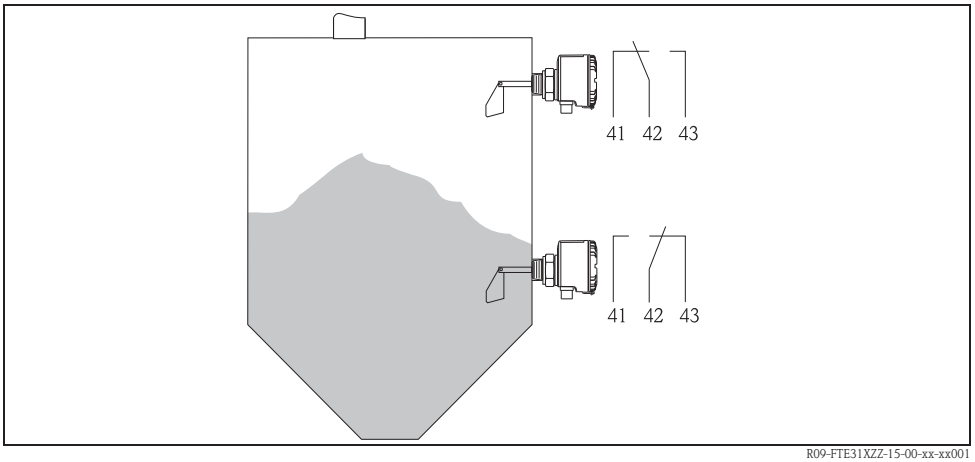
# Function and system construction

**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**

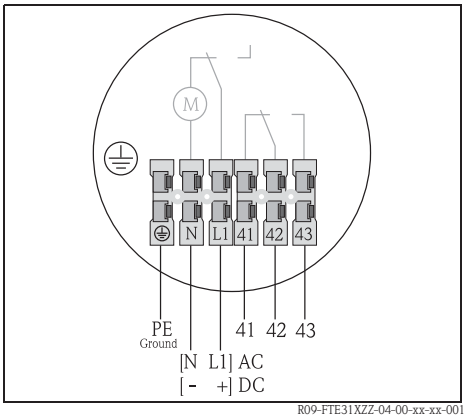
Approx. 2 seconds

**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

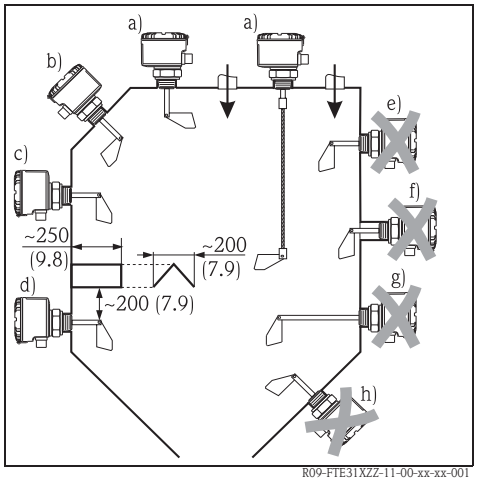
**Current requirement**

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

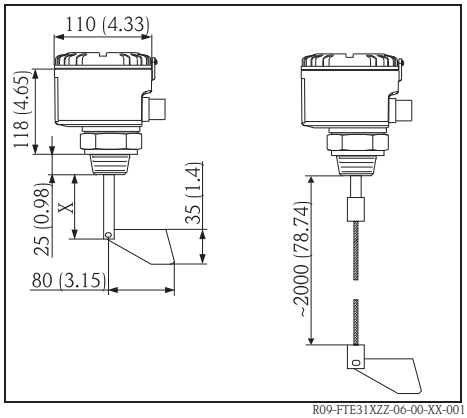
| | |
|---|---|
| **Ambient temperature** | - 20 °C ... + 60 °C (-4 °F ... + 140 °F) |
| **Storage temperature** | - 20 °C ... + 60 °C (-4 °F ... + 140 °F) |
| **Ingress protection** | ■ IP 65 / NEMA 4x / Type 4x with closed cover<br>■ IP 20 / NEMA 1 with open cover |
| **Vibration protection** | IEC 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).*

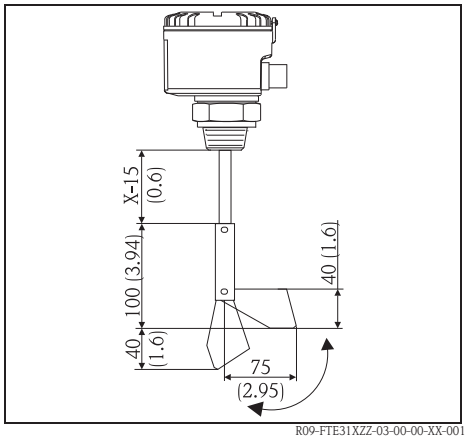
**Shaft variations:**

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:<br>– VALOX 553 plastic with 30% fibre glass.<br>Shaft:<br>– Corrosion resistant steel 1.4435<br>Paddle:<br>– Corrosion reseitant steel 1.4435<br>Option:<br>– Process connection - corrosion resistant steel 1.4435<br>– Rope extension- corrosion resistant1.4571 with corrosion resistant steel 1.4305 weight<br>– Hinged paddle - corrosion resistant steel 1.4435<br>O-ring seal:<br>– NBR<br>Shaft sealing ring:<br>– NBR Perbunan<br>Cable entries NPT ½":<br>– 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.<br>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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Fax +41 61 715 25 00
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info@ii.endress.com

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 | EJGUEJ200371 | IJ9-591 | N/A | EDUCTOR | MANUFACTURER: SHUTTE&KOERTING / MODEL: 1,5"- Fig264 PVC Eductor | N/A | N/A | KMnO4 PREP SYSTEM | | |

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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.

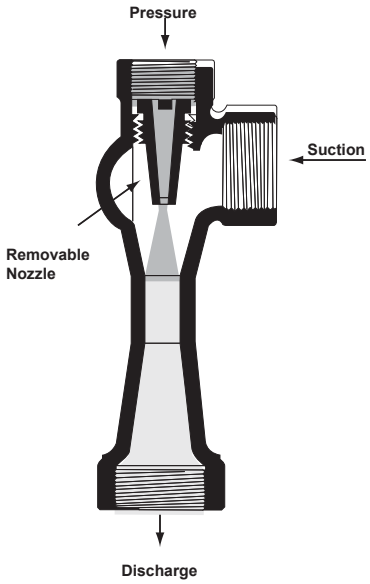



**Fig 1. FIG. 264 EDUCTOR**
Eductors of this type have streamlined bodies with threaded pipe connections. They are made in sizes ranging from 1/2" to 3" and are stocked in these sizes in ductile iron and bronze and Fig. 316 stainless steel. They are stocked in sizes from 1/2", 2", and 3" in PVC. Other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

**Fig. 2. FIG. 264 EDUCTOR**

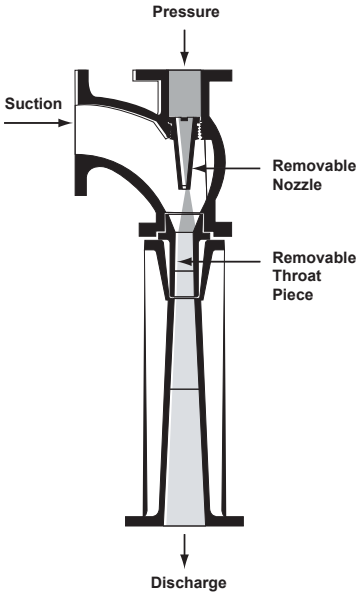



**Fig. 3. FIG. 266 EDUCTOR.**
These eductors are similar to Fig. 264 Eductors except that they have flanged connections and removable throat bushings along with removable nozzles. They are supplied in cast iron, bronze-mounted in 4" and 6" sizes. Other materials can be supplied on special order.

### 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 |

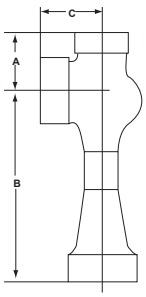



**Fig. 264**

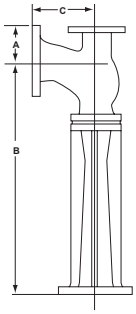



**Fig. 266**


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.

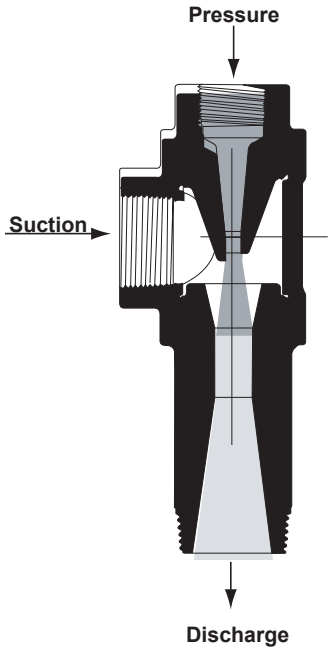



**Fig. 4. FIG. 264 PVC EDUCTOR.** Sizes from 1 1/2" up are designed as shown here and in Fig. 5. On these sizes, the pressure and suction connections are female and the discharge connection is male. All connections are threaded.

**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.

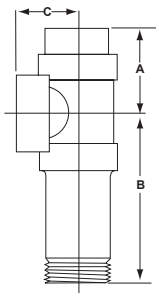



**Fig. 6. FIG. 264 KYNAR EDUCTOR.** 1/2" to 1" Design. Sizes 1/2", 3/4", and 1" look like this. All connections are female and are threaded.

## Fig. 2645 Automatic Eductor

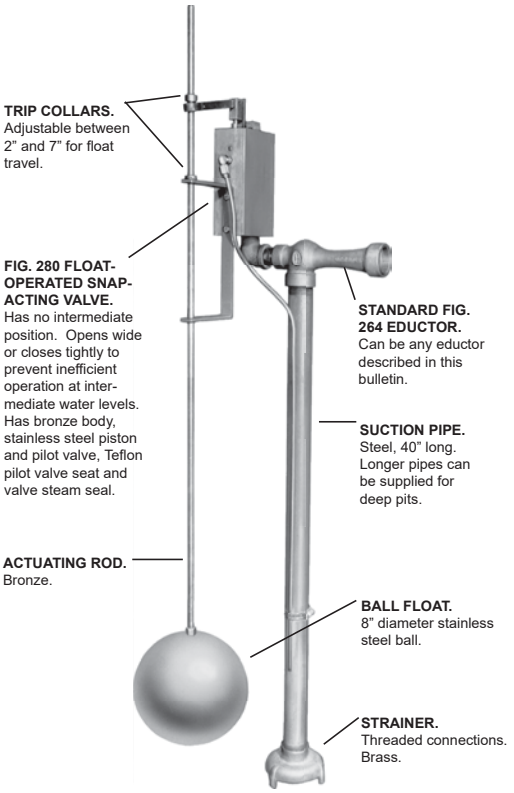
Fig. 2645 Automatic Water Jet Eductors are used to pump out sumps (pits, tanks, etc.) where liquid accumulates slowly but must be evacuated when it reaches a predetermined level.

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.



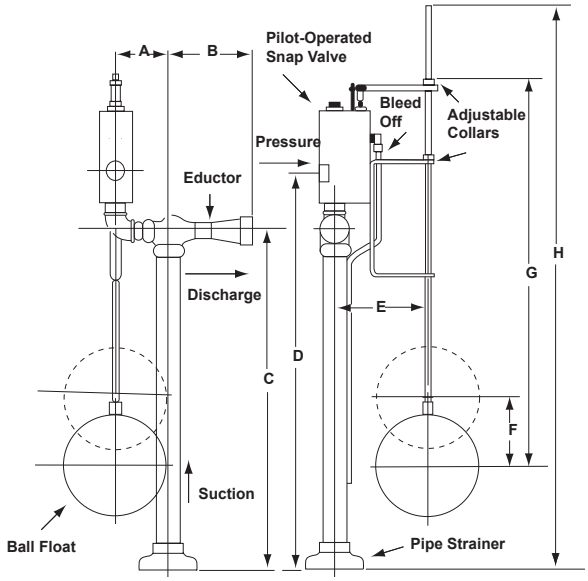




**Table 3. Sizes and Dimensions, Fig. 2645 Automatic Eductor**

| 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.

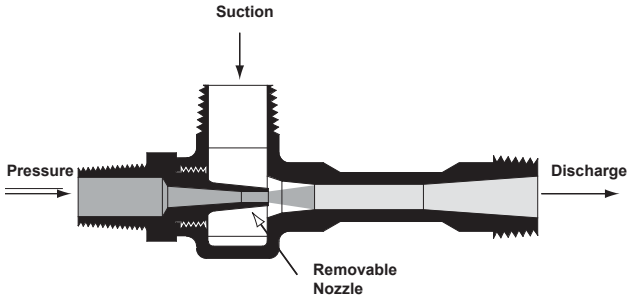



**Fig 8. FIG. 265 LIQUID JET EDUCTOR**
Eductors of this type have streamlined investment cast bodies with threaded NPT male pipe connections. They are made in sizes ranging from 3/4" to 3" and are stocked in these sizes in Fig. 316 stainless steel. Other materials are available on order.

**Fig. 9. FIG. 265 EDUCTOR.**

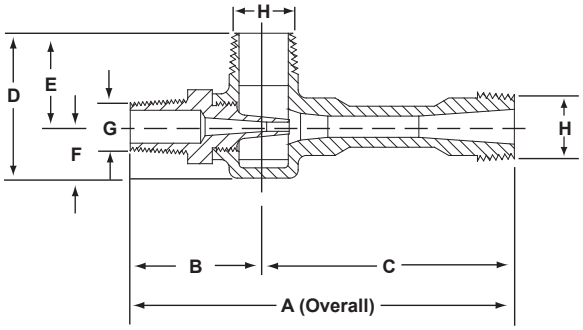



**Table 265. Sizes and Dimensions, Fig. 265 Liquid Jet Eductor**

| 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.

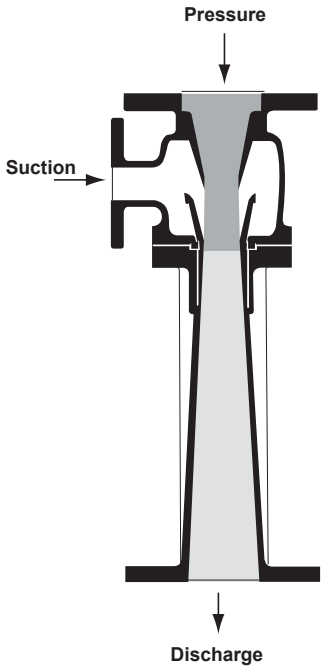
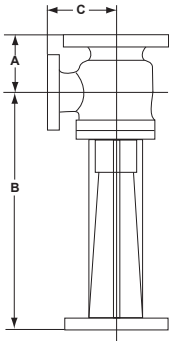



**Fig. 11. FIG. 242 EDUCTOR.**
The 242 is the flanged type Condensate and Mixing Eductor. This style, too, is made in bronze or cast iron, bronze mounted, but can be supplied in other materials. Nozzles and throat bushings are removable.

### 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.

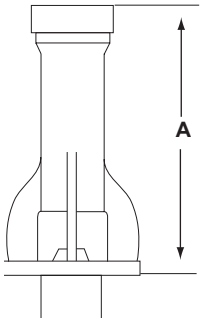
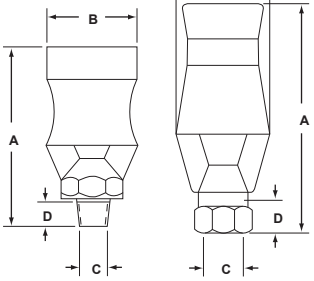



**Table 5. Sizes and Dimensions, Fig. 258 Tank Mixing Eductor**

| 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.**

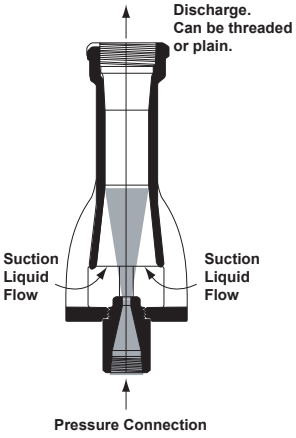



**Fig. 13. FIG. 258 TANK MIXING EDUCTOR.**
Standard units are made in cast iron and bronze but can be made in many other materials on special order. Large sizes can be fabricated instead of cast.

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

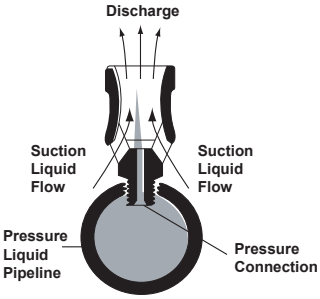



**Fig. 15. FIG. 268 TANK MIXING EDUCTOR.**
This design is used for 3/8" (3 3/4" overall length and 1 3/4" overall width), and 3/4" (5 1/4" overall length and 2 3/8" overall width) pressure connection sizes. It is threaded directly into threads tapped into the 1 1/2" diameter or larger pressure liquid 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.**

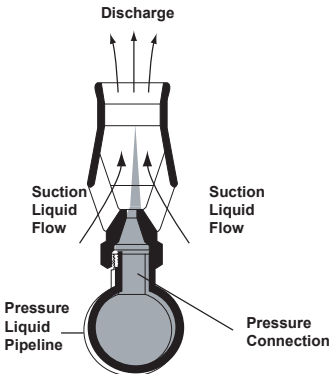



**Fig. 16. FIG. 268 TANK MIXING EDUCTOR.**
This design is used for 1 1/2" (8 7/8" overall length x 4 1/8" overall width), 2" (12 1/4" overall length x 5 7/8" overall width) and 3" (17" overall length x 8 1/8" overall width) pressure connection sizes. All are cast in one piece and have female thread connections 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.

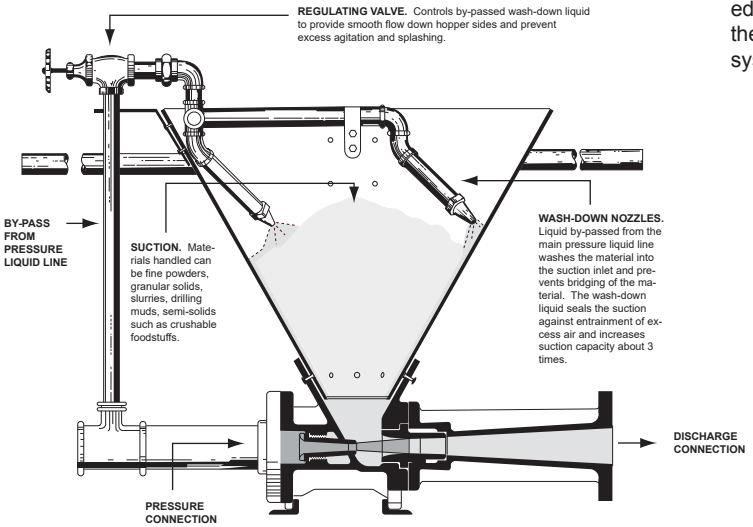



**Fig. 18. FIG. 254 HOPPER-EQUIPPED EDUCTOR.**
Standard units are made in cast iron and have hardened steel nozzles and throat bushings. Special materials are also available on special order. Both nozzles and throat pieces are removable and pressure and discharge connections can be fitted for hose where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

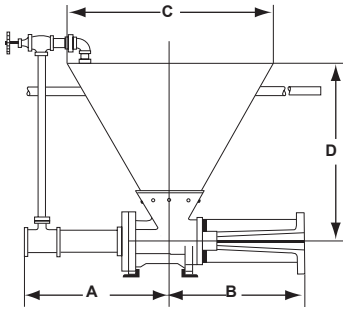



**Fig. 254(1)**

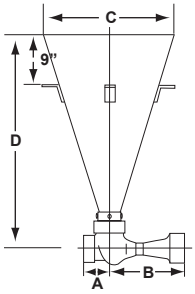



**Fig. 267(2)**

### 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.

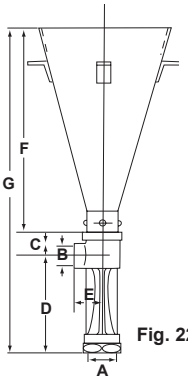



**Fig. 227**

### 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”.

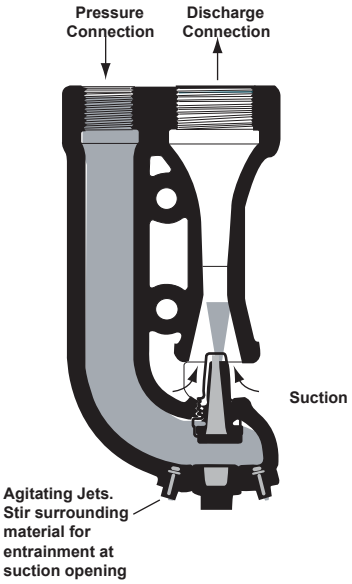


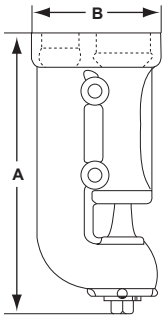

**Fig. 20. FIG. 224 WATER JET SAND AND MUD EDUCTOR.**
Standard units are made of cast iron with bronze pressure nozzles. Other corrosion-resistant materials are available on special order.

**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.

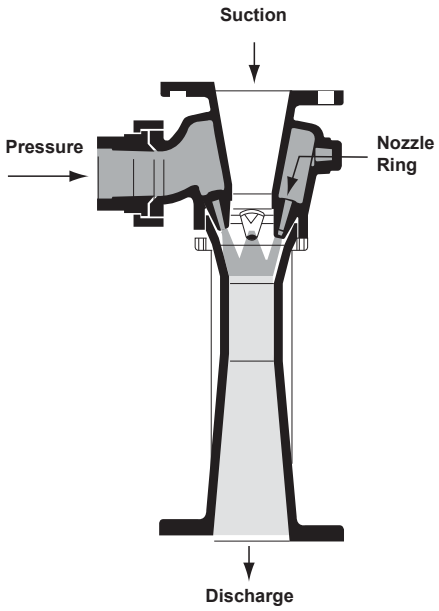



**Fig. 22. FIG. 235 ANNULAR MULTI-NOZZLE WATER JET EDUCTOR.**
These eductors are made to order from any workable material. Sizes from 1 1/2" to 6" are cast with flanged suction, discharge and pressure connections, except 2" size which has sil-brazed pressure connection. Sizes above 6" (to 28" and up)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

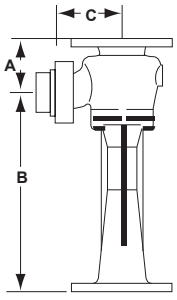



**Fig. 23. FIG. 235 EDUCTOR.**
(2" size with sil-brazed connection).

## 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

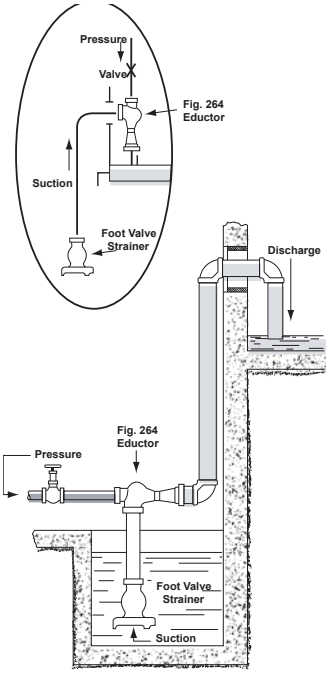



**Fig. 26. FIG. 264 EDUCTOR USED TO EMPTY TANKS.**
Water jet eductors are often used to empty tanks or to pump out sumps, penstocks, cellars, and the like. The pressure line should be fitted with a regulating stop valve and a pressure gauge while the suction line should be provided with an S&K Strainer. 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.

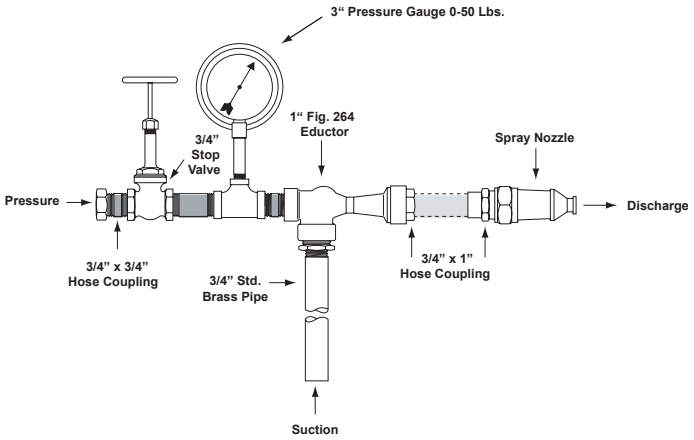



**Fig. 27. FIG. 264 EDUCTOR USED IN MIXING LIQUIDS.**
This illustration shows a typical arrangement used in mixing liquids such as chemicals or fertilizers in proportion for spraying. The solution to be applied is mixed in a container in approximately twice the strength at which it is to be used. The 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.

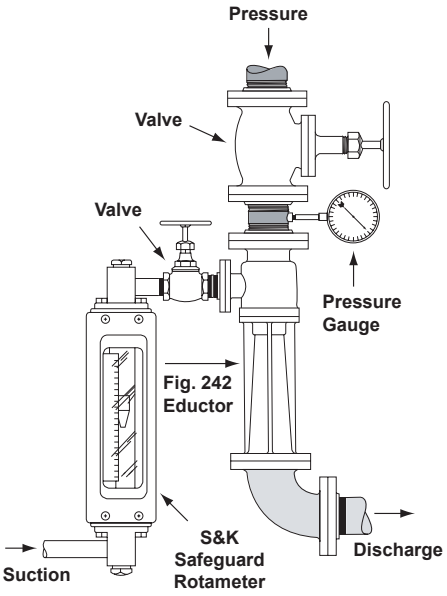



**Fig. 28. FIG. 242 EDUCTOR USED IN TYPICAL PROPORTIONING SYSTEM.**
This shows a typical proportioning system using a Fig. 242 Eductor. Rate of flow is measured by a Rotameter and is controlled by a valve in the line. A valve in the pressure line and orifice of the eductor nozzle control the flow of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

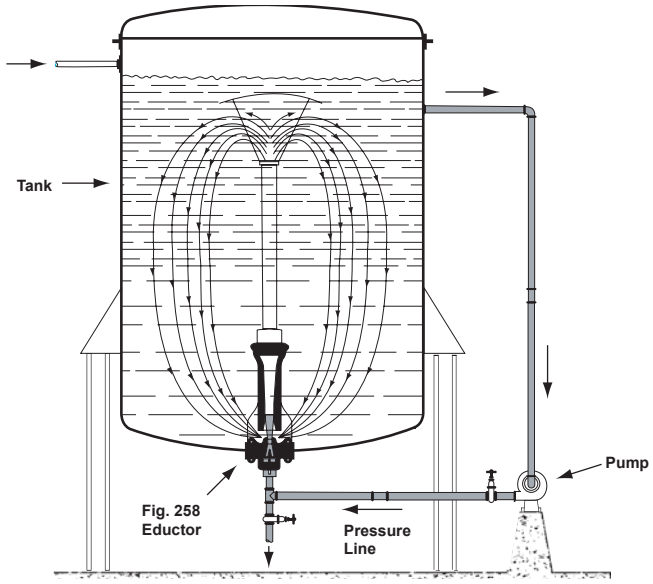



**Fig. 30. FIG. 258 EDUCTOR IN BATCH MIXING APPLICATION.**
This illustrates the batch mixing of two or more liquids with an S&K Fig. 258 Eductor. The pressure liquid, taken from the top of the tank is passed through a pump to the eductor. The jet action of this fluid entrains the liquid at the bottom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

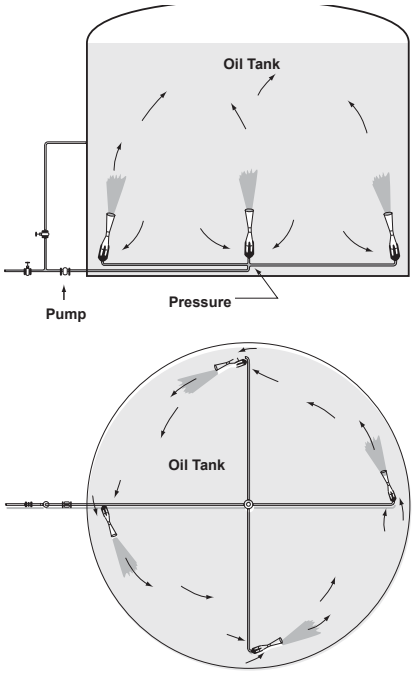



**Fig. 29. FIG. 258 EDUCTORS FOR TANK BLENDING OF OILS.**
For the tank blending of oils, the arrangement shown has proved highly satisfactory. In this particular installation five 8" Fig. 258 Eductors are used in a 100' tank. Initially, the eductors are used to fill the tank during which time they provide 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.

