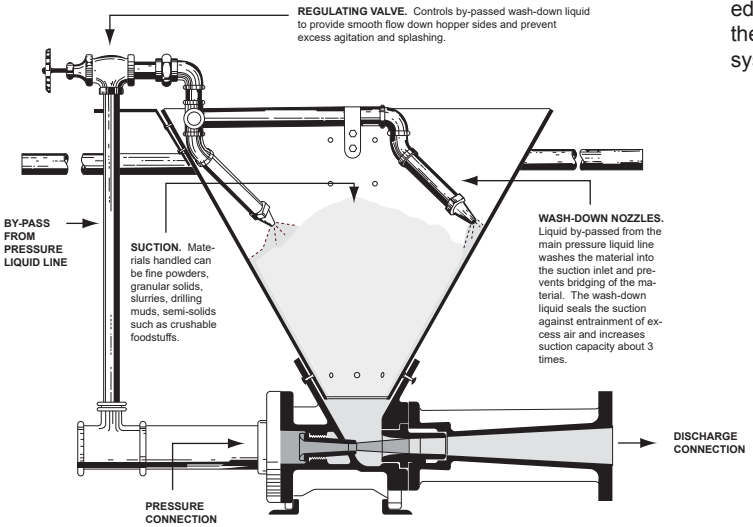


Fig. 18. FIG. 254 HOPPER-EQUIPPED EDUCTOR.
Standard units are made in cast iron and have hardened steel nozzles and throat bushings. Special materials are also available on special order. Both nozzles and throat pieces are removable and pressure and discharge connections can be fitted for hose where maximum portability is desired. Handles and supporting feet are optional.

Fig. 19. FIG. 267 HOPPER-EQUIPPED EDUCTOR.
This economical unit is available from stock with body and nozzle in cast iron, bronze, 316 stainless steel, Kynar and PVC. Hoppers are stocked in Type 304 stainless steel (1, 1 1/2 & 2" sizes) and are also available in galvanized steel, brass, aluminum and PVC.

Table 6. Sizes and Dimensions, Fig. 254(1) and Fig. 267(2) Hopper-Equipped Eductors

Size in Inches	Connection (Inches)		Dimension (Inches)			
	Disch.	Press.	A	B	C	D
FIG. 254(1)						
1 1/2	1 1/2	1 1/2	13 1/4	11 1/2	18	15 1/4
2	2	2	14 1/2	13 3/4	21	17 3/4
3	3	2 1/2	17 3/4	17 1/2	23 3/8	19 3/4
4	4	4	19 5/8	24 3/16	27	22 1/2
6	6	6	28 1/16	36 7/16	38	28 5/16
FIG. 267(2)						
1	1	3/4	1 1/2	4 3/16	24	42
1 1/2	1 1/2	1	2	6 1/2	24	41 1/2
2	2	1 1/4	2 1/4	7 5/8	24	41
2 1/2	2 1/2	1 1/2	2 11/16	9 1/4	24	41 1/4
3	3	2	3 1/8	11 1/4	24	40 3/4

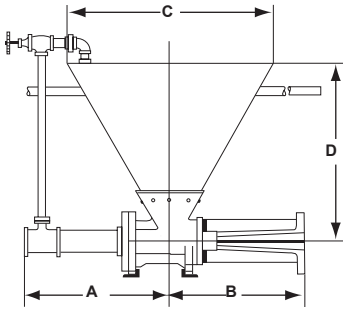


Fig. 254(1)

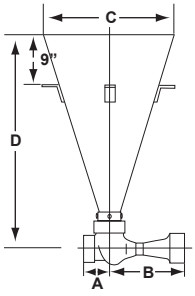


Fig. 267(2)

Fig. 227 Hopper-Equipped Eductor

Furnished with a stainless steel funnel, the eductor can be made of any machinable material. Bronze units up to and including 3" and cast iron units up to and including 4" sizes are available from stock. Prices, delivery or a sectional outline drawing 67-XS-081-J will be furnished on request. Stainless steel funnels are stocked in 1-1/4", 1-1/2" and 2" sizes.

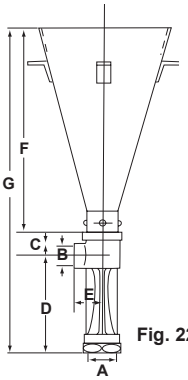


Fig. 227

Table 227. Sizes and Dimensions of Fig. 227 Hopper-Equipped Eductor

Dimensions in Inches							Wgt. (Lbs)
A	B	C	D	E	F	G	
1 1/4	3/4	1 9/16	6 7/16	1 13/16	39 5/8	47 5/8	31
1 1/2	3/4	2	8 13/16	2	39 1/4	50	36
2	1	2 1/2	9 1/8	2 1/4	38 1/2	49 7/8	45
2 1/2	1 1/4	2 3/4	11 1/4	2 3/8	37 7/8	51 7/8	51
3	1 1/2	3 1/16	13 5/16	2 3/4	37	53 3/8	58
4	2	3 5/8	17 1/16	3 3/16	35 1/2	56 3/16	70

Fig. 224 Water Jet Sand and Mud Eductor

Fig. 224 Water Jet Sand and Mud Eductors are used in pumping out wells, pits, tanks, or sumps where there is an accumulation of sand, mud, or other material not easily handled by the standard eductor. They are ideal for handling the heavy sludge residue from refining operations. A typical application of a Fig. 224 Eductor is shown in the application section beginning on page 12.

These eductors have an open suction and are designed to be submerged in the material being handled. The pressure liquid, passing through the nozzle, produces a high velocity jet which entrains the sludge or mud. This mixture is then discharged through a vertical pipe or hose. For performance information, see Bulletin 2M Supplement.

Similar units which use steam as the motive power are described in Bulletin 2A under “Fig. 225 Syphons”.

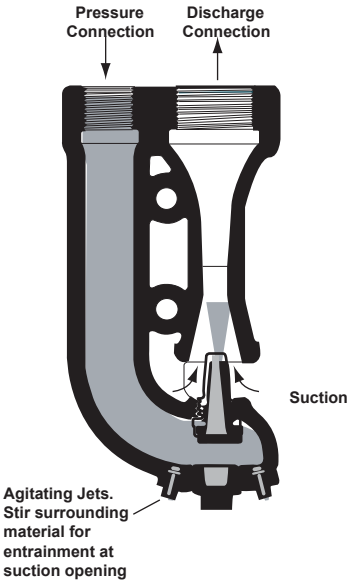


Fig. 20. FIG. 224 WATER JET SAND AND MUD EDUCTOR.
Standard units are made of cast iron with bronze pressure nozzles. Other corrosion-resistant materials are available on special order.

Fig. 21. FIG. 224 EDUCTOR.

Table 7. Sizes and Dimensions, Fig. 224 Sand and Mud Eductor

Size in Inches	Connections in Inches		Wgt in Lbs.	Dimensions in Inches	
	Disch.	Pressure		A	B
1 1/2	1 1/2	1	8	9 3/8	4 5/8
2 1/2	2 1/2	2	42	16 3/4	7 7/8
3	3	2 1/2	87	21 7/8	10 1/4
4	4	3	130	25 1/2	11
5*	5	4	-	30 1/4	17 3/8
6*	6	4	-	35 5/16	18

*Flanged Connections.

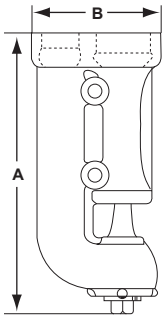


Fig. 235 Annular Multi-Nozzle Water Jet Eductor

Fig. 235 Annular Multi-Nozzle Water Jet Eductors are designed to handle solids and semi-solids. They operate at highest efficiency in large sizes and at low discharge heads. Because these eductors have high air handling capacities, they are particularly well suited for priming large pumps such as dredging pumps which frequently encounter air pockets.

Nozzles on the periphery of the throat introduce the pressure water. The pressure water creates a vacuum which draws in and entrains the material being handled and all flow discharges through the discharge connection. All suction flow is in a straight line through the eductor. For performance information, see Bulletin 2M Supplement.

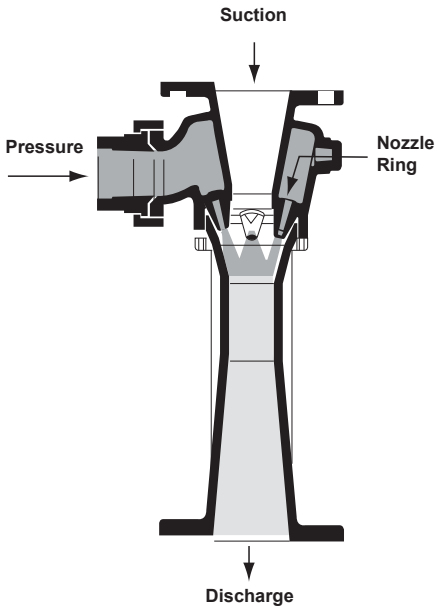


Fig. 22. FIG. 235 ANNULAR MULTI-NOZZLE WATER JET EDUCTOR.
These eductors are made to order from any workable material. Sizes from 1 1/2" to 6" are cast with flanged suction, discharge and pressure connections, except 2" size which has sil-brazed pressure connection. Sizes above 6" (to 28" and up) are generally fabricated.

Table 8. Sizes and Dimensions, Fig. 235 Annular Multi-Nozzle Water Jet Eductor

Size in Inches	Connections in Inches		Wgt. In Lbs.	Dimensions in Inches		
	Suction Disch.	Pressure		A	B	C
1 1/2	1 1/2	1	16	2 7/8	8 7/16	3 3/8
2	2	1 1/4	22	3 1/8	11 7/8	3 3/4
2 1/2	2 1/2	1 1/2	27	3 1/4	12 5/16	4
4	4	2 1/2	65	4 1/8	18 11/16	5 1/8
5	5	3	100	4 5/8	24 7/16	6
6	6	4	150	5 1/4	30	7 1/4

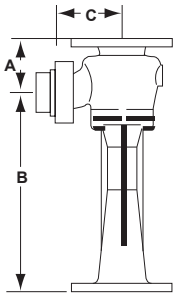


Fig. 23. FIG. 235 EDUCTOR.
(2" size with sil-brazed connection).

Special Purpose Eductors

The special-purpose eductors illustrated here are similar in operation to the basic Fig. 264 Eductor described on page 3.

Fig. 24. FIG. 222 PORTABLE EDUCTOR.
Is designed for use as an auxiliary with a pump where the suction lift is too great for the pump alone. Made of anodized aluminum, bronze or other materials as required.

Fig. 25. FIG. 212 CORROSION RESISTANT EDUCTOR.
Is made of Phenolic Fiberglass Reinforced Plastic (FRP). Body is of one-piece construction.

TYPICAL APPLICATIONS OF S&K WATER JET EDUCTORS

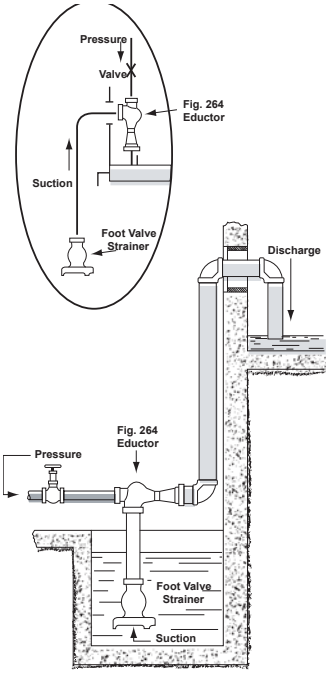


Fig. 26. FIG. 264 EDUCTOR USED TO EMPTY TANKS.
Water jet eductors are often used to empty tanks or to pump out sumps, penstocks, cellars, and the like. The pressure line should be fitted with a regulating stop valve and a pressure gauge while the suction line should be provided with an S&K Strainer. Discharge lines should be sealed for a positive pick-up of the liquid by turning the discharge line up or by submerging the end of the discharge line. It is recommended that the eductor be installed a short distance above the liquid to be handled and that short suction lines be used. Eductors will operate with long suction lines, as shown in the line drawing, however, with suction lifts greater than 15', capacities are reduced considerably. When handling hot liquid the eductor must be arranged with a short suction line or must be submerged.

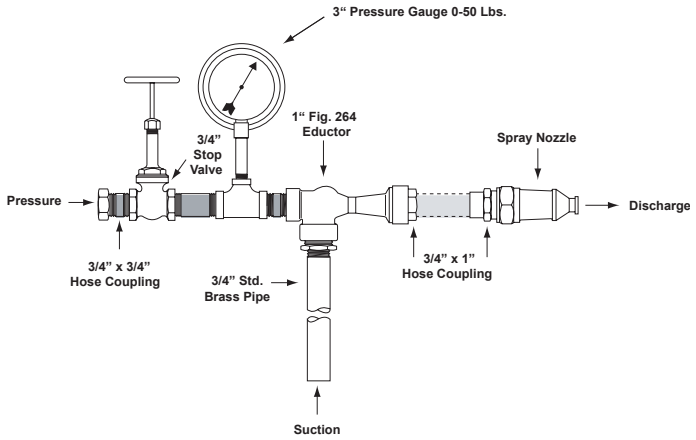


Fig. 27. FIG. 264 EDUCTOR USED IN MIXING LIQUIDS.
This illustration shows a typical arrangement used in mixing liquids such as chemicals or fertilizers in proportion for spraying. The solution to be applied is mixed in a container in approximately twice the strength at which it is to be used. The water jet proportioning apparatus is operated by a jet of high pressure water and is controlled by a 3/4" stop valve. A 3" pressure gauge indicates pressure. The jet action of the pressure water draws the solution from the container and the water and solution are mixed in the throat of the eductor and are discharged through a standard 3/4" hose to a spray nozzle. Solids can be handled and sprayed through a non-clogging type spray nozzle.

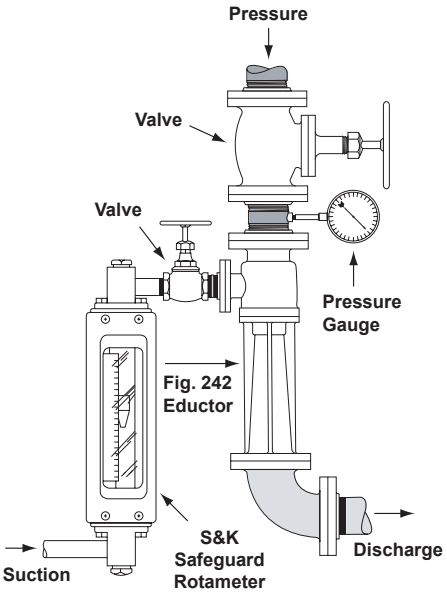


Fig. 28. FIG. 242 EDUCTOR USED IN TYPICAL PROPORTIONING SYSTEM.
This shows a typical proportioning system using a Fig. 242 Eductor. Rate of flow is measured by a Rotameter and is controlled by a valve in the line. A valve in the pressure line and orifice of the eductor nozzle control the flow of the pressure liquid. Fluids are thoroughly mixed in the desired proportions and are then discharged.

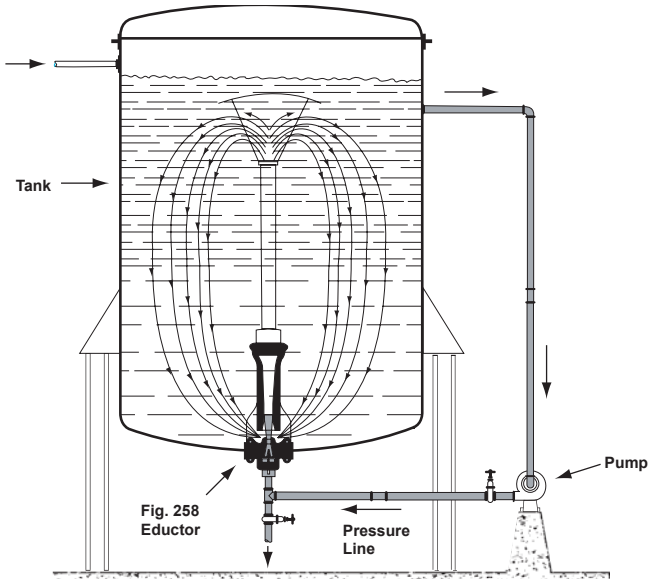


Fig. 30. FIG. 258 EDUCTOR IN BATCH MIXING APPLICATION.
This illustrates the batch mixing of two or more liquids with an S&K Fig. 258 Eductor. The pressure liquid, taken from the top of the tank is passed through a pump to the eductor. The jet action of this fluid entrains the liquid at the bottom of the tank and proper mixing results.

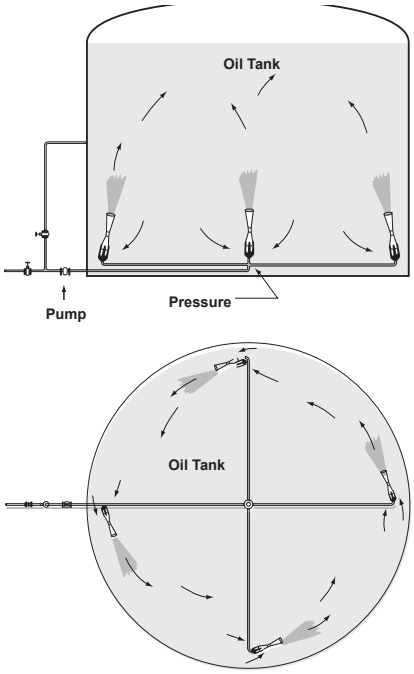


Fig. 29. FIG. 258 EDUCTORS FOR TANK BLENDING OF OILS.
For the tank blending of oils, the arrangement shown has proved highly satisfactory. In this particular installation five 8" Fig. 258 Eductors are used in a 100' tank. Initially, the eductors are used to fill the tank during which time they provide continuous agitation. After the tank is filled, the oil is drawn off and recirculated by means of the same pumps. Oil from the top of the tank issues through the eductor nozzle and entrains oil from the bottom of the tank. The two are mixed in the throat of the eductor and are discharged with sufficient force to maintain constant agitation and further blending in the tank.

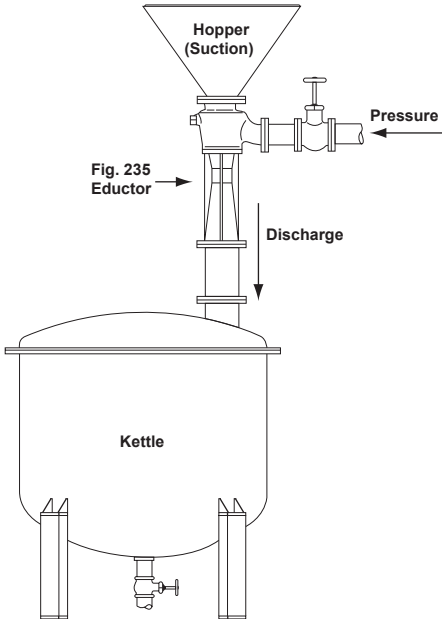


Fig. 31. FIG. 235 EDUCTOR USED IN MIXING DRY POWDER.
Mixing dry powder and a liquid prior to discharge into a tank is accomplished through the use of a Fig. 235 Eductor as shown here.
Pressure liquid enters the eductor, entrains the powder, mixes the two in the venturi of the eductor and discharges the mixture into a receptacle. The streamline eductor design provides maximum efficiency in this operation.

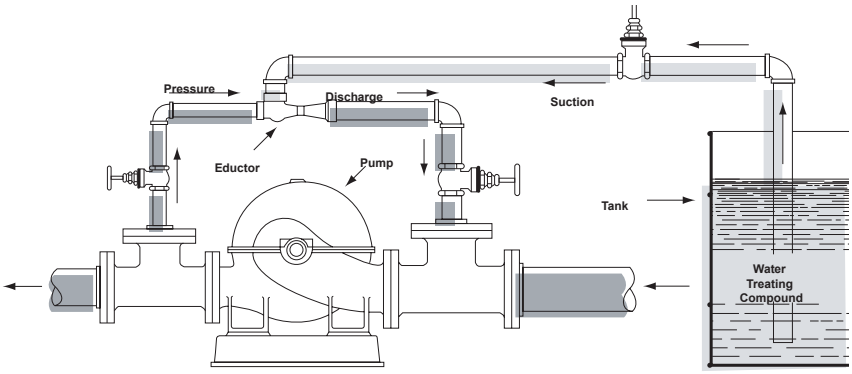


Fig. 32. FIG. 264 OR FIG. 265 WATER JET EDUCTORS USED TO ENTRAIN ANOTHER LIQUID.
This illustration shows a Fig. 264 or Fig. 265 Eductor being used to introduce a water treating compound into boiler feed water. A portion of the water issuing from the pump is bypassed into the eductor where it acts as the pressure medium to draw in and entrain the water treating compound.

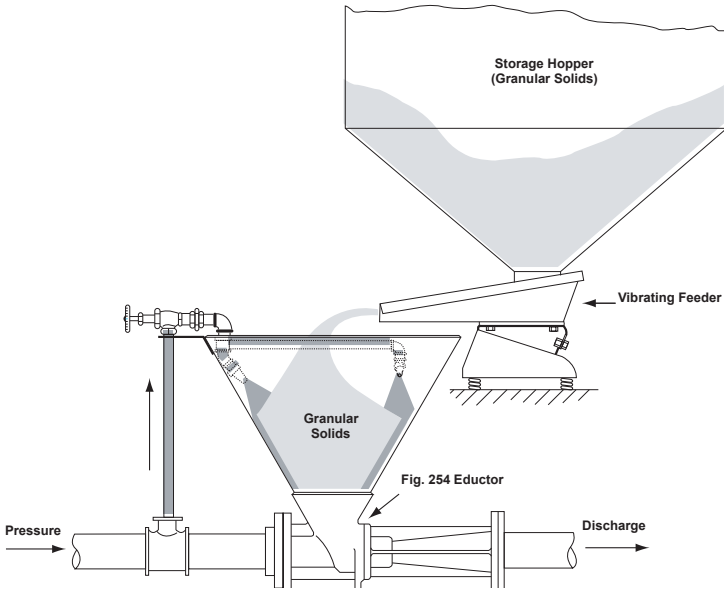


Fig. 33. APPLICATION OF FIG. 254 SOLIDS/LIQUID HOPPER EDUCTOR.
One arrangement for handling granular solids with the Fig. 254 Eductor is illustrated here. In this installation, granular solids drop from a storage hopper into a vibrating feeder which feeds the solids into the eductor hopper at a controlled rate. Water, bypassed from the pressure line, flows through nozzles located in the hopper and washes the solids into the eductor. There they are entrained by the jet action of the pressure water and are discharged. Although the material can be placed in the hopper manually, this system reduces handling and controls the flow of solids.