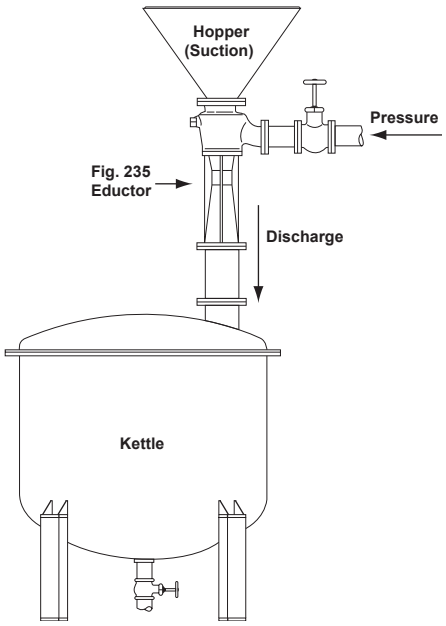



**Fig. 31. FIG. 235 EDUCTOR USED IN MIXING DRY POWDER.**
Mixing dry powder and a liquid prior to discharge into a tank is accomplished through the use of a Fig. 235 Eductor as shown here.
Pressure liquid enters the eductor, entrains the powder, mixes the two in the venturi of the eductor and discharges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

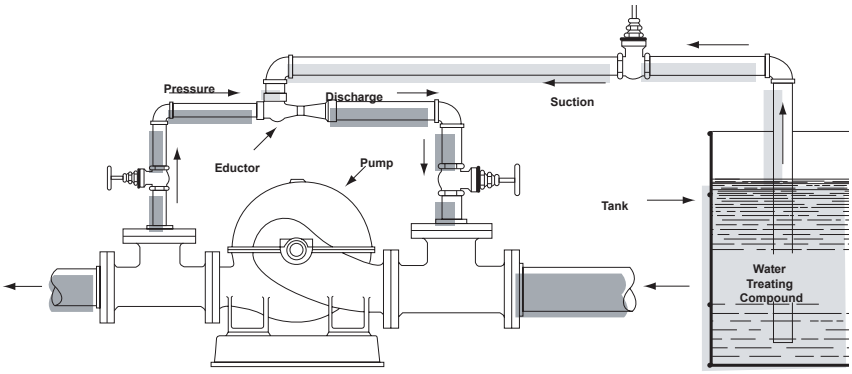



**Fig. 32. FIG. 264 OR FIG. 265 WATER JET EDUCTORS USED TO ENTRAIN ANOTHER LIQUID.**
This illustration shows a Fig. 264 or Fig. 265 Eductor being used to introduce a water treating compound into boiler feed water. A portion of the water issuing from the pump is bypassed into the eductor where it acts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

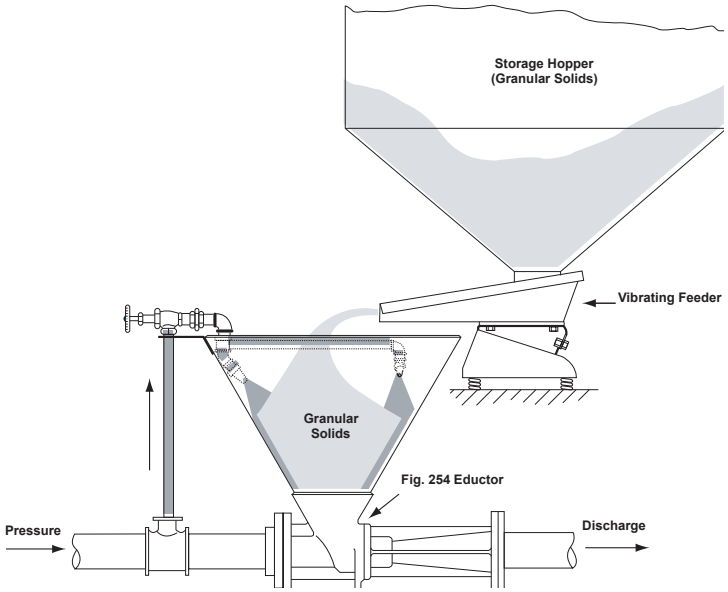



**Fig. 33. APPLICATION OF FIG. 254 SOLIDS/LIQUID HOPPER EDUCTOR.**
One arrangement for handling granular solids with the Fig. 254 Eductor is illustrated here. In this installation, granular solids drop from a storage hopper into a vibrating feeder which feeds the solids into the eductor hopper at a controlled 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.

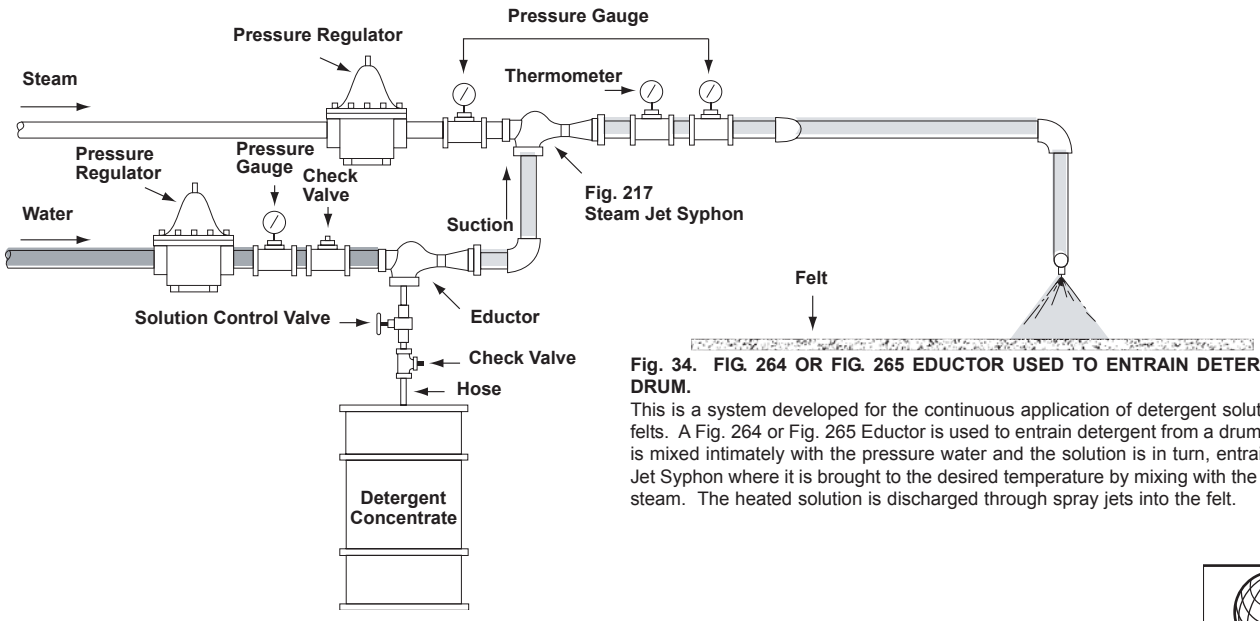



**Fig. 34. FIG. 264 OR FIG. 265 EDUCTOR USED TO ENTRAIN DETERGENT FROM A DRUM.**
This is a system developed for the continuous application of detergent solution to paper mill felts. A Fig. 264 or Fig. 265 Eductor is used to entrain detergent from a drum. This detergent is mixed intimately with the pressure 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-650-600 : 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| KOFLO | FPMIPV202516 | SM9-591 | Dia.= 1-1/2"/ Length=15" | STATIC MIXER | STATIC MIXER / MANUFACTURER : KOFLO / MODEL : / 1.5-40C-4-6-21-1/2" | N/A | N/A | KMnO4 PREP SYSTEM | | |

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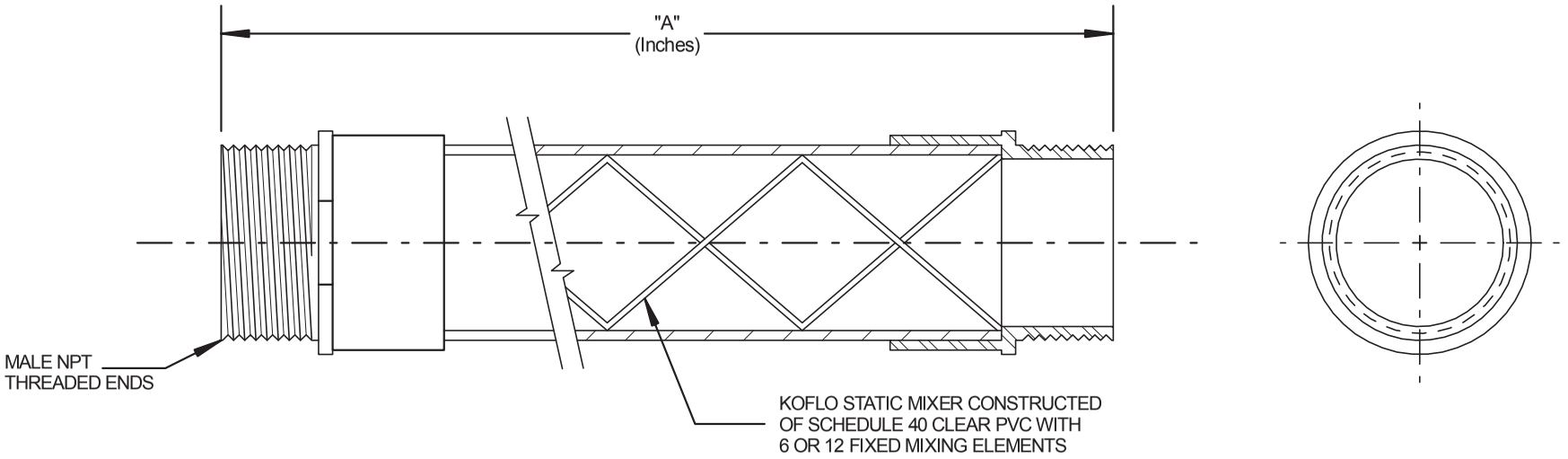


| Size | 6 Element Model Number | "A" 6 Element | 12 Element Model Number | "A" 12 Element |
|---|---|---|---|---|
| 3/8" | 3/8-40C-4-6-2 | 6-1/2 | 3/8-40C-4-12-2 | 11 |
| 1/2" | 1/2-40C-4-6-2 | 7 | 1/2-40C-4-12-2 | 12 |
| 3/4" | 3/4-40C-4-6-2 | 9 | 3/4-40C-4-12-2 | 15 |
| 1" | 1-40C-4-6-2 | 11 | 1-40C-4-12-2 | 18 |
| 1-1/4" | 1.25-40C-4-6-2 | 14 | 1.25-40C-4-12-2 | 25 |
| 1-1/2" | 1.5-40C-4-6-2 | 15 | 1.5-40C-4-12-2 | 28 |
| 2" | 2-40C-4-6-2 | 19 | 2-40C-4-12-2 | 35 |

Koflo Corporation
309 CARY POINT DR.
CARY, IL 60013

| | | |
|---|---|---|
| SCALE: NONE | APPROVED BY JJT | DRAWN BY NJF |
| DATE: 1/18/94 | | REVISED 10/15/01 |
| CUSTOMER: | | REVISED 5/22/08 |
| | | REVISED 6/12/09 |
| MODEL NO: CLEAR PVC SCHEDULE 40 MIXER | | DRAWING NUMBER: KD-993 |

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# CS-910-502 : 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| ENVIREQUIP | CMSPMI319898 | M9-591 | N/A | MATURATION MIXER | HP500 (2016) MIXER // Manuf : Envirequip // Model: EVG01-0.5 // Mtl : 304L SS | Impeller Dia : 13.5" // 181,24 RPM // Shaft lg : 29.25" | Nord Motor 0.5 HP / 575/3/60 | KMnO4 PREP SYSTEM | | |

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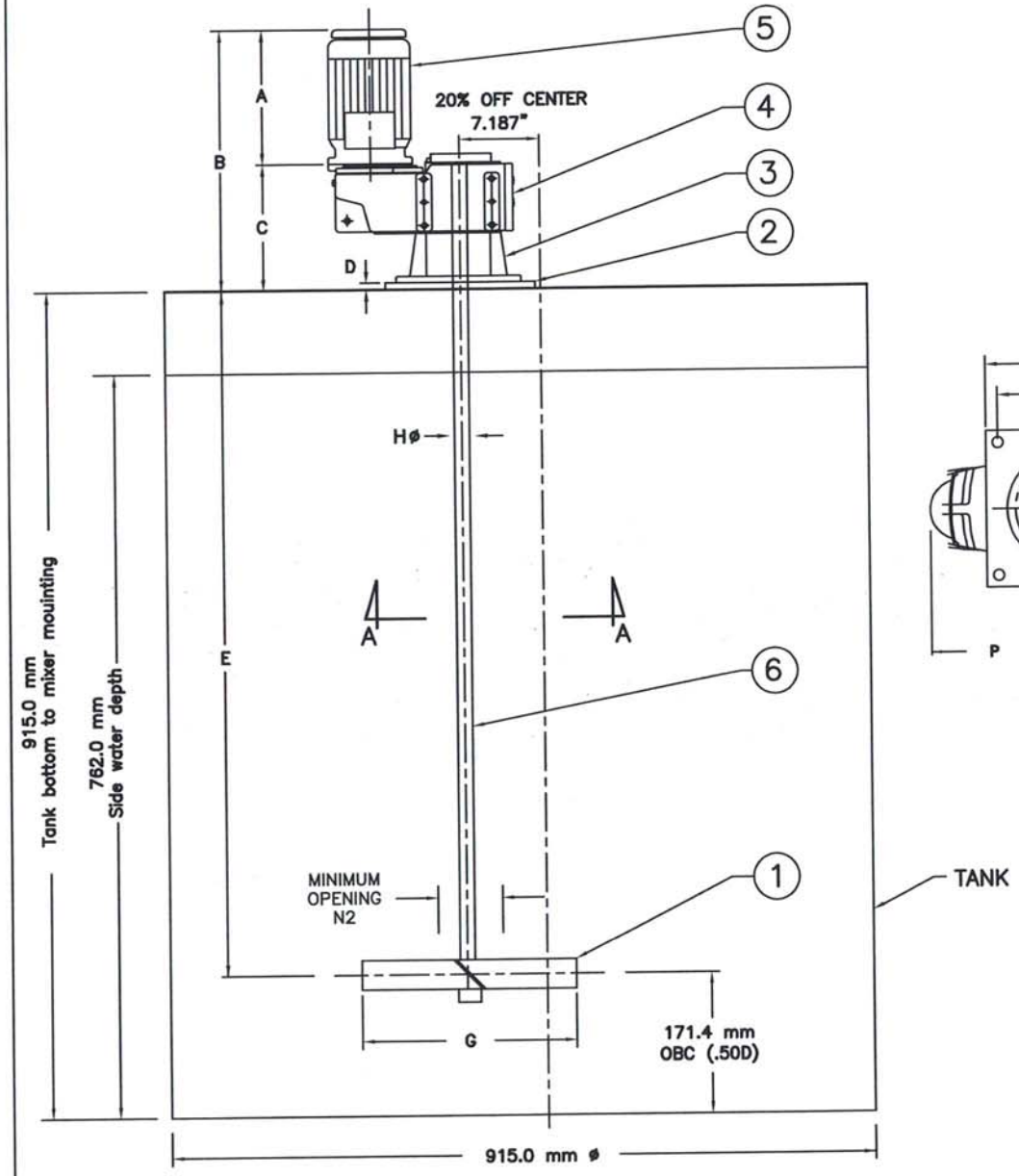


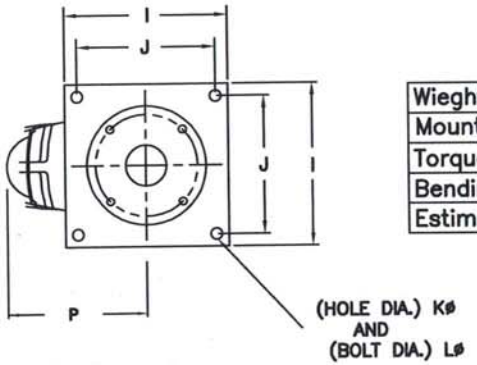


"A–A"

| ITEM | DESCRIPTION | MATERIAL |
|---|---|---|
| 1 | Axial impeller (P–4) 342.9 mm (13.50") ø @ 45.0° | 304L |
| 2 | Base 304.8 mm x 304.8 mm (12.0" X 12.0") | Steel |
| 3 | Pedestal <B5 Flange> | |
| 4 | NORD Reducer 180.24 RPM | |
| 5 | NORD Motor 0.5 Hp, 575/3/60, TEFC | |
| 6 | Shaft: (1) section 742.9 mm (29.25") @ 1.25"ø | 304L |

| |
|---|
| APPL'N: POLYMER (QTY 1) |
| MIX–TECH MIXERS |
| MODEL: EVG01–0.50 |
| 0.37 kW @ 180.24 RPM |
| S/N |
| Rotation: Clockwise |
| Thrust: Down |
| Tag #: |

| |
|---|
| Wieght: 75 Lbs |
| Mounting loads |
| Torque reaction = 435 in lb |
| Bending moment= 490 in lb |
| Estimated beam: 7C @ 9.8 # up to 4 Ft. |

| |
|---|
| ST #: 910–502 |
| LATIS #: CMSPMI319898 |

HP 500

| Dimensions: Inches | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MOD.: | A | B | C | D | E | E2 | F | Gø | Hø SHAFT | I | J | Kø | Lø | M | N2 | P |
| EVG01 | 8.12 | 13.98 | 5.36 | .50 | 29.25 | – | – | 13.50 | 1.25 | 12.0 | 10.5 | .562 | .50 | – | 6.25 | 6.0 |

| Dimensions: mm | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MOD.: | A | B | C | D | E | E2 | F | Gø | Hø SHAFT | I | J | Kø | Lø | M | N2 | P |
| EVG01 | 206.2 | 355.1 | 136.1 | 12.7 | 742.9 | – | – | 342.9 | 31.8 | 304.8 | 266.7 | 14.3 | 12.7 | – | 158.8 | 152.4 |



| NO | DATE | REVISION | P/B |
|---|---|---|---|
| | | | |

PROJET/PROJECT
EVG01–0.5/304/575 (CIRT)

ENVIREQUIP WTEM INC.
460 Bord du Lac – Suite 2
Dorval, QC H9S 3A8
Montreal Tel: (514) 338-1043
RR1 (21494 Little Russia Rd.)
Glen Robertson, Ont K0B 1H0
Ontario Tel: (613) 874-2618
Fax: (613) 874-2828
E-mail: envireqp@glen-net.ca

TITRE/TITLE
"MIX–TECH" Mixers
Veolia Water Technologies
EVG SERIES

| | |
|---|---|
| DESSINÉ PAR: DRAWN BY: PJ | DATE: March 2016 |
| DESS. NO: DWG NO: EVG | ECH./SCALE: N.T.S |
| VÉRIFIÉ PAR: CHECKED BY: PJ | PROJ.NO: |
| APPROUVÉ PAR: APPROVED BY: RJ | REV.: 01 |

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# CS-999-001 : 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 | ST-999-001 | FSM9-591 | | FEEDER SREW | KMNO4 FEEDER // MANUF. : WAM // Model : MBF/073.A/TT/UD4.SST.UO2/F. 0.Q.+.++++.++++ Feeding rate:2,28 Liter/min at 24,8 rpm For material: Potassium Permanganate (KMNO4), approx 1.52 Kg/L | C/w Vertical discharge tube MDXSC34 c/w K539.227.N056 Adapter flange from Varvel c/w K532.227.N056 Adapter flange from Varvel | Baldor 0.75 HP blending tool motor, EX-rated c/w 2 motors E-motor Baldor, 0.75 HP & 0.5 HP, 1750rpm, Nema 056, 575V-60Hz, Inverter | KMnO4 PREP SYSTEM | | |

## REFER TO HAPMAN VACUUM CONVEYER (NEXT SECTION)

# CS-999-010 : 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| HAPMAN | ST-999-010 | VCM9-591 | | CONVEYER MOTOR | HAPMAN 16R Model & rotary valve // Potassium Permanganate // Bulk Density: 94 Lbs/Ft³ // Voltage Service Available: 575V/3Ph/60Hz // Capacity: 25 kg/hr // CW safety interlock switch to shut down system if side access is open | Integral regenerative vacuum blower assembly complete with exhaust silencer and 2.5 HP, 575 volt, 3 phase, 60 Hertz, TEFC motor. // Adjustable material pick-up | Filter/receiver housing complete with flanged outlet to mate with dump gate, and quick release side access door for tool-less filter | KMnO4 PREP SYSTEM | | |

**NOTES:**

(1) PURCHASE ORDER NUMBER: 18000190HD0500

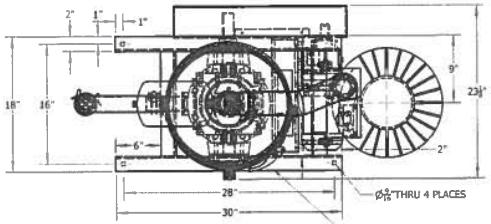
(2) MATERIAL CONVEYED: POTASSIUM PERMANGANATE
COMPOSITION: POWDER
BULK DENSITY: 94 LBS/ CU FT
PARTICLE SIZE: POWDER
CHARACTER: NA
MOISTURE CONTENT: DRY
ABRASIVENESS: MILDLY
FLOWABILITY: FREE FLOWING
CAPACITY RATE: 25KGS/HR
TEMPERATURE: AMBIENT

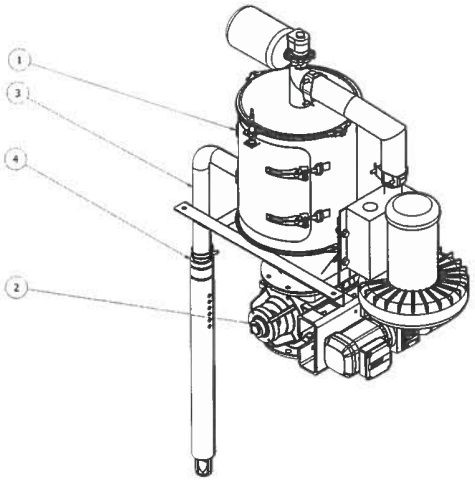
(3) MATERIAL CONTACT SURFACES: STAINLESS STEEL

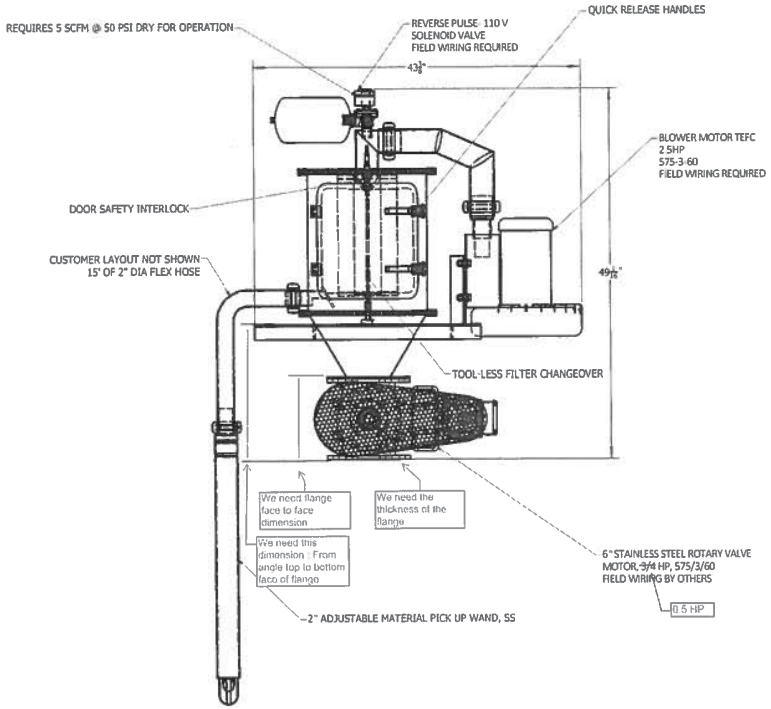
(4) SUPPORT AND INSTALLATION LABOR FURNISHED BY OTHER.

(5) HAPMAN STANDARD GRADE FINISH SPECIFICATION #40-108, REV "C"

(6) VOLTAGE 575V/3PH/60HZ




**CONTROLS, FILTER PULSE TIMER & MOTOR STARTER BY OTHERS**

APPROVAL DRAWING

Ryadh Dahli P.Eng. 2018-03-28

16R

| REV. | SUF | ITEM NO. | DRAWING / PART NO. | DESCRIPTION | ITEM QTY |
|---|---|---|---|---|---|
| | AA | 1 | H1692SAA D00 | 16D PNEUMATIC RECEIVER ASSY, SS | 1 |
| | AB | 2 | ACE M D.S. DP REV. A | ROTARY VALVE, 6", SS | 1 |
| | AC | 3 | H1692SAC-L00 | HOSE, TIGERFLEX, 2" x 15' LG. (WE200) | 1 |
| | AD | 4 | H1692SAD D00 | INLET WAND ASSY, 2", SS | 1 |

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE ENGLISH (FEET AND/OR INCHES)
TOLERANCES

| DECIMALS | INCHES | FEET | ANGLES |
|---|---|---|---|
| .X ±.030" | X/X" = ± 1/16" | .X'-X" = ± 1/4" UP TO 20 FEET | ± .1° |
| .XX ±.015" | | .X'-X" = 1/2" OVER 20 FEET | |
| .XXX ±.005" | | | |

DO NOT SCALE DRAWING — REMOVE ALL SHARP EDGES

HAPMAN
Ideas that move

5944 E. N AVE. KALAMAZOO, MICHIGAN 49048
PHONE (269) 343-1675 FAX (269) 349-2477

| DATE: 2/1/2018 | KIT NO. H16925 | DRAWN: mlesiie |
|---|---|---|
| SCALE: | | WEIGHT: N/A |

16" PNEUMATIC RECEIVER W/ 6" ~~DUMP GATE~~ ROTARY VALVE & WAND, SS

CUSTOMER: VEOLIA WATER TECHNOLOGIES

SHEET 1 OF 1

H1692500-D00

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HAPMAN
Ideas that move


# Vacuum Conveyor

## Installation, Operation and Maintenance Manual



**www.hapman.com**

**All owners and operators should read this manual and/or be instructed on safe operating and maintenance procedures before attempting to uncrate, install, operate, adjust or service this equipment**

Following are symbols used in this manual along with a description of their meanings:


**DANGER**
Indicates an imminently hazardous situation which, if not avoided, will result in death or severe injury.


**WARNING**
Indicates a potentially hazardous situation which, if not avoided, will result in death or severe injury


**CAUTION**
**I**ndicates a potentially hazardous situation which, if not avoided, may result in minor/moderate injury and/or damage to equipment.