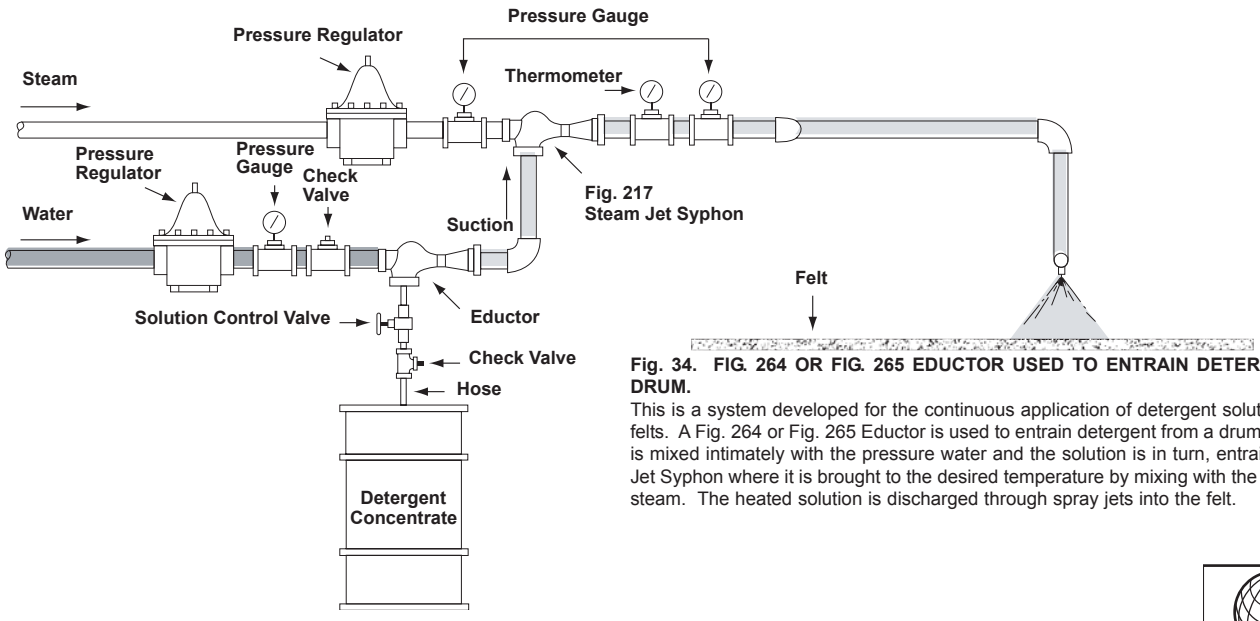


Fig. 34. FIG. 264 OR FIG. 265 EDUCTOR USED TO ENTRAIN DETERGENT FROM A DRUM.
This is a system developed for the continuous application of detergent solution to paper mill felts. A Fig. 264 or Fig. 265 Eductor is used to entrain detergent from a drum. This detergent is mixed intimately with the pressure water and the solution is in turn, entrained by a Steam Jet Syphon where it is brought to the desired temperature by mixing with the syphon's motive steam. The heated solution is discharged through spray jets into the felt.

ISO 9001 Certified

CS-910-400 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
WAM	CMSPGU320682	FSM9-621	N/A	DREY FEEDER	SCREW FEEDER // Manuf : WAM // Model : MBF/073.A/TT/UD4.SST.UO2/C.0.Q.+.++++.++++ Feeding rate: 8,3 Liter/min at 88 rpm For material: dry polymer powder, approx.. 0.8 Kg/Ltr Blending tool: nbr. 1, plowshare shape	Feeding screw: nbr. 4, full flighting on pipe, SS304 Drive Blending tool: varvel gear box ratio 1:40 Drive feeding screw:varvel gear box ratio 1:20 Shaft sealing: SS with	Baldor 0.75 HP blending tool motor 1750rpm NEMA056 Baldor 0.5 HP feeding screw motor 1750rpm NEMA056 575V-	HYDRAPOL 3500		

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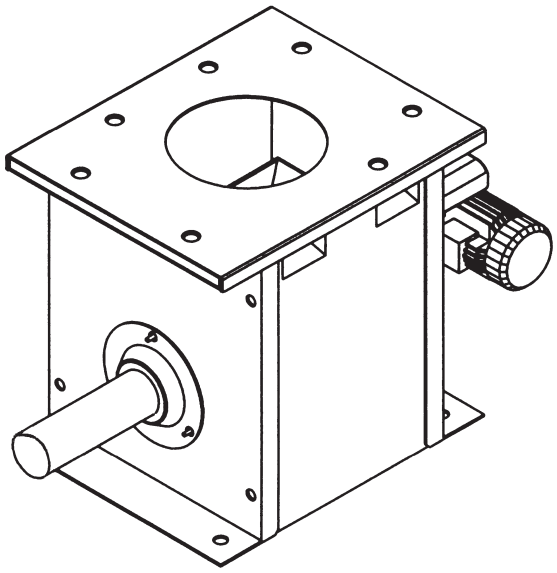
WAM®

WAMGROUP

1

TECHNICAL CATALOGUE



MBF

- **MICRO - BATCH FEEDERS**
  TECHNICAL CATALOGUE
- ***MIKRODOSIERER***
  TECHNISCHER KATALOG
- **MICRODOSEURS**
  CATALOGUE TECHNIQUE
- ***MICRODOSATORI***
  CATALOGO TECNICO

CATALOGUE No.		VAL.062.-.T.4L	CREATION DATE
ISSUE **A17**	CIRCULATION **100**	DATE OF LATEST UPDATE **02.11**	**03.00**

WAM®

All the products described in this catalogue are manufactured according to **WAMGROUP S.p.A. Quality System procedures**. The Company's Quality System, certified in July 1994 according to International Standards **UNI EN ISO 9002** and extended to the latest release of **UNI EN ISO 9001**, ensures that the entire production process, starting from the processing of the order to the technical service after delivery, is carried out in a controlled manner that guarantees the quality standard of the product.

*Alle in diesem Katalog beschriebenen Produkte werden gemäß dem **Qualitätssystem der WAMGROUP S.p.A.** hergestellt. Das im Juli 1994 gemäß der internationalen Norm **UNI EN ISO 9002** und auf die neueste Version der **UNI EN ISO 9001** erweiterte, zertifizierte Qualitätssystem der Firma gewährleistet, dass der gesamte Produktionsprozess von der Auftragsbearbeitung bis zum technischen Kundendienst nach Lieferung in kontrollierter Art und Weise erfolgt, so dass der Qualitätsstandard des Produkts gewährleistet ist.*

Tous les produits décrits dans ce catalogue sont fabriqués selon les procédures du **Système de Qualité de WAMGROUP S.p.A.**, certifié en Juillet 1994 selon les normes internationales **UNI EN ISO 9002** et étendu à la dernière version de la norme **UNI EN ISO 9001**. Cela garantit que le processus de production, à partir de la gestion de la commande au service technique après-vente, est effectué de manière contrôlée garantissant la norme de qualité du produit.

*Tutti i prodotti descritti nel catalogo sono stati realizzati secondo le **procedure del Sistema Qualità di WAMGROUP S.p.A.** Il Sistema Qualità aziendale, certificato dal luglio 1994 in conformità alle normative internazionali **UNI EN ISO 9002** e successivamente esteso all' ultima versione delle normative **UNI EN ISO 9001**, garantisce che l'intero processo produttivo, dalla formulazione dell'ordine fino all'assistenza tecnica dopo la consegna, si svolga secondo modalità controllate che garantiscono lo standard qualitativo del prodotto.*

1 TECHNICAL CATALOGUE — TECHNISCHER KATALOG

1 CATALOGUE TECNIQUE — CATALOGO TECNICO

2 MAINTENANCE CATALOGUE — WARTUNGSKATALOG

2 CATALOGUE D'ENTRETIEN — CATALOGO DI MANUTENZIONE

3 SPARE PARTS CATALOGUE — ERSAITZTEILKATALOG

3 CATALOGUE PIECES DE RECHANGE — CATALOGO RICAMBI

CODES - *CODEBEZEICHNUNGEN* - SIGLES - *SIGLE*

MBF	Micro batch feeder	Mikrodosierer	Microdoseur modulaire	Microdosatore per polveri
MDXCR	Round cover	Runde Abdeckung	Couvercle rond	Coperchio tondo
MDXGS	Cutter grille for square hopper	Quadratischer Aufreißgrill	Grille carré	Griglia quadrata
MDXSV	Vertical spout	Ablaufrohr	Sortie verticale	Scarico verticale
MDXTR	Round hopper	Runder Aufgabetrichter	Trémie ronde	Tramoggia verticale
MDXTS	Square hopper	Quadratischer Aufgabetricher	Trémie carrée	Tramoggia quadrata
UTD	Metering screw	Dosierwerkzeug	Outil dosage	Utensile dosaggio
UTO	Blending tool	Homogenisierwerkzeug	Homogénéisateur	Utensile omogenizzazione
MBT	Seal	Wellenabdichtung	Etanchéité	Tenuta
MBTP	Extendend pipe	Verlängert Innenrohr	Tube rallongé	Tubo prolungato
MBPR	Linerfeeder pipe	Dosierrohr mit innernaiskleidung	Tube de dosage avec revetement interieeur	Scarico rivestito internamente
MBPI	STD inspection hatch	STD inspektionstür	Trappe de visite	Portello di ispezione
MBPIP	Inspection hatch with extended tube	Inspektionstür mit länglichrohr	Trappe de visite avec tube prolonge	Portello di ispezione con tubo prolungato

MBF micro-batch feeders are used in gravimetric and volumetric dosing plants for powders and granular materials of various kinds. The body is made of WAM®'s engineering polymers SINT®ER ,SINT®AL or AISI 304L/316L, while all other feeder parts including nuts and bolts are made of staimless steel 304.

On request micro-batch feeders are supplied in a food-grade version.

Unless otherwise specified, all the dimensions are given in millimetres.

MBF Mikrodosierer werden in gravimetrischen und volumetrischen Dosieranlagen von Pulvern und Granulaten aller Art eingesetzt. Das Gehäuse besteht aus den Polymeren SINT®ER, SINT®AL oder edelstahl 1.4301/1.4401. Alle anderen Komponenten einschließlich Schraubenmaterial sind aus Edelstahl 1.4301.

Auf Wunsch ist eine nahrungsmitteltaugliche Version lieferbar.

Wenn nicht anders angegeben, alle Maßangaben in Millimetern.

Les microdoseurs MBF sont utilisés dans toutes les installations de dosage à poids ou volumétriques pour les plus divers matériaux en poudre ou granulés. Le corps est construit en SINT®ER, SINT®AL ou AISI 304L/316L. Les autres composants sont en acier inox 304L, boulonnerie comprise.

Sur demande le microdoseur est fourni en version indiquée pour des produits alimentaires.

Sauf indication contraire, toutes les dimensions sont exprimées en millimètres.

I microdosatori MBF sono utilizzati in tutti gli impianti di dosaggio a peso o volumetrici per polveri e materiali granulari di vario tipo. Il corpo è costruito in SINT®ER, SINT®AL o AISI 304L/316L, mentre le altre parti sono in AISI 304L, bulloneria compresa.

Su richiesta, queste macchine possono essere fornite idonee per prodotti alimentari.

Se non specificato altrimenti, tutte le dimensioni sono in millimetri.

FINISHING - *FINISH* - FINITION - *FINITURE*

End plate	Endschild	Bride d'extremité	Frontale	**AISI 304L EDELSTAHL 1.4301**
Drive support	Antriebshaltung	Plaque de fixation	Piastra d'attacco	**ALUMINIUM ALLUMINIO**
Reducer	Getriebe	Reducteur	Riduttore	**ALUMINIUM ALLUMINIO**
Speed variator	Regelgetriebe	Variateur	Variatore	**RAL 5010**
Motor	Elektromotor	Moteur	Motore	**RAL7001**

SELECTION CRITERIA - *AUSWAHLKRITEREN* - CRITERES DE CHOIX - *CRITERI DI SCELTA*

CF = [dm³/ J] = theoretical capacity per hour at 1 RPM.
CE = [dm³/ h] = real capacity of MBF
CR = [dm³/ h] requested capacity.
CT = [dm³/ h] theoretical capacity
N = [RPM] = metering screw speed.
mvs = material efficiency

Given:
- the characteristics of the material to be handled, the application and the feeding system into the microbatch feeder;
- CR (=capacity requested by customer), in order to choose correct MBF type proceed as follows:
- Check from material table mvs and all other important characteristics (e.g. metering screw type, accessories, others)
- Calculate real capacity CE of standard MBF (with fixed or variable speed as required by customer)

CE = CT x mvs

where for CT refer to page T.10. If difference between CE and CT is too big (that is, if customer does not accept standard MBF) it is necessary to find correct MBF speed in order to obtain the requested capacity, using the following formula:

$$N = \frac{CR}{CF \times mvs}$$

Subsequently, select ratio nearest to specific requirements (see page T.11). In carrying out these calculations it has to be born in mind that mvs given in materials table is empirical. The real value depends on a number of factors which may be difficult to control, such as the condition of the material, atmospheric conditions, height of material column inside the hopper, speed of rotation etc. For material efficiency mvs see pag. T10.

CF = [dm³/J] = theoretische Stundenleistung bei 1 U/min
CE = [dm³/ h] =effektive Dosierleistung MBF
CR = [dm³/ h] = kundenseits geforderte Dosierleistung
CT = [dm³/ h] = theoretische Dosierleistung
N = [Upm] = Drehzahl des Dosierwerkzeugs
mvs = Material-Wirkungsgrad

Gegeben:
- Bezeichnung und Beschreibung des Dosierguts, zu erwartende Betriebs- und Beschickungsart
- CR (= kundenseits geforderte Dosierleistung). Um den MBF-Dosierer korrekt auszulegen, muß nun wie folgt vorgegangen werden:
- Eigenschaften des Dosierguts der Materialtabelle entnehmen z.B. mvs, Dosierwerkzeug, Zubehör etc.)
- Effektive Dosierleistung CE des Standard-Dosierers errechnen (mit fester oder variabler Drehzahl, je nach Kundenwunsch)

CE = CT x mvs

wobei CT wie auf Seite T.10 angegeben. Wenn Differenz zwischen GE und CT zu groß, bzw. Kunde MBF Standard-Dosierer nicht akzeptiert, muß jene Drehzahl gefunden werden, bei welcher der Dosierer die kundenseits geforderte Stundenleistung erbringt. Hierzu ist folgende Formel zu verwenden :

$$N = \frac{CR}{CF \times mvs}$$

Demzufolge wählt man eine Getriebeuntersetzung (siehe Seite T.11), die den Wünschen des Kunden am nächsten kommt. Bei der Ermittlung der vorgenannten Werte ist zu berücksichtigen, daß der in der Materialtabelle aufgeführte Parameter mvs ein rein empirischer Durchschnittswert aus der Summe der bisher gemachten Erfahrungen mit dem jeweiligen Medium ist, welcher im Einzelfall teilweise stark schwankt. In der Tat hängt mvs von mehreren, zum Teil schwer kontrollierbaren Variablen ab (z.B. Zustand des Dosierguts, Witterungseinflüsse, Materialsäule im Aufgabetrichter, Dosierer-Drehzahl etc.). Für Material-Wirkungsgrad siehe Seite T.10.

CF = [dm³/J] = débit horaire théorique pour 1 RPM
CE = [dm³/h] = débit effectif MBF
CR = [dm³/h] débit souhaité par le client
CT = [dm³/h] débit théorique MBF
N = [TPM] = vitesse de rotation de la spire doseuse.
mvs = coefficient du matériau

Donné:
- la description du matériau à doser, le fonctionnement prévu et le système d'alimentation du microdoseur,
- CR (= débit souhaité par le client), là succession correcte des opérations pour la choix d'un microdoseur est la suivante:
- Contrôler dans le tableau des matériaux mvs et toutes les autres caractéristiques impor-tantes (ex.; type de spire doseuse, accessoires, autres)
- Calculer le débit effectif CE du MBF standard (vitesse fixe ou variable suivant la demande du client)

CE = CT x mvs

où CT est à la page T.10. Si la différence entre CE et CT est trop grande (c'est à dire, le client n'accepte pas le MBF standard), il est nécessaire de trouver à quelle vitesse de rotation devra tourner le MBF pour obtenir le débit souhaité par le client. On utilisera la formule:

$$N = \frac{CR}{CF \times mvs}$$

Ensuite il faut choisir (voir page T.11) le rapport qui se rapproche le plus de celui souhaité par le client. A ce point du calcul quoi qu'il en soit, il est nécessaire de tenir compte que mvs figurant dans le tableau matériaux est en realité une donnée empirique obtenue comme une moyenne des résultas de l'expérience passée. Cette donnée peut dépendre en fait de multiple facteurs difficiles à contrôler (ex. état du matériau, conditions atmosphériques, hauteur de la colonne du matériau dans la trémie, vitesse de rotation etc.).
Le coefficient du matériau mvs est indiqué a page T.10.

CF = [dm³/J] = portata teorica oraria per 1 RPM
CE = [dm³/h] = portata effettiva MBF
CR = [dm³/h] = portata richiesta dal cliente
CT = [dm³/h] = portata teorica MBF
N = [RPM] = velocità di rotazione dell'utensile di dosaggio
mvs= efficienza del materiale

Dati:
- la descrizione dei materiale da dosare, il funzionamento previsto e il sistema di alimentazione dei microdosatore,
- CR (= portata richiesta dal cliente), la successione corretta delle operazioni per la scelta dei MBF è la seguente:
- controllare mvs e tutte le altre caratteristiche importanti nella tabella materiali (es.: tipo di utensile di dosaggio, accessori, vari, etc.)
- calcolare la portata effettiva CE del MBF standard (a velocità fissa o variabile in base alla richiesta dei cliente)

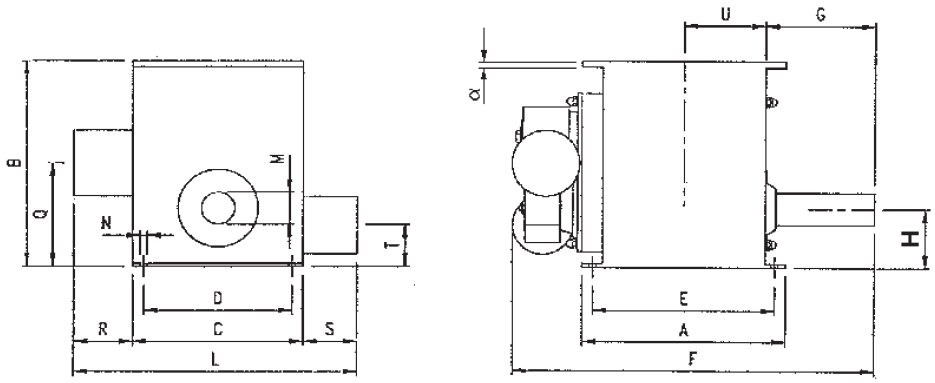
CE = CT x mvs

dove CT è a pag. T.10. Se la differenza tra CE e CT è troppo grande (cioè il cliente non accetta il ns. MBF standard) è necessario trovare a quale velocità di rotazione deve ruotare l' MBF per ottenere la portata richiesta dal cliente. Si usa la formula:

$$N = \frac{CR}{CF \times mvs}$$

Poi si sceglie (vedi pag. T.11) il rapporto che più si avvicina ai desideri del cliente. In questi calcoli è comunque necessario tenere presente che mvs riportato nella tabella materiali, è in realtà un dato empirico ottenuto come media dei risultati delle esperienze fatte, risultati talvolta anche distanti tra di loro. Esso può dipendere infatti da molteplici variabili, alcuni delle quali di difficile controllo (es. stato del materiale, condizioni atmosferiche, altezza colonna materiale nella tramoggia, velocità di rotazione, etc.).
Il coefficiente mvs è indicato a pagina T.10.

DIMENSIONS - *EINBAUMASSE* - ENCOMBREMENT - *INGOMBRO*



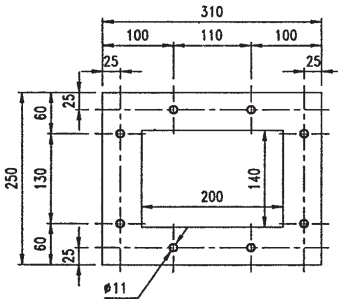
MBF	A	B	C	D	E	F	G	H	L*	M	N	Q	R*	S**	T	U	α	dm³	kg
042	310	295	250	200	253	595	200	100	535	42	12.5	235	160	125	100	105	12	5	20
073	464	486	390	305	410	855	250	135	600	76	12.5	240	135	75	95	185	15	28	60
114	464	486	390	305	410	855	250	135	600	114	12.5	259	135	75	95	185	15	35	65

* Without variable speed reducer
** Ohne Regelgetriebe*
* Sans variateur
** Senza variatore*

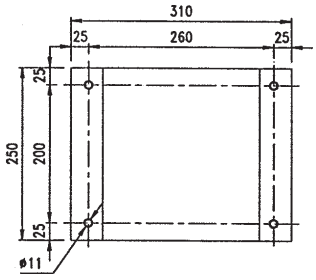
** According to IEC - Standards
*** Gemäß IEC - Norm*
** Selon normes IEC
*** Secondo norme IEC*

MBF 042

TOP FLANGE
FLANSCH OBEN
BRIDE SUPERIEURE
FLANGIATURA SUPERIORE

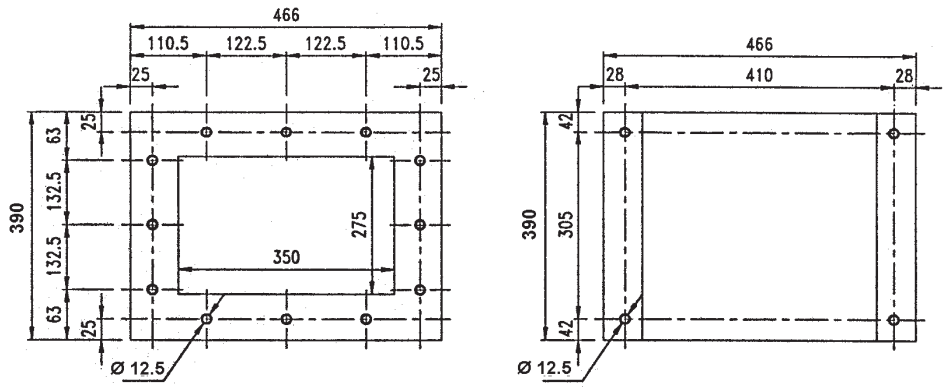


BOTTOM FLANGE
FLANSCH UNTEN
BRIDE INFERIEURE
FLANGIATURA INFERIORE

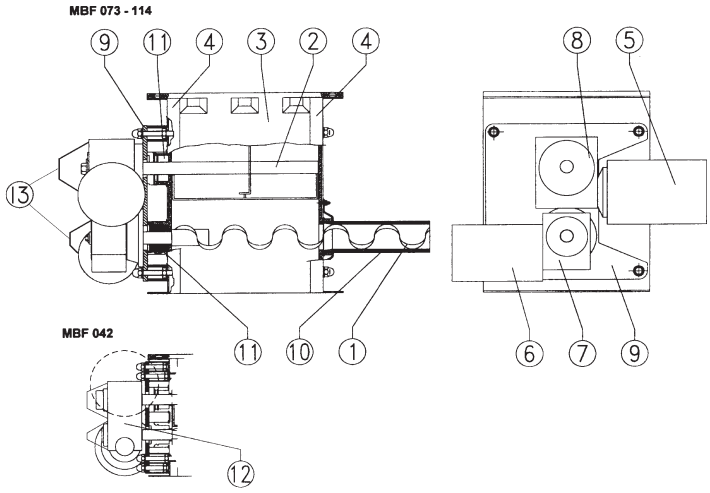


MBF 073

MBF 114



STANDARD SUPPLY - *STANDARD-LIEFERUMFANG* - FORNITURE STANDARD - *FORNITURE STANDARD*



1	Metering screw	Dosierwerkzeug	Vis de dosage	Utensile dosaggio
2	Blending tool	Homogenisierwerkzeug	Homogénéisateur	Utensile omogeneiz.
3	Elastomer trough	Dosiertrog	Corps	Corpo
4	End plate	Endschild	Bride d'extremité	Frontale
5	Agitator motor	E- Motor Homogenisierer	Moteur electr. outil de homogé	Motore elect. omogen.
6	Metering screw motor	E- Motor Dosierer	Moteur elect. outil de dosage	Motore elect. dosaggio
7	Metering screw reducer	Getriebe Dosierer	Réducteur outil de dosage	Riduttore dosaggio
8	Blending tool reducer	Getriebe Homogenisierer	Réducteur outil de homogén.	Riduttore omogeneiz.
9	Drive support	Antriebshalterung	Plaque de fixation	Piastra d'attacco
10	Feeder pipe	Dosierrohr	Sortie	Uscita
11	Seals	Wellenabdichtungen	Etancheitées	Tenute
12	Reducer	Getriebe	Réducteur	Riduttore
13	Cover	Abdeckung	Couvercle	Coperchio

N.B. Item 4 in the stainless steel version, front panel can be opened for inspection.
N.B. Pos.4 in der Edelstahlversion mit abnehmbarer Frontplatte zu Inspektionszwecken.
N.B. Pos.4 dans la version en acier inox, plaque frontale peut être ouverte pour inspection.
N.B. Pos.4 nella versione in AISI, frontale apribile per ispezione.

The batch feeder must not be starded before the screw conveyor itself, as well as the plant it is going to be installed in, have been declared in conformity with the European Directive 14/06/1982 (89/392/EEC).

It is the plant designer's / plant fitter's responsability to design and install all necessary protection in order to avoid that breaking and / or yielding of the equipment or of parts of it might damage people and / or parts of the plant (e.g. adequate protection against falling down of the motor etc.).
For dangerous materials, i.e. those that must not get in contact with the human body or be inhaled, for flammable, explosive and bacteriologically dangerous materials the plant manufacturer or fitter must provide for the required safety devices and measures.

Der Dosier darf nicht in Betrieb genommen werden, bevor sowohl sie selbst, als auch die Anlage, in die sie eingebaut wird, mit den Vorschriften der Direktive 14/06/1982 (89/392/ ECC) für konform erklärt wurde.
Es liegt in der Verantwortung des Anlagenplaners bzw. -aufstellers, alle notwendigen Schutzvorrichtungen vorzusehen, welche es verhindern, daß durch einen Geräte- oder Teiledefekt Personen- und/oder Sachschäden verursacht werden (z.B. geeigneter Schutz gegen das Herunterfallen des Motors etc.).
Für Gefahrenprodukte, bzw. solche, die nicht mit dem menschlichen Körper in Kontakt geraten oder eingeatmet werden dürfen, für leicht entzündbare, explosive sowie bakteriologisch gefährliche Medien muß der Anlagenbauer bzw. –errichter die für die Sicherheit erforderlichen Vorrichtungen vorsehen und Maßnahmen treffen.

Il est interdit de mettre le doseur en fonction avant que la machine / l'installation dans laquelle elles doivent être montées a été déclarée conforme aux dispositions de la Directive 14/06/1982 (89/392/ECC).

Dans ce cadre il est la responsabilité du constructeur de l'installation ou de l'installateur de projeter et d'installer tout équipement de protection nécessaire afin d'eviter que des ruptures et / ou des parties d'elle puissent causer de dégâts à des personnes et / ou des choses (par ex.: des protections appropriées contre la chaute du moteur etc.).
Pour des produits dangereux, nuisibles au contact et/ou à l'inhalation, inflammables, explosifs et dangereux du point de vue bactériologique et/ou viral, le constructeur de l'installation ou l'installateur devront prévoir des dispositifs appropriés au besoin.

E' vietato mettere il dosatore in funzione prima che la macchina/ impianto, nel quale devono essere installate, sia dichiarato conforme alle disposizioni della direttiva 14/06/1982 (89/392/EEC).

In quest'ambito è cura dell'impiantista / installatore predisporre ed installare tutti gli accorgimenti / protezioni al fine di evitare danni a cose o persone in caso di rotture e conseguente caduta di pezzi della macchina (ad es.: rottura del motore).
Per prodotti pericolosi, nocivi al contatto e/o all'inalzione, infiammabili, esplosivi e pericolosi dal punto di vista batteriologico e/o virale, l'impiantista e/o l'installatore, dovranno prevedere idonei dispositivi all'uopo.

THEORETICAL STANDARD FEED RATES - *THEORETISCHE STANDARD - DOSIERLEISTUNGEN*
DEBITS THEORIQUES STANDARD - *PORTATE TEORICHE STANDARD*

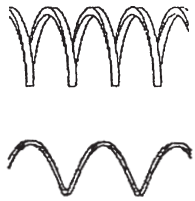
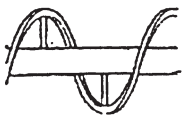
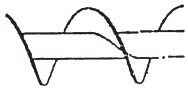
TAB. 1

MBF		THEORETICAL STANDARD FEED RATES *THEORETISCHE STANDARD-DOSIERLEISTUNGEN* DEBITS THEORIQUES STANDARD *PORTATE TEORICHE STANDARD*			CT
	Metering screws *Dosierwerkzeuge* Outils dosage *Utensili dosatori*	Hourly feed rate at *Dosierleistung pro Stunde bei* Débit horaïre à *Portata oraria a* 1 rpm	Fixed speed feed rate *Leistung bei Konstanter Drehzahl* Débit à vitesse fixe *Portata a velocità fissa* 93 rpm	Feed rate with variable speed *Leistung bei variabler Drehzahl* Débit à vitesse variable *Portata a velocità variabile* 13 - 67 rpm	Capacity whit diff. variator *Leist. bei var. Drehz. + Diff.* Débit à vites. var. avec différ. *Port.a vel. variab. con differ.* 4 - 60 rpm
	Type	**dm³ / h**	**dm³ / h**	**dm³ / h**	**dm³ / h**
042	1 - 4 - D - 2 - B 3 5 7	0.7 0.6 0.64 0.95	65 56 60 88	9 - 48 8 - 40 8 - 45 12 - 64	
073	1 - 2 - B 3 4 - 5 - D - E	5.7 4.4 7.4	530 410 688	74 - 382 57 - 295 96 - 496	23 - 342 18 - 264 31 - 421
114	1 - 2 - B 3 4 - 5 - D- E	26 13.6 29.7	2418 1265 2762	338 - 1742 177 - 911 386 - 1990	104 - 1560 55 - 816 130 - 1930

N.B. The theoretical feed rate has to be multiplied by the efficient factor which depends on the type of feeder screw and on the material fed.
N.B. Die theoretische Dosierleistung ist dem Wirkungsfactor zu multiplizieren, der wierderum abhängig ist vom Dosierwendeltyp und vom dosierten Medium.
N.B. La débit théorique doit être multiplié pae le facteurs d'efficience qui est en fonction de la spire et du produit dosé.
N.B. La portata teorica deve essere moltiplicata per il fattore di efficenza che è in funzione dell'elica e del prodotto trasportato.

General efficiency coefficient mvs depeneding on feeder screw used
Allgemeiner Wirkungsgrad mvs in Abhängigkeit von der eingesetzten Dosierwendel
Coefficient d'efficacité général en fonction du type de spire utilisée
Coefficienti di efficienza generico mvs, in funzione del tipo di elica utilizzata

TAB. 3

UTD. 12 UTD. 32	UTD. 22 UTD. B2	UTD. 42 UTD. D2	UTD. 5 UTD. G UTD. E
			
Efficiency: 1.1	**Wirkungsgrad: 0.6**	**Coefficient: 0.75**	**Efficienza: 0.7**

The theoretical feeds rate (pag.T.11)has to be multiplied by the efficient factor which depends on the type of feeder screw fed.

Note:
The efficiency factor can vary due to grain size, bulk density, degree of humidity and all the other material properties that have an influence on handling the material.

Die theoretischen Dosierleistungen gem. Seite T.11 müssen mit diesem Faktor je nach eingestzter Dosierwendeltype multipliziert werden.

Anm.:
Der Wirkungsgrad kann sich aufgrund der Körnung, des Schüttgewichts, des Feuchtegrads sowie aller übrigen, sich auf das Handling auswirkenden Produkte.

Les débits théoriques comme à page T.11 doivent être multipliés par ce facteur en fonction des spires choisies.

Note:
Le facteur d'efficacité peut subir des variations à cause de la granulométrie, du poids spécifique, de l'humidité et de tous les composants imputables au matériau transporté.

Le portate teoriche come a pag. T.11 debbono essere moltiplicate per questo fattore in funzione delle eliche scelte.

Nota:
Il fattore di efficienza può subire delle variazioni dovute a granulometria, al peso specifico, umidità e a tutte quelle componenti imputabili al prodotto trasportato.

THEORETICAL CAPACITIES SPC - *THEORETISCHE DOSIERLEIST.SPEZ.*
DEBITS THEORIQUES SPC. - *PORTATE TEORICHE SPECIALI*

TAB. 2

MBF				THEORETICAL FEED RATES *THEORETISCHE DOSIERLEISTUNGEN* DEBITS THEORIQUES *PORTATE TEORICHE*			CT
	Metering screws *Dosierwerkzeuge* Outils dosage *Utensili dosatori*	Hourly feed rate at *Dosierleistung pro Stunde bei* Débit horaïre à *Portata oraria a* 1 rpm	Gear ratios *Getriebeuntersetzungen* Rapports réducteurs *Rapporti riduttori*	Fixed speed feed rate *Leistung bei Konstanter Drehzahl* Débit à vitesse fixe *Portata a velocità fissa*	Feed rate with variable speed *Leistung bei variabler Drehzahl* Débit à vitesse variable *Portata a velocità variabile*		Capacity with diff. variator *Leist. bei var. Drehz. + Diff.* Débit à vites. var. avec différ. *Port.a vel. variab. con differ.*
	Type	dm^3 / h	1 / ..	dm^3 / h	dm^3 / h MIN	dm^3 / h MAX	dm^3 / h
42	1-2-4-B-D	0.70	10 15 28 40(std)	98 65 35 24	14 9 5 3	70 47 25 17	
	3	0.6	10 15 28 40 (std)	82 55 29 20	11 8 4 3	59 39 21 15	
	5-E	0.64	10 15 28 40(std)	90 60 32 22	12 8 4 3	64 43 23 16	
	7-G	0.95	10 15 28 40 (std)	133 89 48 33	19 12 7 5	95 63 34 24	
73	1-2-B	5.7	10 15 20 28 40 (std) 70	798 532 399 285 199 114	111 74 56 40 28 16	570 380 285 203 142 81	33-513 22-342 17-256 12-183 8-128 5-73
	3	4.4	10 15 20 28 40 (std) 70	616 411 308 220 154 88	86 57 43 31 21 12	440 293 220 157 110 63	26-396 17-264 13-198 9-141 6-99 4-57
	4-5-D-E	7.4	10 15 20 28 40(std) 70	1,036 691 518 370 259 148	144 96 72 52 36 21	740 493 370 264 185 106	43-66 29-444 21-333 15-238 11-167 6-95
114	1-2-B	26	10 15 20 28 40 (std) 70	3,640 2,427 1,820 1,300 910 520	507 338 254 181 127 72	2,600 1,733 1,300 929 650 371	151-2,340 101-1,560 75-1,170 54-836 38-585 22-334
	3	13.6	10 15 20 28 40 (std) 70	1,904 1,269 952 680 476 272	265 177 133 95 66 38	1,360 907 680 486 340 194	79-1,224 53-816 39-612 28-437 20-306 11-175
	4-5-D-E	29.7	10 15 20 28 40 (std) 70	4,158 2,772 2,079 1,485 1,040 594	579 386 290 207 145 83	2,970 1,980 1,485 1,061 743 424	172-2,673 115-1,782 86-1,337 62-955 43-668 25-382

N.B. The theoretical feed rate has to be multiplied by the efficient factor which depends on the type of feeder screw and on the material fed.
(See tab. 3 pag. T.10)

N.B. Die theoretische Dosierleistung ist dem Wirkungsfactor zu multiplizieren, der wierderum abhängig ist vom Dosierwendeltyp und vom dosierten Medium.(Siehe Tabelle 3 Seite T.10)

N.B. La débit théorique doit être multiplié pae le facteurs d'efficience qui est en fonction de la spire et du produit dosé.(Voir tab. 3 pag. T.10)

N.B. La portata teorica deve essere miltiplicata per il fattore di efficenza che è in funzione dell'elica e del prodotto trasportato.(vedi tab.3 pag. T.10)

FIXED SPEED DRIVES - *ANTRIEBE MIT KONSTANTER DREHZAHL*
MOTORISATIONS A VITESSE FIXE - *MOTORIZZAZIONI A VELOCITA' FISSA*

MBF 042	**METERING SCREW - *DOSIERWERKZEUG* - OUTIL DOSAGE - *UTENSILE DOSAGGIO***				
	RPM	**STANDARD**	**SPECIAL**		
		93	140	50	35
	Ratio - *Untersetzung* Rapport - *Rapporto*	1:15	1:10	1:28	1:40
	Gear red. - *Getriebe* Réduct. - *Riduttore*	RW BB ØØ	RW AA ØØ	RW DA ØØ	RW EA ØØ
	Motors - *E-Motoren* Moteurs - *Motori*	**0.12 kW 4P 50 Hz 63A B5 (std)** (0.18 kW/0.25 kW 4P 50 Hz 63b/63c B5)			
	BLENDING TOOL - *HOMOGENISIERWERKZEUG* - OUTIL DE HOMOGENEISATION - *OMOGENEIZZATORE*				
	RPM	35			
	Ratio - *Untersetzung* Rapport - *Rapporto*	1:40			
	Motors - *E-Motoren* Moteurs - *Motori*	**0.25 kW 4P 50 Hz 71A B5 (std)** (0.37 kW 4P 50 Hz 71B B5)			

MBF 073 114	**METERING SCREW - *DOSIERWERKZEUG* - OUTIL DOSAGE - *UTENSILE DOSAGGIO***						
	RPM	**STANDARD**	**SPECIAL**				
		93	140	70	50	35	20
	Ratio - *Untersetzung* Rapport - *Rapporto*	1:15	1:10	1:20	1:28	1:40	1:70
	Gear red. - *Getriebe* Réduct. - *Riduttore*	B5 PAM 71 Ø Flange = 160 mm Ø M* = 14 mm Ø U* = 24 mm					
	Motors - *E-Motoren* Moteurs - *Motori*	**0.25 kW 4P 50 Hz 71A B5 (std)** (0.37 kW 4P 50 Hz 71B B5)					
	BLENDING TOOL - *HOMOGENISIERWERKZEUG* - OUTIL DE HOMOGENEISATION - *OMOGENEIZZATORE*						
	RPM	**STANDARD**	**SPECIAL**				
		35	14				
	Ratio - *Untersetzung* Rapport - *Rapporto*	1:40	1:100				
	Gearbox - *Getriebe* Réduct. - *Riduttore*	B5bi PAM 80 Ø Flange = 200 mm Ø M* = 19 mm Ø U* = 25 mm					
	Motors - *E-Motoren* Moteurs - *Motori*	**0.55 kW 4P 50 Hz 80A B5 (std)** (0.75 kW 4P 50 Hz 80B B5)					

*** ØM** = Ø Electric motor shaft - *Welle elektromotore* - Arbre moteur electrique - *Albero motore elettrico*

*** ØU** = Ø Screw shaft - *Werkzeugwelle* - Arbre outil - *Albero utensile*

VARIABLE SPEED DRIVES - *ANTRIEBE MIT VARIABLER DREHZAHL*
MOTORISATIONS A VITESSE VARIABLE - *MOTORIZZAZIONI A VELOCITA' VARIABILE*

MBF 042	**METERING SCREW - *DOSIERWERKZEUG* - OUTIL DOSAGE - *UTENSILE DOSAGGIO***				
	RPM	**STANDARD**	**SPECIAL**		
		93	140	50	35
	Ratio - *Untersetzung* Rapport - *Rapporto*	1:15	1:10	1:28	1:40
	Gear red. - *Getriebe* Réduct. - *Riduttore*	RW NB ØØ	RW MA ØØ	RW QA ØØ	RW RA ØØ
	Variator - *Regelgetr.* Variateur - *Variatore*	B5/B5 PAM 63/63 n° 190-910 rpm Ø Flange 140/140 mm Ø M* = 11 mm Ø U* = 11 mm			
	Motors - *E-Motoren* Moteurs - *Motori*	**0.12 kW 4P 50 Hz 63C B5 (std)** **(0.18 kW/0.25 kW 4P 50 Hz 63b/63c B5)**			
	BLENDING TOOL - *HOMOGENISIERWERKZEUG* - OUTIL DE HOMOGENEISATION - *OMOGENEIZZATORE*				
	RPM	35			
	Ratio - *Untersetzung* Rapport - *Rapporto*	1:40			
	Motors - *E-Motoren* Moteurs - *Motori*	**0.25 kW 4P 50 Hz 71A B5 (std)** (0.37 kW 4P 50 Hz 71B B5)			

N.B.: the motors provided on the speed variator are special and can therefore be 0.22-0.25 kW, depending on the supplier
Anm.: Die auf dem Drehzahlregler vorhandenen Motoren sind Spezialausführungen und können je nach Hersteller 0,22 -0,25 kW haben
N.B.: Etant donnée que les moteurs prévus sur variateur sont spéciaux, ils peuvent être de 0.22-0.25 kW, en fonction du fournisseur
N.B.: i motori previsti su variatore, essendo speciali, potranno essere, 0.22-0.25 kW in funzione del fornitore

MBF 073 114	**METERING SCREW - *DOSIERWERKZEUG* - OUTIL DOSAGE - *UTENSILE DOSAGGIO***						
	RPM	**STANDARD**	**SPECIAL**				
		93	140	70	50	35	20
	Ratio - *Untersetzung* Rapport - *Rapporto*	1:15	1:10	1:20	1:28	1:40	1:70
	Gear red. - *Getriebe* Réduct. - *Riduttore*	B5/B5 PAM 71 Ø Flange = 160 mm Ø M* = 14 mm Ø U* = 24 mm					
	Variator - *Regelgetr.* Variateur - *Variatore*	B5/B5 PAM 71/71 n° 190-1000 rpm Ø Flange 160/160 mm Ø M* =14 mm Ø U* =14 mm					
	Differrent. - *Different.* Différént. - *Differenz.*	B5/B5 PAM 71/71 n° 0-1000 rpm Ø Flange 160/160 mm Ø M* =14 mm Ø U* =14 mm					
	Motors - *E-Motoren* Moteurs - *Motori*	**0.25 kW 4P 50 Hz 71A B5 (std)** (0.37 kW 4P 50 Hz 71B B5)					
	BLENDING TOOL - *HOMOGENISIERWERKZEUG* - OUTIL DE HOMOGENEISATION - *OMOGENEIZZATORE*						
	RPM	**STANDARD**	**SPECIAL**				
		35	14				
	Ratio - *Untersetzung* Rapport - *Rapporto*	1:40	1:100				
	Gear red. - *Getriebe* Réduct. - *Riduttore*	B5bi PAM 80 Ø Flange = 200 mm Ø M* = 19 mm Ø U* = 25 mm					
	Motors - *E-Motoren* Moteurs - *Motori*	**0.55 kW 4P 50 Hz 80A B5 (std)** (0.75 kW 4P 50 Hz 80B B5)					

*** ØM** = Ø Electric motor shaft - *Welle elektromotor* - Arbre moteur electrique - *Albero motore elettrico*
*** ØU** = Ø Screw shaft - *Werkzeugwelle* - Arbre outil - *Albero utensile*