HAPMAN

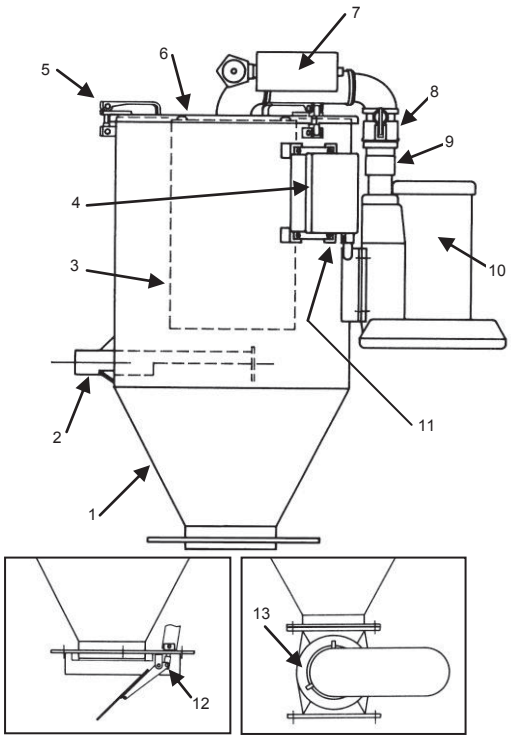
# MiniVac™ PNEUMATIC CONVEYOR

Table of Contents

## Major Features Index

1. Filter Plenum
2. Material Inlet
3. Cartridge Filter
4. Solenoid Cabinet (If Required)
5. Cam Latch
6. Removable Top Cover (Lid Assembly)
7. Pulse Air Reservoir
8. Quick Disconnect
9. Vacuum Breaker (If Required)
10. Regenerative Blower
11. 80 PSI (Dry) Air Connection
12. Discharge Gate
13. Rotary Valve

**NOTE:** The marker numerical designations listed in this illustration are for reference purposes only within this manual.




# 1.0 Warranty

Equipment manufactured by Hapman is warranted to be free of defective material and workmanship under the use and service quoted for a period of one year after date of shipment. This warranty is void if serviced by anyone other than Hapman service personnel.

Hapman agrees to replace or repair any defective parts it has manufactured as covered under this warranty. F.O.B. our plant, subject to inspection of the part in question by Hapman's personnel. No article may be returned to Hapman without Hapman's written consent.

Parts supplied but not manufactured by Hapman are subject to the warranties extended to Hapman by its suppliers. Hapman's liability is limited to such adjustment as the respective manufacturer makes to the seller.

In no event shall Hapman be liable for costs incurred due to equipment malfunction such as consequential damages, lost production or the expenses or losses incurred due to geographical location or fault of the product, difficulty of access to the product as installed, or time urgency on the part of the user and/or buyer of the equipment.

**NOTICE**:
While all information in this manual has been checked for accuracy, changes in design or specifications may occur at any time in HAPMAN's continuing program of product improvement. HAPMAN cannot assume responsibility for errors in the production of this manual, or for unsafe operating practice of those employing HAPMAN equipment.

**WARNING**

**BEFORE INSTALLING, OPERATING OR MAINTAINING ANY EQUIPMENT, THE CONTENTS OF THIS MANUAL SHOULD BE THOROUGHLY REVIEWED AND UNDERSTOOD.**

Statements and instructions set forth herein are based upon the best information and practices known to HAPMAN, but this may not be construed to suggest that every conceivable safety precaution is contained herein. As a matter of practicality, HAPMAN cannot guarantee that actions in accordance with such statements and instructions will result in the complete elimination of all hazards and thus assumes no liability for accidents which may occur.

For further information regarding installation, operation and maintenance please contact the factory service department.

**HAPMAN Customer Service**
5944 East N Avenue, Kalamazoo, MI 49048-2321 (US/Can): 800.427.6260
Phone: 269.343.1675, Fax: 269.382.8266 E-mail: service@hapman.com

## 2.0 Safety Instructions

**⚠ CAUTION**

All Hapman furnished equipment must be installed, operated and maintained in accordance with service instructions. Failure to follow these instructions may result in serious personal injury or property damage.

**2.1** Once the pneumatic conveyor (sometimes referred to as the MiniVac™) has been properly positioned in the desired location, it must be securely fastened (anchored) to approved structural supporting beams or equipment before connecting the electric and air utilities.

**2.2** Installation, operation and maintenance of electrical machinery must be performed only by qualified, trained and experienced personnel. Make sure that the motor and conveyor body is effectively grounded in accordance with OSHA safety and health standards, the National Electric Code and local codes.

**2.3** Avoid physical contact in and around the pneumatically operated discharge gate because it can cause injury to the operator when it closes. The gate can severely pinch fingers and hands when it is activated.

**2.4** Likewise, when a rotary valve is used for controlled discharge of product, it too can present a significant “pinch-point” hazard.

**2.5** Keep clothing, hair, hands and other body parts away from the rotary valve and receiving pickup wand when the unit is operational.

**2.6** Do not manually override or electrically bypass any protective device.

**2.7** Periodically inspect the bolts and welds of the frame to ensure their continued integrity and tightness.

**⚠ WARNING**

**2.8** Do not attempt to open, work on, clean, service, remove any protective cover, guard, or maintenance panel on the pneumatic conveyor until the **POWER IS TURNED OFF AND LOCKED OUT.**


**2.9 Use extreme care and caution** when handling combustible dusts, powders, and vapors because such conditions can introduce a potential fire/explosive hazard which may be caused by sparks (electrical, electrostatic, metal against metal) in the filter receiver or transport pipe.

Pneumatic filter receivers do not contain extinguishing or suppression equipment.

Should combustible dusts or explosive vapors be introduced to the conveyed material, consult NFPA (National Fire Prevention Association) guideline for recommended explosion relief (vent) devices and/or fire extinguishing equipment. Hapman conveyor equipment hoppers, filter/receivers and dust collectors do not contain explosion relief vents, except on special order.

**2.10** Any equipment which is used in the processing or transporting of explosive materials in hazardous environments requires an evaluation on the part of the user and operator or proper and adequate equipment enclosures. Do not use your equipment in hazardous environments unless it has been properly equipped for the hazard.

**2.11** Protective gloves, breathing masks, and other protective clothing required for the material being conveyed must be worn when using the pickup wand and when changing the cartridge filter to prevent over exposure to the material.

**2.12** It is ultimately the operator's responsibility to implement the above-listed precautions and ensure proper use of the equipment. Keep these instructions and list of warnings with your machines at all times. **WORK SAFELY AT ALL TIMES**.

## 3.0 General Description and Installation

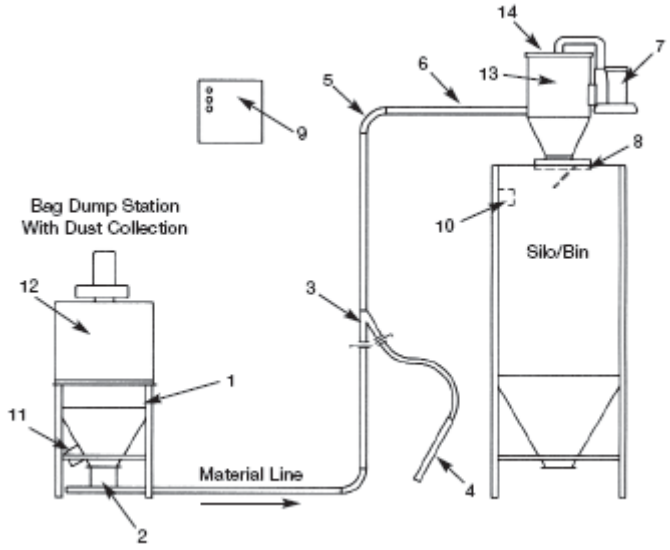
Designed for in-plant handling of most dry solids and powders, Hapman Mini-Vacuum conveyors deliver high performance, ultra-compact size, and cost effectiveness. Operating under negative pressure, or "vacuum"; material is drawn directly into the conveying line by airflow via pick up nozzle or hopper. Product loss and dusting is minimal as accidental leakage is drawn inward, providing maximum safety in handling toxic products.

The Hapman Mini-Vacuum system is particularly adaptable to providing material pick up from single or multiple hoppers, or open containers and delivering to one discharge point. Material laden air is transported through the line by induced air flow created by a positive-displacement blower or regenerative centrifugal fan. Material/air separation and discharge is accomplished by Hapman's compact receiver unit. The Hapman receiver provides highly-efficient final filtration through application of cartridge-type filtration technology.

Available in both standard and custom arrangements, each Hapman pneumatic conveyor system is designed for your specific application. The success of your conveyor installation will be dependent on understanding the operation of each component and its operation.

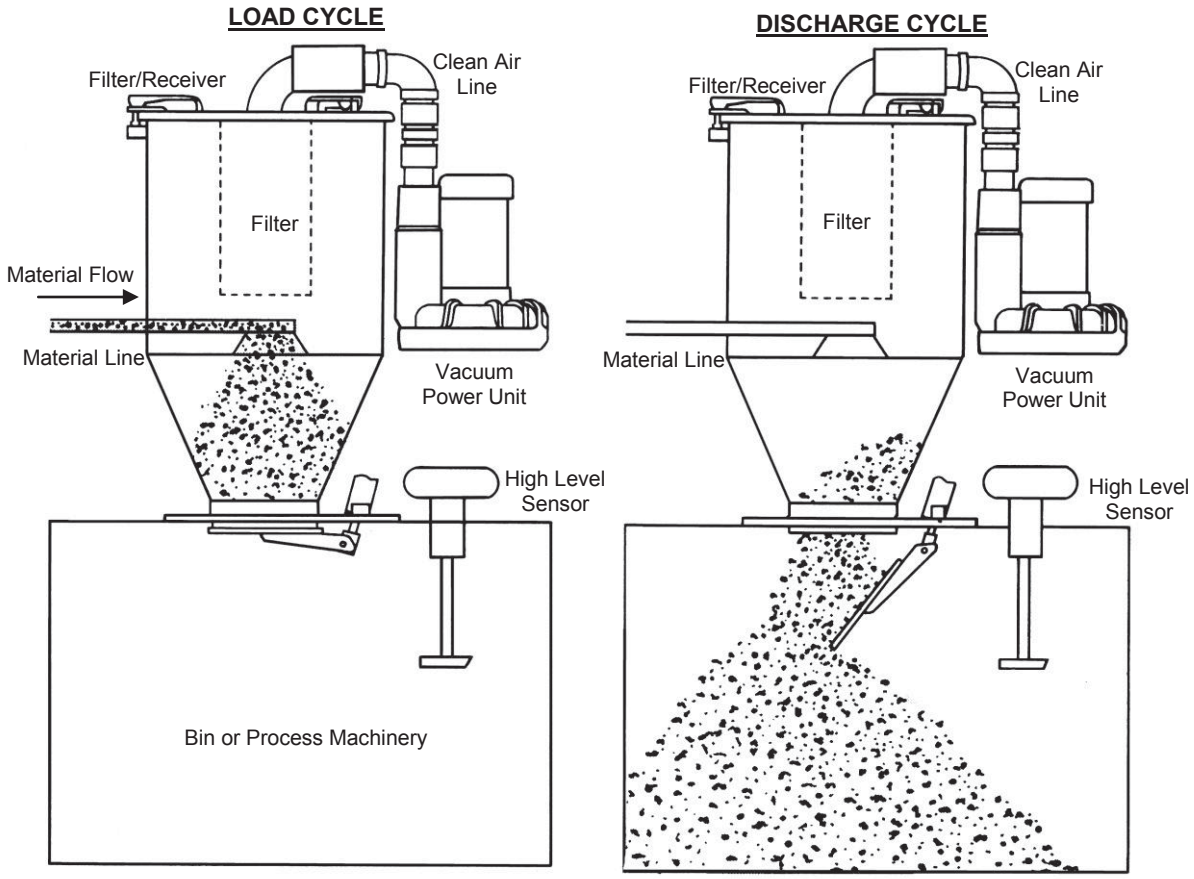
Please review the following guidelines when installing your pneumatic conveyor system. In addition, carefully review specific construction drawings that have been prepared by Hapman engineers for your applications.

**TYPICAL SYSTEM COMPONENTS**
**Figure 7**




1. Air Intake
2. Self-Feeding Material Intake
3. Y Branch
4. Pick-Up Wand
5. Elbow
6. Transport Pipe
7. Regenerative Blower
8. Discharge Gate
9. Control Panel
10. High Level Sensor-Silo
11. Low Level Probe-Material Inlet
12. Bag Dump Station
13. Filter Receiver
14. Receiver Lid

# 4.0 Hapman Pneumatic Conveyor Equipment



Hapman's miniature filter receiver units provide efficient separation and collection of air-borne solids that have been introduced into the conveying system. The air/material mixture enters the receiver plenum chamber and immediately begins to decelerate. Larger particles quickly fall from the air stream and collect in the receiver. Smaller particles remain entrained in the air flow, migrating upward and collecting on the filter media. The filtered air passes up through the receiver "lid" and continues to the vacuum blower inlet.

Collected dust begins to densify on the filter membrane. A solid state timer periodically energizes a solenoid operated air valve resulting in a burst of compressed air directed into the inside of the cartridge filter. The compressed air expands inside the filter and provides a momentary reverse air flow across the filter membrane. This dislodges the collected dust which falls into the receiver. The filter is now clean and resumes collecting dust from the conveying air stream.

**NOTE:** The filter cartridge, when reversed pulsed, may contain a significant amount of the material being conveyed. This material accumulates within the filter pleats and on end-caps. It is normal for the cartridge to look "dirty" as the material buildup densifies. This buildup of densified conveyed material actually aids in the air/material separation. The Hapman MiniVac™ receiver includes a side access door for filter access and ease of cleaning. See Major Features Index on Page 4.

**Note:** When preparing to clean the filter receiver, use extreme care when removing the filter from the filter receiver. Do not rest the filter cartridge on the edge of the receiver housing. The cartridge's delicate filter membrane will be damaged by the exposed receiver housing edge.

### 4.1 Major Components of Filter/Receiver Unit Include:

**Discharge Gate**

Standard filter receivers are equipped with a cylinder operated "dump" gate to periodically empty the filter plenum of collected material.

During normal operation, the discharge gate is in the closed position, sealing the receiver chamber. Once closed, a vacuum develops inside the receiver causing the material/air to flow through the transport line. At the beginning of the cycle, a solid state timer (located in the operators control station) energizes. This timer is adjustable; however, the factory setting is 4 seconds.

When the timer de-energizes, two events simultaneously occur. First, the vacuum breaker valve (located on blower inlet) opens and relieves the vacuum from the receiver chamber. In the absence of vacuum, material ceases to flow through the transport line. Next, the discharge gate is signaled to open allowing collected material to discharge from the receiver. After 4 seconds, the discharge gate is signaled to close and prepare for the next conveying cycle. The vacuum breaker valve is held open by a delay timer for a short time period to allow the dump gate to fully close. When the delay timer de-energizes, the vacuum breaker valve is closed and the convey cycle is repeated.

**Solenoid Cabinet (Dump Gate model only)**

The discharge gate and vacuum breaker valve are cylinder operated and controlled via electrically operated solenoids (110VAC). These solenoids, as well as the filter cleaning pilot solenoid, are mounted and wired inside a NEMA 4 enclosure mounted to the filter/receiver housing. Field wiring and compressed air connections are furnished for ease of installation.

**NOTE:** Solenoids are equipped with flow control fittings to control the Speed of the cylinder operated discharge gate.

**Rotary Discharge Valve**

An optional rotary discharge valve may be installed in lieu of a cylinder operated dump valve. This effectively increases the net conveyor capacity by eliminating the delay period necessary for dump gate discharge. The application of a rotary valve is usually limited to fine, free-flowing materials.

The rotary discharge valve provides an airlock seal between the interior of the filter/receiver chamber (under vacuum) and the discharge chute or hopper vessel (ambient pressure).

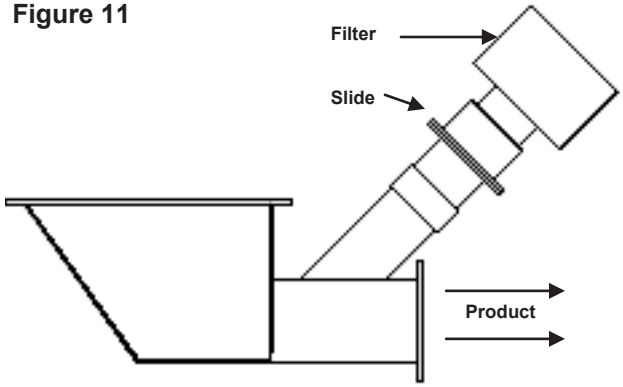
Rotary valves are normally supplied with 1/2 HP gear motor arrangement including shear-pin overload.

# 5.0 Material Feed Devices

## 5.1 Flooded Well Inlet

The Hapman flooded well inlet provides a controllable means of introducing most free-flowing solids into the conveying air stream. The inlet is attached to the discharge of material supply hoppers and can be fitted with a cylinder or manually operated shut-off gate to allow several feed points to be arranged on a single vacuum conveyor line.

**Figure 11**




Its design directs material to the bottom of the pneumatic conveyor line where it is swept away by the conveying air stream. Volumetric feeding is achieved by the natural angle of repose of the material. Adjustable flow rates are achieved by a movable slide. See Figure 11.

## 5.2 Rotary Inlet Valve (Figure 12)

Rotary valves are often utilized to provide more positive feed control into pneumatic conveyors. This type of valve more readily controls fluid material and prevents surging or flooding the conveyor line. See Figure 12.

## 5.3 Manual Pickup Wand (Figure 13)

Material can be unloaded from open containers using a hand-held pick-up lance or wand. The wand is constructed of concentric steel tubes which maintain infeed air flow when the wand top is buried deep into the material container. The wand can be adjusted to provide optimum material-to-air ratios to increase or decrease conveying rates as required. See Figure 13.

**Figure 12**
**ROTARY INLET VALVE**

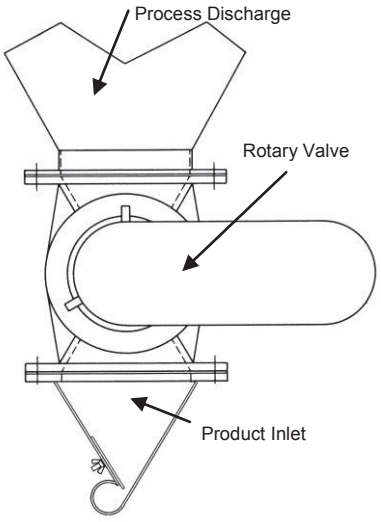
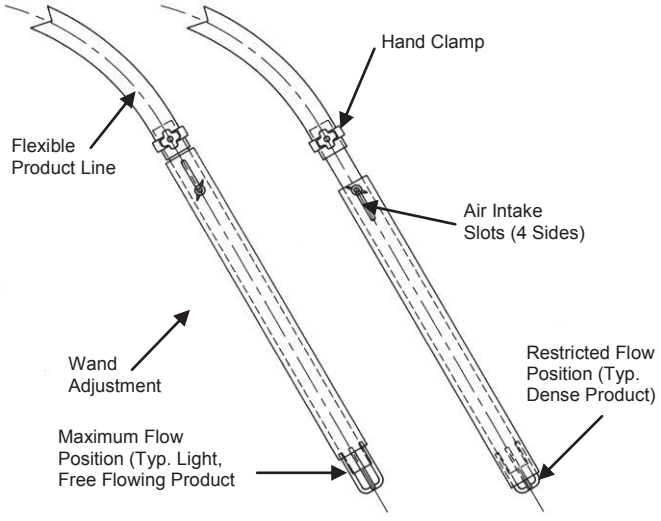



**Figure 13**
**PICKUP WAND**



# 6.0 Blower Packages

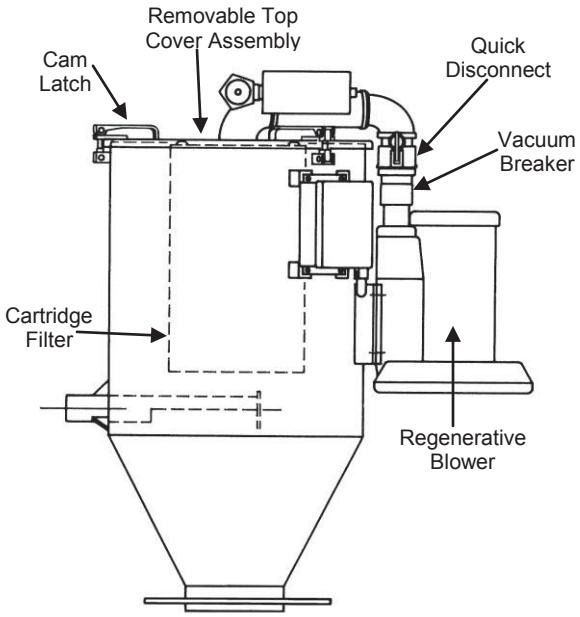
### 6.1 Regenerative

The regenerative blower utilizes a motor driven impeller that draws in air from the inlet port and then by centrifugal force, accelerates the air out through the discharge.

The regenerative blower works in principle by utilizing an annular shaped housing that turns air back to the base of the following blades where it is again hurled outward. Each regeneration imparts additional pressure to the air until it reaches the discharge where air is then diverted out of the blower.

Each blower is assembled as an integral part of the pneumatic receiver. A quick disconnect-cam/lever type coupling is furnished on the blower inlet. This coupling allows the vacuum line-top cover assembly to be easily removed for inspection of the filter cartridge. See Figure 14.

**Figure 14**




**NOTE:** Blower motor must be wired for clockwise rotation and should be verified before running the unit.

### 6.2 Positive Displacement

A positive displacement system utilizes a rotary blower that is either belt driven or direct coupled to the drive motor. The blower has two impellers rotating in opposite directions. As each impeller lobe passes the blower inlet, air is trapped and routed around the case and to the blower outlet.

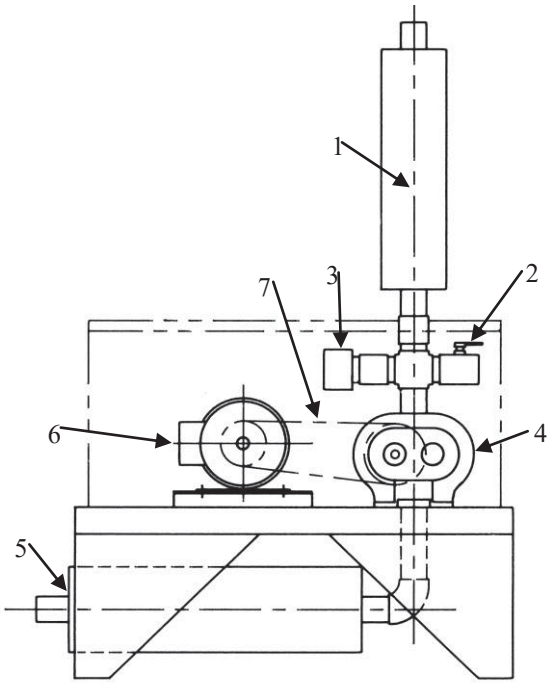
Positive displacement blower systems are normally furnished with inlet and discharge silencers and a foam lined enclosure that will effectively dampen the noise level. A spring loaded vacuum relief valve is furnished in the clean air-vacuum line. The relief valve is factory set at a predetermined value.

The blower system may also be furnished with an auxiliary air inlet valve (manual ball valve). This valve can be used to bleed air into the clean air side of the receiver thus reducing both vacuum and system capacity.

A positive displacement blower system is normally located remote from the pneumatic receiver. Clean air-vacuum piping is furnished either in random lengths or cut to length as dictated by job requirements. A quick disconnect cam/lever type coupling is furnished at the filter receiver-top cover assembly. This coupling allows the vacuum line-top cover to be easily removed for inspection of the filter cartridge. See Figure 16.

**Figure 16**
**POSITIVE DISPLACEMENT SYSTEM**

1. Inlet Silencer
2. Auxiliary Air Inlet Valve
3. Vacuum Relief Valve
4. Positive Displacement Blower
5. Discharge Silencer
6. Drive Motor
7. V-Belt




## 7.0 Electronic Control Systems (Figure 17)

**Inlet Rotary Timer:**
Delays the starting of the inlet rotary valve after the pneumatic conveyor has started.
Typical setting = 5 seconds

**Conveyor Delay Timer:**
Delays the starting of the conveyor if a rotary valve is located on the discharge
Typical setting = 3 Seconds

**Fill Timer:**
When a dump gate is purchased this timer is used to set the fill time in between dumps.
Typical setting = 30 seconds

**Dump Timer:**
When a dump gate is purchased this timer is used to set the dump duration time.
Typical setting = 4 seconds

**Vacuum Break Timer:**
Used to set the amount of time the vacuum is vented to atmosphere.
Typical setting is 2 seconds longer then dump timer setting.

**Pulse#1 on Timer:**
Sets the duration of time an air pulse is delivered to clean filter#1.
Typical setting = 0.5 seconds

**Pulse#1 off Timer:**
Sets the amount of off time between each pulse for filter#1.
Typical setting = 30 seconds

**Pulse#2 on Timer:**
Sets the duration of time an air pulse is delivered to clean filter#2.
Typical setting = 0.5 seconds

**Pulse#2 off Timer:**
Sets the amount of off time between each pulse for filter#2.
Typical setting = 30 seconds

**Pulse#3 on Timer:**
Sets the duration of time an air pulse is delivered to clean filter#3.
Typical setting = 0.5 seconds

**Pulse#3 off Timer:**
Sets the amount of off time between each pulse for filter#3.
Typical setting = 30 seconds

**Pulse#4 on Timer:**
Sets the duration of time an air pulse is delivered to clean filter#4.
Typical setting = 0.5 seconds

**Pulse#4 off Timer:**
Sets the amount of off time between each pulse for filter#4.
Typical setting = 30 seconds

**High level discharge Timer:**
This timer is used when there is a high level sensor located at the discharge and when product falls below the high level this timer will start and once expired will restart the pneumatic conveyor
Typical setting = varies per receiver.

**Discharge off delay Timer:**
When a discharge rotary valve is purchased this timer is used to set the amount of time the discharge rotary valve continues to run after the pneumatic conveyor shuts off allowing the receiver to be emptied
Typical setting = 5 seconds

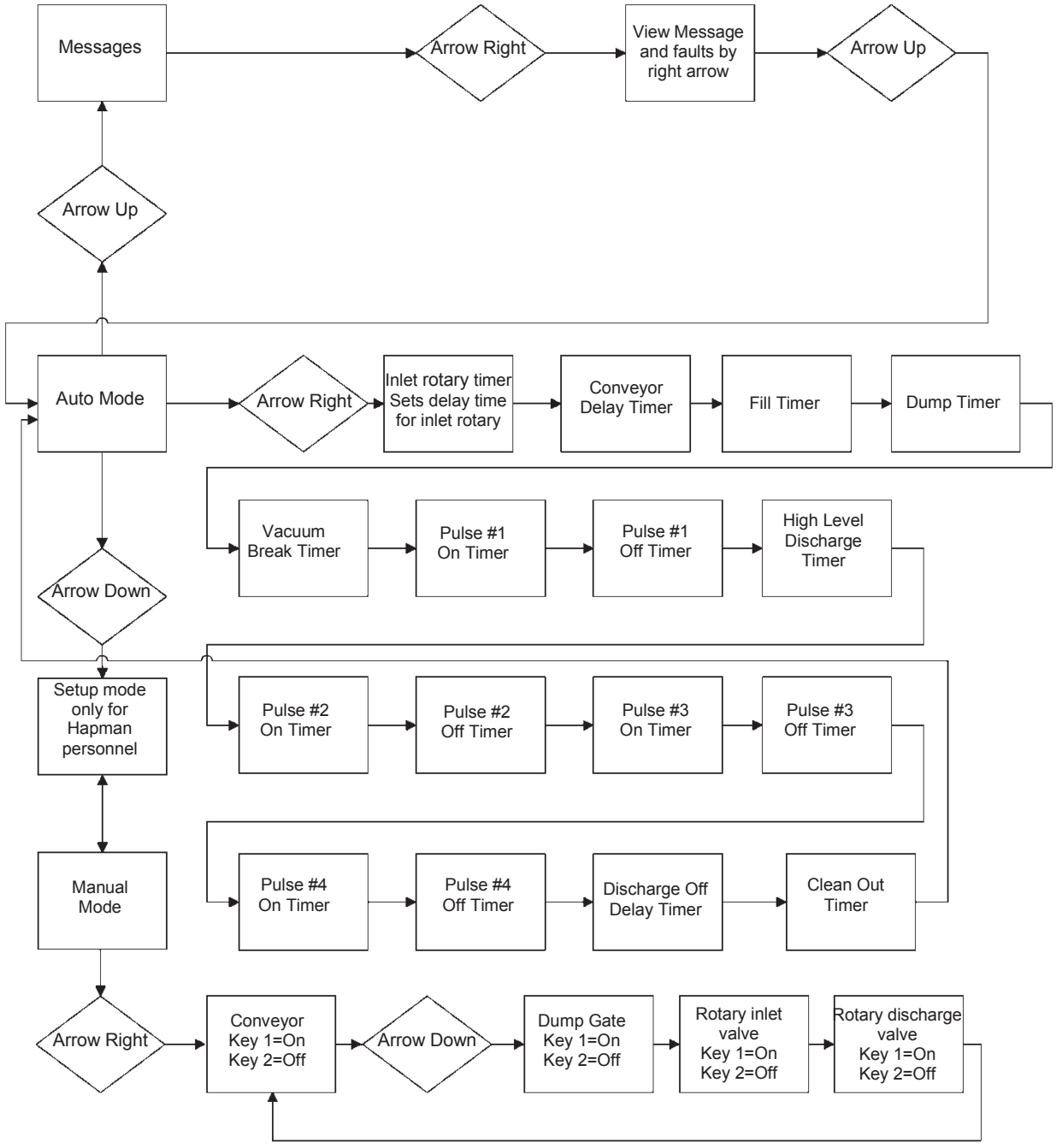
**Clean out Timer:**
When a dump gate is purchased this timer is used to clean out the pneumatic conveyors pipes in between dumping the product. This timer is only needed when there is long vertical drops.
Typical setting = 5 seconds.