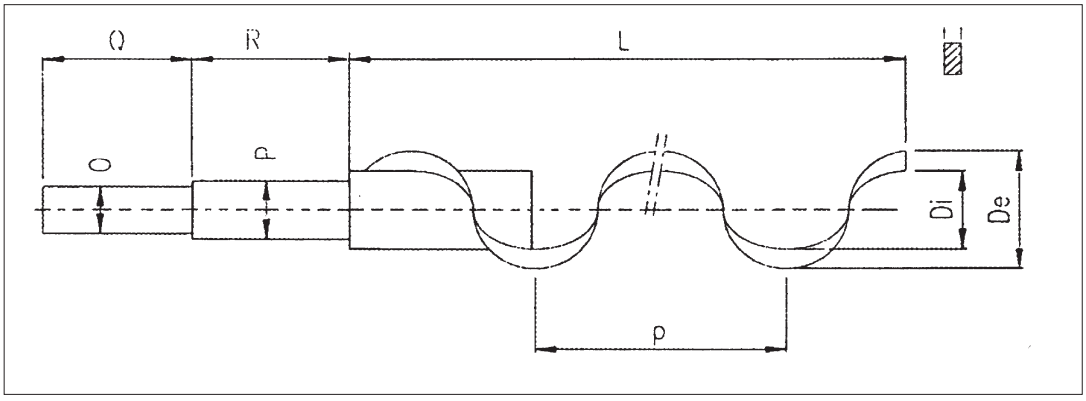
FINISHING - *FINISH* - FINITION - *FINITURE*

End plate	Endschild	Bride d'extremité	Frontale	**St. St. 304 / EDELSTAHL 1.4301 / AISI 304**
Drive support	Antriebshalter.	Plaque de fixation	Piastra d'attacco	**ALUMINIUM / ALLUMINIO**
Reducer	Getriebe	Reducteur	Riduttore	**ALUMINIUM / ALLUMINIO**
Speed variator	Regelgetriebe	Variateur	Variatore	**RAL 5010**
Motor	Elektromotor	Moteur	Motore	**RAL 7001**

STANDARD METERING SCREWS - *STANDARD-DOSIERWERKZEUGE*
OUTILS DE DOSAGE STANDARD - *UTENSILI DOSAGGI STD*

UTD. 12 — **TYPE 1**

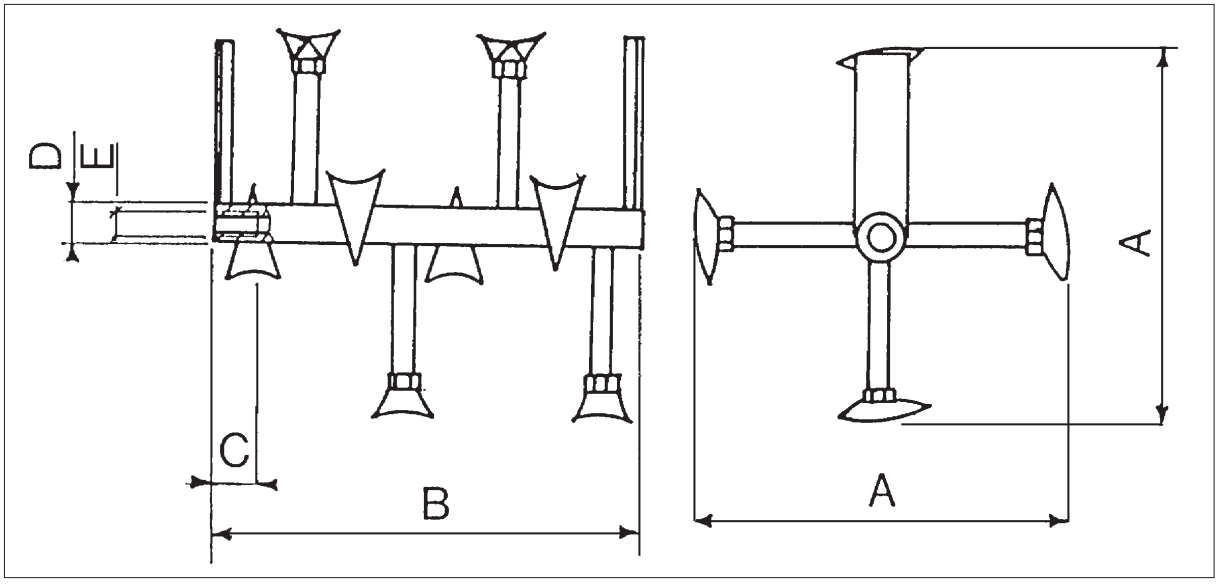
RECTANGULAR SECTION SPIRAL WITHOUT CENTRE PIPE	WENDEL MIT RECHTECKIGEM QUERSCHNITT OHNE INNENROHR	HELICE A SECTION RECTANGULAIRE SANS TUBE INTERIEUR	ELICHE A SEZIONE RETTANGOLARE PRIVE DI TUBO INTERNO
Light sticky materials: flour, sugar, cocoa, pellets, granular products, light and slightly sticky oxides.	Geeignet für Medien mit geringem Schüttgewicht und mit Tendenz zum Anbacken: Mehl, Zucker, Kakao, Pellets, Granulate, Oxyde mit geringem Schüttgewicht und gewisser Tendenz zum Anbacken.	Matériaux légers avec une tendance au tassement: farines, sucre, cacao, pellets, poduits granulaires, oxides légers.	Materiali leggeri con tendenza all'impaccamento: farine, zucchero, cacao, pellets, prodotti granulari, ossidi leggeri moderatamente impaccati.



TYPE1 Rectangular section spiral withhout centre pipe
TYPE1 *Wendel mit rechteckigem Querschnitt ohne Innenrohr*
TYPE1 Hélice à section rectangulaire sans tube intérieur
TIPO 1 *Eliche a sezione rettangolare senza tubo interno*

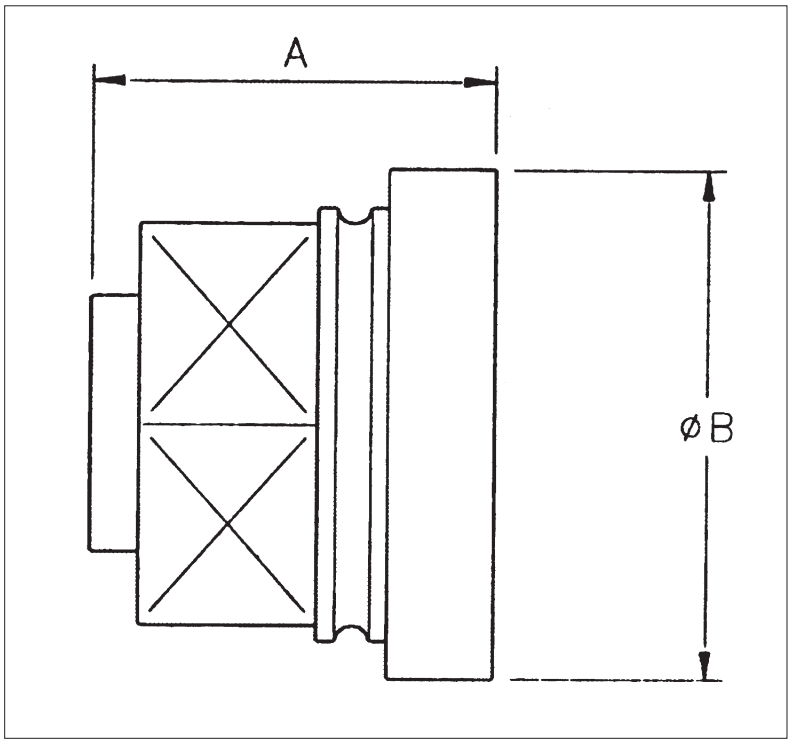
MBF	Code	De	Di	p	S	L	Ø O	Ø P	Q	R	kg
042	**UTD 212**	26	16	30	5	403	14	25	58	81	0.5
073	**UTD 312**	60	40	60	5	607	24	29	96	119	3
114	**UTD 412**	100	67	100	5	607	24	29	96	119	5

STD BLENDING TOOLS - STD - *HOMOGENISIERWERKZEUGE*
HOMOGENEISATEURS STD - *UTENSILI OMOGENEIZZAZIONE STD*



TYPE 2

MBF	Code	A	B	C	D	E	kg
042	**UTO 22**	130	199	25	25	M 12	1
073	**UTO 23**	269	349	35	35	M 16	3.5
114	**UTO 24**	269	349	35	35	M 16	3.5



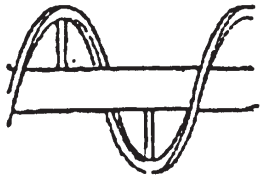
SINT®ER

MBF	Code	A	B
042	**MBT N2**	54	60
073	**MBT N3**	57	80
114	**MBT N4**	57	80

SINT®AL

MBF	Code	A	B
042	**MBT F2**	54	60
073	**MBT F3**	57	80
114	**MBT F4**	57	80

SPECIAL METERING SCREWS - *SPEZIALDOSIERWERKZEUGE* - OUTILS DOSAGE SPECIAUX - *UTENSILI DOSAGGIO SPECIALI*

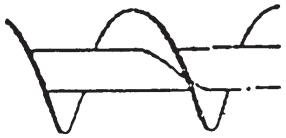


UTD. 22 — TYPE 2

RIBBON SPIRAL ON PIPE	BRANDWENDEL MIT INNENROHR	HELICE A RUBAN AVEC TUBE INTERIERUR	ELICHE A NASTRO CON TUBO INTERNO
Heavy sticky materials, heavy oxides, clay	Geeignet für Medien mit höherem Schüttgewicht und mit Tendenz zum Anbacken: Oxyde mit höherem Schüttgewicht, Ton	Matériaux lourds avec tendance au tassement, oxides lourdes, argiles	Materiali pesanti con tendenza all'impaccamento ossidi pesanti, argille

UTD. 32 — TYPE 3

ROUND SECTION SPIRAL WITHOUT CENTRE PIPE	WENDEL MIT RUNDEM QUERSCHNITT OHNE INNENROHR	HELICE A SECTION RONDE SANS TUBE INTERIEUR	ELICHE A SEZIONE TONDA PRIVE DI TUBO INTERNO
Light materials, granular products, pellets, PVC, polymers in pellets.	Geeignet für Medien mit geringem Schüttgewicht, ohne Tendenz zum Anbacken: Granulate, Pellets; PVC, Polymere in Pellets.	Matériaux légers, produits granulaires, pellets, PVC, polymers en pellets.	Materiali leggeri non impaccati, prodotti granulari, pellets, PVC, polimeri in pellets.



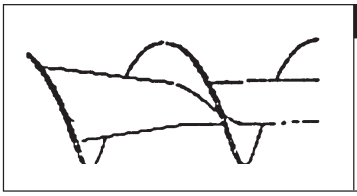
UTD.42 — TYPE 4

STANDARD SCREW	VOLLBLATTWENDEL MIT INNENROHR	HELICE AVEC TUBE INTERIEUR	ELICHE CONTINUE CON TUBO INTERNO
Heavy fluid materials metallic granules.	Geeignet für gut fließende Medien mit höherem Schüttgewicht: Schiefer gemahlen, Metallgranulate.	Matériaux lourds et fluides, grains de métal.	Materiali pesanti e scorrevoli, graniglia di metalli.

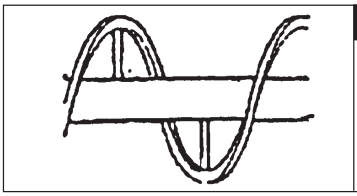
UTD. 5. — TYPE 5

HELICOID SCREW ON TAPERED PIPE MADE FROM SINT®ER OR SINT®AL	WENDEL MIT KONISCHER WELLE AUS SINT®ER ODER SINT®AL	HELICE AVEC TUBE CONIQUE EN SINT®ER OU SINT®AL	ELICA CON TUBO CONICO IN SINT®ER O SINT®AL
Whenever even metering on the entire surface along with mixing of materials with different particle size, bulk density and/or fluency is required.	Findet überall Verwendung, wo eine homogene Dosierung auf der gesamten Fläche in Verbindung mit einer Durchmischung von Medien mit unterschiedlicher Körnung, Fließfähigkeit und/ oder Schüttdichte erforderlich ist.	Où qu'une extraction homogéne sur toute la surface avec des mélanges de produits à granulométries différentes, à poids spécifiques différents et/ ou degrés différents de fluidité.	Dovunque sia necessaria una estrazione omogenea su tutta la superficie con miscele di prodotti a diversa granulometria, diverso peso specifico, diverso grado di scorrevolezza.

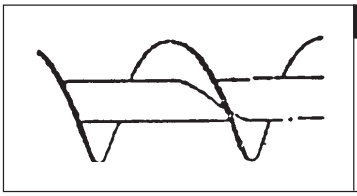
SPECIAL METERING SCREWS - *SPEZIAL-DOSIERWERKZEUGE* - OUTILS DOSAGE SPECIAUX - *UTENSILI DOSAGGIO SPECIAL*



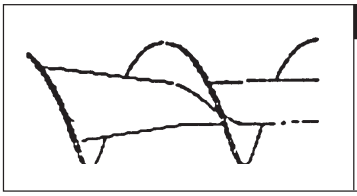
UTD. 7.	TYPE 7			
	SAME AS TYPE 5 BUT WITH DIFFERENT PITCH	WIE TYP 5, JEDOCH MIT UNTERSCHIEDLICHER STEIGUNG	SIMILAIRE AU TYPE 5, MAIS AVEC PAS DIFFERENT	SIMILE AL TIPO 5, MA CON PASSO DIVERSO



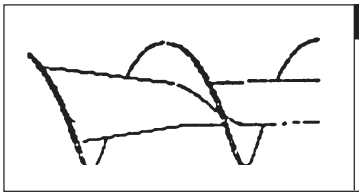
UTD. B2	TYPE B			
	SAME AS TYPE 2 BUT EXTENDED	WIE TYP 2, JEDOCH VERLÄNGERT	SIMILAIRE AU TYPE 2, MAIS PROLONGÉ	SIMILE AL TIPO 2, MA PROLUNGATO



UTD. D2	TYPE D			
	SAME AS TYPE 4 BUT EXTENDED	WIE TYP 4, JEDOCH VERLÄNGERT	SIMILAIRE AU TYPE 4, MAIS PROLONGÉ	SIMILE AL TIPO 4, MA PROLUNGATO

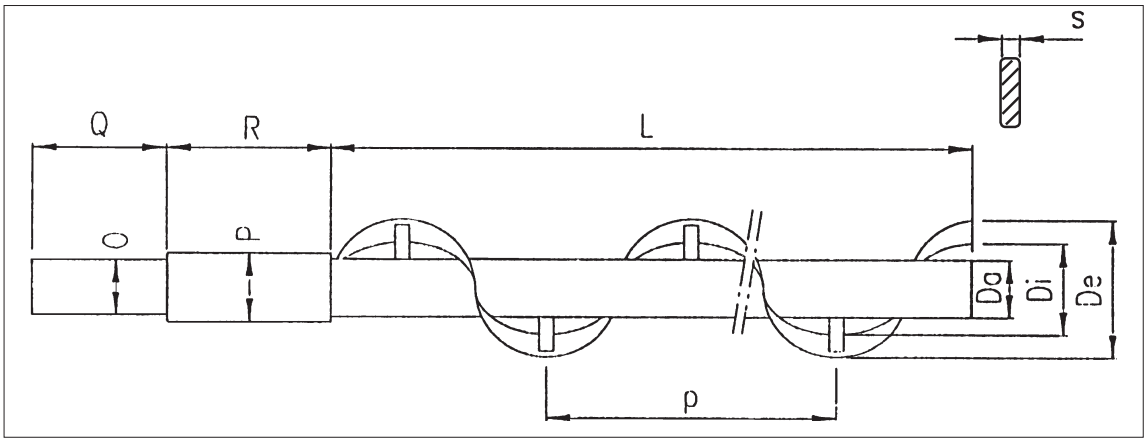


UTD. E.	TYPE E			
	SAME AS TYPE 5 BUT EXTENDED	WIE TYP 5, JEDOCH VERLÄNGERT	SIMILAIRE AU TYPE 5, MAIS PROLONGÉ	SIMILE AL TIPO 5, MA PROLUNGATO



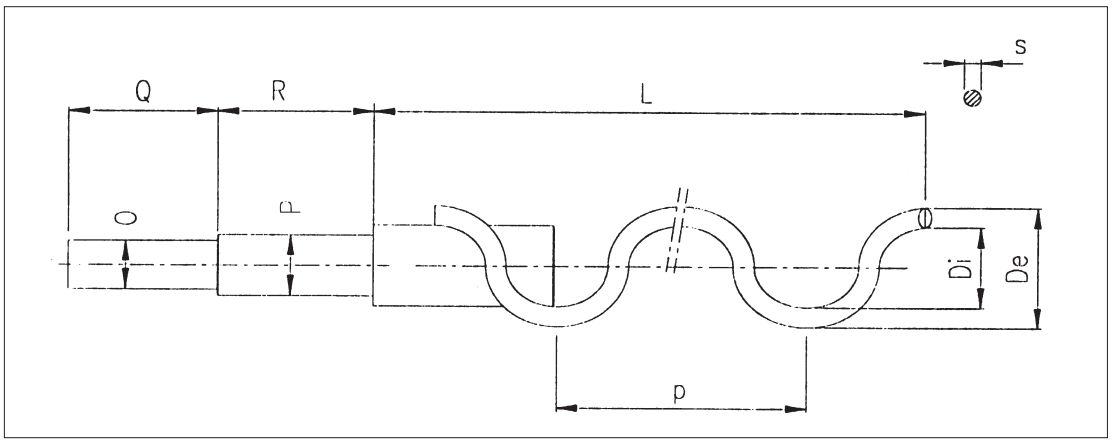
UTD. G.	TYPE G			
	SAME AS TYPE 7 BUT EXTENDED	WIE TYP 7, JEDOCH VERLÄNGERT	SIMILAIRE AU TYPE 7, MAIS PROLONGÉ	SIMILE AL TIPO 7, MA PROLUNGATO

SPECIAL METERING SCREWS - *SPEZIAL-DOSIERWERKZEUGE* - OUTILS DOSAGE SPECIAUX - *UTENSILI DOSAGGIO SPECIAL*



TYPE 2 and TYPE B Ribbon flight on pipe
TYPE 2 und TYPE B *Bandwendel mit Innenrohr*
TYPE 2 et TYPE B à ruban avec tube interieur
TIPO 2 e TIPO B *a nastro con tubo interno*

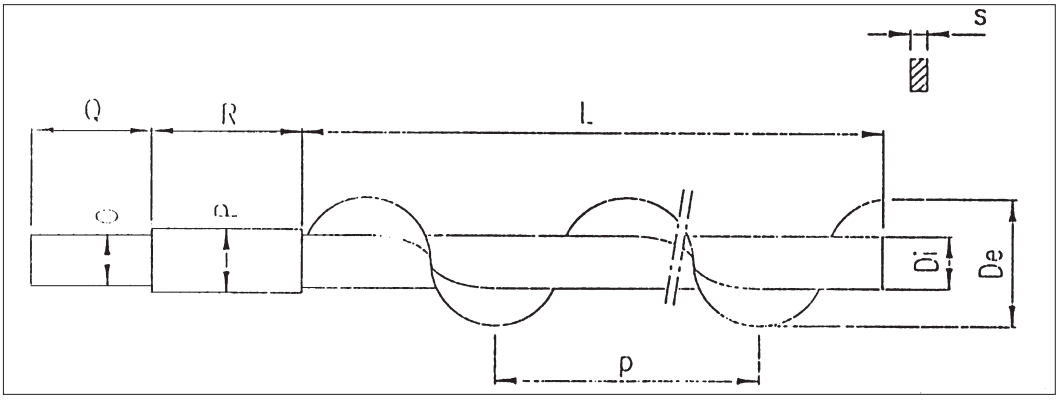
Type	MBF	Code	De	Di	Da	p	S	L	Ø O	Ø P	Q	R	kg
2	**042**	**UTD222**	30	20	10	30	5	403	14	25	58	81	2
	073	**UTD322**	60	40	25	60	5	607	24	29	96	119	3
	114	**UTD422**	100	67	25	100	5	607	24	29	96	119	4
B	**042**	**UTD2B2**	30	20	10	30	5	573	14	25	58	81	3
	073	**UTD3B2**	60	40	25	60	5	857	24	29	96	119	4
	114	**UTD4B2**	100	67	25	100	5	857	24	29	96	119	4,5



TYPE 3 Round section spiral without centre pipe
TYPE 3 *Wendel mit rundem Querschnitt ohne Innenrohr*
TYPE 3 Hélice à section rectangulaire sans tube intérieur
TIPO 3 *Eliche sezione tonda senza tubo interno*

Type	MBF	Code	De	Di	p	S	L	Ø O	Ø P	Q	R	kg
3	**042**	**UTD 232**	26	16	30	5	403	14	25	58	81	0.5
	073	**UTD 332**	57	40	60	8	607	24	29	96	119	3
	114	**UTD 432**	90	70	75	10	607	24	29	96	119	5

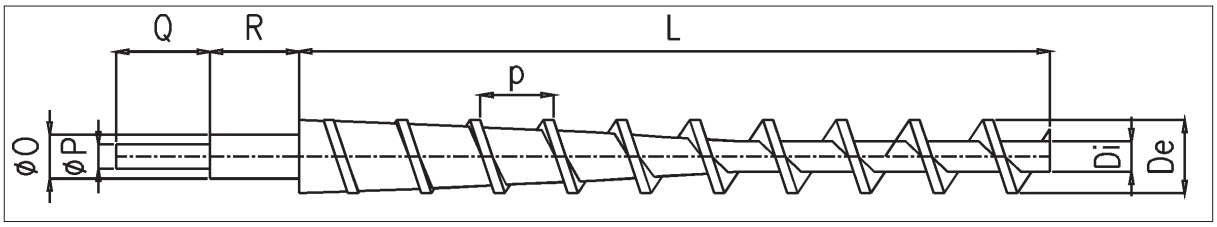
SPECIAL METERING SCREWS - *SPEZIAL-DOSIERWERKZEUGE* - OUTILS DOSAGE SPECIAUX - *UTENSILI DOSAGGIO SPECIAL*



TYPE 4 **and** **TYPE D** standard screws
TYPE 4 ***und*** ***TYPE D*** *Vollblattwendeln mit Innenrohr*
TYPE 4 **et** **TYPE D** hélices continues avec tube interieur
TIPO 4 ***e*** ***TIPO D*** *eliche continue con tubo interno*

EXTENDED
VERLÄNGERT
RALLONGE
ALLUNGATO

Type	MBF	Code	De	Di	p	S	L	Ø O	Ø P	Q	R	kg
4	042	UTD 242	30	20	30	5	403	14	25	58	81	1.5
	073	UTD 342	57	25	60	5	607	24	29	96	119	3.5
	114	UTD 442	90	32	100	5	607	24	29	96	119	6
D	042	UTD 2D2	30	20	30	5	573	14	25	58	81	2
	073	UTD 3D2	57	25	60	5	857	24	29	96	118	5
	114	UTD 4D2	90	32	100	5	857	24	29	96	119	7.5



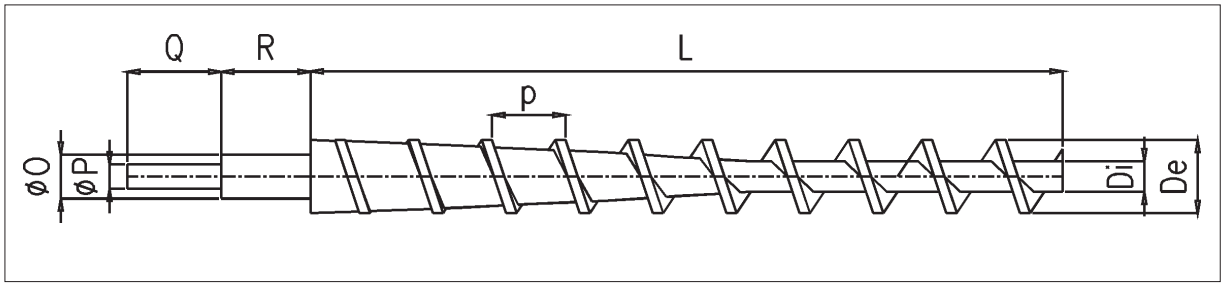
TYPE 5 **and** **TYPE E** screws made of SINT®ER or SINT®AL with tapered pipe
TYPE 5 ***und*** ***TYPE E*** *Wendeln aus SINT®ER oder SINT®AL mit konischem Innenrohr*
TYPE 5 **et** **TYPE E** Hélices en SINT®ER ou SINT®AL avec tube conique
TIPO 5 ***e*** ***TIPO E*** *Eliche in SINT®ER o SINT®AL con tubo conico*

EXTENDED
VERLÄNGERT
RALLONGE
ALLUNGATO

Type	MBF	Code	De	Di	p	L	Ø O	Ø P	Q	R	kg
5	042	UTD 25.	30	15	20	403	25	14	58	81	0.6
	073	UTD 35.	60	25	60	607	30	24	96	119	2
	114	UTD 45.	100	35	100	607	30	24	96	119	3
E	042	UTD 2E.	30	15	20	573	25	14	58	81	0.85
	073	UTD 3E.	60	25	60	857	30	24	96	119	2
	114	UTD 4E.	100	35	100	857	30	24	96	119	3.5

4	SINT®ER
5	SINT®AL

SPECIAL METERING SCREWS - *SPEZIAL-DOSIERWERKZEUGE* - OUTILS DOSAGE SPECIAUX - *UTENSILI DOSAGGIO SPECIAL*

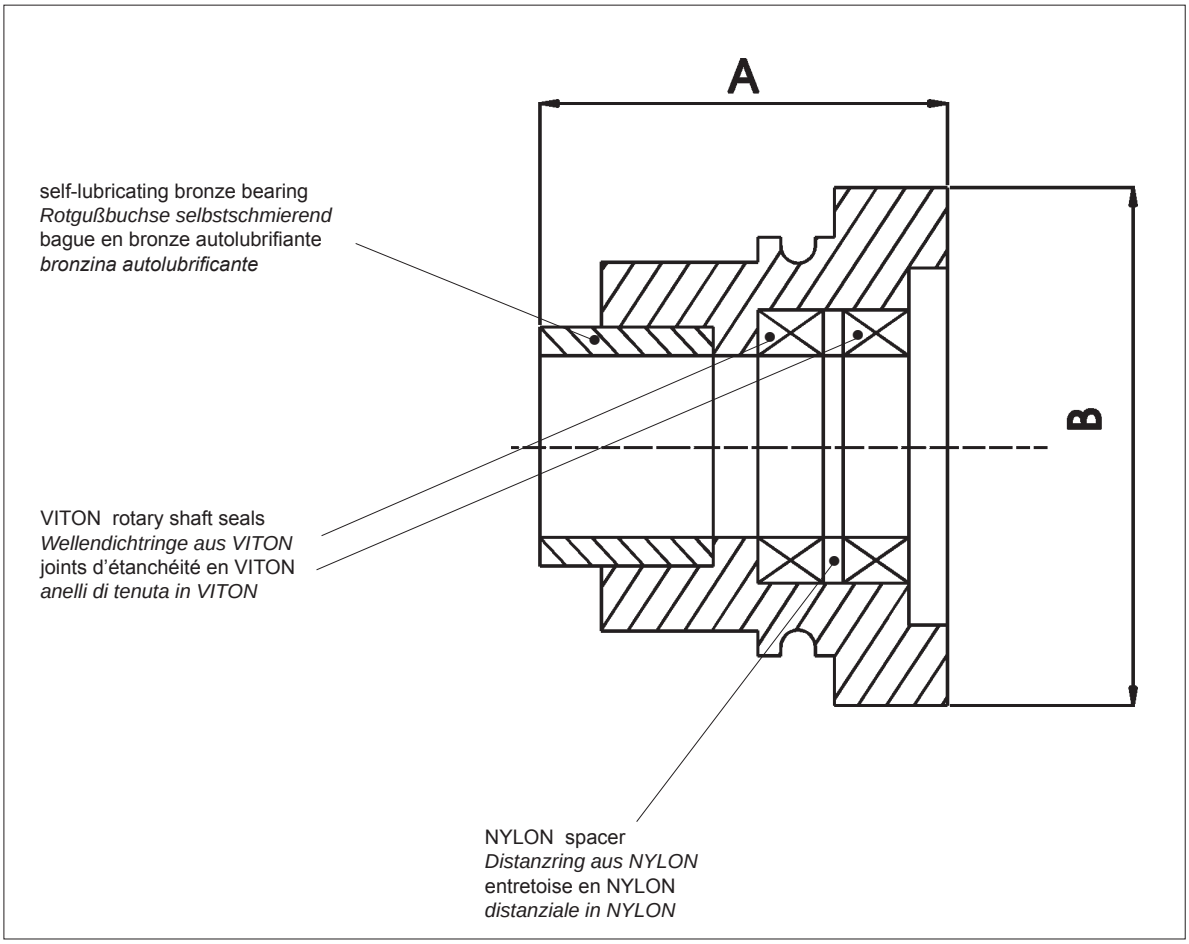


TYPE 7- G Screw with tapered centre pipe made of SINT®ER or SINT®AL
TYPE 7- G *Vollblattwendel mit konischem Innenrohr aus SINT®ER oder SINT®AL*
TYPE 7- G Hélice continue avec tube intérieur conique en SINT®ER ou SINT®AL
TIPO 7- G *Elica continua con yubo interno conico in SINT®ER o SINT®AL*

Type	MBF	Code	De	Di	p	L	Ø O	Ø P	Q	R	kg
7	042	UTD 27 .	30	20	30	403	25	14	58	81	0.6
G	042	UTD 2G .	30	20	30	573	25	14	58	81	0.7

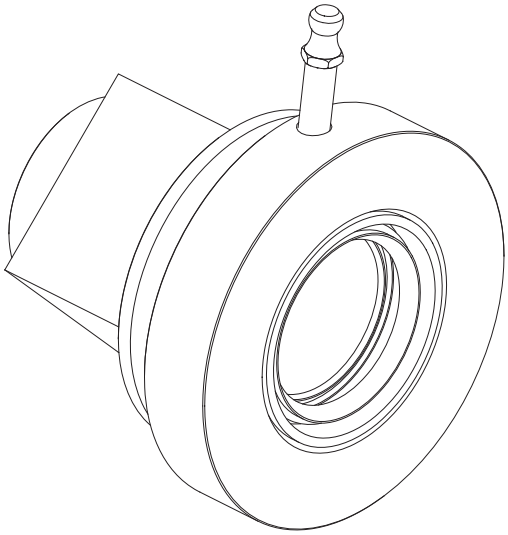
4	SINT®ER
5	SINT®AL

SPECIAL SHAFT SEAL - *SONDER-WELLENABDICHTUNG* - ETANCHEITE SPECIALE - *TENUTA SPECIALE*

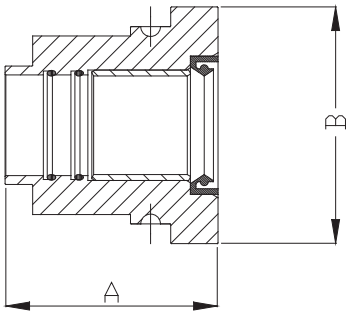


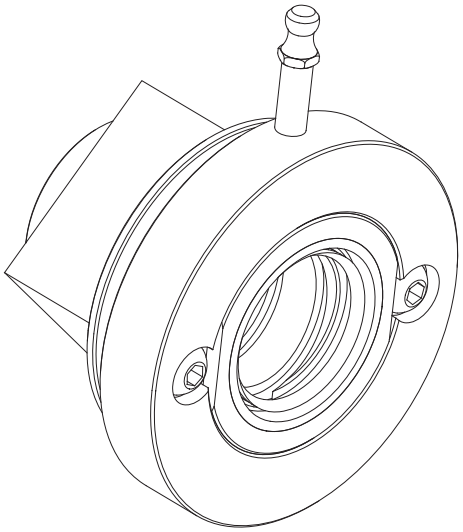
MBF	Code	A	B	kg
042	**MBTX2**	54	60	0.35
073	**MBTX3**	57	80	0.5
114	**MBTX4**	57	80	0.5

SPECIAL SHAFT SEAL WITH GREASING - *SONDER-WELLENABDICHTUNG MIT FETT*
ETANCHEITE SPECIALE AVEC GRAISSE - *TENUTA SPECIALE CON INGRASSAGGIO*

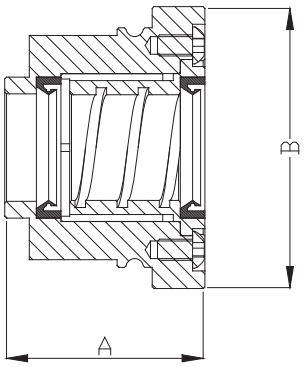


MBTT 2





MBTT 3 - 4



MBF	Code	A	B	kg
042	MBTT2	54	60	0.35
073	MBTT3	57	80	0.5
114	MBTT4	57	80	0.5

N.B. : The MBTT seal is standard with stainless steel version only
N.B. : MBTT-Wellenabdichtung ist nur für Edelstahlversion Standard
N.B. : L'étanchéité MBTT est standard seulement pour la version en acier inox
N.B. : La tenuta MBTT è STD solo sulla versione in AISI

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
MBF	073	N	TN	UD 1	SST	UO 2	B	0	Q	1	0025	0055

MICROBATCH FEEDER
TYPE “MBF”

DIAMETER
042 - 073 - 114

BODY MATERIAL
N =Standard SINT® polymer
F= Food SINT® polymer
A= St.Steel 304L
B= St.steel 316L

SEAL
TN= SINT®ER
TF= SINT®AL
TT= 304 ST.STEEL WITH GREASING
TA= 304 ST.STEEL WITH TEFLON
TX= 304 ST.STEEL WITH BRONZE

FEEDER SCREW
+++ - UD1 (©)- UD2- UD3- UD4- UD5- UD7(#)- UDB- UDD- UDE- UDG(#)

FEEDER PIPE
SST= STANDARD FEEDER PIPE
SPL= EXTENDED FEEDER PIPE
SSR= LINER FEEDER PIPE
SPR= EXTENDED LINER FEEDER PIPE

BLENDING TOOL
+++ = WITHOUT
UO1= SHAPED PADDLES
UO2= STANDARD PLOUGHSHARE

FEEDER DRIVE
+ = WITHOUT 0 rpm (§)
A = FIXED SPEED 1/10 -140 rpm
B = FIXED SPEED 1/15 -93 rpm (©)
C = FIXED SPEED 1/20 -70 rpm (§)
D = FIXED SPEED 1/28 -50 rpm
E = FIXED SPEED 1/40 -35 rpm
F = FIXED SPEED 1/70 -20 rpm (§)

VARIABLE SPEED
0 = WITHOUT (©)
1= VARIABLE SPEED 1000 rpm-190 rpm
2= VARIABLE SPEED WITH DIFFERENTIAL 900 rpm-10 rpm (§)

BLENDING DRIVE
+ = WITHOUT GEAR (§)
Q = STANDARD SPEED 35 rpm
S = SPECIAL SPEED 14 rpm (§)

VOLTAGE
+ = WITHOUT MOTOR
1 = 220-240 / 380-420 V 50 Hz; 440-480 V 60 Hz (©)
6 = 210-230 / 360-400 V 60 Hz

DRIVE POWER FEEDER SCREW
++++ = WITHOUT MOTOR
0012= 0,12 kW for D=042 (©)
0018 = 0,18 kW for D=042
0025= 0,25 kW for D= 042-073-114 (©)
0037= 0,37 kW for D= 042-073-114

DRIVE POWER FEEDER SCREW
++++ = WITHOUT MOTOR
0025= 0,25 kW for D=042 (©)
0037= 0,37 kW for D= 042
0055= 0,25 kW for D= 073-114 (©)
0075= 0,75 kW for D= 073-114

LEGENDA:
© STANDARD
§ NO MBF042
# ONLY MBF042

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
MBF	073	N	TN	UD 1	SST	UO 2	B	0	Q	1	0025	0055

MIKRODOSIERER
TYP “MBF”

DURCHMESSER
042 - 073 - 114

WERKSTOFF GEHÄUSE
N =Standard SINT®ER Technisches Polymer
F= SINT®AL Technisches Polymer
A= Edelstahl 1.4301
B= Edelstahl 1.4401

WELLENABDICHTUNG
TN= SINT®ER
TF= SINT®AL
TT= Edelstahl 1.4301 MIT FETT
TA= Edelstahl 1.4301 MIT TEFLON-BUCHSE
TX= Edelstahl 1.4301

DOSIERWERKZEUGE
+++ - UD1 (©)- UD2- UD3- UD4- UD5- UD7(#)- UDB-
UDD- UDE- UDG(#)

DOSIERROHR MIT INNENAUSKLEIDUNG
SST= STANDARD DOSIERROHR
SPL= VERLÄNGERTES DOSIERROHR
SSR= DOSIEROHR MIT INNENAUSKLEIDUG
SPR= VERLÄNGERTES DOSIERROHR MIT INNENAUSKLEIDUG

HOMOGENISIERWEKZEUG
+++ = OHNE HOMOGENISIERWEKZEUG
UO1= HOMOGENISIERWEKZEUG MIT PADDEL
UO2= STANDARD PFLUGSCHAR-HOMOGENISIERWEKZEUG

DREHZAHL DES DOSIERANTRIEBS
+ = OHNE GETRIEBE 0 rpm (§)
A = KOSTANTE DREHZAHL 1/10 -140 rpm
B = KOSTANTE DREHZAHL 1/15 -93 rpm (©)
C = KOSTANTE DREHZAHL 1/20 -70 rpm (§)
D = KOSTANTE DREHZAHL 1/28 -50 rpm
E = KOSTANTE DREHZAHL 1/40 -35 rpm
F = KOSTANTE DREHZAHL 1/70 -20 rpm (§)

REGELBARE DREHZAHL
0 = KOSTANTE DREHZAHL (©)
1 = REGELBARE DREHZAHL 1000 rpm-190 rpm
2 = REGELBARE DREHZAHL MIT DIFFERENTIAL 900 rpm-10 rpm (§)

ANTRIEB HOMOGENISIERWERKZEUG
+ = OHNE GETRIEBE (§)
Q = STANDARD-DREHZAHL 35 rpm
S = SONDER-DREHZAHL14 rpm (§)

SPANNUNG- FREQUENZ
+ = OHNE VERSORGUNG
1 = 220-240 / 380-420 V 50 Hz; 440-480 V 60 Hz (©)
6 = 210-230 / 360-400 V 60 Hz

ANTRIEBSLEISTUNG DOSIERWERKZEUG
++++ = OHNE ANTRIEB
0012= 0,12 kW mit D=042 (©)
0018 = 0,18 kW mit D=042
0025= 0,25 kW mit D= 042-073-114 (©)
0037= 0,37 kW mit D= 042-073-114

ANTRIEBSLEISTUNG HOMOGENISIERWERKZEUG
++++ = OHNE ANTRIEB
0025= 0,25 kW mit D=042 (©)
0037= 0,37 kW mit D= 042
0055= 0,25 kW mit D= 073-114 (©)
0075= 0,75 kW mit D= 073-114

LEGENDA:
© STANDARD
§ NO MBF042
# NUR MBF042

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
MBF	073	N	TN	UD 1	SST	UO 2	B	0	Q	1	0025	0055

MICRODOSEUR
TYPE “MBF”

DIAMETRE
042 - 073 - 114

MATERIAU CORPS
N =Standard SINT® Tecnopolmero
F= SINT® Tecnopolimero Alimentare
A= AISI 304L
B= AISI 316L

ETANCHEITES
TN= SINT®ER
TF= SINT®AL
TT= AISI 304 AVEC GRAISEE
TA= AISI 304 AVEC TEFLON
TX= AISI 304 SPECIALE

OUTIL DE DOSAGE
+++ - UD1 (©)- UD2- UD3- UD4- UD5- UD7(#)- UDB- UDD- UDE- UDG(#)

TUBE DE DOSAGE
SST= TUBE DE DOSAGE STANDAR
SPL= TUBE DE DOSAGE RALLONGEE
SSR= TUBE DE DOSAGE AVEC REVETEMENT INTERIEU
SPR= TUBE DE DOSAGE RALLONGE AVEC REVETEMENT INTERIEUR

OUTILS HOMOGENEISATEUR
+++ = AVEC HOMOGENEISATEUR
UO1= SPECIAL
UO2= STANDARD

MOTORISATION DE DOSAGE
+ = AVEC MOTORISATION 0 rpm (§)
A = VITESSE COSTANTE 1/10 -140 rpm
B = VITESSE COSTANTE 1/15 -93 rpm (©)
C = VITESSE COSTANTE 1/20 -70 rpm (§)
D = VITESSE COSTANTE 1/28 -50 rpm
E = VITESSE COSTANTE 1/40 -35 rpm
F = VITESSE COSTANTE 1/70 -20 rpm (§)

VITESSE VARIABLE
0 = VITESSE COSTANTE (©)
1= VITESSE VARIABLE 1000 rpm-190 rpm
2= VITESSE VARIABLE AVEC DIFFÉRENZIALE 900 rpm-10 rpm (§)

MOTORISATION DE HOMOGENEISATION
+ = AVEC MOTORISATION (§)
Q = STANDARD 35 rpm
S = SPECIAL 14 rpm (§)

VOLTAGE ET FREQUENCE D’ALIMENTATION
+ = SANS MOTEUR
1 = 220-240 / 380-420 V 50 Hz; 440-480 V 60 Hz (©)
6 = 210-230 / 360-400 V 60 Hz

PUISSANCE MOT. OUTIL DE DOSAGE
++++ = SANS MOTEUR
0012= 0,12 kW per D=042 (©)
0018 = 0,18 kW per D=042
0025= 0,25 kW per D= 042-073-114 (©)
0037= 0,37 kW per D= 042-073-114

PUISSANCE MOT. OUTIL DE HOMOGENEISATION
++++ = SANS MOTEUR
0025= 0,25 kW per D=042 (©)
0037= 0,37 kW per D= 042
0055= 0,25 kW per D= 073-114 (©)
0075= 0,75 kW per D= 073-114

LEGENDA:
© STANDARD
§ NO MBF042
# SEULEMENT POUR MBF042

WAM®

MBF

- **ORDER CODES**
- **BESTELLCODE**
- **CODES DE COMMANDE**
- **CODICI DI ORDINAZIONE**

ITALIANO

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫
MBF	**073**	**N**	**TN**	**UD 1**	**SST**	**UO 2**	**B**	**0**	**Q**	**1**	**0025**	**0055**

MICRODOSATORE
TIPO “MBF”

DIAMETRO
042 - 073 - 114

MATERIALE CORPO
N =Standard SINT® Tecnopolimero
F= SINT® Tecnopolimero Alimentare
A= AISI 304L
B= AISI 316L

TENUTE
TN= SINT®ER
TF= SINT®AL
TT= AISI 304 INGRASSATE
TA= AISI 304 CON TEFLON
TX= AISI 304 CON BRONZO

UTENSILE DI DOSAGGIO
+++ - UD1 (©)- UD2- UD3- UD4- UD5 - UD7(#) - UDB- UDD- UDE- UDG(#)

TUBO DI SCARICO
SST= SCARICO STANDARD
SPL= SCARICO PROLUNGATO
SSR= SCARICO INTERNAMENTE RIVESTITO
SPR= SCARICO PROLUNGATO INTERNAMENTE RIVESTITO

UTENSILE DI OMOGENIZZAZIONE
+++ = SENZA
UO1= SPECIALE
UO2= STANDARD A VOMERI

MOTORIZZAZIONE DOSAGGIO
+ = ASSENTE 0 rpm (§)
A = VELOCITA’ FISSA 1/10 -140 rpm
B = VELOCITA’ FISSA 1/15 -93 rpm (©)
C = VELOCITA’ FISSA 1/20 -70 rpm (§)
D = VELOCITA’ FISSA 1/28 -50 rpm
E = VELOCITA’ FISSA 1/40 -35 rpm
F = VELOCITA’ FISSA 1/70 -20 rpm (§)

VELOCITA’ VARIABILE
0 = VELOCITA’ COSTANTE (©)
1= VELOCITA’ VARIABILE 1000 rpm-190 rpm
2= VELOCITA’ VARIABILE DIFFERENZIALE 900 rpm-10 rpm (§)