**Note**:
Depending on options purchased only some of these 1imers will be visible when shipped to the end user.

**How to enter values into a Timer:**
When the auto mode is showing press right arrow to first Timer then press the 0 key until desired digit then enter correct value. If there is a Timer that you do not want to adjust then just press the enter key then the right arrow.


**Isolate and lock power source** prior to inspecting control panel wiring. Inspect control panel wiring for tightness

**FIGURE 17**
**PNEUMATIC RECEIVER PLC FLOW DIAGRAM**



# 8.0 Installation Instructions

**8.1** Refer to Hapman general arrangement drawings when installing air-handling piping. The material handling capacity of your conveyor system has been calculated based upon a pre-determined number of straight lengths and bends of piping. Deviations or additions to the layout may impact the performance and capacity of the conveyor system. Piping runs should be kept in a horizontal and vertical axis at all times. Avoid sloped routing (upward or downward).

**8.2** Inspect your equipment for loosening and breakage that may occur during shipment.
a. Inspect compressed air connections on the filter/receiver for tightness.
b. Check the tightness of the cartridge filter in the filter/receiver chamber.

**8.3** Compressed air requirements:
a. Install 1/2" (minimum) air supply line to filter/receiver unit.
b. Compressed air should be 60-80 PSI; the filter/receiver will consume 2-3 SCFM of air (per unit maximum).

**NOTE: Install regulator should plant air exceed 90 PSI.**

c. Compressed air should be free from water, oil and solids. Oil will eventually plug the filter media and solids may cause solenoid malfunctions.

**NOTE: Install a mist eliminator if the plant air quality is poor.**

d. If pneumatic conveyor is installed outdoors or in unheated areas, the compressed air must be dried to appropriate dew point to prevent air lines from freezing.

**8.4** Control System:


**Isolate and lock power source** prior to inspecting control panel wiring. Inspect control panel wiring for tightness. Verify timer settings (see illustrations for correct settings), and reinsert timers and relays that may have loosened during shipment.

**8.5** Motor-Driven Devices: Check for correct rotation as indicated by the "rotation" arrow on housings of vacuum blower, fan or rotary valve.

**8.6** Re-inspect conveyor piping for tightness, rigidly and leaks. Be sure that all piping connections have static grounding straps correctly installed.

**8.7** Adjust, if necessary, flow control valves controlling speed of cylinder operated discharge gate. Gate should not slam open or closed.

**8.8** Check lubrication levels, motor driven devices such as gearboxes and positive displacement blowers. Follow suggested lubrication inspection and replenishment according to manufacturer's instructions.

# 9.0 General Maintenance

An air conveying system that has been properly engineered, checked out, and adjusted for start-up is subject to little trouble. A regular maintenance schedule will help prevent malfunctions.

**9.1 Weekly**

1. Inspect blower discharge air for presence of dust, indicating filter failure.
2. Inspect compressed air line filter/oil separators for accumulation of oil, water and debris.
3. Check for smooth operation of air operated devices such as slide gates, discharge gates and vacuum breakers.

**9.2 Monthly**

1. Remove receiver lid and inspect for cartridge filter wear and excessive product buildup on filter media.
   Remove excess product buildup as necessary.
2. Check lubrication levels of positive displacement blower and gear boxes.
   Consult Appendix for further lubrication information.
3. Inspect conveyor piping for leaks and wear.
4. Energize pulse timer circuit (with blower off) and observe operation of the filter cleaning mechanism.

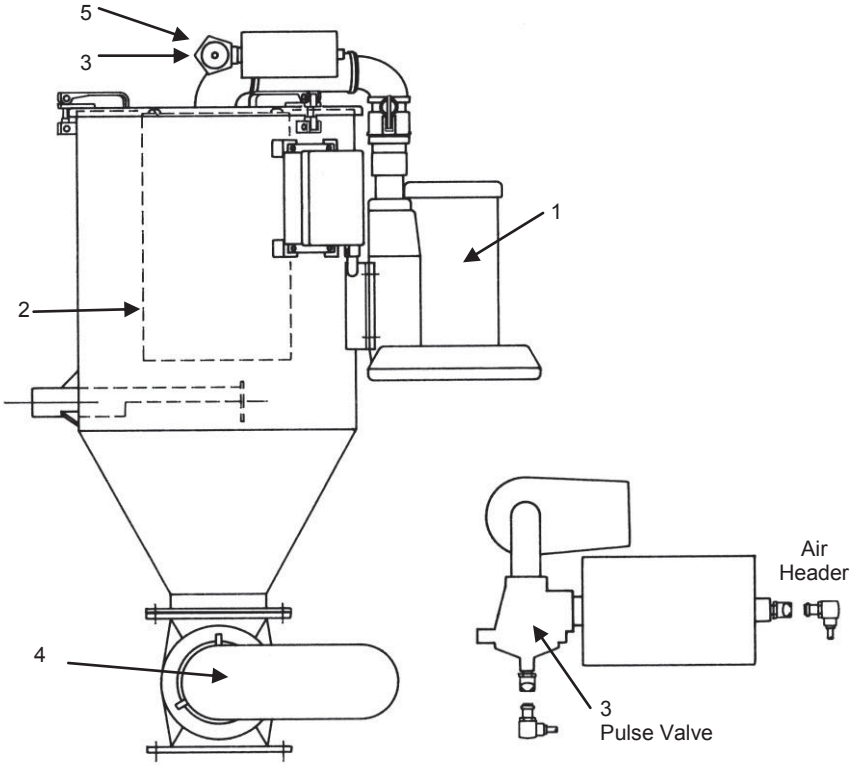
# 10.0 Replacement Parts for Receiver with Rotary Discharge Valve

When calling or writing for replacement parts, please reference the equipment serial number embossed on the Hapman nameplate affixed to equipment. See back of this manual for phone number and address of Hapman Service.

| Hapman Filter Receivers – Rotary Discharge Valve Model "R" | | | | | |
|---|---|---|---|---|---|
| Item No. | Description | Model | | | |
| | | 16R/20R/24R | 30R | 36R | 42R |
| 1 | Blower Assembly | 1 | 1 | 1 | 1 |
| 2 | Filter Cartridge | 1 | 2 | 3 | 4 |
| 3 | Pulse Air Valve | 1 | 2 | 3 | 4 |
| 4 | Rotary Valve | 1 | 1 | 1 | 1 |
| 5 | Solenoid NC 2-Way (Pulse) | 1 | 2 | 3 | 4 |

**NOTE:** For Replacement Parts and Service for the Filter Receiver Discharge Gate See Page 18

**Figure 27**
**PARTS DIAGRAM FILTER RECEIVER WITH ROTARY DISCHARGE VALVE**



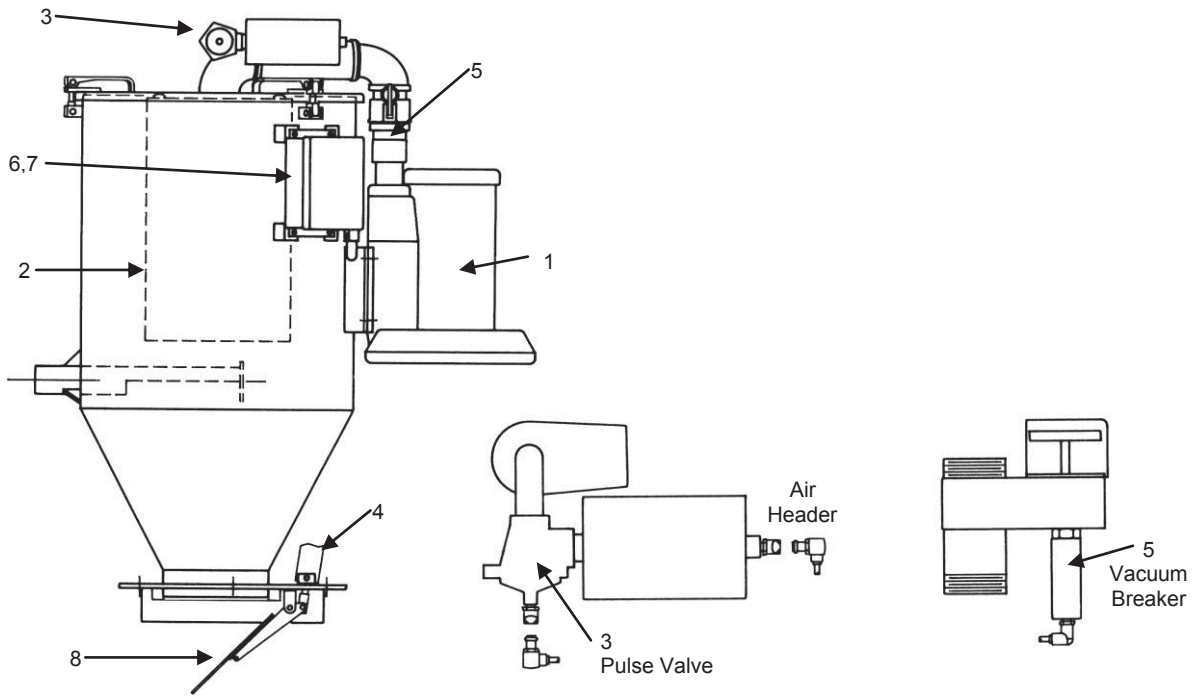

## Replacem

When calling or writing for replacement parts, please reference the equipment serial number embossed on the Hapman nameplate affixed to equipment. See back of this manual for phone number and address of Hapman Service.

| Hapman Filter Receivers –Discharge Gate Model "D" | | | | | |
|---|---|---|---|---|---|
| Item No. | Description | Model | | | |
| | | 16D / 20D / 24D | 30D | 36D | 42D |
| 1 | Blower Assembly | 1 | 1 | 1 | 1 |
| 2 | Filter Cartridge | 1 | 2 | 3 | 4 |
| 3 | Pulse Air Valve | 1 | 2 | 3 | 4 |
| 4 | Discharge Gate Cylinder | 1 | 1 | 1 | 1 |
| 5 | Vacuum Breaker Cylinder | 1 | 1 | 1 | 1 |
| 6 | Solenoid NC 3-Way (Dump gate, vacuum break) | 3 | 3 | 3 | 3 |
| 7 | Solenoid NC 2-Way (Pulse) | 1 | 2 | 3 | 4 |
| 8 | Discharge Gate | 1 | 1 | 1 | 1 |

**Note:**
For Replacement Parts and Service for the Filter Receiver Rotary Discharge Valve See Page 17

**Figure 28 - PARTS DIAGRAM FILTER RECEIVER WITH DISCHARGE GATE**



## Record of Important Information for This Machine

Serial Number_____

Model Number_____

## For Operational Information in This Plant Contact

Name_____

Department / Phone Number_____

## Notes

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

HAPMAN

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# *4 – DETAILED TECHNICAL DOCUMENTATION*

## *4.3 – SHOP DRAWINGS*

## *4.3.7 – $KMnO_4$ DOSING SKID*

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| | |
|---|---|
| **Project name:** | AMARUQ |
| **Project#:** | 5000218009 |
| **Document #:** | SPK_0007_PCH |
| **by:** | GH |
| **chkd:** | GP |
| **appvd:** | CB |

# SUBMITTAL PACKAGE

# KMnO4 DOSING SKID

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|---|---|
| **Project name:** | AMARUQ |
| **Project#:** | 5000218009 |
| **Document #:** | SPK_0007_PCH |
| **by:** | GH |
| **chkd:** | GP |
| **appvd:** | CB |

# KMnO4 DOSING SKID

# PROCESS DATASHEET

**OIM manual section:** 4.3.7.1

# REFER TO 5000216065_PSDS_0007_PCH_VWT

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**Project name:** AMARUQ

**Project#:** 5000218009

**Document #:** SPK_0007_PCH

**by:** GH

**chkd:** GP

**appvd:** CB

# KMnO4 DOSING SKID

# GENERAL ARRANGEMENT DRAWING

**OIM manual section:** 4.3.7.2

# REFER TO 5000218009_GA_0007_PCH_VWT

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**Project name:** AMARUQ

**Project#:** 5000218009

**Document #:** SPK_0007_PCH

**by:** GH

**chkd:** GP

**appvd:** CB

# KMnO4 DOSING SKID

# PUMP(S)

**OIM manual section:** 4.3.7.3

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# CS-999-003 : 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| PULSAFEEDER | ST-999-003 | P9-591 | | KMnO4 METERING PUMP | KMnO4 Shadow pumps // 55BF-EZ000234U1 // 55BF Mechanical Diaphragm, 316/316L Stainless Steel [316], 400 LPH, 75 PSIG, 0000140-MM Diaphragm, NPT Connections, Manual Stroke Length Control, Stock Motor, 1750 RPM, 1 Horsepower, EAR99 | | | KMnO4 DOSING SKID | | |
| PULSAFEEDER | ST-999-003 | P9-592 | | KMnO4 METERING PUMP | KMnO4 Shadow pumps // 55BF-EZ000234U1 // 55BF Mechanical Diaphragm, 316/316L Stainless Steel [316], 400 LPH, 75 PSIG, 0000140-MM Diaphragm, NPT Connections, Manual Stroke Length Control, Stock Motor, 1750 RPM, 1 Horsepower, EAR99 | | | KMnO4 DOSING SKID | | |

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PULSAFEEDER®
ENGINEERED PRODUCTS

# PULSAR Shadow®

**The PULSAR Shadow® sets a new standard for the mechanically actuated diaphragm metering pump.** It features rugged and reliable construction, delivering superior value. The Shadow is easy to operate and simple to maintain. The Shadow HYPOPump configuration is the ideal choice for sodium hypochlorite or other off-gassing and difficult to handle fluids.
It is commonly used in water & wastewater treatment.

**Applications**
sodium hypochlorite injection, disinfection, pH and odor control

**Flow**
up to 170 gph (643 lph)

**Pressure**
up to 305 psi (21 bar)

**Temperature**
up to 150°F (65°C)

5 YEAR DRIVE TRAIN WARRANTY

CE • ATEX

## Mechanical diaphragm metering delivers more than you expect.

**PULSAR Shadow HYPOPump**

- The solution for injection of sodium hypochlorite and other off gassing fluids
- Fully integrated closed loop design, no external valves or piping required
- Balanced, low stress, dynamic seal ensures extended operating life
- 3 year HYPO valve warranty

## Features & Benefits

- Mechanically actuated diaphragm for simple maintenance
- Four bolt tie bar design provides ultimate resistance to piping moments and forces
- Three component check valves for controlled rise, assuring proper valve operation, extende valve seat life, and metering accuracy
- Manual self-locking stroke length adjustment with resolution of 0.5% for set point accuracy

## Specifications

| | |
|---|---|
| Max temp | 150°F (65°C) |
| Min temp | 40°F (4.4°C) |
| Accuracy | ±2% |
| Standards | CE, |

## Custom Engineering

- Compatible materials: PVDF
- Multiplex configurations
- Manual Degass Valve
- Custom electronic controls
- Chemical feed systems
- Application consulting

*The dimensions given may differ depending on pump configuration.*

***For More Information, Contact Your Authorized Pulsafeeder Engineered Products Representative***

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IDEX FLUID & METERING

shdwspec_Rev0814

# PULSAR SHADOW SERIES

## SPECIFICATION
DATA SHEET

PULSAFEEDER® ENGINEERED PRODUCTS
2883 BRIGHTON-HENRIETTA TL RD.
ROCHESTER, NEW YORK 14623 USA
585-292-8000 FAX 585-424-5619

| CUSTOMER | END USER | SERIAL NO. | DATE |
|---|---|---|---|
| VEOLIA WATER TECHNOLOGIES CANADA INC | VEOLIA WATER TECHNOLOGIES CANADA INC | 18EZ000234U1N1-2 | 4/19/2018 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MODEL NO: 55BF | QTY: 2 | REF. ID NO.: SQEZ000234_1.1.1 | REV: 1 | BY: IPASS2 | | | |
| PURCHASE ORDER NO.: | ITEM REFERENCE: | | | | | | |
| JOB REFERENCE: | PUMP TAG: | | | | | | |
| ITEM NUMBER: 55BF-EZ000234U1 | KOPKIT NUMBER: KK5BF-53631-AATY | DIM DWG. NO.: 25969_000.PDF | FLOW CURVE NO.: EZ000234U1~1~PFC~000~PMP.PDF | | | | |

| JOB CONDITIONS | | | | | | | |
|---|---|---|---|---|---|---|---|
| LIQUID: KMNO4 - POTASSIUM PERMANGANATE | | | | FLOW MAX: 400.0000 LPH | | FLOW MIN: 0.00 LPH | |
| LIQUID TEMPERATURE: 75 F | OPERATING PRESS. (MAX) (1): 75.00 PSIG | | | SPECIFIC GRAVITY: 0 | | PERCENT SOLIDS: 0 | |
| VAPOR PRESSURE @ TEMP.: 0 PSIA | SUCTION PRESSURE (2): PSIG | | | VISCOSITY @ TEMP: 0 CP | | SOLIDS SIZE (MICRON): 0 | |
| DUTY CYCLE: CONTINUOUS | ATMOSPHERIC PRESSURE: 14.7 PSIA | | | NPSH: 5 PSIA | | | |
| PULSAR NOTES: (1) MUST BE AT LEAST 5 PSI (0.35 BAR) ABOVE SUCTION PRESSURE, (2) MUST BE AT LEAST 5.0 PSIA (0.35 BAR(A)) AND 3 PSI (0.21 BAR) ABOVE FLUID VAPOR PRESSURE. | | | | | | | |
| COMMENTS: | | | | | | | |

| SPECIFICATIONS | | | | | | | |
|---|---|---|---|---|---|---|---|
| BUILD TO API STDS: NO | HIGH VISCOSITY: NO | DISH SIZE: CF | MULTIPLEX ARRANGEMENT: SIMPLEX | | | | |
| RATED CAPACITY: 507.24 LPH | VALVE TYPE: BALL | GEAR RATIO: 12.5:1 | PISTON SIZE: NA | | | | |
| RATED PRESSURE: 75 PSIG | SUCTION VALVE QTY: 1 | SUCTION VALVE SIZE: 20 MM | MECH. DIAPHRAGM SIZE: 140 MM | | | | |
| HYD. BY-PASS VALVE SET: | DISCHARGE VALVE QTY: 1 | DISCHARGE VALVE SIZE: 20 MM | STROKE LENGTH: 5 MM | | | | |
| SUCTION CONNECTION: MNPT | SUCTION CONNECTION SIZE: 1.5 INCH | SUCTION FLANGE RATING: | STROKE RATE: 140 SPM | | | | |
| DISCHARGE CONNECTION: FNPT | DISCHARGE CONNECTION SIZE: 1 INCH | DISCH. FLANGE RATING: | CE/CE-ATEX: NONE | TRCU010: NO | | | |
| HYD/GEAR OIL: PULSALUBE ULTRA 8GS/PULSALUBE PREMIUM 9M | GEAR OIL: PULSALUBE ULTRA 8GS | GEARBOX MTL: ALUMINUM | TRCU012: NO | | | | |
| COMMENTS: | | | | | | | |

| MATERIALS | | | | | | | |
|---|---|---|---|---|---|---|---|
| VALVE BALL/DISC: 316 SS | VALVE GASKETS: PTFE | VALVE CAP: 316/316L | VALVE GUIDE: 316/316L | | | | |
| VALVE SEAT: 316/316L | VALVE SEAT TYPE: HARD | REAGENT HEAD: 316/316L | PASSIVATE: | FLANGE: | | | |
| DIAPHRAGM: PTFE/HYP | DIAPHRAGM TYPE: MECH | DIAPHRAGM GASKET: | HARDWARE (HEAD/TIEBAR): STAINLESS | | | | |
| DOUBLE DIAPHRAGM: NO | INTERMEDIATE HEAD: | INTERMEDIATE DIAPHRAGM: | INTERMEDIATE FLUID: | | | | |
| MATERIALS NOTE: THE END USER, WITH KNOWLEDGE OF PUMPED CHEMICAL, OPERATING AND ENVIROMENTAL CONDITIONS, IS RESPONSIBLE FOR THE FINAL SELECTION OF ALL RELATED MATERIALS. | | | | | | | |
| COMMENTS: | | | | | | | |

| LEAK DETECTION | | | |
|---|---|---|---|
| SETUP: | OPTION: | TYPE: | |
| ENCLOSURE: | VOLTAGE: | OPTION: | |
| COMMENTS: | | | |

| FEATURES | | |
|---|---|---|
| DEGAS VALVE: | | HYPO SYSTEM VOLTAGE: |
| SPLASH GUARDS: NO | PUMP BASE MATERIAL: STEEL | SPECIAL OPTIONS: |

| CONTROLS | | | | | | | |
|---|---|---|---|---|---|---|---|
| TYPE: MANUAL STROKE LENGTH CONTROL | DEVICE: STROKE LENGTH CONTROLLER | ITEM NUMBER: | | | | | |
| VOLTAGE: | INPUT SIGNAL: | OUTPUT SIGNAL: | ENCLOSURE: | | | | |
| ENGINEERING NO.: | WIRING NO.: | EUROPEAN RATING: | REMOTE CABLE: | | | | |
| OP STATION: | METER READ OUT: | OP STATION ENCLOSURE: | OP PUMP MOUNT: | | | | |
| OP STATION-PART NO.: | OP STATION INST DWG. NO.: | OP STATION WIRING NO.: | | | | | |
| PNEUMATIC SERVICE TYPE: | RATIO CTL.: | TRANSDUCER: | REMOTE LOAD STN: | AUTO/MAN: | FILTER REG.: | | |
| COMMENTS: | | | | | | | |

| DRIVE | | | | |
|---|---|---|---|---|
| CURRENT: | VOLTAGE: | DRIVE ENCL.: | AGENCY APPROVAL: | |
| INPUT SIGNAL: | OUTPUT SIGNAL: | WIRING DIAGRAM: | | |

| MOTOR | | | | | | | |
|---|---|---|---|---|---|---|---|
| MOTOR INFO: PUMP COMPLETE WITH MOTOR | | | | | | | |
| POWER: 1.0 HP | VOLTAGE: 575 | HZ: 60 | PHASE: 3 | TYPE: AC | SPEED: 1750 | FRAME: 143TC | |
| MANUFACTURER: BALDOR | MOTOR NO.: TSEZ000234-002 | ENCLOSURE: TOTALLY ENCLOSED | MOTOR TYPE: STANDARD EFFICIENCY | | | | |
| DESCRIPTION: BALDOR, XP, DIV 1, CLASS II, GROUP F&G, 575V, 60HZ, 3PH, INVERTER DUTY VEM7014T-5 | | | | | | | |
| MOTOR NOTE: SPEED IS NOMINAL FULL LOAD. ACTUAL NAMEPLATE SPEED MAY VARY BY +/- 3% DEPENDING ON MOTOR MANUFACTURER. CONSULT MOTOR SPECIFICATION FOR ACTUAL NAMEPLATE RATINGS. | | | | | | | |
| COMMENTS: | | | | | | | |

| PAINT | | | | | |
|---|---|---|---|---|---|
| MFG & BRAND: DEVOE DEVRAN 224V | TOP COAT: TWO-PART EPOXY | TOP COAT COLOR: BLACK | PAINT THICKNESS: SINGLE (1.5 MILS DFT) | | |
| INTERMEDIATE COAT: | PRIMER COLOR: | PAINT WET END: NO | SAND BLAST: | DFT CERT.: | |
| COMMENTS: | | | | | |

| TEST | | | | | | |
|---|---|---|---|---|---|---|
| STANDARD TEST: | PERFORMANCE (1-PT): YES | CALIBRATION (3-PT): NO | HYDROSTATIC (15MIN): NO | WITNESSED: NO | JOB INSPECTION: NO | |
| API 675 TESTING (W=WITNESSED) | PERFORMANCE [STROKE] (3-PT): | REPEATABILITY (+2-PT): | HYDROSTATIC (30MIN): | SOUND LEVEL: | JOB INSPECTION: | |
| | PERFORMANCE [SPEED] (3-PT): | HIGH DISCHARGE PRESURE: | MECHANICAL RUN: | CHLORIDE CONT.: | NPIP TEST: | |
| MILL (MTL) CERTS: NO | POSITIVE MTL. ID (PMI): NO | CERT. OF CONF. NO | RADIOGRAPHIC-PROCESS SIDE: | RADIOGRAPHIC-DRIVE SIDE: | LIQUID PENETRANT: | |
| COMMENTS: | | | | | | |

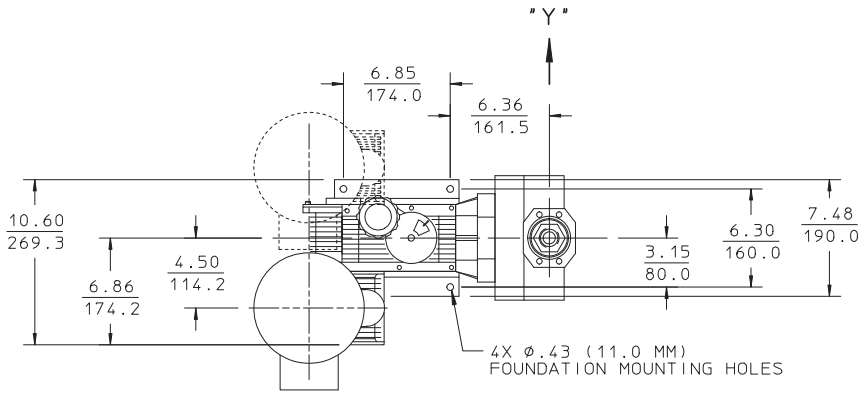
| DOCUMENTATION | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| API 675 CERTIFICATE: NO | | TEST REPORT: YES | | MILL (MTL) CERTIFICATE: NO | | CONFORMANCE CERT.: NO | | MANUAL (IOM): YES | |
| PUMP DIM DRAWING: NO | MOTOR DIM DRAWING: NO | FLOW CURVE: NO | | PMI TEST CERTIFICATE: NO | | CERTIFICATE OF ORIGIN: NO | | ISO CERTIFICATES: NO | |
| PARTS LIST: NO | MOTOR WIRING DIA.: NO | CALIBRATION CURVE: NO | | MTL. COMPLIANCE CERT.: NO | | ACCESSORY DIM DRAWING: NO | | PROCESS DOCUMENTS: NO | |
| KOPKIT INFORMATION: NO | CONTROL WIRING DIA.: NO | HYDRO TEST REPORT: NO | | SPEC. COMPLIANCE CERT.: NO | | ACCESSORY CUT SHEETS: NO | | WEB LINKS: NO | |