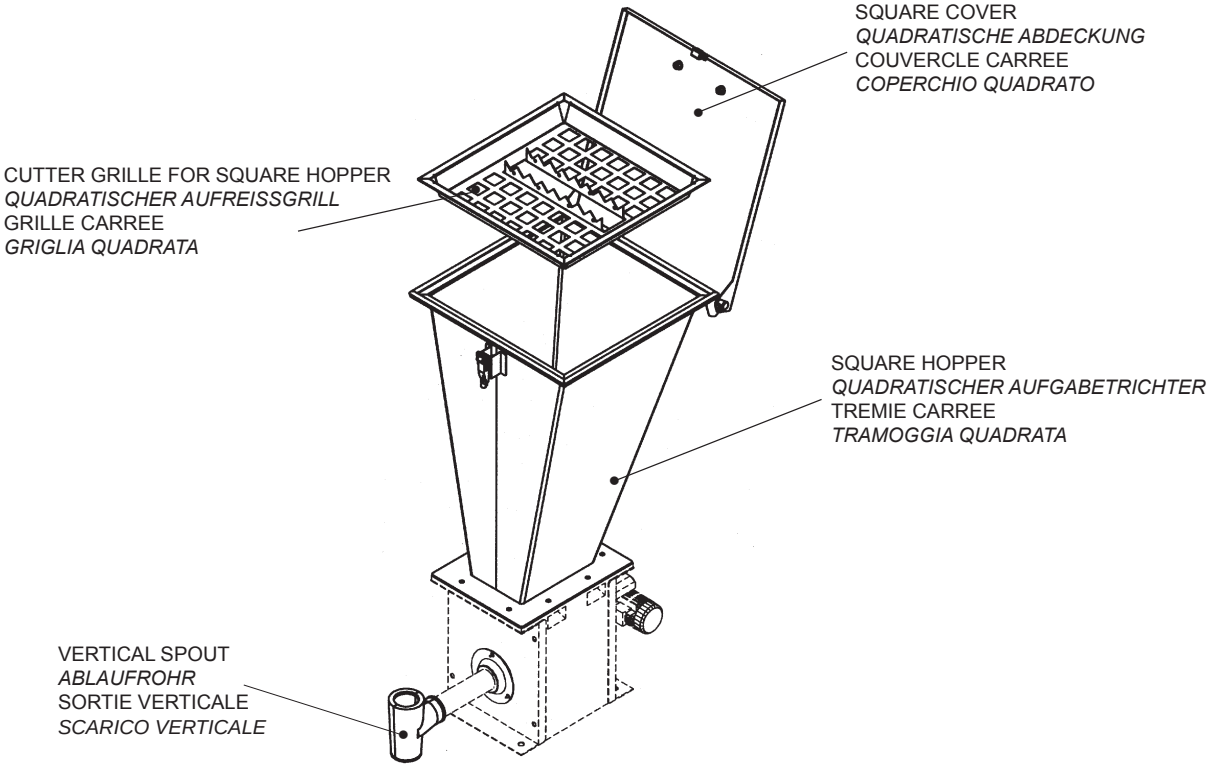
MOTORIZZAZIONE OMOGENIZZATORE
+ = ASSENTE (§)
Q = STANDARD 35 rpm
S = SPECIALE 14 rpm (§)

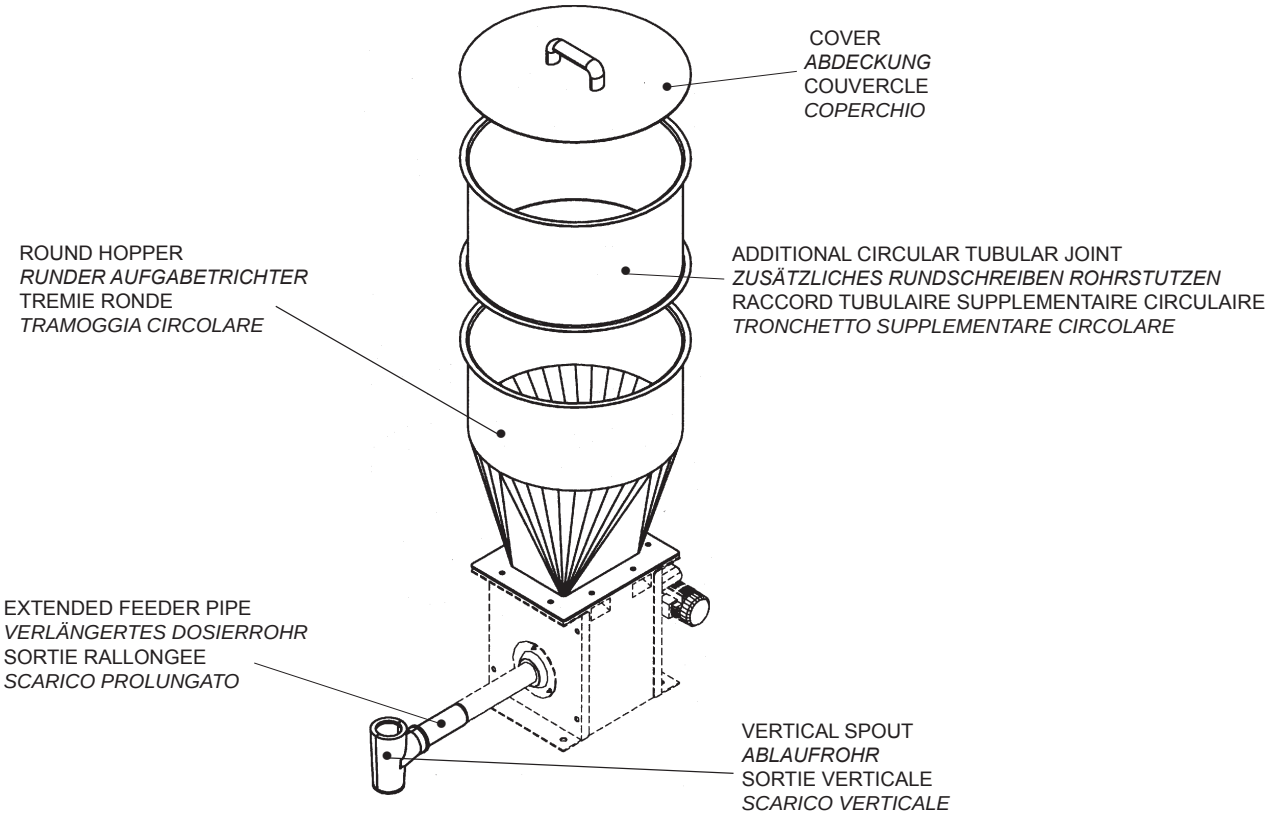
TENSIONE E FREQUENZA
+ = SENZA MOTORE
1 = 220-240 / 380-420 V 50 Hz; 440-480 V 60 Hz (©)
6 = 210-230 / 360-400 V 60 Hz

MOTORIZZAZIONE UTENSILE DOSAGGIO
++++ = SENZA MOTORE
0012= 0,12 kW per D=042 (©)
0018 = 0,18 kW per D=042
0025= 0,25 kW per D= 042-073-114 (©)
0037= 0,37 kW per D= 042-073-114

MOTORIZZAZIONE UTENSILE OMOGENIZZAZIONE
++++ = SENZA MOTORE
0025= 0,25 kW per D=042 (©)
0037= 0,37 kW per D= 042
0055= 0,25 kW per D= 073-114 (©)
0075= 0,75 kW per D= 073-114

LEGENDA:
© STANDARD
§ NO MBF042
# SOLO MBF042


SQUARE COVER
QUADRATISCHE ABDECKUNG
COUVERCLE CARREE
COPERCHIO QUADRATO
CUTTER GRILLE FOR SQUARE HOPPER
QUADRATISCHER AUFREISSGRILL
GRILLE CARREE
GRIGLIA QUADRATA
SQUARE HOPPER
QUADRATISCHER AUFGABETRICHTER
TREMIE CARREE
TRAMOGGIA QUADRATA
VERTICAL SPOUT
ABLAUFROHR
SORTIE VERTICALE
SCARICO VERTICALE


COVER
ABDECKUNG
COUVERCLE
COPERCHIO
ROUND HOPPER
RUNDER AUFGABETRICHTER
TREMIE RONDE
TRAMOGGIA CIRCOLARE
ADDITIONAL CIRCULAR TUBULAR JOINT
ZUSÄTZLICHES RUNDSCHREIBEN ROHRSTUTZEN
RACCORD TUBULAIRE SUPPLEMENTAIRE CIRCULAIRE
TRONCHETTO SUPPLEMENTARE CIRCOLARE
EXTENDED FEEDER PIPE
VERLÄNGERTES DOSIERROHR
SORTIE RALLONGEE
SCARICO PROLUNGATO
VERTICAL SPOUT
ABLAUFROHR
SORTIE VERTICALE
SCARICO VERTICALE

SQUARE HOPPER - *QUADRATISCER AUFGABETRICHTER* -TREMIE CARREE - *TRAMOGGIA QUADRATA*

M	D	X	T	S	1	2

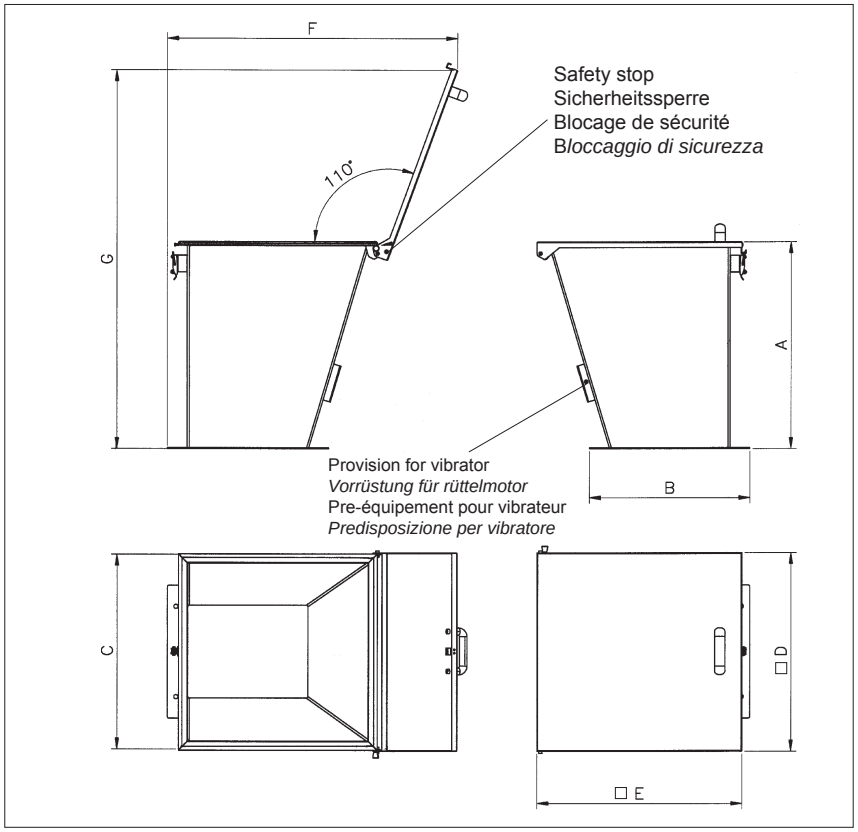
2: Stainless steel - *Edelstahl 1.4301* - Inox 304 - *AISI 304*

Type hopper
Trichtergröße
Type de trémie
Grandezza tramoggia

1	MBF 042
2	MBF 073 -114

Square hopper
Quadratischer Aufgabetrichter
Trémie carrée
Tramoggia quadrata

Micro batch feeder accessories
Zubehör Mikrodosierer
Accessoires microdoseur
Accessori microdosatore



MDXTS	Suitable for - *Passend zu* Pour type - *Idoneo* MBF	A	B	C	□ D	□ E	F	G	dm³	kg
12	042	600	310	428	434	445	640	980	25	12
22	073 - 114	600	466	575	582	595	840	1120	75	19

ROUND HOPPER - *RUNDER AUFGABETRICHTER* - TREMIE RONDE - *TRAMOGGIA CIRCOLARE*

M	D	X	T	R	1	2

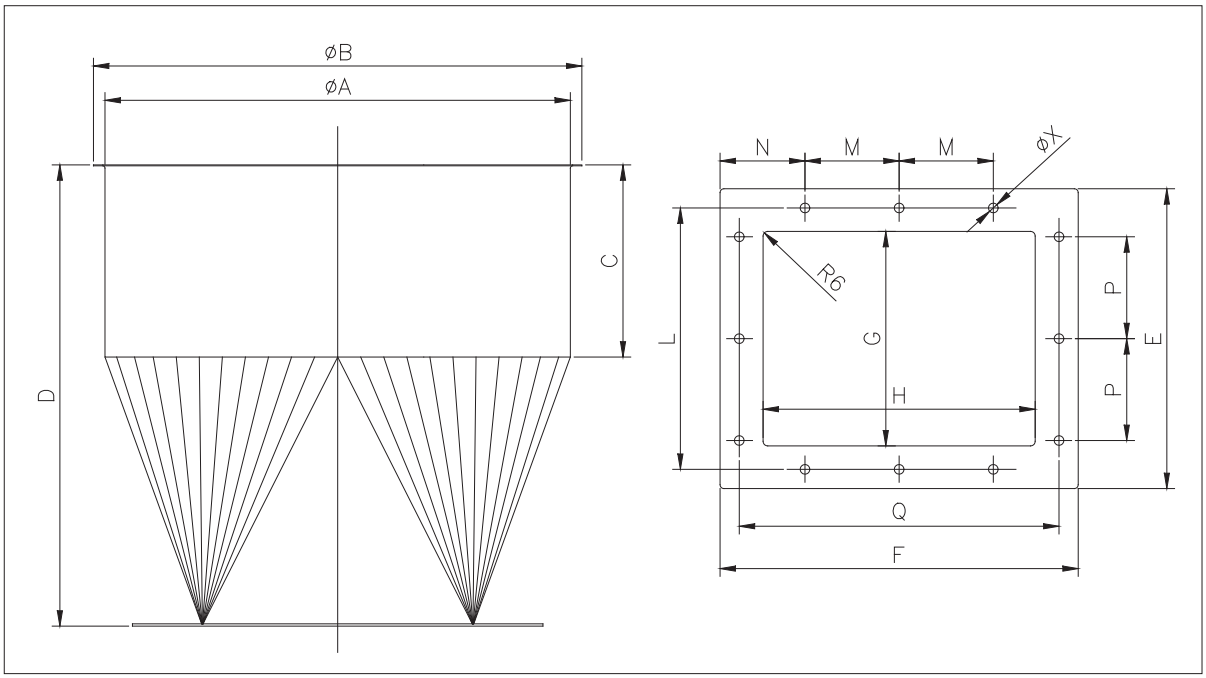
2: Stainless steel - *Edelstahl 1.4301* - Inox 304 - *AISI 304*

Type hopper
Trichtergröße
Type de trémie
Grandezza tramoggia

1	MBF 042
2	MBF 073 -114

Round hopper
Runder Aufgabetrichter
Trémie ronde
Tramoggia circolare

Micro batch feeder accessories
Zubehör zu Mikrodosierer
Accessoires microdoseur
Accessori microdosatore



MDXTR	Suitable for - *Passend zu* Pour type - *Idoneo* MBF	Ø A	Ø B	C	D	E	F	G	H	L	M	N	P	Q	Holes - *Bohrungen* Trous - *Fori* X		dm³	kg
															Ø	n°		
12	042	408	436	200	500	250	310	140	200	200	110	100	130	260	9	8	52	12
22	073 - 114	630	636	250	600	390	466	279	354	340	122.5	110.5	132.5	416	12.5	12	120	20

ADDITIONAL CIRCULAR TUBULAR JOINT - *ZUSÄTZLICHES RUNDSCHREIBEN ROHRSTUTZEN*
RACCORD TUBULAIRE SUPPLEMENTAIRE CIRCULAIRE - *TRONCHETTO SUPPLEMENTARE CIRCOLARE*

M	D	X	A	R	1	2

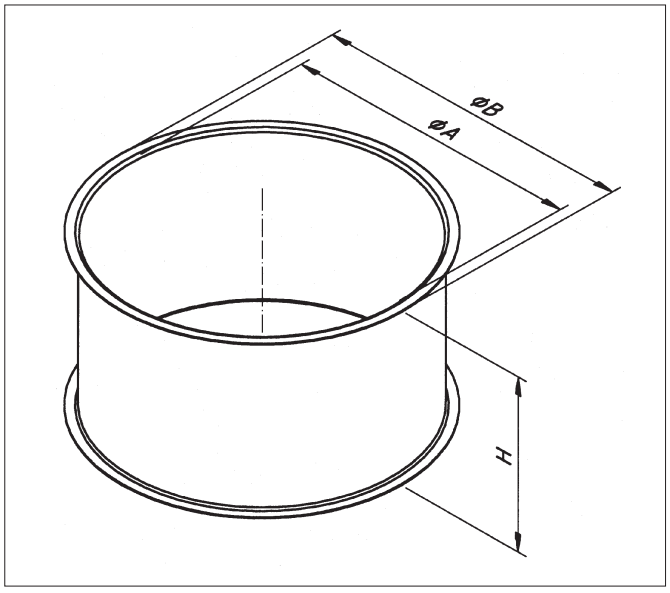
2: Stainless steel - *Edelstahl 1.4301* - Inox 304 - *AISI 304*

Type hopper
Trichtergröße
Type de trémie
Grandezza tramoggia

1	MBF 042
2	MBF 073 -114

Additional circular tubular joint
Zusätzliches rundschreiben Rohrstutzen
Raccord tubulaire supplementaire circulaire
Tronchetto supplementare circolare

Micro batch feeder accessories
Zubehör zu Mikrodosierer
Accessoires microdoseur
Accessori microdosatore



MDXAR	Suitable for - *Passend zu* Pour type - *Idoneo* MBF	Ø A	Ø B	H	dm^3
12	042	406	436	200	25
22	073-114	605	635	180	50

CUTTER GRILLE FOR SQUARE HOPPER - *QUADRATISCHER AUFREISSGRILL* - GRILLE CARREE - *GRIGLIA QUADRATA*

M	D	X	G	S	1	2

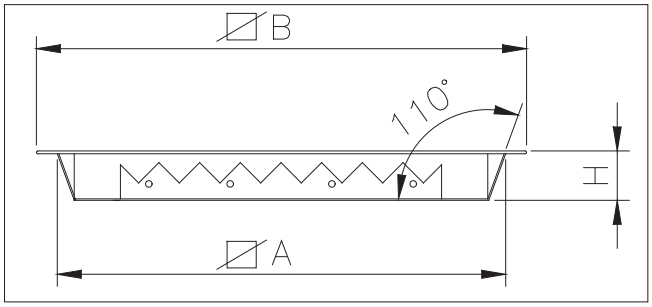
2: Stainless steel - *Edelstahl 1.4301* - Inox 304 - *AISI 304*

Type hopper
Trichtergröße
Type de trémie
Grandezza tramoggia

1	MBF 042
2	MBF 073 -114

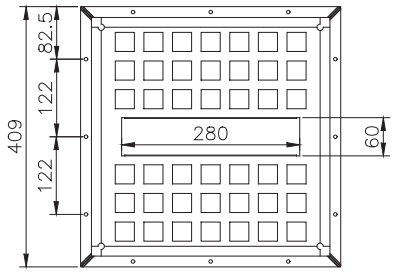
Type hopper cutter grille
Grill
Type de grille
Griglia quadrata tagliasacchi

Micro batch feeder accessories
Zubehör Mikrodosierer
Accessoires microdoseur
Accessori per microdosatore

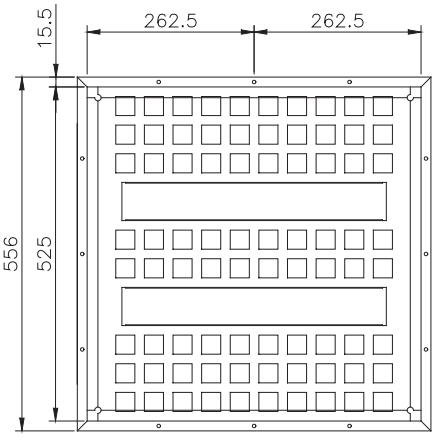


MDXGS	Suitable for - *Passend zu* Pour type - *Idoneo* MBF	□ A	□ B	H	kg
12	042	345	410	40	2
22	073 - 114	495	555	40	3

FLANGES - *FLANSCHE*
BRIDES - *FLANGIATURE*



MDXGS12



MDXGS22

ROUND COVER - *RUNDE ABDECKUNG* - COUVERCLE ROND - *COPERCHIO TONDO*

M	D	X	C	R	1	2

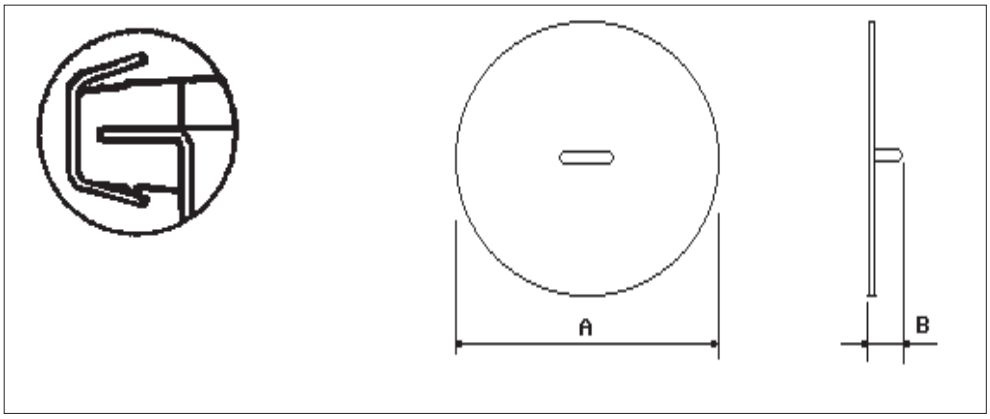
2: Stainless steel - *Edelstahl 1.4301* - Inox 304 - *AISI 304*

Type hopper
Trichtergröße
Type de trémie
Grandezza tramoggia

1	MBF 042
2	MBF 073 -114

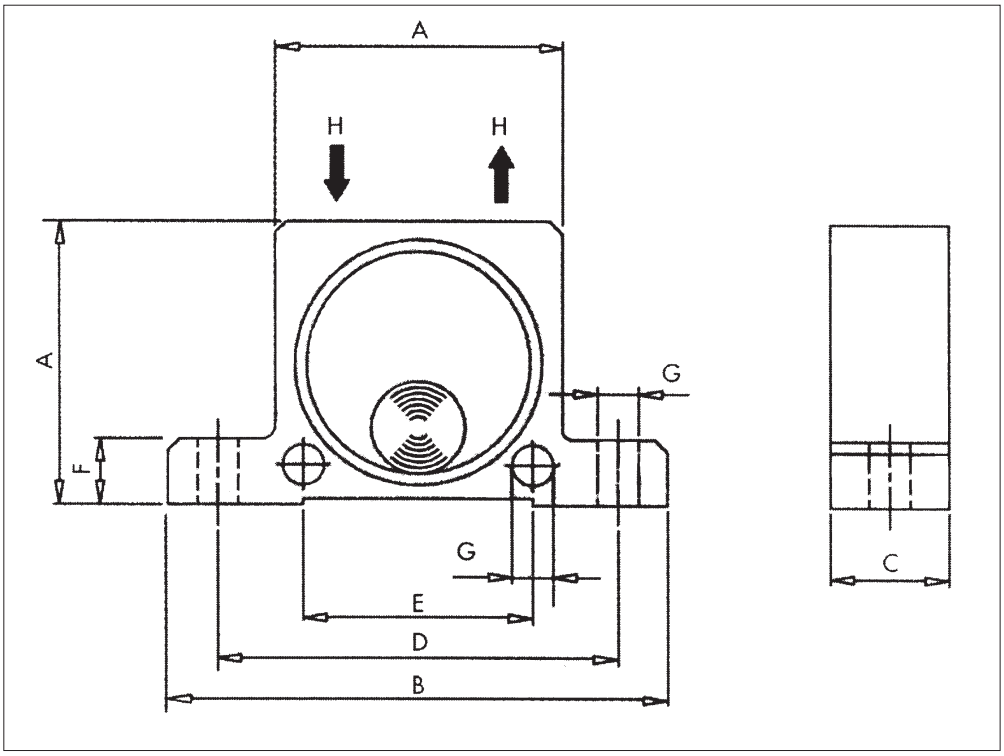
Round cover
Runde Abdeckung
Couvercle rond
Coperchio tondo

Micro- batch fedeer accessories
Zubehör Mikrodosierer
Accessoires microdoseur
Accessori per microdosatore



MDXCR	Suitable for - *Passend zu* Pour type - *Idoneo* MBF	A	B	kg
12	042	436	50	2
22	073 - 114	635	50	3

PNEUMATIC BALL VIBRATORS - *DRUCKLUFT-KUGELVIBRATOREN*
VIBRATEURS PNEUMATIQUES A BILLE - *VIBRATORI PNEUMATICI A SFERA*
"S"



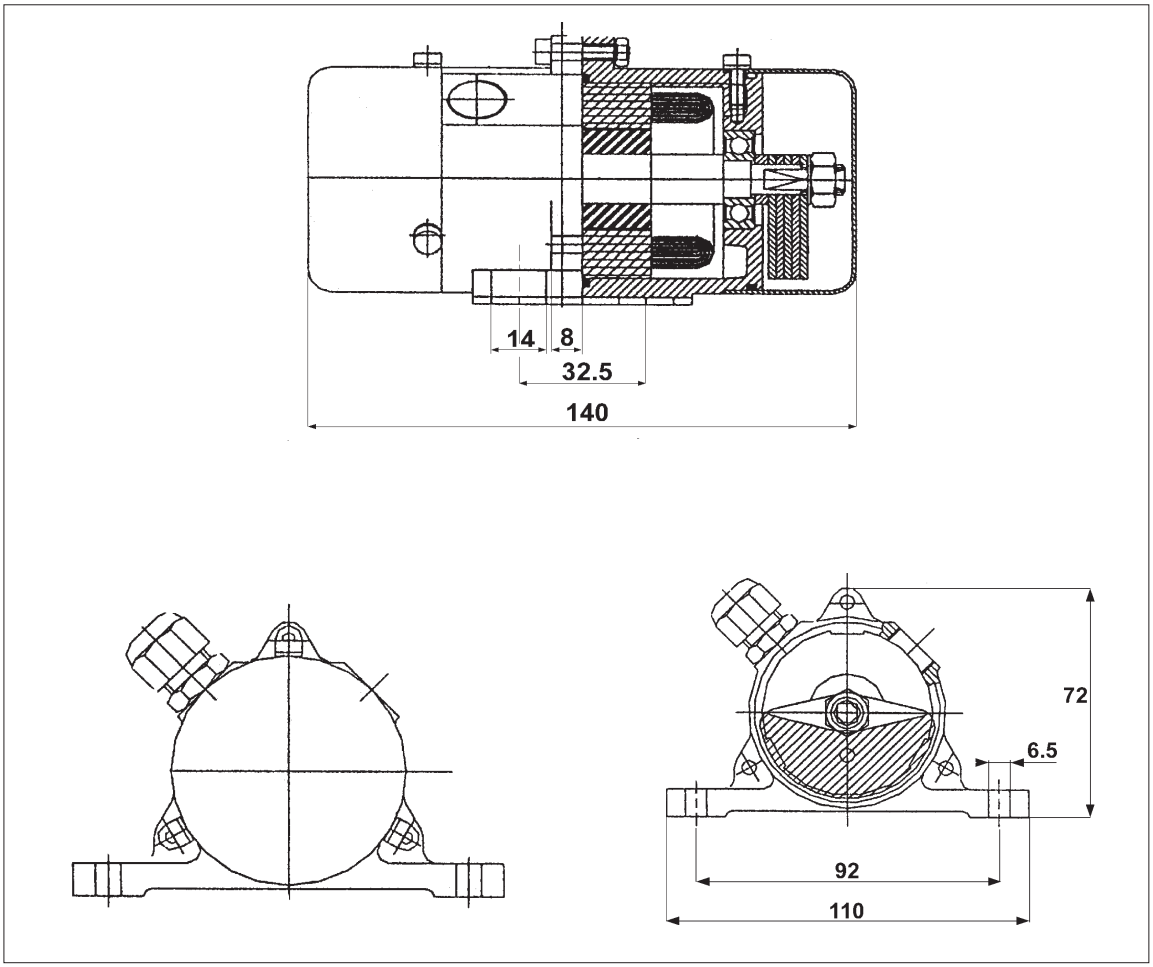
Dimensions - *Abmessungen* - Dimensions - *Dimensioni*

Type	A		B		C		D		E		F		G		H	kg	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in		kg	lbs
S 20	80	3.15	128	5.04	33	1.30	104	4.09	60	2.36	16	0.63	9	0.35	1/4"	0.53	1.17
S 25					38	1.50										0.63	1.39

Performance data - *Leistungsdaten* - Performances - *Prestazioni*

Type	Vibrations - *Schwingungwen* Vibrations - *Vibrazioni* min			Fc max. kg						Air consumption - *Luftverbrauch* Consommation d'air - *Consumo d'aria* l/min					
	2 bar 29 psi	4 bar 58 psi	6 bar 87 psi	2 bar = 29 psi		4 bar = 58 psi		6 bar = 87 psi		2 bar = 29 psi		4 bar = 58 psi		62 bar = 87psi	
				kg	lbs	kg	lbs	kg	lbs	dm^3	cf	dm^3	cf	dm^3	cf
S 20	10.500	14.500	16.500	72	162	122	275	172	387	130	4.6	230	81	340	12.0
S 25	9.200	12.200	14.000	93	209	157	353	205	461	160	5.6	290	10.2	425	15.0

ELECTRIC EXTERNAL MOTOVIBRATORS - *ELEKTRISCHE VIBRATIONSMOTOREN*
MOTOVIBRATEURS EXTERNES ELECTRIQUES - *MOTOVIBRATORI ELETTRICI*
MVE



Type	Max. power *Max. Leistung* Puissance max. *Potenza max.* W		Max. current *Max. Stromaufnahme* Courant max. *Assorbimento max.* A		RPM *U/min* TPM *Giri/min*		Centrifugal force *Zentrifugalkraft* Force centrifuge *Forza centrifuga* kg		Weight *Gewicht* Poids *Peso*
	50 Hz	60 Hz	220 V 50 Hz	115 V 60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	kg
MVE 20	32	36	0.10	0.23	2750	3300	0-22	0-32	1.5

TECNICAL FEATURES

- Adjustable Centrifugal Force
- Protection IP 65
- Insulation Class “F”
- Continuous Duty

TECHNISCHE MERKMALE

- Einstellbare Zentrifugalkraft
- Schutzart IP 65
- Iso-Klasse F
- 100% ED

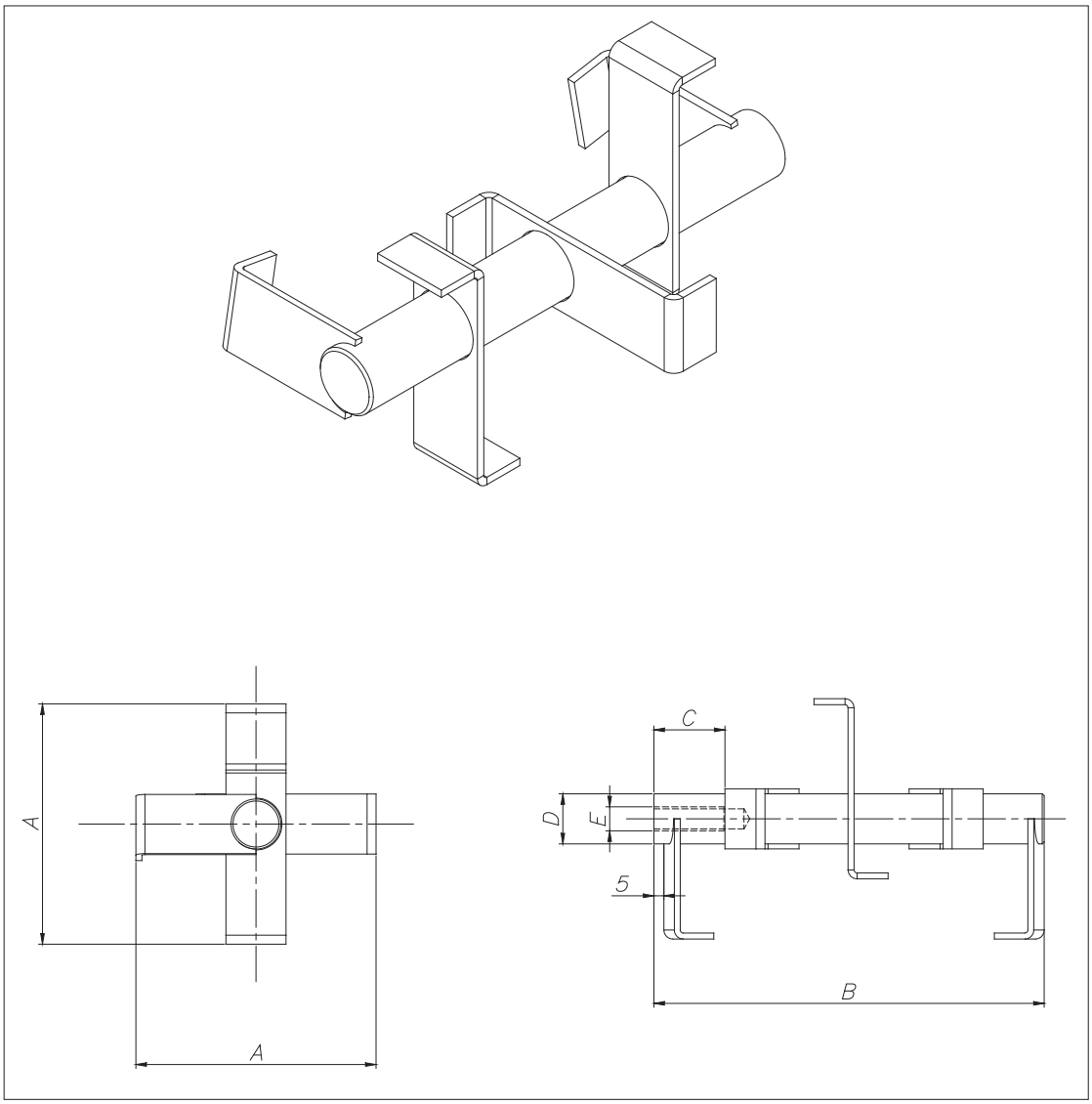
CARACTERISTIQUES TECHNIQUES

- Force centrifuge réglable
- Protection IP 65
- Classe d’isolation F
- Service continu

CARATTERISTICHE TECNICHE

- Forza centrifuga regolabile
- Protezione IP 65
- Classe d’isolamento F
- Servizio continuo

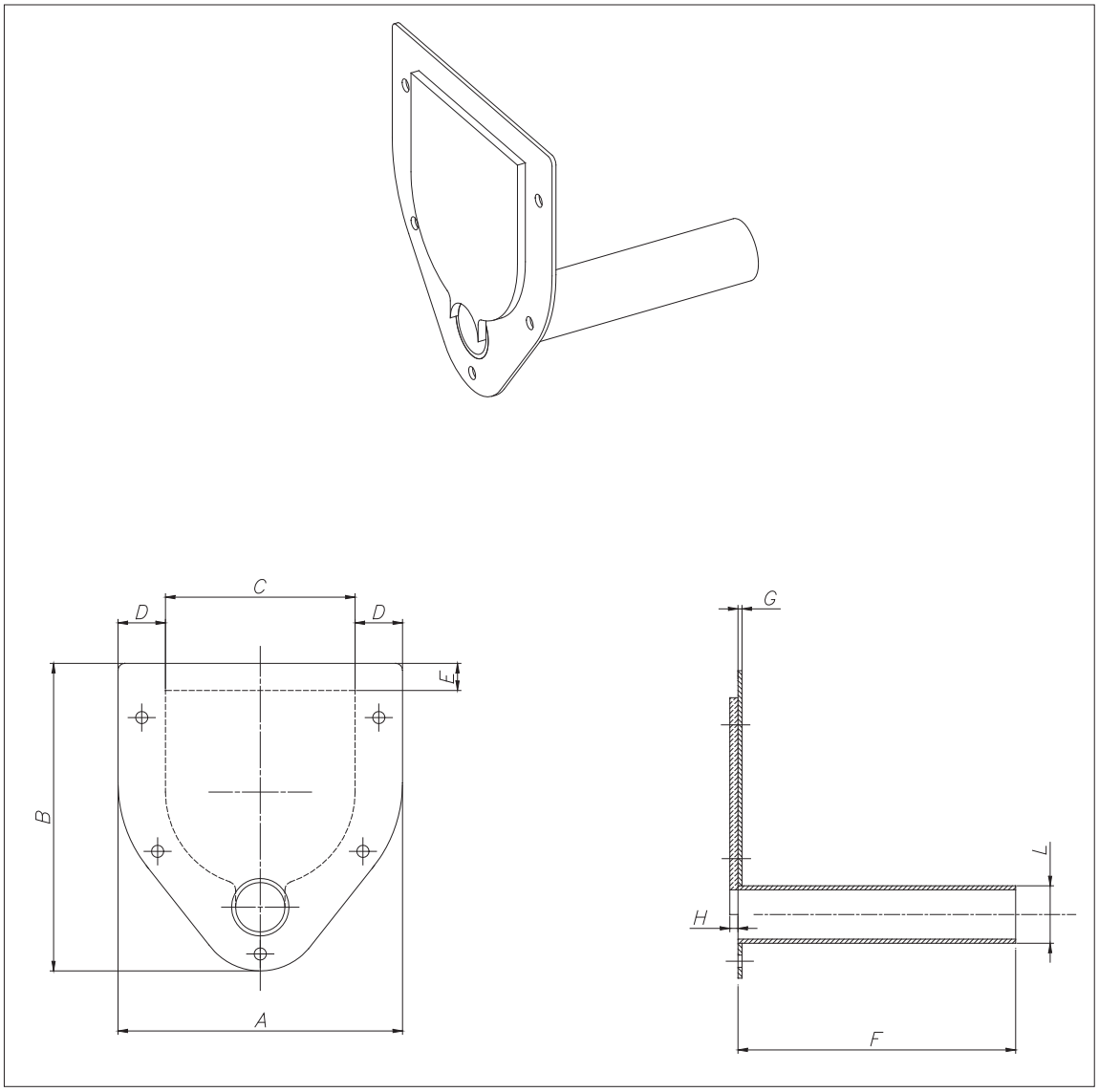
SPECIAL BLENDING TOOLS - *SPEZIAL-HOMOGENISIERWERKZEUGE*
OUTILS DE HOMOGENEISATION SPECIAUX - *UTENSILI OMOGENEIZZAZIONE SPECIALI*



TYPE1

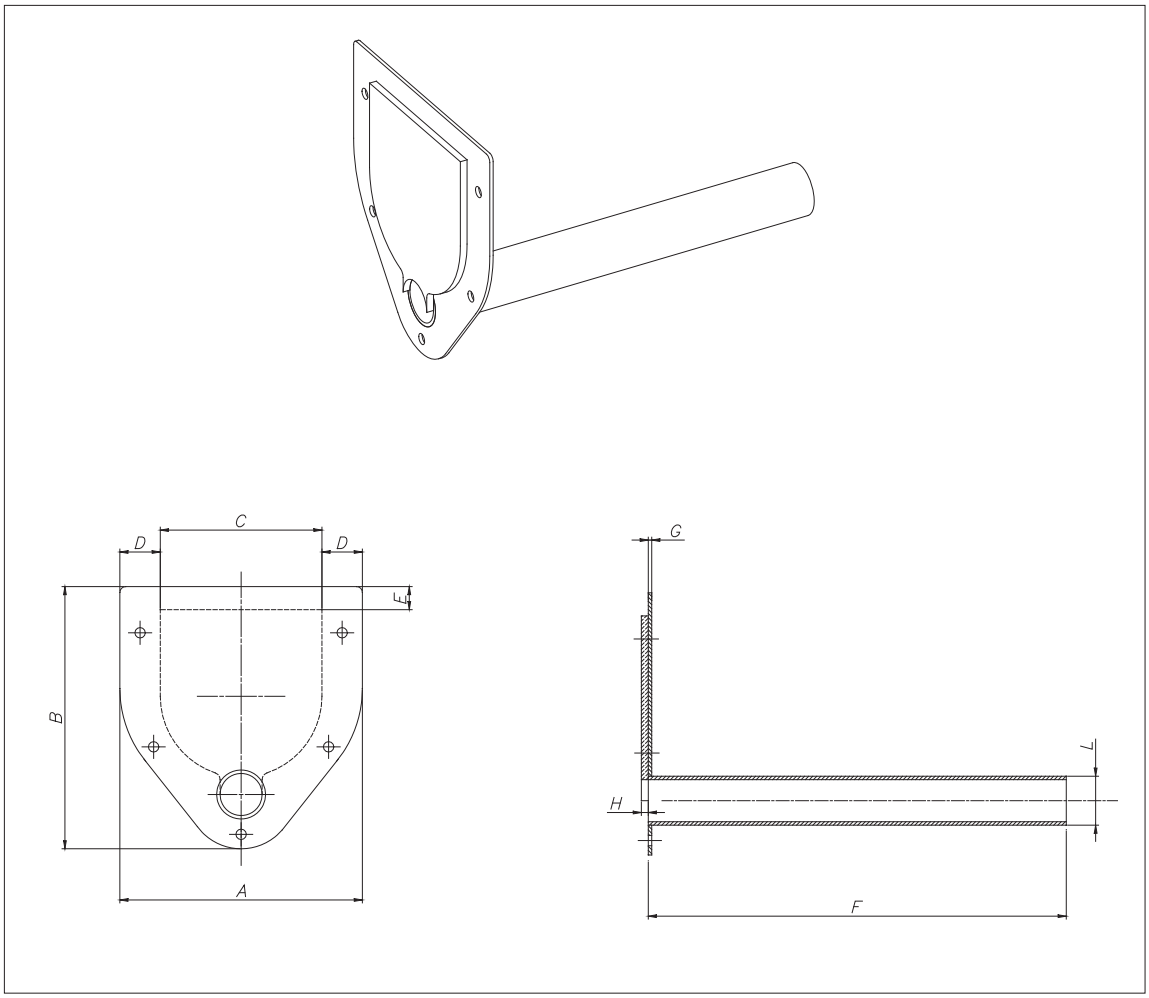
MBF	Code	A	B	D	E	kg
042	**UTO 12**	130	199	25	M 12	1
073	**UTO 13**	260	349	35	M 16	3.5
114	**UTO 13**	260	349	35	M 16	3.5

STD INSPECTION HATCH FOR AISI 304L MBF TYPE - *STD INSPEKTIONSTÜR FÜR MBF IN EDELSTAHL 1.4301*
TRAPPE DE VISITE STD POUR MBF DANS AISI 304L - *PORTELLO DI ISPEZIONE STD PER MBF IN AISI 304L*



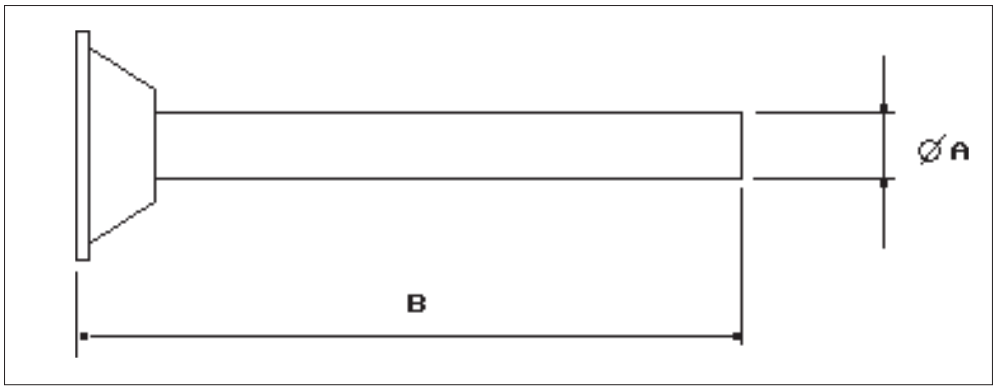
MBF	Code	A	B	C	D	E	F	G	H	Ø L	kg
042	**MBPI 2**	210	227	140	35	20	205	3	6	42	1.4
073	**MBPI 3**	345	395	275	35	20	255	3	6	76	5.6
114	**MBPI 4**	350	431	275	37	20	255	3	6	114	6.3