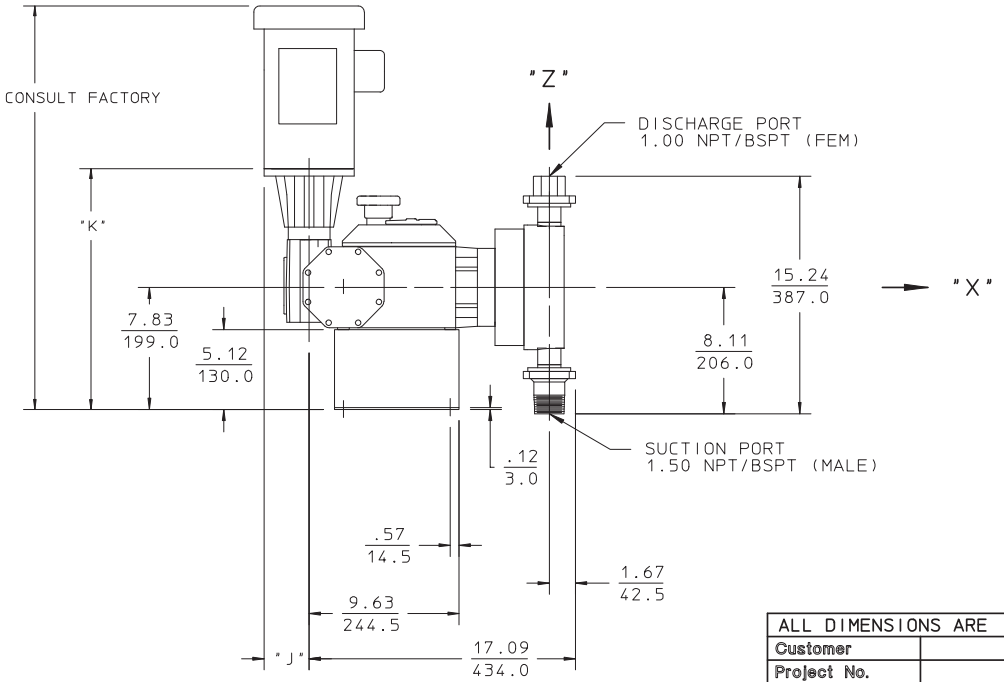
| OTHER | | | | | |
|---|---|---|---|---|---|
| EXPORT CONTROL CLASS: EAR99 | EXP. LICENSE CANDIDATE: | 6-MONTH STORAGE: | PACKING: STANDARD | OIL:2/0 KK: 1 | |
| COMMENTS: | | | | ACC: NO TYP: C | |

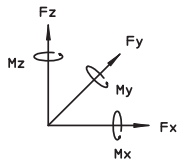
4E20AC73-9B75-4ECD-9C4C-6C0EAA14244C

18EZ000234U1N1-2

*18EZ000234U1N1-2*




| FORCES STATIC & DYNAMIC | | SUCTION | DISCHARGE |
|---|---|---|---|
| NOZZLE FORCES | Fx(LB) | 15 | 15 |
| | Fy(LB) | 15 | 15 |
| | Fz(LB) | 45 | 45 |
| NOZZLE FORCES | Mx(FT-LB) | 15 | 15 |
| | My(FT-LB) | 15 | 15 |
| | Mz(FT-LB) | 15 | 15 |

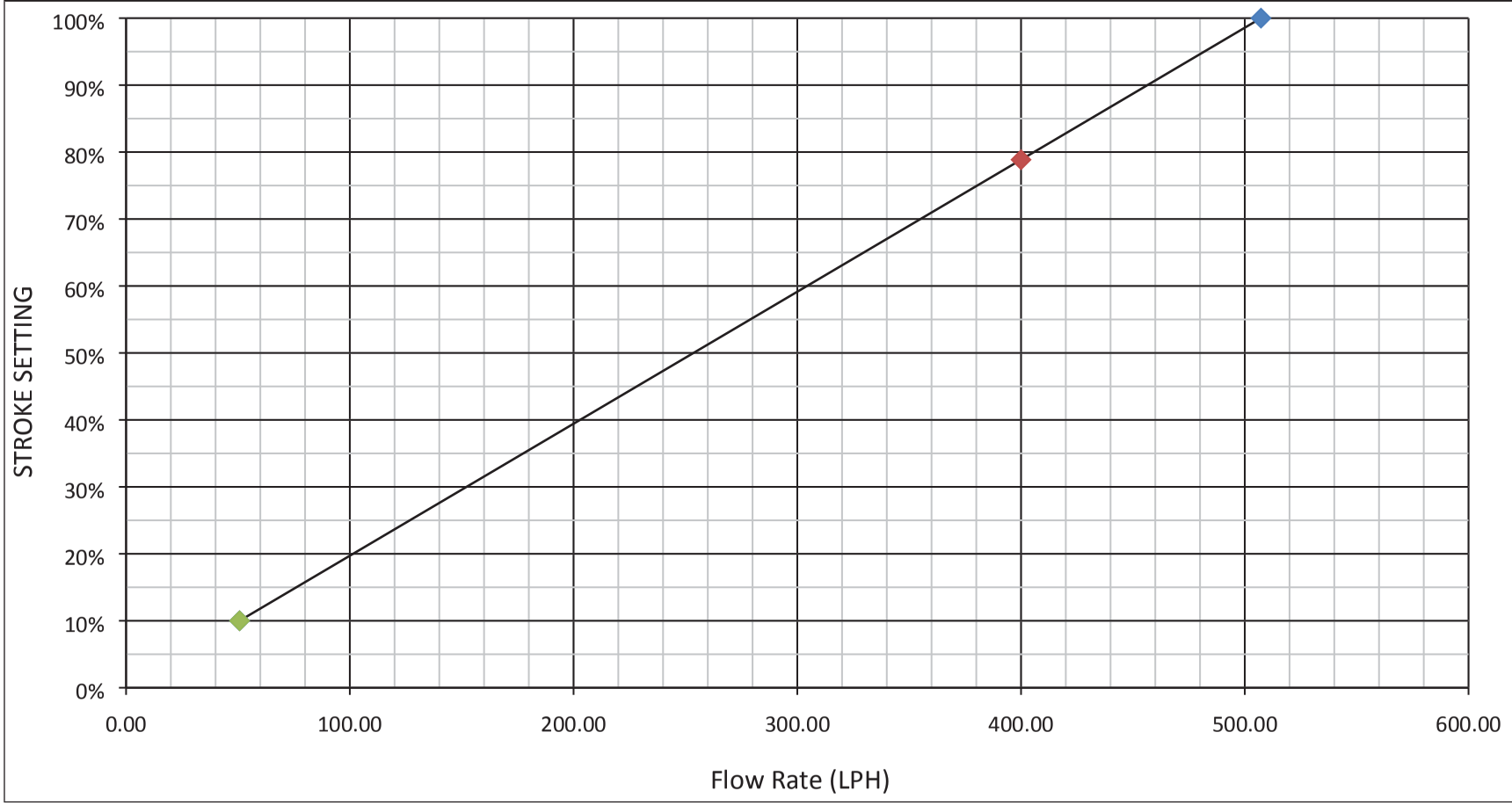
| MOTOR FRAME | "J" | "K" |
|---|---|---|
| 56C | 2.89<br>73.5 | 15.4<br>392.0 |
| 80 | 2.36<br>60.0 | 14.9<br>379.0 |
| 71 | 2.07<br>52.5 | 14.5<br>369.0 |
| 143TC<br>145TC | 2.89<br>73.5 | 15.4<br>392.0 |
| 182C<br>184C | 2.89<br>73.5 | 15.4<br>392.0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ALL DIMENSIONS ARE IN INCHES/mm | | RHA: E HEAD SGL VALVE | | SCALE: 1:8 | | Item – No. | |
| Customer | | | | | | Model | 55BF – METAL |
| Project No. | | | | | | Motor Pwr/Fr | SEE CHART |
| Po No./SO No. | | | | | | Unit Weight | lb kg |
| CONNECTIONS: HP/GP OR HB/GB | | | | | | PULSAR SHADOW | PULSAFEEDER A Unit of IDEX Corporation |
| | | | | | Name | Date | |
| A | UPDATED DWG FORMAT | KMG | 02/28/14 | Drawn | KMG | 04/06/09 | Drawing No. 25969–000 |
| Rev | Revision Description | Name | Date | Checked | KMG | 04/06/09 | |

PULSAFEEDER
ENGINEERED PRODUCTS

# PUMP PERFORMANCE CURVE

| PUMP DATA | | ORDER DATA | |
|---|---|---|---|
| MODEL NUMBER: | 55BF | CUSTOMER: | VEOLIA WATER TECHNOLOGIES CANADA INC |
| PISTON DIAMETER: | NA | CUSTOMER PO: | 18000751HD |
| STROKING RATE: | 140 SPM | CUSTOMER ITEM: | P9-591/2 |
| RATED PRESSURE: | 75 PSIG | PART NUMBER: | 55BF-EZ000234U1 |
| MAXIMUM RATED FLOW (◆): | **507.24 LPH (100%)** | SERIAL NUMBER: | |
| MINIMUM RATED FLOW (◆): | 50.7 LPH (10%) | DATED: | 4/19/2018 |
| EXPECTED OPERATING POINT (◆): | 400.0 LPH (78.9%) | TAGGING: | |



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TSEZ000234-002

BALDOR • RELIANCE

# Product Information Packet

# PULSAFEEDER, INC.

# VEM7014T-5

## 1HP,1760RPM,3PH,60HZ,143TC,3520M,XPFC,F1

## Part Detail

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Revision:** | M | **Status:** | PRD/A | **Change #:** | | **Proprietary:** | No |
| **Type:** | AC | **Elec. Spec:** | 35WGM849 | **CD Diagram:** | CD0006 | **Mfg Plant:** | |
| **Mech. Spec:** | 35E380 | **Layout:** | 35LYE380 | **Poles:** | 04 | **Created Date:** | 08-03-2010 |
| **Base:** | N | **Eff. Date:** | 08-08-2017 | **Leads:** | 3#18 | | |

## Specs

| | | | |
|---|---|---|---|
| **Catalog Number:** | VEM7014T-5 | **Inverter Code:** | Not Inverter |
| **Enclosure:** | XPFC | **KVA Code:** | L |
| **Frame:** | 143TC | **Lifting Lugs:** | No Lifting Lugs |
| **Frame Material:** | Steel | **Locked Bearing Indicator:** | Locked Bearing |
| **Output @ Frequency:** | 1.000 HP @ 60 HZ | **Motor Lead Quantity/Wire Size:** | 3 @ 18 AWG |
| **Synchronous Speed @ Frequency:** | 1800 RPM @ 60 HZ | **Motor Lead Exit:** | Ko Box |
| **Voltage @ Frequency:** | 575.0 V @ 60 HZ | **Motor Lead Termination:** | Flying Leads |
| **XP Class and Group:** | CLI GP D; CLII GP F,G | **Motor Type:** | 3520M |
| **XP Division:** | Division I | **Mounting Arrangement:** | F1 |
| **Agency Approvals:** | CSA | **Power Factor:** | 71 |
| | CSA EEV | **Product Family:** | General Purpose |
| | UL | **Pulley End Bearing Type:** | Ball |
| | UR | **Pulley Face Code:** | C-Face |
| **Auxillary Box:** | No Auxillary Box | **Pulley Shaft Indicator:** | Standard |
| **Auxillary Box Lead Termination:** | None | **Rodent Screen:** | None |
| **Base Indicator:** | No Mounting | **RoHS Status:** | ROHS COMPLIANT |
| **Bearing Grease Type:** | Polyrex EM (-20F +300F) | **Shaft Extension Location:** | Pulley End |
| **Blower:** | None | **Shaft Ground Indicator:** | No Shaft Grounding |

| | |
|---|---|
| **Current @ Voltage:** | 1.200 A @ 575.0 V |
| **Design Code:** | B |
| **Drip Cover:** | No Drip Cover |
| **Duty Rating:** | CONT |
| **Electrically Isolated Bearing:** | Not Electrically Isolated |
| **Feedback Device:** | NO FEEDBACK |
| **Front Face Code:** | Standard |
| **Front Shaft Indicator:** | None |
| **Heater Indicator:** | No Heater |
| **Insulation Class:** | B |

| | |
|---|---|
| **Shaft Rotation:** | Reversible |
| **Shaft Slinger Indicator:** | No Slinger |
| **Speed Code:** | Single Speed |
| **Motor Standards:** | NEMA |
| **Starting Method:** | Direct on line |
| **Thermal Device - Bearing:** | NONE (OLD) |
| **Thermal Device - Winding:** | Normally Closed Thermostat |
| **Vibration Sensor Indicator:** | No Vibration Sensor |
| **Winding Thermal 1:** | None |
| **Winding Thermal 2:** | None |
| **XP Temp Code:** | T3C |

## Nameplate NP1426XPSLEV

| | | | | | | |
|---|---|---|---|---|---|---|
| NO. | | CC | 010A | | | |
| SER. | | | | | | |
| SPEC. | 35E380M849G1 | | | | | |
| CAT.NO. | VEM7014T-5 | | | | | |
| HP | 1 | T. CODE | T3C | | | |
| VOLTS | 575 | | | | | |
| AMPS | 1.2 | | | | | |
| RPM | 1760 | | | | | |
| HZ | 60 | PH | 3 | CL | B | |
| SER.F. | 1.00 | DES | B | CODE | L | |
| RATING | 40C AMB-CONT | | | | | |
| FRAME | 143TC | NEMA-NOM-EFF | 85.5 | | | |
| USABLE AT 208V | | PF | 71 | | | |
| BLANK | | | | | | |

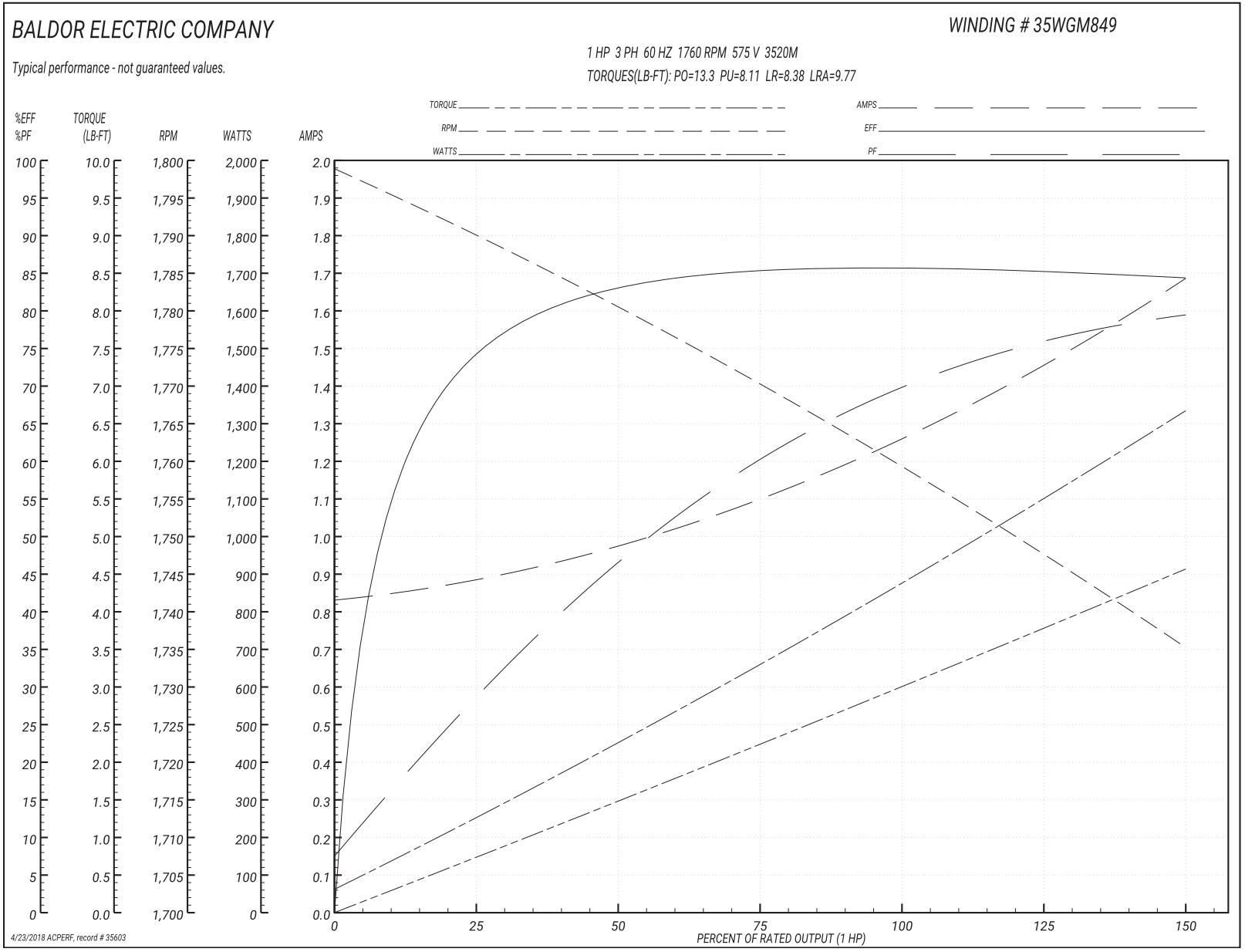
## Parts List

| Part Number | Description | Quantity |
|---|---|---|
| SA200774 | SA 35E380M849G1 | 1.000 EA |
| RA188087 | RA 35E380M849G1 | 1.000 EA |
| 34FN3002B01 | EXTERNAL FAN, PLASTIC, .637/.639 HUB W/ | 1.000 EA |
| 35CB3001A02SP | EXPL PROOF CONDUIT BOX, 3/4"PIPE TAP LEA | 1.000 EA |
| 11XW1032G06 | 10-32 X .38, TAPTITE II, HEX WSHR SLTD U | 1.000 EA |
| HW3001B01 | BRASS CUP WASHER, FOR #10 SCREW | 1.000 EA |
| 35EP3700A01SP | FR ENDPLATE, XPFC | 1.000 EA |
| HW5100A03 | WAVY WASHER (W1543-017) | 1.000 EA |
| 35EP3702A01SP | PU EP-205 BRG-35X-56C-143-5TC | 1.000 EA |
| 51XN1032A20 | 10-32 X 1 1/4 HX WS SL SR | 2.000 EA |
| HA3013A01 | 1/2-20X5/8 SPL.HX BOLT | 2.000 EA |
| HW3021C06 | 3/32 DI X .625 PIN (F/S) | 2.000 EA |
| XY3118A12 | 5/16-18 HEX NUT DIRECTIONAL SERRATION | 4.000 EA |
| 51XB1214A16 | 12-14X1.00 HXWSSLD SERTYB | 1.000 EA |
| 35FH4005A01SP | IEC FH NO GREASER W/PRIMED | 1.000 EA |
| 51XW1032A06 | 10-32 X .38, TAPTITE II, HEX WSHR SLTD S | 3.000 EA |
| 35CB3500A01SP | CONDUIT BOX LID, MACH | 1.000 EA |
| 51XN2520A16 | SCREW, HEX WS SLT, ZN, 1/4-20 X 1.00 | 4.000 EA |
| HW2501D13 | KEY, 3/16 SQ X 1.375 | 1.000 EA |
| HA7000A01 | KEY RETAINER 7/8" DIA SHAFT | 1.000 EA |
| 85XU0407S04 | 4X1/4 U DRIVE PIN STAINLESS | 6.000 EA |
| NP0018F | ALUM UL XP CONDUIT BOX NAMEPLATE | 1.000 EA |
| MJ1000A02 | GREASE, POLYREX EM EXXON (USe 4824-15A) | 0.050 LB |
| MG1025G29 | WILKOFAST, 789.229, DARK CHARCOAL GRAY | 0.017 GA |

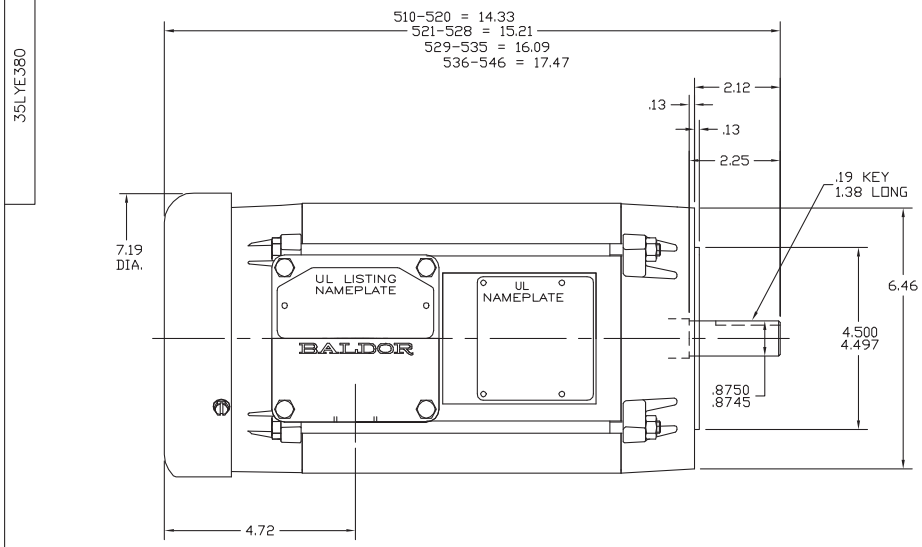
## Parts List (continued)

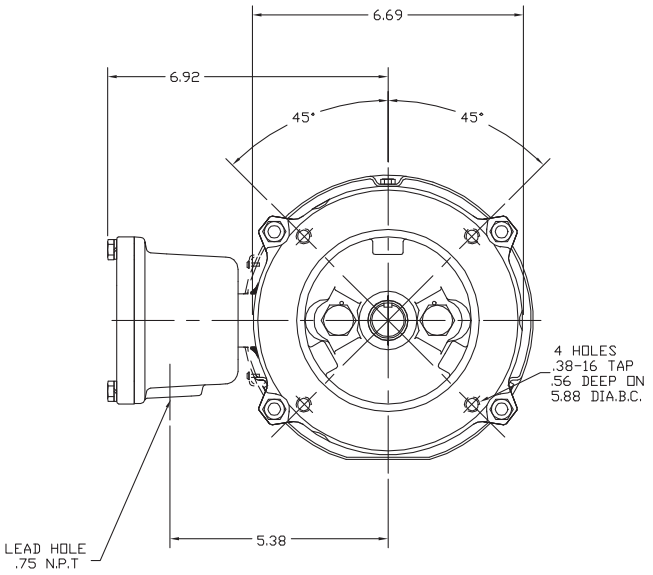
| Part Number | Description | Quantity |
|---|---|---|
| HA3104A06 | THRUBOLT 5/16-18 X 8.50 OHIO ROD | 4.000 EA |
| LB1119N | WARNING LABEL | 1.000 EA |
| LC0006 | CONNECTION LABEL | 1.000 EA |
| NP1426XPSLEV | SS XP UL CSA-EEV CC CL-I GP-D | 1.000 EA |
| 36PA1000 | PKG GRP, PRINT PK1016A06 | 1.000 EA |
| PK3082 | STYROFOAM CRADLE | 1.000 EA |
| MN416A01 | TAG-INSTAL-MAINT no wire (1100/bx) 11/14 | 1.000 EA |

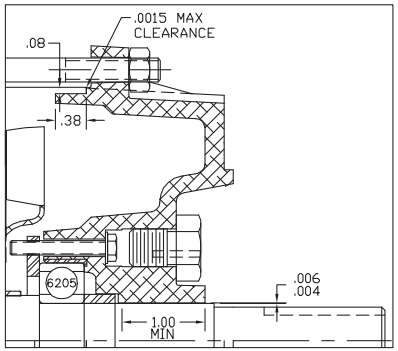
## Performance Graph at 575V, 60Hz, 1.0HP Typical performance - Not guaranteed values



35LYE380




PULLEY END DETAIL

35LYE380

CUSTOMER IS RESPONSIBLE FOR DETERMINING THAT BALDOR'S PRODUCT WILL PERFORM SUITABLY IN THE INTENDED APPLICATION.

| | | |
|---|---|---|
| REV. DESC: ADD PULLEY END DETAIL | | |
| REV. LTR: L | VERSION: 03 | TDR: 000001064811 |
| FILE: \AAA\00005\398 | REVISED: 11:08:15 03/19/2018 | BY: ENALEM0 |
| MTL: – | | |

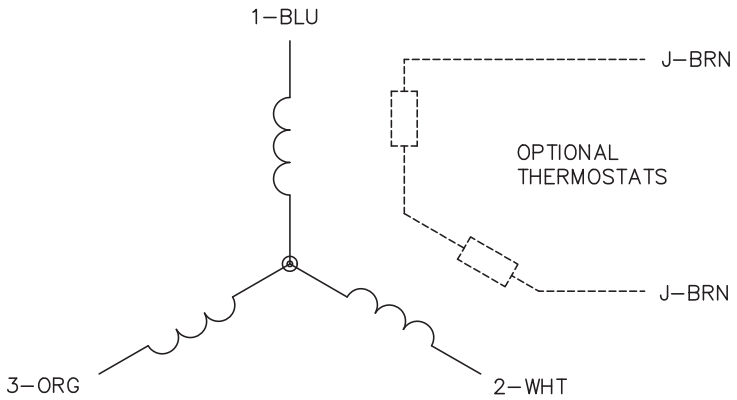
BALDOR

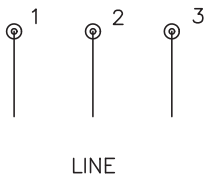
STD VERT 143-5TC XPFC X35M CL-I GP-D, CL-II GP-F&G

SH 1 of 1

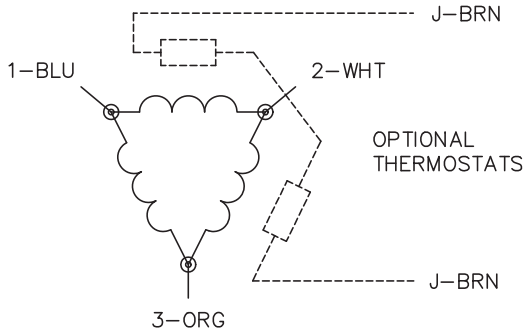
CD0006

TYPICAL WYE–CONNECTED MOTOR




TYPICAL DELTA–CONNECTED MOTOR




NOTES:

1. THREE LEAD MOTOR MAY BE EITHER WYE CONNECTED OR DELTA CONNECTED.
2. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
3. OPTIONAL THERMOSTATS ARE PROVIDED WHEN SPECIFIED.
4. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY VARY.
5. LEAD COLORS ARE OPTIONAL. LEADS MUST BE NUMBERED AS SHOWN.

CD0006

| | | | |
|---|---|---|---|
| REV. DESC: REVISE TO SHOW OPTIONAL COLORS | | | BALDOR ELECTRIC Co. |
| REV. LTR: D | BY: JLP | REVISED: 01/21/99 4:02 | TDR: 0171435 |
| 9000CD | | FILE: AAA00005141 | MDL: – |
| | | MTL: – | 3PH, SV, 3 LEADS, WYE OR DELTA CONNECTED |

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**Project name:** AMARUQ

**Project#:** 5000218009

**Document #:** SPK_0007_PCH

**by:** GH

**chkd:** GP

**appvd:** CB

# KMnO4 DOSING SKID

# VALVES

**OIM manual section:** 4.3.7.4

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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 | VABLPV200249 | CYL9-591-V002 | DIA: 13 mm (1/2") | CLEANING VALVE | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-005-E-C//CONNECTION TYPE : COMBO \| 13 mm (1/2")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |
| CHEMLINE | VABLPV200249 | P9-591-V003 | DIA: 13 mm (1/2") | CLEANING VALVE | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-005-E-C//CONNECTION TYPE : COMBO \| 13 mm (1/2")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |
| CHEMLINE | VABLPV200249 | P9-592-V003 | DIA: 13 mm (1/2") | CLEANING VALVE | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-005-E-C//CONNECTION TYPE : COMBO \| 13 mm (1/2")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |

| SUPPLIER | EQPT CODE | EQPT TAG NO | DIA | DESCRIPTION | INFO 1 | INFO 2 | INFO 3 | APPLIC. | NOTE | REV |
|---|---|---|---|---|---|---|---|---|---|---|
| CHEMLINE | VABLPV200249 | PD9-591-V002 | DIA: 13 mm (1/2") | CLEANING VALVE | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-005-E-C//CONNECTION TYPE : COMBO \| 13 mm (1/2")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |
| CHEMLINE | VABLPV200250 | P9-591-V005 | DIA: 20 mm (3/4") | ISOLATION VALVE (DISCHARGE) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-007-E-S//CONNECTION TYPE : SOCKET \| 20 mm (3/4")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |
| CHEMLINE | VABLPV200250 | PD9-591-V001 | DIA: 20 mm (3/4") | ISOLATION VALVE (DISCHARGE) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-007-E-S//CONNECTION TYPE : SOCKET \| 20 mm (3/4")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |
| CHEMLINE | VABLPV200251 | CYL9-591-V001 | DIA: 25 mm (1") | ISOLATION VALVE (SUCTION) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |
| CHEMLINE | VABLPV200251 | P9-591-V001 | DIA: 25 mm (1") | ISOLATION VALVE (SUCTION) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |

| SUPPLIER | EQPT CODE | EQPT TAG NO | DIA | DESCRIPTION | INFO 1 | INFO 2 | INFO 3 | APPLIC. | NOTE | REV |
|---|---|---|---|---|---|---|---|---|---|---|
| CHEMLINE | VABLPV200251 | P9-591-V002 | DIA: 25 mm (1") | ISOLATION VALVE (SUCTION) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |
| CHEMLINE | VABLPV200251 | P9-591-V004 | DIA: 25 mm (1") | ISOLATION VALVE (DISCHARGE) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |
| CHEMLINE | VABLPV200251 | P9-591-V006 | DIA: 25 mm (1") | ISOLATION VALVE (DISCHARGE) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |
| CHEMLINE | VABLPV200251 | P9-592-V001 | DIA: 25 mm (1") | ISOLATION VALVE (SUCTION) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |
| CHEMLINE | VABLPV200251 | P9-592-V002 | DIA: 25 mm (1") | ISOLATION VALVE (SUCTION) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |

| SUPPLIER | EQPT CODE | EQPT TAG NO | DIA | DESCRIPTION | INFO 1 | INFO 2 | INFO 3 | APPLIC. | NOTE | REV |
|---|---|---|---|---|---|---|---|---|---|---|
| CHEMLINE | VABLPV200251 | P9-592-V004 | DIA: 25 mm (1") | ISOLATION VALVE (DISCHARGE) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |
| CHEMLINE | VABLPV200251 | V9-591 | DIA: 25 mm (1") | ISOLATION VALVE (COMMON SUCTION) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | KMnO4 DOSING SKID | | |

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.

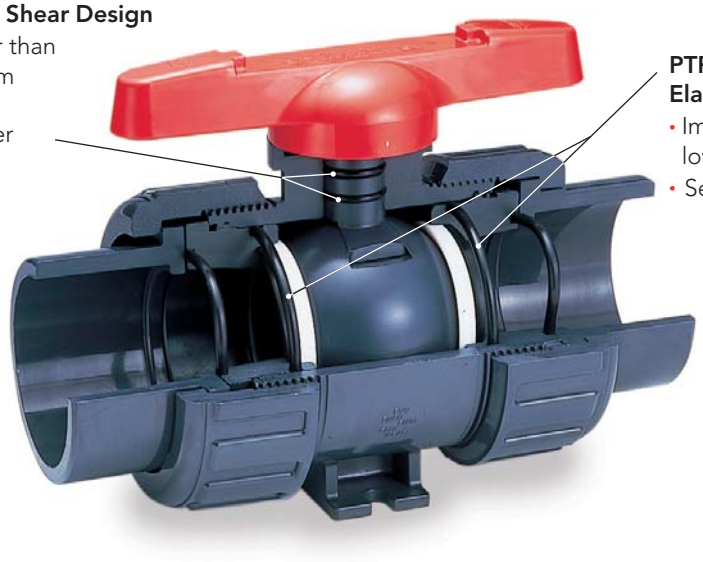
[1] Butt ends for fusion to Chemline metric PP, PVDF or ECTFE (Halar®) piping.
[2] Other materials are available.
[3] CPE=Chlorinated Polyethylene.
[4] PVC, CPVC and PVDF 1/2" to 2" are rated at 230 psi; 2-1/2" to 4" and all size PP valves are rated at 150 psi at 20°C.
[5] PVC valves with EPDM or FKM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

# Type 21 Ball Valves

## features

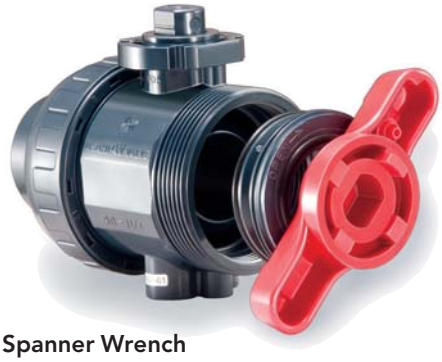
**Double Stem O-Rings – Safety Shear Design**

- 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**

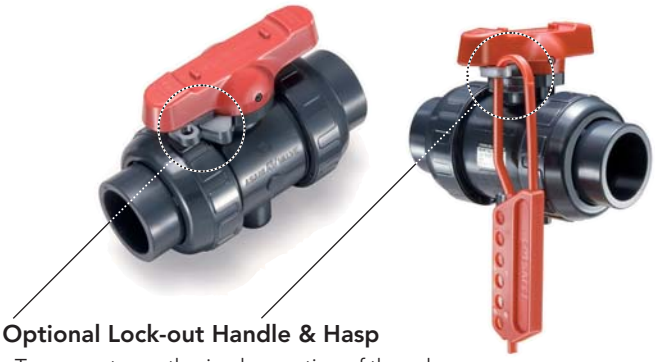
- Optional threaded inserts allow valves to be securely anchored
- Supplied standard with actuated valves

# Type 21 Ball 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

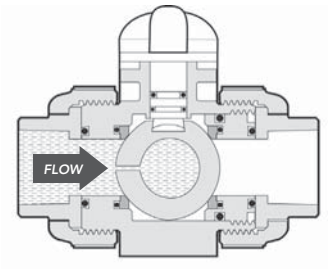
- To prevent unauthorized operation of the valve
- Used during maintenance shut-downs

### 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**

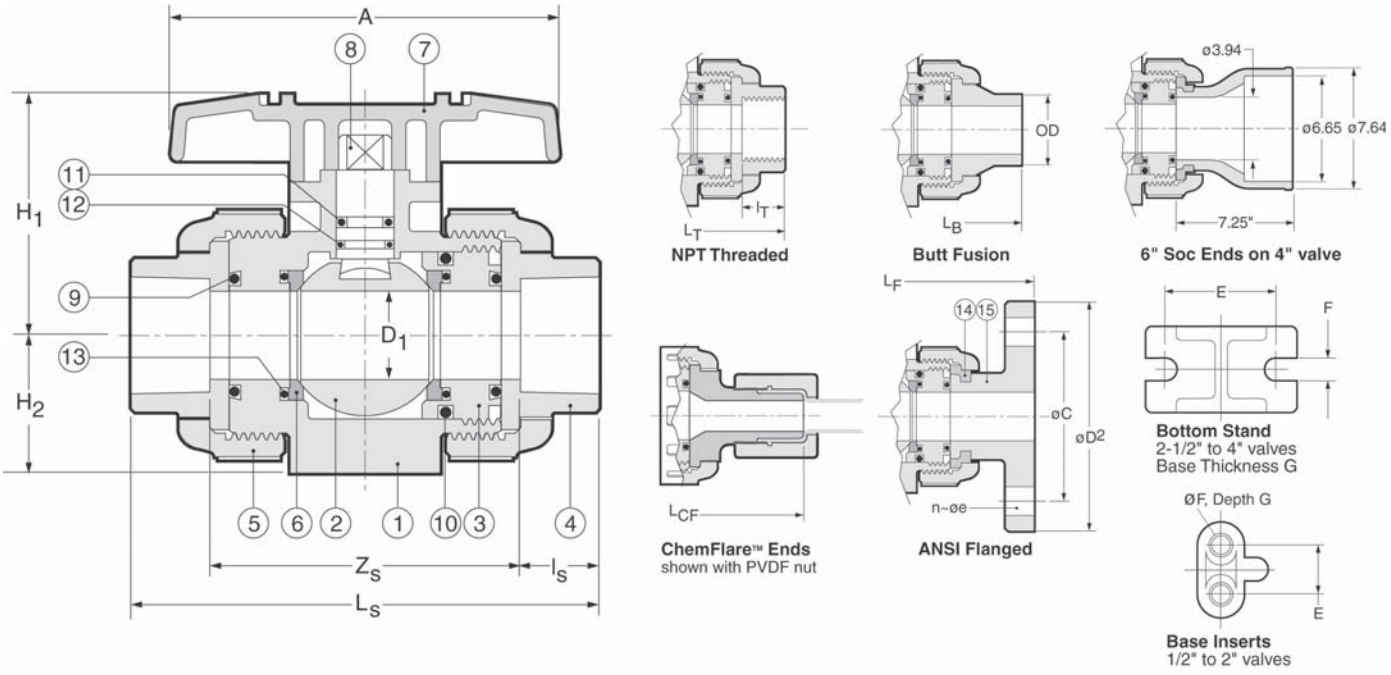
**Q Series Electric**

**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-303-100 : 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 | VARFPV207282 | PRV9-591 | DIA: 25 mm (1") | RELIEF VALVE | TYPE: RELIEF VALVE \| 150#//MANUFACTURER : CHEMLINE//MODEL : SB12A010EU//CONNECTION TYPE : UNION SOCKET \| 25 mm (1")//BODY : PVC// SEAL \| SEAT :EPDM \| EPDM// STEM : N/A | | | KMnO4 DOSING SKID | | |
| CHEMLINE | VARFPV207282 | PRV9-592 | DIA: 25 mm (1") | RELIEF VALVE | TYPE: RELIEF VALVE \| 150#//MANUFACTURER : CHEMLINE//MODEL : SB12A010EU//CONNECTION TYPE : UNION SOCKET \| 25 mm (1")//BODY : PVC// SEAL \| SEAT :EPDM \| EPDM// STEM : N/A | | | KMnO4 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

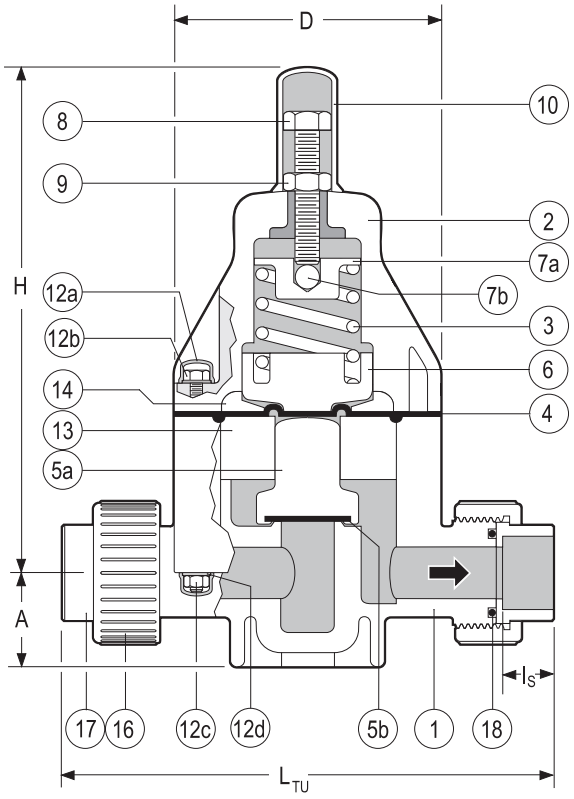
- 1/2" to 2" – 5 to 150 psi
- 2-1/2" and 3" – 7.5 to 150 psi
- 2-1/2" to 4" – 4 to 60 psi (optional)
- 4" – 7.5 to 90 psi

### 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

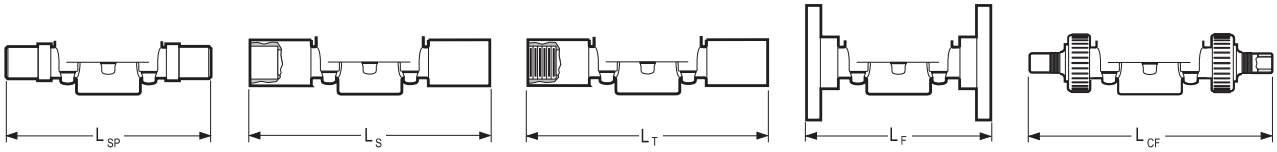
## PARTS

▲ 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

| Size | D | H | PVC A | PVC $I_S$ | PVC $L_{TU}$[2] | PVC $L_{SP}$[3] | PVC $L_S$ | PVC $L_T$ | PVC $L_F$ | PVC $L_{CF}$ | PP and PVDF A | PP and PVDF $L_{SP}$[3] | PP and PVDF $L_{TU}$[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".

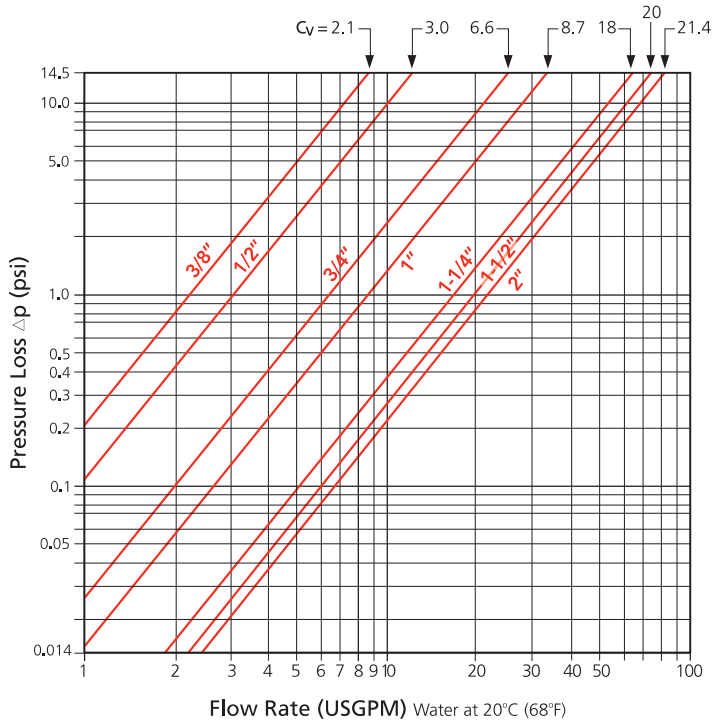
## MAXIMUM PRESSURES PSI

| Size | PVC 20°C 68°F | PVC 30°C 86°F | PVC 40°C 104°F | PVC 50°C 122°F | PP 30°C 86°F | PP 40°C 104°F | PP 50°C 122°F | PP 60°C 140°F | PP 70°C 158°F | PVDF 30°C 86°F | PVDF 50°C 122°F | PVDF 70°C 158°F | PVDF 80°C 176°F | PVDF 90°C 194°F | PVDF 100°C 212°F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/2"– 2" | 150 | 105 | 60 | 15 | 150 | 90 | 60 | 37.5 | 15 | 150 | 100 | 60 | 45 | 30 | 15 |

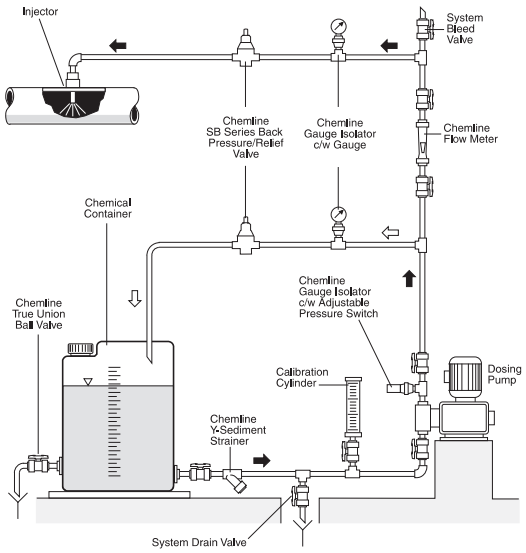
**Temperature Ranges: PVC** 0 to 50°C (32 to 122°F), **PP** 10 to 70°C (50 to 158°F), **PVDF** –30 to 100°C (–22 to 212°F).

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

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

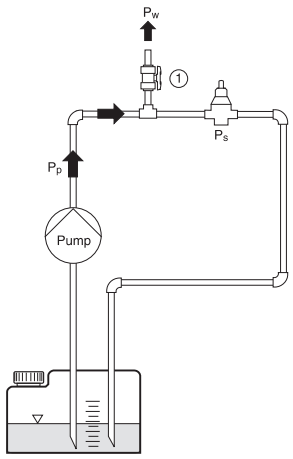



## typical dosing system schematic




## application of pressure relief valves

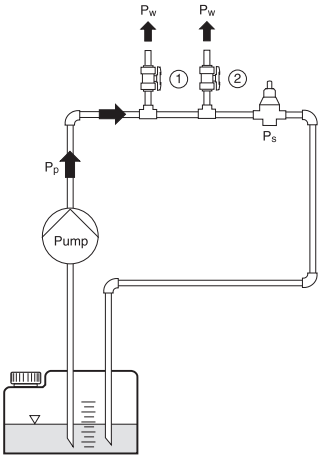
### Constant System Pressure




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

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

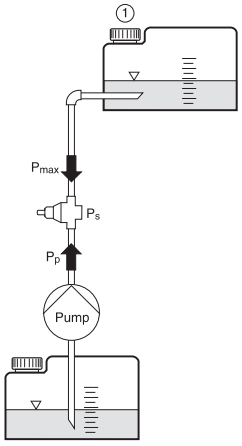
### Consumer 1 and/or 2 Open, Valve Closes




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

### Non-Return Valve

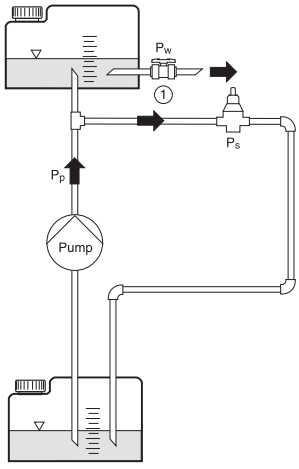
Container 1 is located above the pump




$P_s \geq P_{max}$
$P_p \geq P_s$ → 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

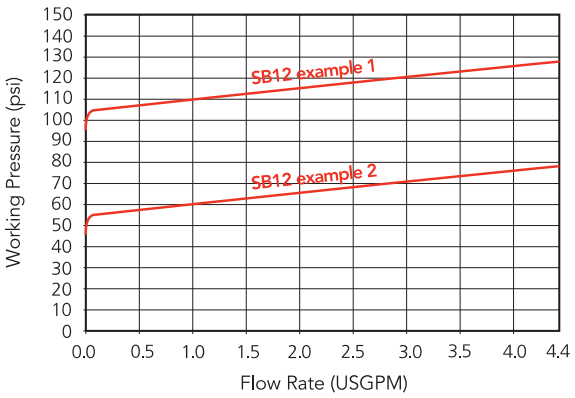
The curves show the relationship between the working pressure and the approximate flow rate through the valve for water at 20°C (68°F) . These values will vary depending on:

- 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.

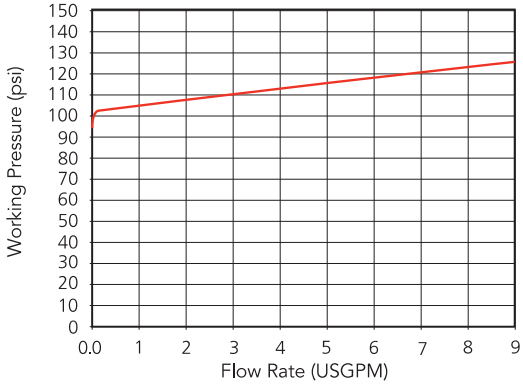
## operation examples

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

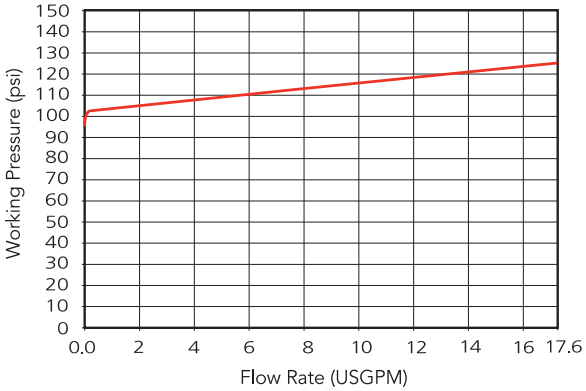
### 3/8" Valves



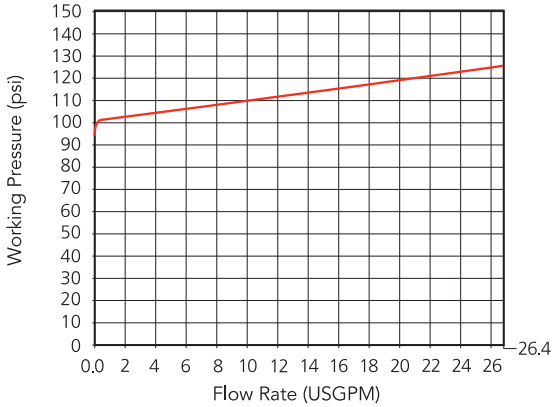

### 1/2" Valves



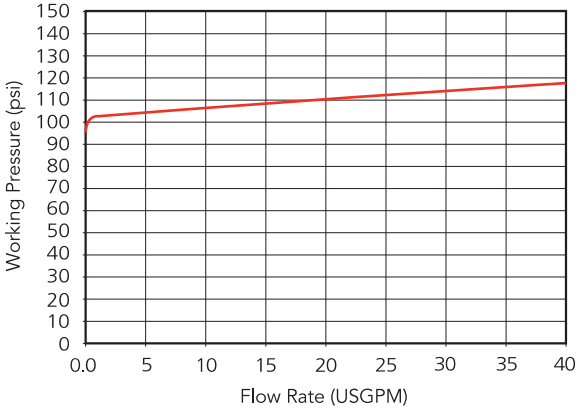

### 3/4" Valves



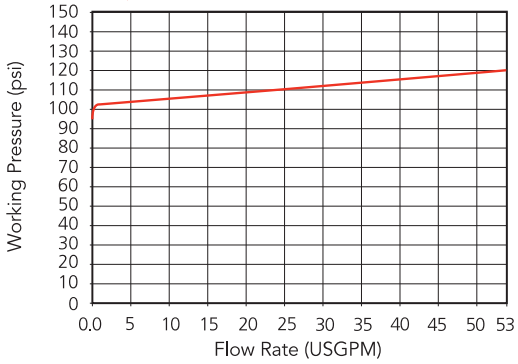

### 1" Valves



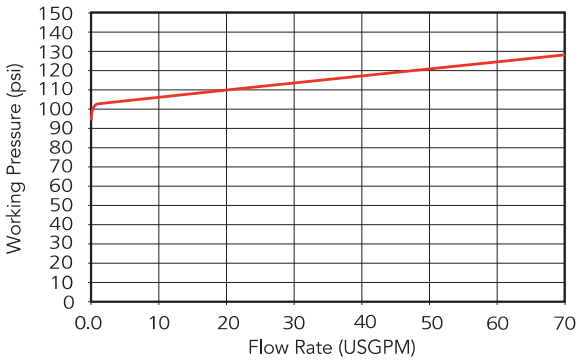

### 1-1/4" Valves



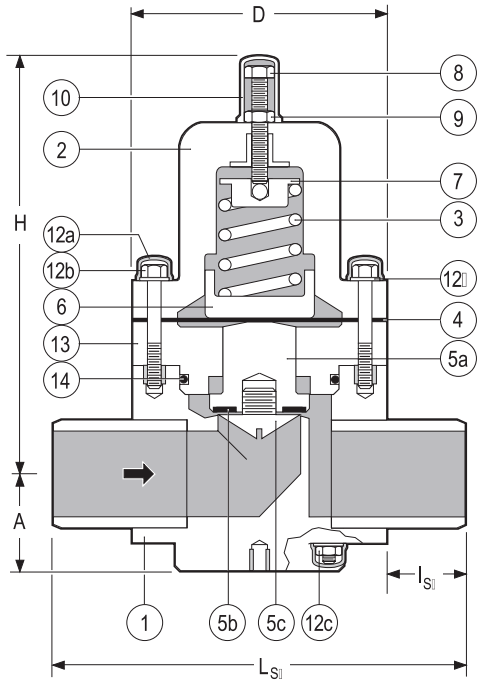

### 1-1/2" Valves




### 2" Valves



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




Spigot Body

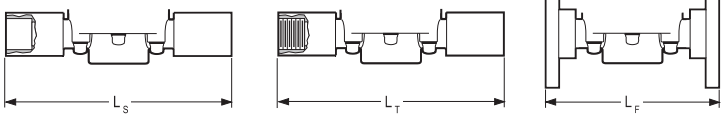
## PARTS

▲ 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

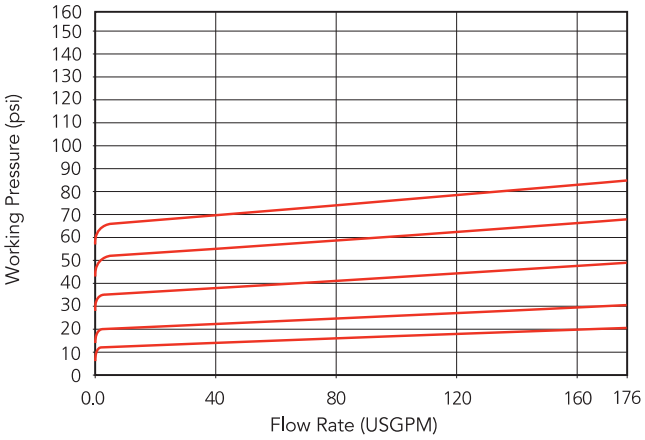
**Optional Pressure Gauge**
- For inlet and/or outlet

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

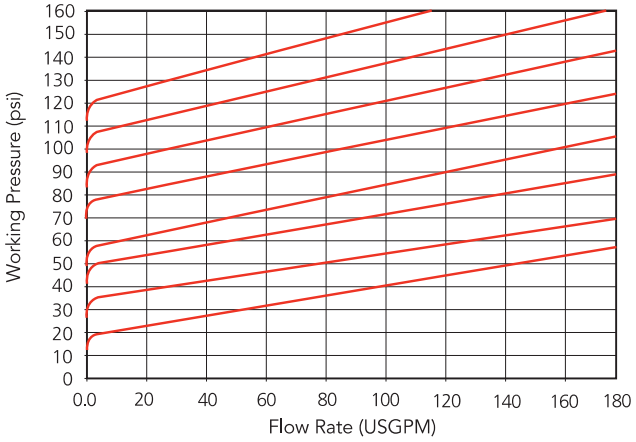
## working pressure vs. flow rate

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

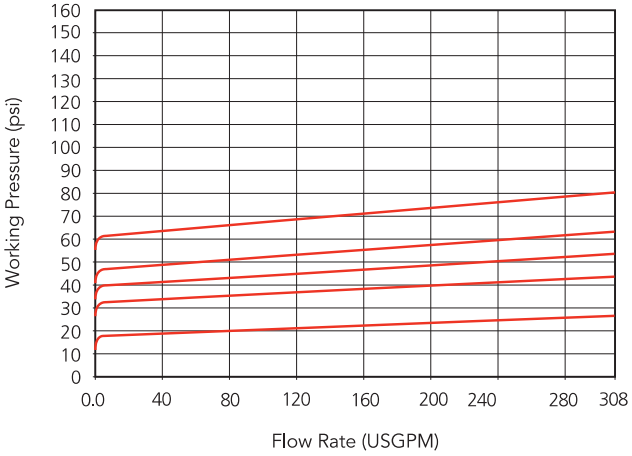
### 2-1/2" Valves / 4 to 60 psi set pressure range