INSPECTION HATCH FOR AISI 304L MBF TYPE WITH EXTENDED TUBE
INSPEKTIONSTÜR FÜR MBF IN EDELSTAHL 1.4301 MIT* LÄNGLICH*ROHR
TRAPPE DE VISITE POUR MBF DANS AISI 304L AVEC TUBE PROLONGE
PORTELLO DI ISPEZIONE PER MBF IN AISI 304L CON TUBO PROLUNGATO



MBF	Code	A	B	C	D	E	F	G	H	Ø L	kg
042	**MBPIP 2**	210	227	140	35	20	362	3	6	42	1.8
073	**MBPIP 3**	345	395	275	35	20	505	3	6	76	6.8
114	**MBPIP 4**	350	431	275	37	20	505	3	6	114	7.4

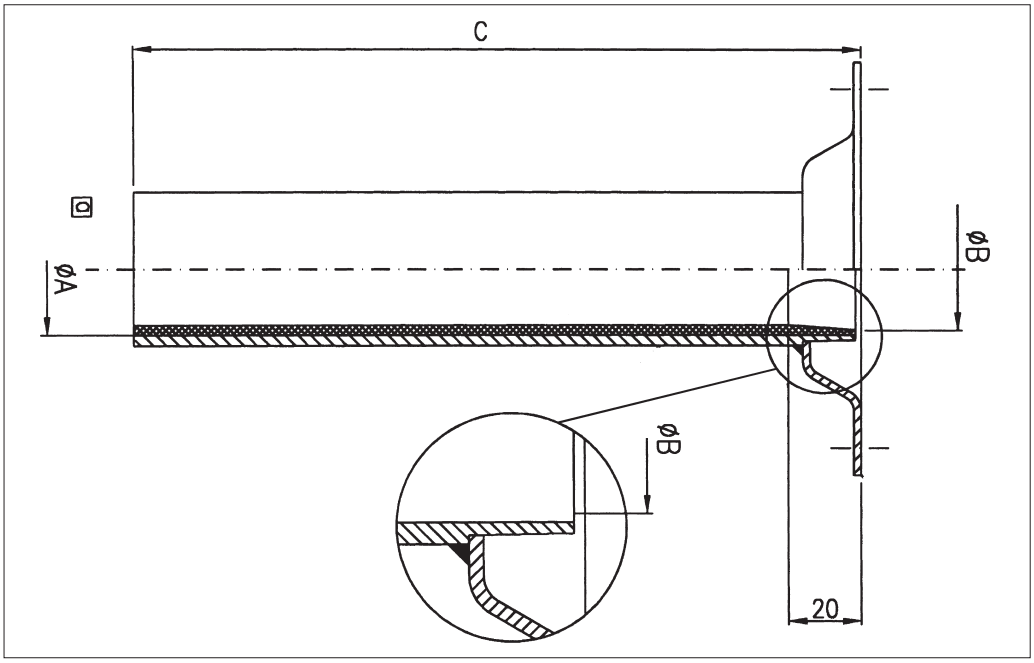
FEEDER PIPE - *DOSIERROHR* - TUBE DE DOSAGE - *SCARICO*



STANDARD FEEDER PIPE - *STANDARD DOSIERROHR* - TUBE DE DOSAGE STANDARD - *SCARICO STANDARD*				
Code	**Suitable for - *Passend zu* Pour type - *Idoneo per* MBF**	**Ø A**	**B**	**kg**
MBT 2	042	42	200	1.0
MBT 3	073	76	250	2.4
MBT 4	114	114	250	4.0

EXTENDED FEEDER PIPE - *VERLÄNGERTES DOSIERROHR* - SORTIE RALLONGEE - *SCARICO PROLUNGATO*				
Code	**Suitable for - *Passend zu* Pour type - *Idoneo per* MBF**	**Ø A**	**B**	**kg**
MBTP 2	042	42	370	1.2
MBTP 3	073	76	500	2.7
MBTP 4	114	114	500	4.4

LINERFEEDER PIPE - *DOSIERROHR MIT INNENAUSKLEIDUNG*
TUBE DE DOSAGE AVEC REVETEMENT INTERIEUR - *SCARICO INTERNAMENTE RIVESTITO*



4 SINT®ER
5 SINT®AL

STANDARD LINED FEEDER PIPE - *STANDARD DOSIERROHR MIT INNENAUSKLEIDUNG* TUBE DE DOSAGE AVEC REVETEMENT INTERIEUR - *SCARICO STD INTERNAMENTE RIVESTITO*					
Code	**Suitable for - *Passend zu* Pour type - *Idoneo per* MBF**	**Ø A**	**Ø B**	**C**	**kg**
MBTR 2 .	042	31	34	200	1.2
MBTR 3 .	073	61	63	250	2.7
MBTR 4 .	114	101	104	250	4.4

4 SINT®ER
5 SINT®AL

EXTENDED LINED FEEDER PIPE - *VERLÄNGERTES DOSIERROHR MIT INNENAUSKLEIDUNG* TUBE DE DOSAGE RALLONGE AVEC REVETEMENT INTERIEUR - *SCARICO PROLUNGATO INTERNAMENTE RIVESTITO*					
Code	**Suitable for - *Passend zu* Pour type - *Idoneo per* MBF**	**Ø A**	**Ø B**	**C**	**kg**
MBTRP 2 .	042	31	34	370	1.6
MBTRP 3 .	073	61	63	500	3.2
MBTRP 4 .	114	101	104	500	5.2

VERTICAL SPOUT - *ABLAUFROHR* - SORTIE VERTICALE - *SCARICO VERTICALE*

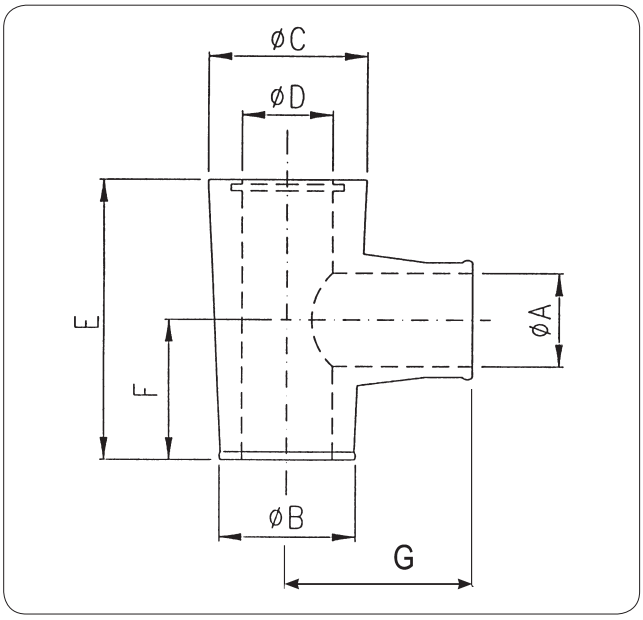
M	D	X	S	V	2	4

4: SINT®ER
5: SINT®AL

2 = MBF 042
3 = MBF 073
4 = MBF 114

Vertical spout
Ablaufrohr
Sortie verticale
Scarico verticale

Micro-batch fedeer accessories
Zubehör Mikrodosierer
Accessoires microdoseur
Accessori microdosatore



MDXSV	Suitable for - *Passend zu* Pour type - *Idoneo* MBF	Ø A	Ø B	Ø C	Ø D	E	F	G	kg
2.	042	42	60	70	50	126	63	81	0.27
3.	073	75	121	130	100	187.5	95	143.5	1.3
4.	114	114	175	190	150	230	115	191	3

4	SINT®ER
5	SINT®AL

VERTICAL SPOUT WITH PNEUMATIC CLOSURE - *ABLAUFROHR MIT PNEUMATISCHEM VERSCHLUSS*
SORTIE VERTICALE AVEC FERMETEURE PNEUMATIQUE - *SCARICO VERTICALE CON CHIUSURA PNEUMATICA*

M	D	X	S	C	2	4

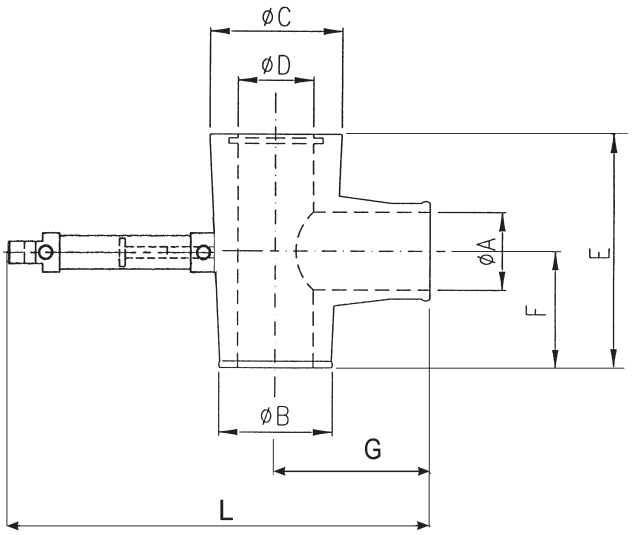
4: SINT®ER
5: SINT®AL

2 = MBF 042
3 = MBF 073
4 = MBF 114

vertical spout with pneumatic cover
Ablaufrohr mit pneumatischem verschluss
Sortie verticale avec fermeteure pneumatique
Scarico verticale con chiusura pneumatica

Micro-batch fedeer accessories
Zubehör Mikrodosierer
Accessoires microdoseur
Accessori microdosatore

N.B.: Operation P_{max} 4 bar !
N.B.: Betrieb P_{max} 4 bar !
N.B.: P_{max} de travail 4 bar !
N.B.: P_{max} di lavoro 4 bar !



MDXSC	Suitable for - *Passend zu* Pour type - *Idoneo* MBF	Ø A	Ø B	Ø C	Ø D	E	F	G	L	kg
2.	042	42	60	70	50	126	63	81	214.5	0.5
3.	073	75	121	130	100	187.5	95	143.5	353.5	2.8
4.	114	114	175	190	150	230	115	191	472	4.5

4 SINT®ER
5 SINT®AL

Note: Microcylinder ISO 6432 - Anm.: Mikrozylinder ISO 6432
Remarque: Micro-cylindre ISO 6432 - *Nota: Microcilindro ISO 6432*

MAGENTIC SENSOR KIT FOR MICRO-CYLINDER - *MAGNETISCHES SENSORKIT FÜR MIKROZYLINDER*
KIT SENSEUR MEGNETIQUE POUR MICRO-CYLINDRE - *KIT SENSORE MAGNETICO RILEVAMENTO PER MICROCILINDRO*

KXM	Suitable for - *Passend zu* Pour type - *Idoneo* MBF
16	MDXSC2
20	MDXSC3
25	MDXSC4

AUTOMATIC LUBRICATOR | **AUTOMATISCHE SCHMIERVORRICHTUNG** | **GRAISSEUR AUTOMATIQUE** | **LUBRIFICATORE AUTOMATICO**

CARTRIDGE GREASE NIPPLE LIT - *SCHMIERPATRONENSATZ*
KIT GRAISSEUR CARTOUCHE - *KIT INGRASSATORE CARTUCCIA*

M	D	X	I	125

Capacity - *Kapazität* - Capacité - *Capacità*

Grease nipple - *Schmiernippel* - Graisseur - *Ingrassatore*

Micro-batch feeders accessories - *Mikrodosierer zubehör*
Accessoires microdoseurs - *Accessori microdosatore*

TECHNICAL SPECIFICATIONS	
Capacity	125 ml
Operating period	Adjustable at 1-12 months
Operating temperature	-20°C a + 55°C°
Max. operating pressure	5 bar**
Activation mechanism	Hydrogen gas release battery (H2)
Threading	G 1/4
Recommended storage temperature	+20°C
Storage period	2 years***
Weight	Approx. 190g (including grease)
Appellative	LAGD 125/WA (filled with SKF LGWA 2 grease) LAGD 125/"lubricant"

TECHNISCHE DATEN	
Kapazität	125 ml
Betriebsdauer	Von 1 bis 12 Monate einstellbar
Betriebstemperatur	-20°C bis + 55°C°
Max. Betriebsdruck	5 bar**
Einschaltmechanismus	Wasserstoff freisetzende Batterie (H2)
Gewinde	G 1/4
Empfohlene Lagerhaltungstemperatur	+20°C
Lagerzeit	2 Jahre ***
Gewicht	circa 190 g (Fett inbegriffen)
Bezeichnung	LAGD 125/WA (mit Fett SKF LGWA 2 gefüllt) LAGD 125/"Schmierstoff"

CARACTÉRISTIQUES TECHNIQUES	
Capacité	125 ml
Période de fonctionnement	Réglable de 1 à 12 mois
Température de fonctionnement	-20°C a + 55°C°
Pression max. de fonctionnement	5 bar**
Mécanisme d'activation	Batterie à dégagement de gaz hydrogène (H2)
Filetage	G 1/4
Température conseillée pour le stockage	+20°C
Période de stockage	2 ans***
Poids	Env. 190jj (graisse incluse)
Désignation	LAGD 125/WA (avec le plein de graisse SKF LGWA 2 grease) LAGD 125/"lubrifiant"

DATI TECNICI	
Capacità	125 ml
Periodo di funzionamento	Regolabile da 1 a 12 mesi
Temperatura di funzionamento	-20°C a + 55°C°
Pressione max. di funzionamento	5 bar**
Meccanismo di attivazione	Batteria a sviluppo di gas idrogeno (H_2)
Filettatura	G 1/4
Temperatura consigliata per lo stoccaggio	+20°C
Periodo di stoccaggio	2 anni***
Peso	Circa 190g (grasso incluso)
Appellativo	LAGD 125/WA (riempito con grasso SKF LGWA 2) LAGD 125/"lubrificante"

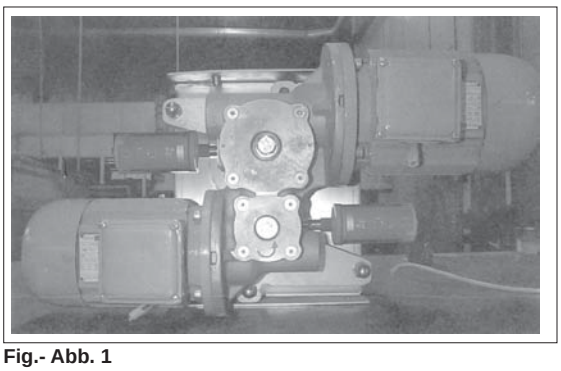
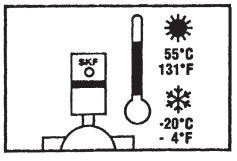
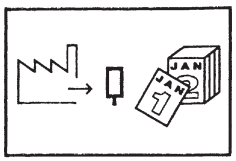


Fig.- Abb. 1
SKF assembly on Batch feeder - *Montage SKF auf Dosierer*
Montage SKF sur doseur - *Montaggio SKF su dosatore*



Operatin temperature - *Betriebstemperatur*
Température de fonctionnement
Temperatura di funzionamento



Production date - *Produktionsdatum*
Date de production - *Data di produzione*

MATERIAL TO DOSE
PHYSICAL AND CHEMICAL CHARACTERISTICS

- ☐☐ ☐☐ DENSITY
- ☐☐☐☐ GRANULOMETRY
- ☐ FLUIDITY
- ☐ ABRASIVITY
- ☐ BUILDS UP AND HARDENS
- ☐ STATIC ELECTRICITY GENERATOR
- ☐ DECOMPOSITION - DAMAGING
- ☐ FLAMMABILITY
- ☐ PLASTICITY - TENDENCY TO SOFTEN
- ☐ DUSTINESS
- ☐ AIRATED - FLUIDITY
- ☐ EXPLOSIVITY
- ☐ VISCOSITY - ADHESIVENENESS
- ☐ CONTAMINABILITY
- ☐ DEGRADABILITY
- ☐ PRESENCE OF TOXIC GAS
- ☐ HIGH CORROSIVITY
- ☐ MEDIUM CORROSIVITY
- ☐ HYGROSCOPICITY
- ☐ FORMATION OF GRANULES
- ☐ INTERLOCKS, AGGLOMERATES
- ☐ PRESENCE OF OILS AND GREASE
- ☐ TENDENCY TO COMPACT UNDER PRESSURE
- ☐ LIGHT AND SOFT
- ☐ HIGH TEMPERATURE

REQUEST CAPACITY (dm^3/h) ☐☐☐☐ (kg/h) ☐☐☐☐

TOLERANCE ☐ ☐

LOADING AND HOPPER CAPACITY

MBW MODEL

FEED SCREW AND AGITATOR ☐ ☐ R ☐

ACCESSORIES

MOTORS V Hz

NOTES

DOSIERMEDIUM
PHYSIKALISCHE UND CHEMISCHE EIGENSCHAFTEN

- ☐☐ ☐☐ SCHÜTTGEWICHT
- ☐☐☐☐ KÖRNUNG
- ☐ FLIESSFÄHIGKEIT
- ☐ ABRASIVITÄT
- ☐ HÄRTET LEICHT AUS
- ☐ LÄDT SICH STATICH AUF
- ☐ VERROTTET LEICHT
- ☐ LEICHT ENTZÜNDBAR
- ☐ PLASTIFIZIERT
- ☐ HOHE STAUBENTWICKLUNG
- ☐ HOHER LUFTANTEIL
- ☐ EXPLOSIV
- ☐ VISKOS, STARK HAFTEND
- ☐ LEICHT ZU VERUNREINIGEN
- ☐ ZERFALLT LEICHT
- ☐ ENTWICKELT GIFTIGE GASE ODER RAUCH
- ☐ SEHR KORROSIV
- ☐ HYGROSKOPISCH
- ☐ NEIGT ZUR KORN-ODER KLUMPENBILDUNG
- ☐ ÖL-ODER FETTHALTIG
- ☐ NEIGT ZUM ANBACKEN
- ☐ SEHR LEICHT
- ☐ HOHE TEMPERATUR

GEFORDERTE DURCHSATZLEISTUNG (dm^3/h) ☐☐☐☐ (kg/h) ☐☐☐☐

TOLERANZ %____*☐ ☐

ART DER BESCHICKUNG:
TRICHTERKAPAZITÄT:
BETRIEBSDAUER :(h/Tag)
EINSCHALTUNGEN PRO STUNDE:
WOHIN WIRD DOSIERT ?
WENN VARIABLE DURCHSATZLEISTUNG GEFORDERT, WARUM ?
DOSIERER TYPE:

DOSIER-/HOMOGENISIERWERKZEUG ☐ ☐ R ☐
ZUBEHÖR:

ELEKTROMOTOR (E) V Hz

BEMERKUNGEN :

MATERIAU A DOSER
CARACTERISTIQUES PHYSICO - CHIMIQUES

- ☐☐ ☐☐ POIDS SPECIFIQUE
- ☐☐☐☐ GRANULOMETRIE
- ☐ CORROSION
- ☐ ABRASIVITE
- ☐ DELATATION ET DURCISEMENT
- ☐ ENGENDRE DE L' ELECTRICITE STATIQUE
- ☐ DECOMPOSITION - DETERIOSATION
- ☐ IMFLAMABLE
- ☐ PLASTIQUE
- ☐ SOUPLE
- ☐ AERE - FLUIDE
- ☐ EXPLOSIF
- ☐ VISCOSITE
- ☐ CONTAMINABLE
- ☐ DEGRADABLE
- ☐ CREATION DE GAZ TOXIDE ET DE FUME NUISIBLE
- ☐ HAUTE CORROSION
- ☐ MOYEN CORROSION
- ☐ HYGROSCOPIQUE
- ☐ FORMATION DE GRANULE
- ☐ PRESENTE HUILE ET GRAISSE
- ☐ TASSEMENT SOUS PRESSION
- ☐ TRES LEGER
- ☐ TEMPERATURE ELEVEE
- ☐

DEBIT DEMANDE (dm^3/h) ☐☐☐☐ (kg/h) ☐☐☐☐

TOLERANCE ☐ ☐

SYSTEME DE CHARGEMENT ET CAPACITE DE LA TREMIE

MICRODOSEUR TYPE

VIS DOSAGE ET HO-MOGENEISATION ☐ ☐ R ☐

ACCESSOIRES

MOTEURS V Hz

NOTES

MATERIALE DA DOSARE
CARATTERISTICHE FISICO CHIMICHE

- ☐☐ ☐☐ PESO SPECIFICO
- ☐☐☐☐ GRANULOMETRIA
- ☐ SCORREVOLEZZA
- ☐ ABRASIVITA'
- ☐ ACCRESCIMENTO E INDURIMENTO
- ☐ GENERA ELETTRICITA' STATICA
- ☐ DECOMPOSIZIONE - DETERIORAMENTO
- ☐ INFIAMMABILITA'
- ☐ PLASTICITA ' - TENDENZA ALL'AMMORBIDIMENTO
- ☐ POLVEROSITA'
- ☐ AERAZIONE - FLUIDITA'
- ☐ ESPLOSIVITA'
- ☐ VISCOSITA' E ADESIONE
- ☐ CONTABILITA'
- ☐ DEGRADABILITA'
- ☐ CREAZIONE DI GAS TOSSICO DI FUMO NOCIVO
- ☐ ALTA CORROSIVITA'
- ☐ MEDIA CORROSIVITA'
- ☐ IGROSCOPICITA'
- ☐ FORMAZIONE DI GRANULI,INTRECCIAMENTI, E
- ☐ AGGLOMERATI
- ☐ PRESENZA DI OLII E GRASSI
- ☐ IMPACCAMENTO SOTTO PRESSIONE
- ☐ MOLTO LEGGERO E SOFFICE
- ☐ TEMPERATURA ELEVATA

PORTATA RICHIESTA(dm^3/h) ☐☐☐☐ (kg/h) ☐☐☐☐

TOLLERANZA ☐ ☐

SISTEMA DI CARICO E CAPACITA' TRAMOGGIA

MICRODOSATORE TIPO

UTENSILE DOSAGGIO E OMOG. ☐ ☐ R ☐

ACCESSORI

MOTORI V Hz

NOTE

WAM®

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CS-910-405 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
WAM	CMSPGU320683	FSM9-621-V001		SLIDE GATE VALVE	SLIDE GATE VALVE // Manuf : WAM // Model : VLC0250P3/CMG0250 stainless 304, inlet section made of Polyurethane Incl. Hand wheel	10” slide gate with round inlet, frame and knife blade made of SS 304	Inlet section made of Polyurethane Incl. Hand wheel	HYDRAPOL 3500		

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