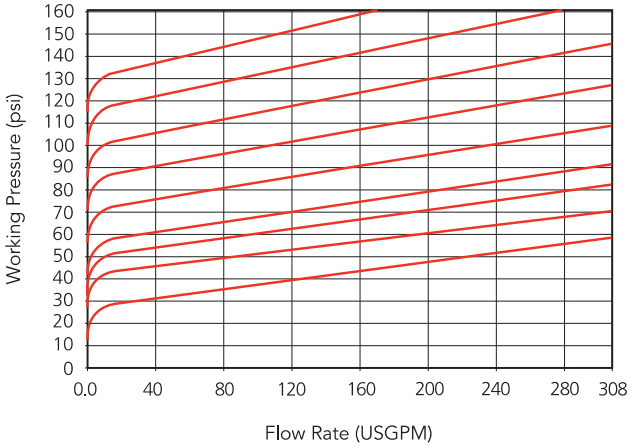

### 2-1/2" Valves / 7.5 to 150 psi set pressure range



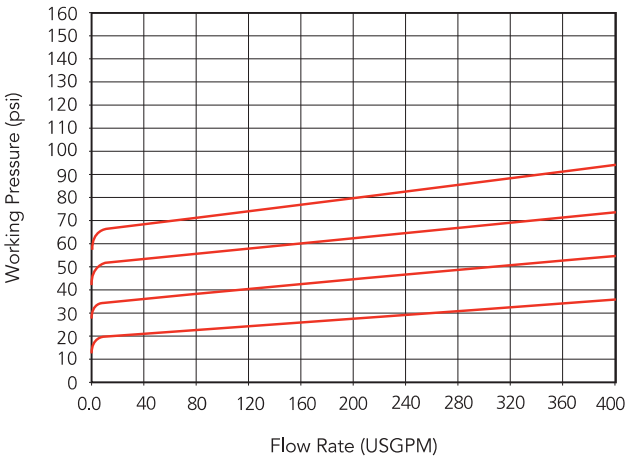

### 3" Valves / 4 to 60 psi set pressure range



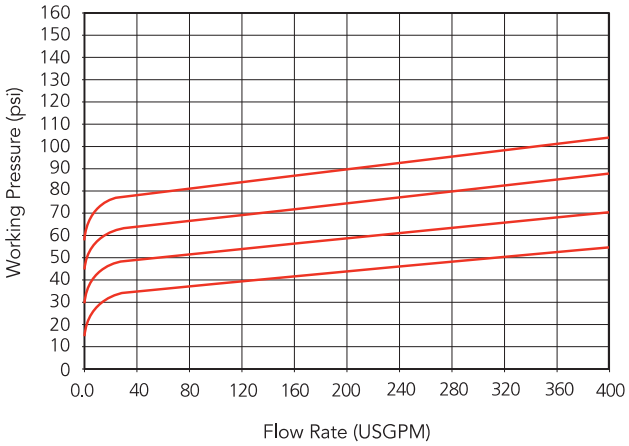

### 3" Valves / 7.5 to 150 psi set pressure range




### 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

# 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 | VARFPV348515 | BPV9-591 | DIA: 20 mm (3/4") | BACKPRESSURE VALVE | TYPE: BACK PRESSURE VALVE \| 150#//MANUFACTURER : CHEMLINE//MODEL : SB12A007EU + SGA-005-002-P-G + P025-160-BM//CONNECTION TYPE : UNION SOCKET \| 18 mm (3/4")//BODY : PVC// SEAL \| SEAT :EPDM \| EPDM// STEM : N/A | (CONFIG. L_U) | | KMnO4 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

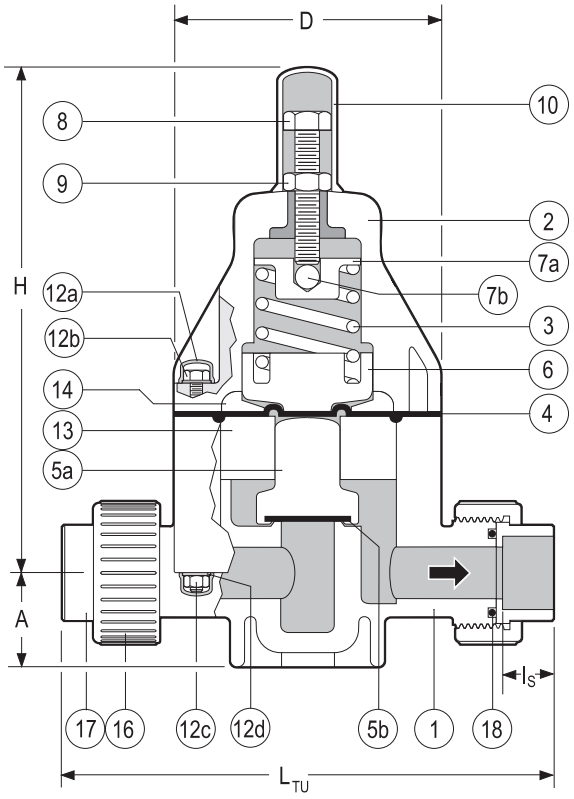
- 1/2" to 2" – 5 to 150 psi
- 2-1/2" and 3" – 7.5 to 150 psi
- 2-1/2" to 4" – 4 to 60 psi (optional)
- 4" – 7.5 to 90 psi

### 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

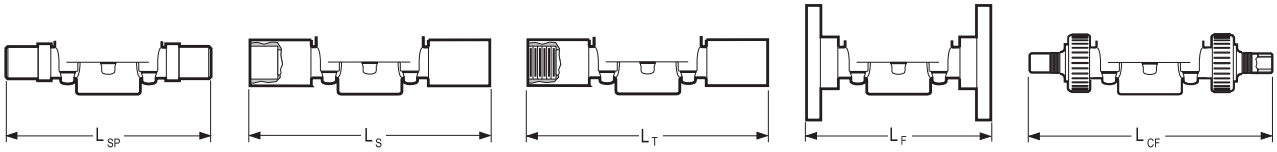
## PARTS

▲ 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

| Size | D | H | PVC A | PVC $I_S$ | PVC $L_{TU}$[2] | PVC $L_{SP}$[3] | PVC $L_S$ | PVC $L_T$ | PVC $L_F$ | PVC $L_{CF}$ | PP and PVDF A | PP and PVDF $L_{SP}$[3] | PP and PVDF $L_{TU}$[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".

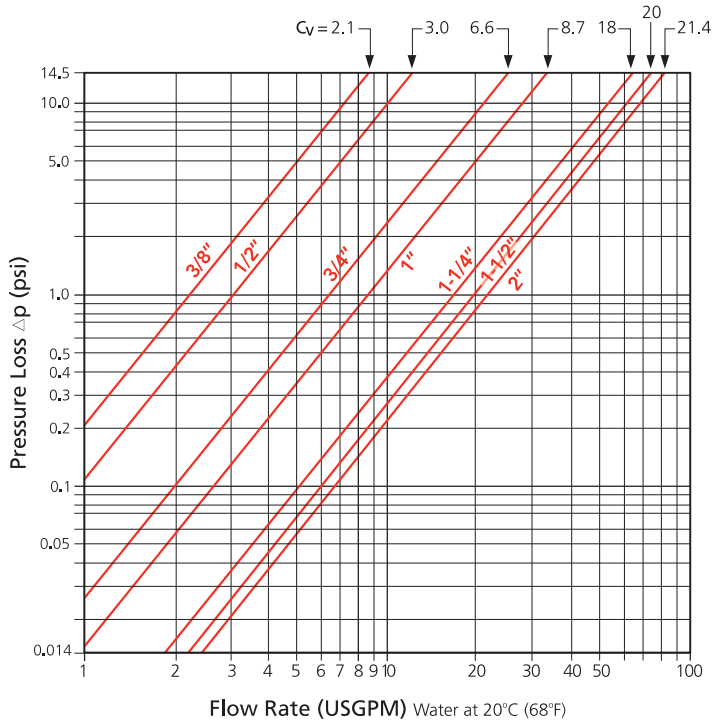
## MAXIMUM PRESSURES PSI

| Size | PVC 20°C 68°F | PVC 30°C 86°F | PVC 40°C 104°F | PVC 50°C 122°F | PP 30°C 86°F | PP 40°C 104°F | PP 50°C 122°F | PP 60°C 140°F | PP 70°C 158°F | PVDF 30°C 86°F | PVDF 50°C 122°F | PVDF 70°C 158°F | PVDF 80°C 176°F | PVDF 90°C 194°F | PVDF 100°C 212°F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/2"– 2" | 150 | 105 | 60 | 15 | 150 | 90 | 60 | 37.5 | 15 | 150 | 100 | 60 | 45 | 30 | 15 |

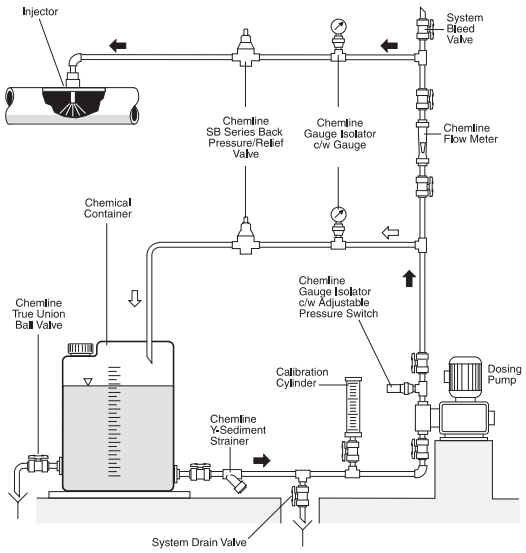
**Temperature Ranges: PVC** 0 to 50°C (32 to 122°F), **PP** 10 to 70°C (50 to 158°F), **PVDF** –30 to 100°C (–22 to 212°F).

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

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

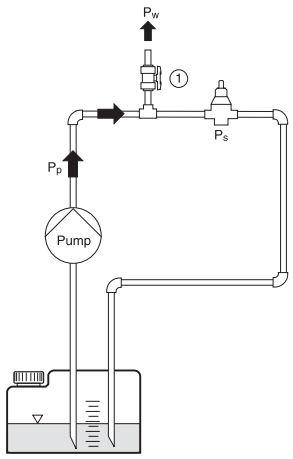



## typical dosing system schematic




## application of pressure relief valves

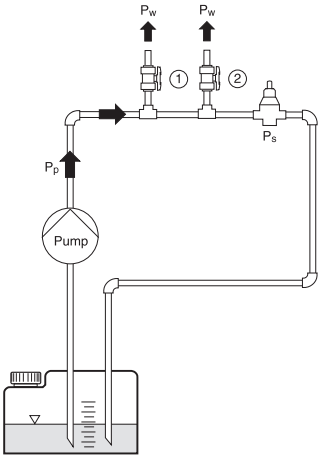
### Constant System Pressure




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

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

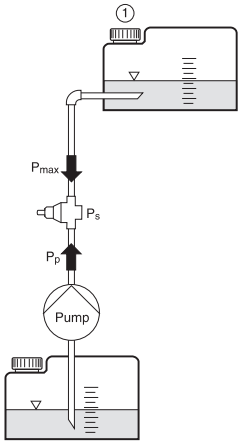
### Consumer 1 and/or 2 Open, Valve Closes




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

### Non-Return Valve

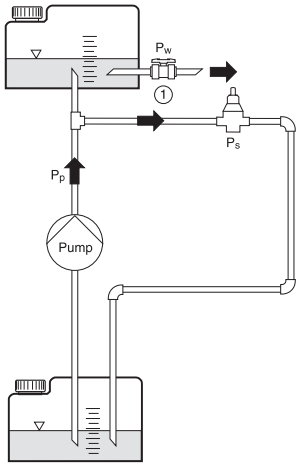
Container 1 is located above the pump




$P_s \geq P_{max}$
$P_p \geq P_s$ → 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

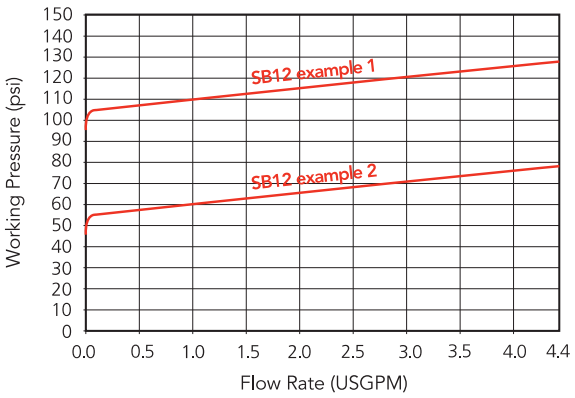
The curves show the relationship between the working pressure and the approximate flow rate through the valve for water at 20°C (68°F) . These values will vary depending on:

- 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.

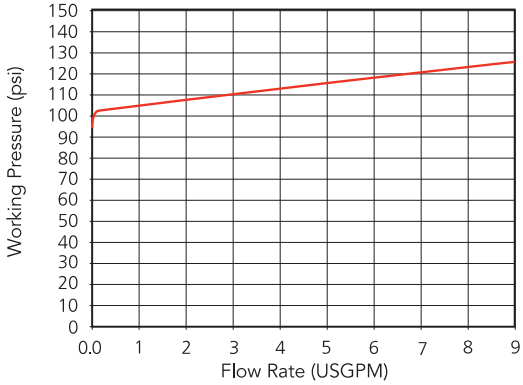
## operation examples

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

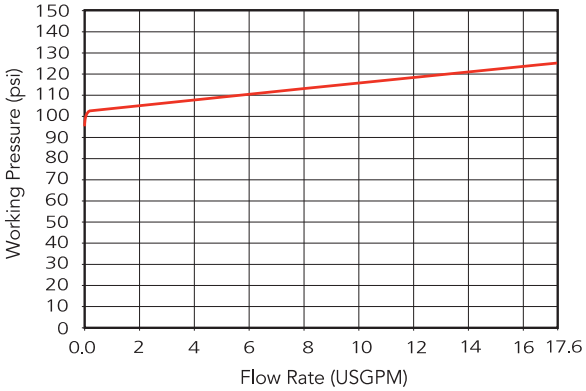
### 3/8" Valves



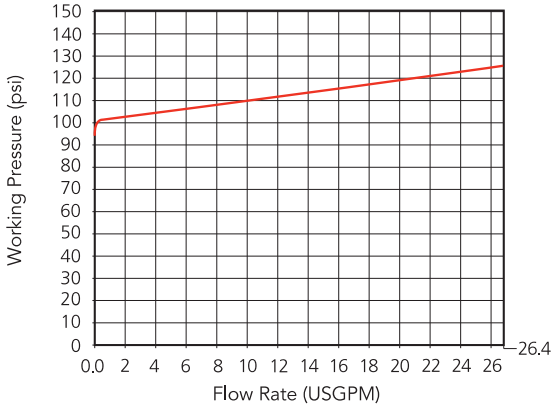

### 1/2" Valves



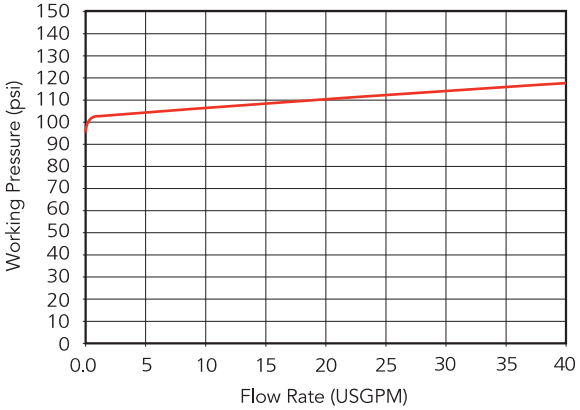

### 3/4" Valves



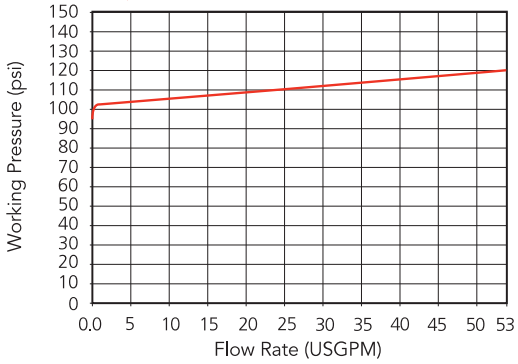

### 1" Valves



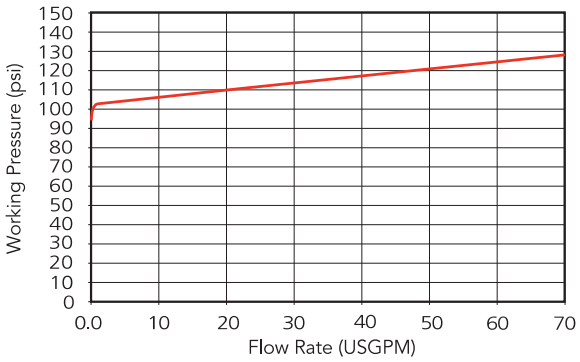

### 1-1/4" Valves



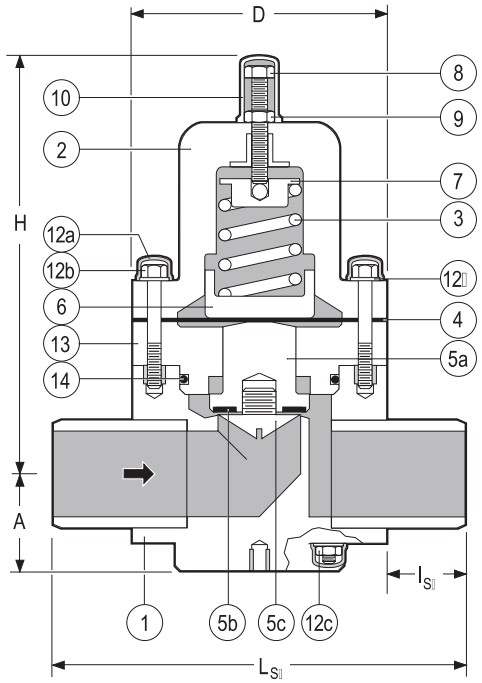

### 1-1/2" Valves




### 2" Valves



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




Spigot Body

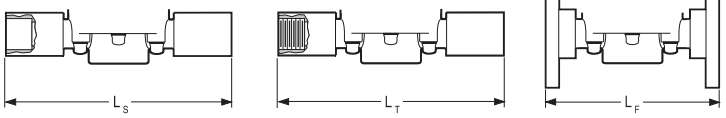
## PARTS

▲ 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

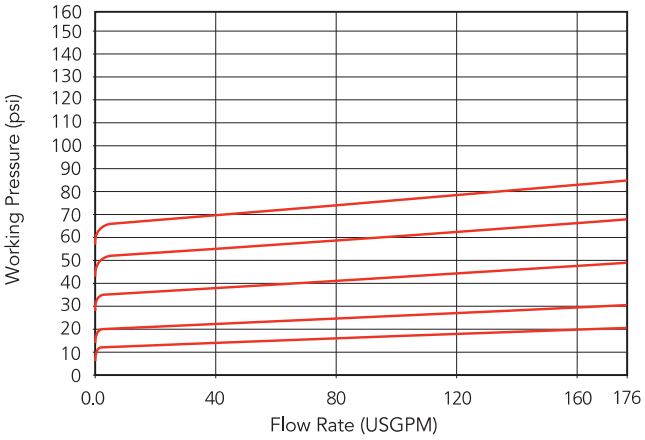
**Optional Pressure Gauge**
- For inlet and/or outlet

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

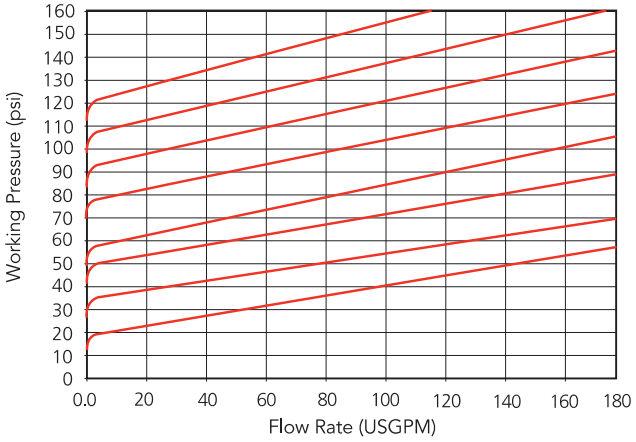
## working pressure vs. flow rate

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

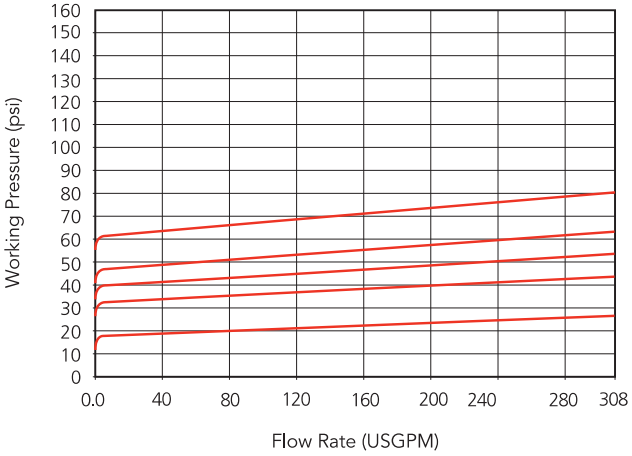
### 2-1/2" Valves / 4 to 60 psi set pressure range



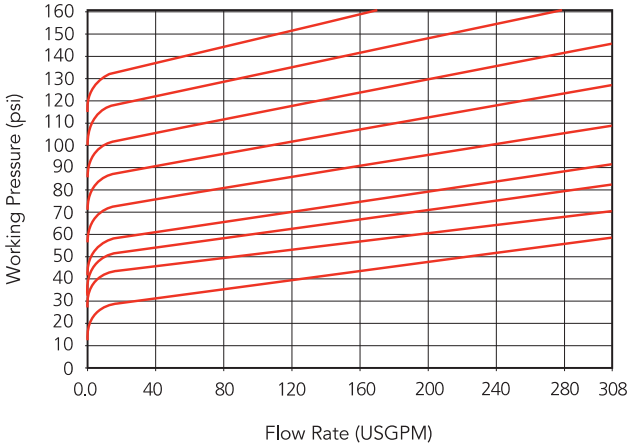

### 2-1/2" Valves / 7.5 to 150 psi set pressure range



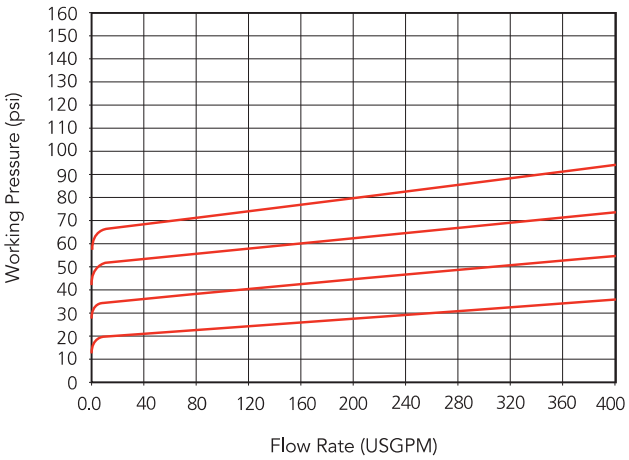

### 3" Valves / 4 to 60 psi set pressure range



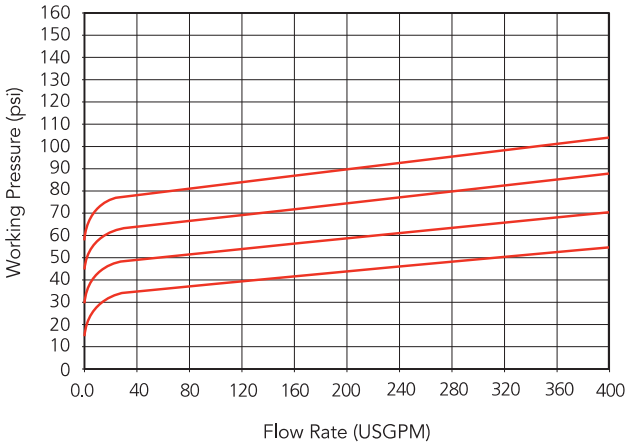

### 3" Valves / 7.5 to 150 psi set pressure range




### 4" Valves / 4 to 60 psi set pressure range




### 4" Valves / 7.5 to 90 psi set pressure range




CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

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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

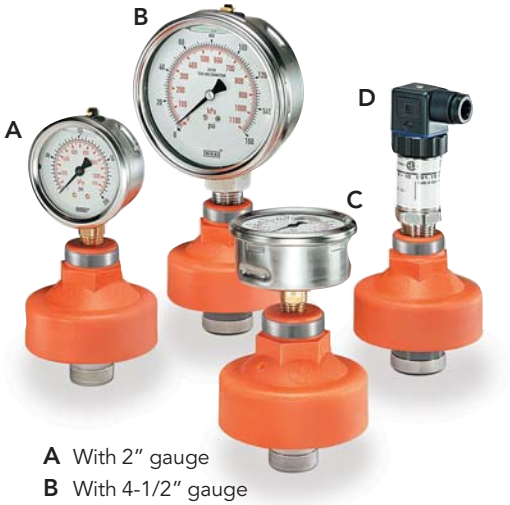
- PPG[3] top chamber
- Heavy wall connection ports

### CRN Registration number by province

- Ontario: OH16085.5

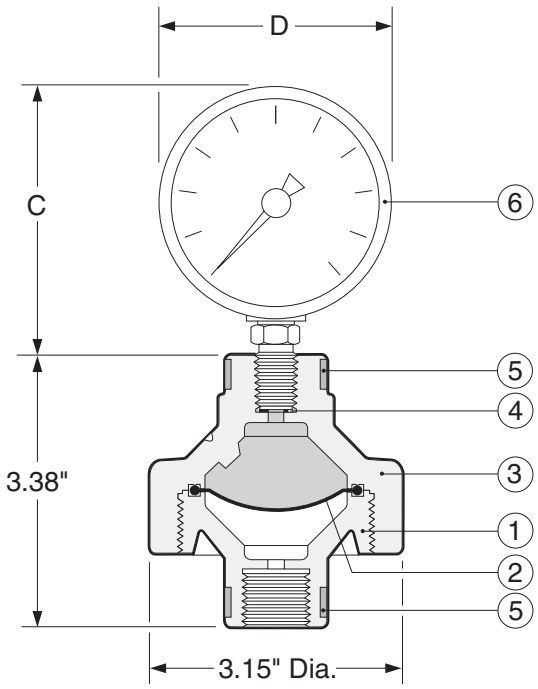
### Optional Gauges

- 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.

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

**Project name:** AMARUQ

**Project#:** 5000218009

**Document #:** SPK_0007_PCH

**by:** GH

**chkd:** GP

**appvd:** CB

# KMnO4 DOSING SKID

# CALIBRATION CYLINDER

**OIM manual section:** 4.3.7.5

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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 | PUSPPV200288 | CYL9-591 | N/A | CALIBRATION CYLINDER | CALIBRATION CYLINDER/MANUFACTURER: PRIMARY FLUID/MODEL: PV2-4000 | N/A | N/A | KMnO4 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***

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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)**

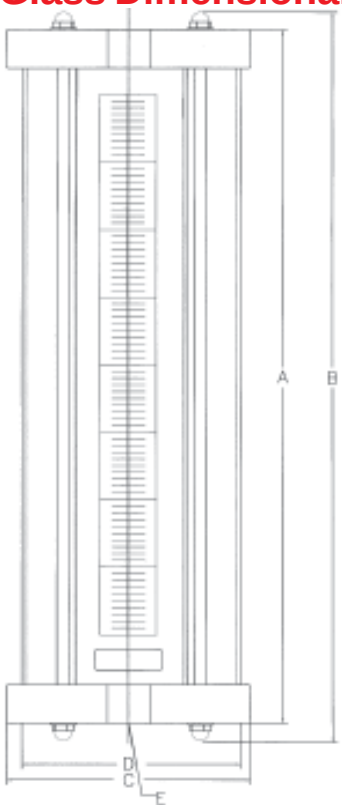
- **different type or size of thread connection, different "O" ring material, different flange material**

**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 |

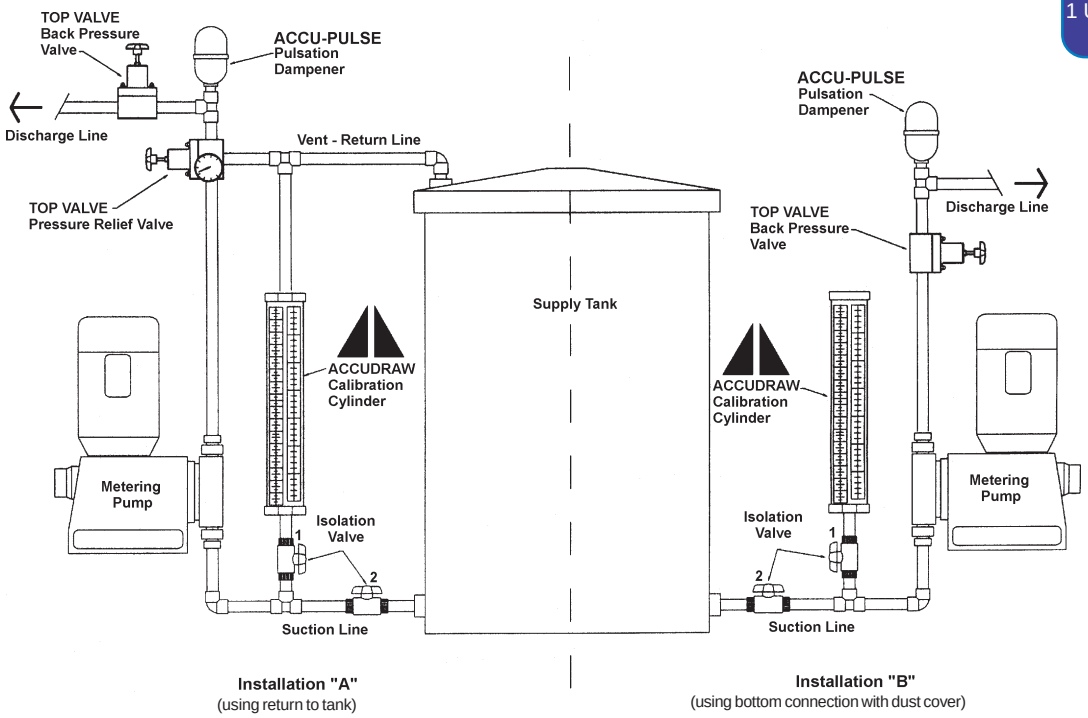
### Glass cylinders with 316 Stainless Steel End Flanges

| 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:**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Tel: (905) 333-8743
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**Distribution Territories Available**

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

**Project name:** AMARUQ

**Project#:** 5000218009

**Document #:** SPK_0007_PCH

**by:** GH

**chkd:** GP

**appvd:** CB

# KMnO4 DOSING SKID

# PULSATION DAMPENER

**OIM manual section:** 4.3.7.6

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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 | PUSPPV304128 | PD9-591 | N/A | PULSTAION DAMPENER | PULSATION DAMPENER/MANUF.: ACCU-PULSE// MODEL: APII-PVC-E-2 | Vol.: 85 in3/Body Mtl: PVC/Bellows Mtl: EPDM (NORDEL)/Size: 3/4" FNPT | N/A | KMnO4 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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**Distribution Territories Available**

# *4 – DETAILED TECHNICAL DOCUMENTATION*

## *4.3 – SHOP DRAWINGS*

## *4.3.8 – COAGULANT DOSING SKID*

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| | |
|---|---|
| **Project name:** | AMARUQ |
| **Project#:** | 5000218009 |
| **Document #:** | SPK_0008_PCH |
| **by:** | GH |
| **chkd:** | GP |
| **appvd:** | CB |

# SUBMITTAL PACKAGE

# COAGULANT DOSING SKID

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| | |
|---|---|
| **Project name:** | AMARUQ |
| **Project#:** | 5000218009 |
| **Document #:** | SPK_0008_PCH |
| **by:** | GH |
| **chkd:** | GP |
| **appvd:** | CB |

# COAGULANT DOSING SKID

# PROCESS DATASHEET

**OIM manual section:** 4.3.8.1

# REFER TO 5000218009_PSDS_0008_PCH_VWT

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|---|---|
| **Project name:** | AMARUQ |
| **Project#:** | 5000218009 |
| **Document #:** | SPK_0008_PCH |
| **by:** | GH |
| **chkd:** | GP |
| **appvd:** | CB |

# COAGULANT DOSING SKID

# GENERAL ARRANGEMENT DRAWING

**OIM manual section:** 4.3.8.2

# REFER TO 5000218009_GA_0008_PCH_VWT

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| | |
|---|---|
| **Project name:** | AMARUQ |
| **Project#:** | 5000218009 |
| **Document #:** | SPK_0008_PCH |
| **by:** | GH |
| **chkd:** | GP |
| **appvd:** | CB |

# COAGULANT DOSING SKID

# PUMP(S)

**OIM manual section:** 4.3.8.3

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# CS-999-004 : 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| PULSAFEEDER | ST-999-004 | P9-513 | | COAGULANT METERING PUMP | Coagulant Shadow pumps // 55BF-EZ000234U6 // 55BF Mechanical Diaphragm, 316/316L Stainless Steel [316], 500 LPH, 75 PSIG, 0000140-MM Diaphragm, NPT Connections, Manual Stroke Length Control, Stock Motor, 1750 RPM, 1 Horsepower, EAR99 | | | COAGULANT DOSING SKID | | |
| PULSAFEEDER | ST-999-004 | P9-514 | | COAGULANT METERING PUMP | Coagulant Shadow pumps // 55BF-EZ000234U6 // 55BF Mechanical Diaphragm, 316/316L Stainless Steel [316], 500 LPH, 75 PSIG, 0000140-MM Diaphragm, NPT Connections, Manual Stroke Length Control, Stock Motor, 1750 RPM, 1 Horsepower, EAR99 | | | COAGULANT DOSING SKID | | |

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PULSAFEEDER®
ENGINEERED PRODUCTS

# PULSAR Shadow®

**The PULSAR Shadow® sets a new standard for the mechanically actuated diaphragm metering pump.** It features rugged and reliable construction, delivering superior value. The Shadow is easy to operate and simple to maintain. The Shadow HYPOPump configuration is the ideal choice for sodium hypochlorite or other off-gassing and difficult to handle fluids.
It is commonly used in water & wastewater treatment.

**Applications**
sodium hypochlorite injection, disinfection, pH and odor control

**Flow**
up to 170 gph (643 lph)

**Pressure**
up to 305 psi (21 bar)

**Temperature**
up to 150°F (65°C)

5 YEAR DRIVE TRAIN WARRANTY

CE • ATEX

## Mechanical diaphragm metering delivers more than you expect.

**PULSAR Shadow HYPOPump**

- The solution for injection of sodium hypochlorite and other off gassing fluids
- Fully integrated closed loop design, no external valves or piping required
- Balanced, low stress, dynamic seal ensures extended operating life
- 3 year HYPO valve warranty

## Features & Benefits

- Mechanically actuated diaphragm for simple maintenance
- Four bolt tie bar design provides ultimate resistance to piping moments and forces
- Three component check valves for controlled rise, assuring proper valve operation, extende valve seat life, and metering accuracy
- Manual self-locking stroke length adjustment with resolution of 0.5% for set point accuracy

## Custom Engineering

- Compatible materials: PVDF
- Multiplex configurations
- Manual Degass Valve
- Custom electronic controls
- Chemical feed systems
- Application consulting

## Specifications

| | |
|---|---|
| Max temp | 150°F (65°C) |
| Min temp | 40°F (4.4°C) |
| Accuracy | ±2% |
| Standards | CE, |

*The dimensions given may differ depending on pump configuration.*

***For More Information, Contact Your Authorized Pulsafeeder Engineered Products Representative***

VISIT OUR REPRESENTATIVE LOOKUP

**Pulsafeeder Engineered Products**
2883 Brighton Henrietta Town Line Rd.
Rochester, NY 14623
Phone: +1 (585) 292-8000
pulsa@idexcorp.com • **pulsa.com**

*Pulsafeeder is an ISO 9001:2008 and 14001:2004 certified company.*

IDEX FLUID & METERING

shdwspec_Rev0814

Spec Pulsafeeder.
Get more than you expect.

# PULSAR SHADOW SERIES
## STATUS: ORDERED

## SPECIFICATION
DATA SHEET

PULSAFEEDER® ENGINEERED PRODUCTS
2883 BRIGHTON-HENRIETTA TL RD.
ROCHESTER, NEW YORK 14623 USA
585-292-8000 FAX 585-424-5619

| CUSTOMER | END USER | SERIAL NO. | DATE |
|---|---|---|---|
| VEOLIA WATER TECHNOLOGIES CANADA INC | VEOLIA WATER TECHNOLOGIES CANADA INC | 18EZ000234U6N1-2 | 4/19/2018 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MODEL NO: 55BF | QTY: 2 | REF. ID NO.: SQEZ000234_1.1.1 | REV: 1 | BY: IPASS2 | | | |
| PURCHASE ORDER NO.: | ITEM REFERENCE: | | | | | | |
| JOB REFERENCE: | PUMP TAG: | | | | | | |
| ITEM NUMBER: 55BF-EZ000234U6 | KOPKIT NUMBER: KK5BF-53631-AATY | DIM DWG. NO.: 25969_000.PDF | FLOW CURVE NO.: EZ000234U6~1~PFC~000~PMP.PDF | | | | |

| JOB CONDITIONS | | | | | | | |
|---|---|---|---|---|---|---|---|
| LIQUID: COAGULANT | | | | FLOW MAX: 500.0000 LPH | | FLOW MIN: 0.00 LPH | |
| LIQUID TEMPERATURE: 75 F | OPERATING PRESS. (MAX) (1): 75.00 PSIG | | | SPECIFIC GRAVITY: 0 | | PERCENT SOLIDS: 0 | |
| VAPOR PRESSURE @ TEMP.: 0 PSIA | SUCTION PRESSURE (2): PSIG | | | VISCOSITY @ TEMP: 0 CP | | SOLIDS SIZE (MICRON): 0 | |
| DUTY CYCLE: CONTINUOUS | ATMOSPHERIC PRESSURE: 14.7 PSIA | | | NPSH: 5 PSIA | | | |

**PULSAR NOTES: (1) MUST BE AT LEAST 5 PSI (0.35 BAR) ABOVE SUCTION PRESSURE, (2) MUST BE AT LEAST 5.0 PSIA (0.35 BAR(A)) AND 3 PSI (0.21 BAR) ABOVE FLUID VAPOR PRESSURE.**

COMMENTS:

| SPECIFICATIONS | | | | | | | |
|---|---|---|---|---|---|---|---|
| BUILD TO API STDS: NO | HIGH VISCOSITY: NO | DISH SIZE: CF | MULTIPLEX ARRANGEMENT: SIMPLEX | | | | |
| RATED CAPACITY: 507.24 LPH | VALVE TYPE: BALL | GEAR RATIO: 12.5:1 | PISTON SIZE: NA | | | | |
| RATED PRESSURE: 75 PSIG | SUCTION VALVE QTY: 1 | SUCTION VALVE SIZE: 20 MM | MECH. DIAPHRAGM SIZE: 140 MM | | | | |
| HYD. BY-PASS VALVE SET: | DISCHARGE VALVE QTY: 1 | DISCHARGE VALVE SIZE: 20 MM | STROKE LENGTH: 5 MM | | | | |
| SUCTION CONNECTION: MNPT | SUCTION CONNECTION SIZE: 1.5 INCH | SUCTION FLANGE RATING: | STROKE RATE: 140 SPM | | | | |
| DISCHARGE CONNECTION: FNPT | DISCHARGE CONNECTION SIZE: 1 INCH | DISCH. FLANGE RATING: | CE/CE-ATEX: NONE | TRCU010: NO | | | |
| HYD/GEAR OIL: PULSALUBE ULTRA 8GS/PULSALUBE PREMIUM 9M | GEAR OIL: PULSALUBE ULTRA 8GS | GEARBOX MTL: ALUMINUM | TRCU012: NO | | | | |
| COMMENTS: | | | | | | | |

| MATERIALS | | | | | | | |
|---|---|---|---|---|---|---|---|
| VALVE BALL/DISC: 316 SS | VALVE GASKETS: PTFE | VALVE CAP: 316/316L | VALVE GUIDE: 316/316L | | | | |
| VALVE SEAT: 316/316L | VALVE SEAT TYPE: HARD | REAGENT HEAD: 316/316L | PASSIVATE: | FLANGE: | | | |
| DIAPHRAGM: PTFE/HYP | DIAPHRAGM TYPE: MECH | DIAPHRAGM GASKET: | HARDWARE (HEAD/TIEBAR): STAINLESS | | | | |
| DOUBLE DIAPHRAGM: NO | INTERMEDIATE HEAD: | INTERMEDIATE DIAPHRAGM: | INTERMEDIATE FLUID: | | | | |

**MATERIALS NOTE: THE END USER, WITH KNOWLEDGE OF PUMPED CHEMICAL, OPERATING AND ENVIROMENTAL CONDITIONS, IS RESPONSIBLE FOR THE FINAL SELECTION OF ALL RELATED MATERIALS.**

COMMENTS:

| LEAK DETECTION | | | |
|---|---|---|---|
| SETUP: | OPTION: | TYPE: | |
| ENCLOSURE: | VOLTAGE: | OPTION: | |
| COMMENTS: | | | |

| FEATURES | | |
|---|---|---|
| DEGAS VALVE: | | HYPO SYSTEM VOLTAGE: |
| SPLASH GUARDS: NO | PUMP BASE MATERIAL: STEEL | SPECIAL OPTIONS: |

| CONTROLS | | | | | | | |
|---|---|---|---|---|---|---|---|
| TYPE: MANUAL STROKE LENGTH CONTROL | DEVICE: STROKE LENGTH CONTROLLER | ITEM NUMBER: | | | | | |
| VOLTAGE: | INPUT SIGNAL: | OUTPUT SIGNAL: | ENCLOSURE: | | | | |
| ENGINEERING NO.: | WIRING NO.: | EUROPEAN RATING: | REMOTE CABLE: | | | | |
| OP STATION: | METER READ OUT: | OP STATION ENCLOSURE: | OP PUMP MOUNT: | | | | |
| OP STATION-PART NO.: | OP STATION INST DWG. NO.: | OP STATION WIRING NO.: | | | | | |
| PNEUMATIC SERVICE TYPE: | RATIO CTL.: | TRANSDUCER: | REMOTE LOAD STN: | AUTO/MAN: | FILTER REG.: | | |
| COMMENTS: | | | | | | | |

| DRIVE | | | | |
|---|---|---|---|---|
| CURRENT: | VOLTAGE: | DRIVE ENCL.: | AGENCY APPROVAL: | |
| INPUT SIGNAL: | OUTPUT SIGNAL: | WIRING DIAGRAM: | | |

| MOTOR | | | | | | | |
|---|---|---|---|---|---|---|---|
| MOTOR INFO: PUMP COMPLETE WITH MOTOR | | | | | | | |
| POWER: 1.0 HP | VOLTAGE: 575 | HZ: 60 | PHASE: 3 | TYPE: AC | SPEED: 1750 | FRAME: 56C | |
| MANUFACTURER: BALDOR | MOTOR NO.: | ENCLOSURE: TOTALLY ENCLOSED | MOTOR TYPE: STANDARD EFFICIENCY | | | | |
| DESCRIPTION: BALDOR, GENERAL PURPOSE, 575V, 60HZ, 3PH, INVERTER READY VEM3546-5 | | | | | | | |

**MOTOR NOTE: SPEED IS NOMINAL FULL LOAD. ACTUAL NAMEPLATE SPEED MAY VARY BY +/- 3% DEPENDING ON MOTOR MANUFACTURER. CONSULT MOTOR SPECIFICATION FOR ACTUAL NAMEPLATE RATINGS.**

COMMENTS:

| PAINT | | | | | |
|---|---|---|---|---|---|
| MFG & BRAND: DEVOE DEVRAN 224V | TOP COAT: TWO-PART EPOXY | TOP COAT COLOR: BLACK | PAINT THICKNESS: SINGLE (1.5 MILS DFT) | | |
| INTERMEDIATE COAT: | PRIMER COLOR: | PAINT WET END: NO | SAND BLAST: | DFT CERT.: | |
| COMMENTS: | | | | | |

| TEST | | | | | | |
|---|---|---|---|---|---|---|
| STANDARD TEST: | PERFORMANCE (1-PT): YES | CALIBRATION (3-PT): NO | HYDROSTATIC (15MIN): NO | WITNESSED: NO | JOB INSPECTION: NO | |
| API 675 TESTING (W=WITNESSED) | PERFORMANCE [STROKE] (3-PT): | REPEATABILITY (+2-PT): | HYDROSTATIC (30MIN): | SOUND LEVEL: | JOB INSPECTION: | |
| | PERFORMANCE [SPEED] (3-PT): | HIGH DISCHARGE PRESURE: | MECHANICAL RUN: | CHLORIDE CONT.: | NPIP TEST: | |
| MILL (MTL) CERTS: NO | POSITIVE MTL. ID (PMI): NO | CERT. OF CONF. NO | RADIOGRAPHIC-PROCESS SIDE: | RADIOGRAPHIC-DRIVE SIDE: | LIQUID PENETRANT: | |
| COMMENTS: | | | | | | |

| DOCUMENTATION | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| API 675 CERTIFICATE: NO | | TEST REPORT: YES | | MILL (MTL) CERTIFICATE: NO | | CONFORMANCE CERT.: NO | | MANUAL (IOM): YES | |
| PUMP DIM DRAWING: NO | MOTOR DIM DRAWING: NO | FLOW CURVE: NO | | PMI TEST CERTIFICATE: NO | | CERTIFICATE OF ORIGIN: NO | | ISO CERTIFICATES: NO | |
| PARTS LIST: NO | MOTOR WIRING DIA.: NO | CALIBRATION CURVE: NO | | MTL. COMPLIANCE CERT.: NO | | ACCESSORY DIM DRAWING: NO | | PROCESS DOCUMENTS: NO | |
| KOPKIT INFORMATION: NO | CONTROL WIRING DIA.: NO | HYDRO TEST REPORT: NO | | SPEC. COMPLIANCE CERT.: NO | | ACCESSORY CUT SHEETS: NO | | WEB LINKS: NO | |

| OTHER | | | | | |
|---|---|---|---|---|---|
| EXPORT CONTROL CLASS: EAR99 | EXP. LICENSE CANDIDATE: | 6-MONTH STORAGE: | PACKING: STANDARD | OIL:2/0 KK: 1 | |
| COMMENTS: | | | | ACC: NO TYP: C | |

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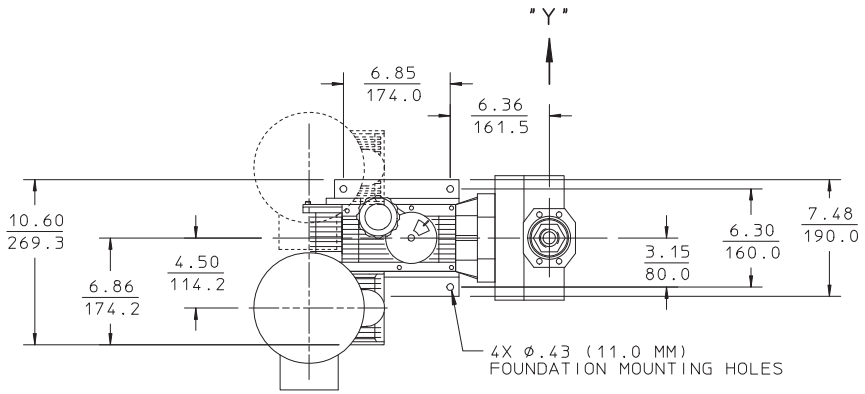
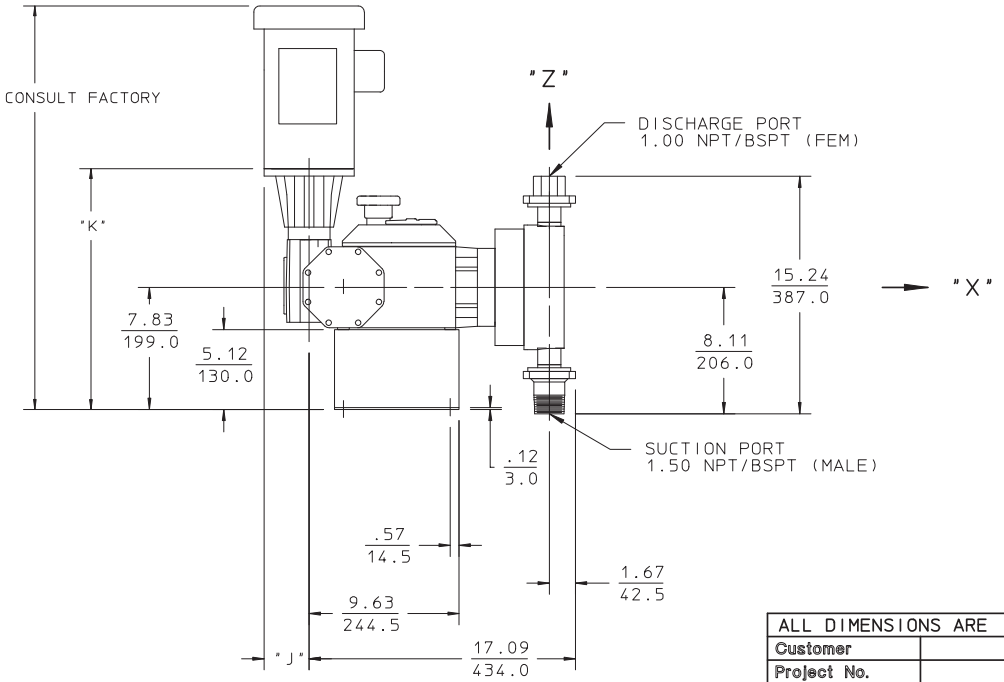
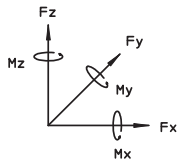
18EZ000234U6N1-2

*18EZ000234U6N1-2*




| FORCES STATIC & DYNAMIC | | SUCTION | DISCHARGE |
|---|---|---|---|
| NOZZLE FORCES | Fx(LB) | 15 | 15 |
| | Fy(LB) | 15 | 15 |
| | Fz(LB) | 45 | 45 |
| NOZZLE FORCES | Mx(FT-LB) | 15 | 15 |
| | My(FT-LB) | 15 | 15 |
| | Mz(FT-LB) | 15 | 15 |

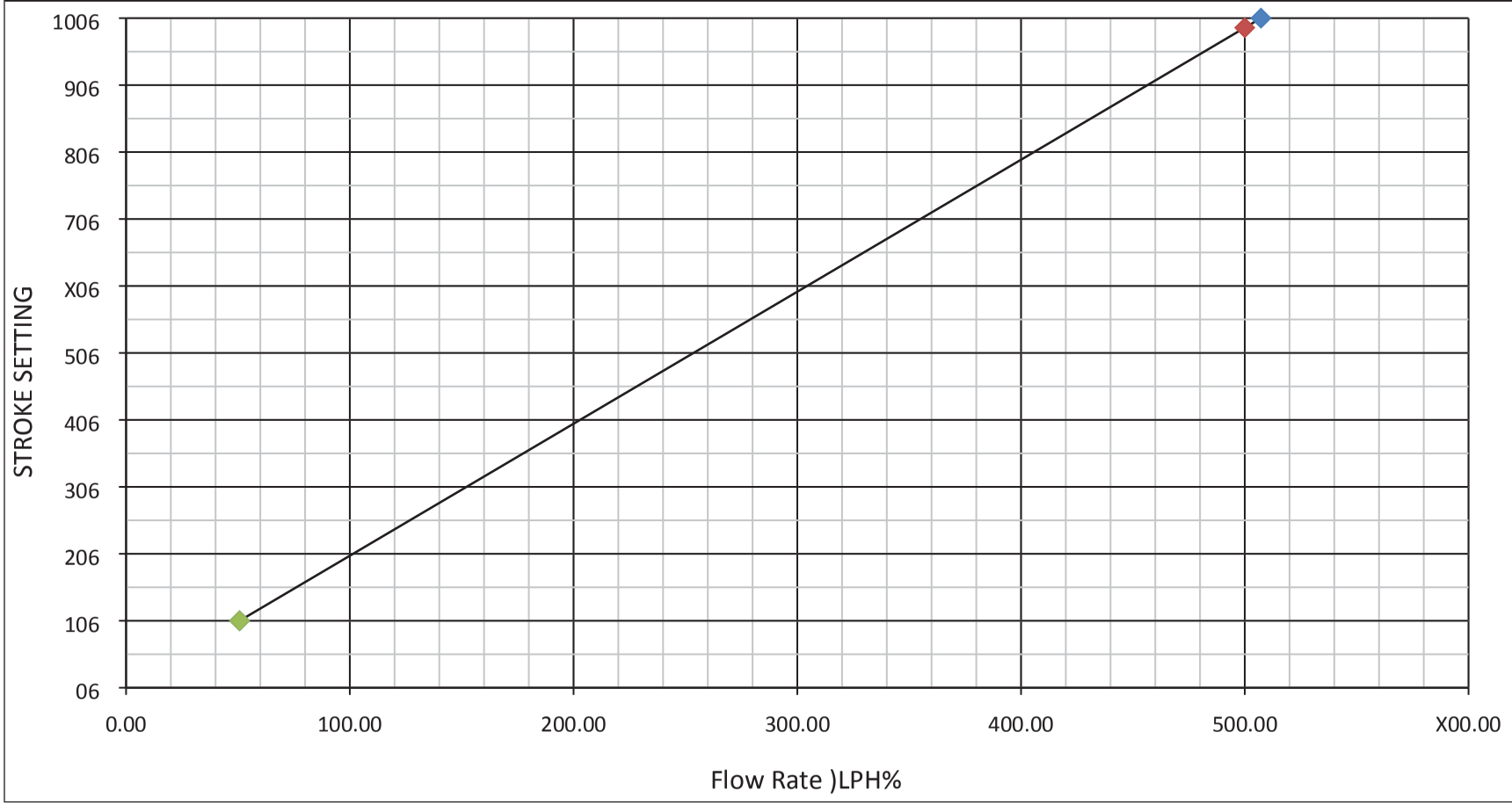
| MOTOR FRAME | "J" | "K" |
|---|---|---|
| 56C | 2.89<br>73.5 | 15.4<br>392.0 |
| 80 | 2.36<br>60.0 | 14.9<br>379.0 |
| 71 | 2.07<br>52.5 | 14.5<br>369.0 |
| 143TC<br>145TC | 2.89<br>73.5 | 15.4<br>392.0 |
| 182C<br>184C | 2.89<br>73.5 | 15.4<br>392.0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ALL DIMENSIONS ARE IN INCHES/mm | | RHA: E HEAD SGL VALVE | | SCALE: 1:8 | | Item – No. | |
| Customer | | | | | | Model | 55BF – METAL |
| Project No. | | | | | | Motor Pwr/Fr | SEE CHART |
| Po No./SO No. | | | | | | Unit Weight | lb kg |
| CONNECTIONS: HP/GP OR HB/GB | | | | | | PULSAR SHADOW | PULSAFEEDER A Unit of IDEX Corporation |
| | | | | | Name | Date | |
| A | UPDATED DWG FORMAT | KMG | 02/28/14 | Drawn | KMG | 04/06/09 | Drawing No. 25969–000 |
| Rev | Revision Description | Name | Date | Checked | KMG | 04/06/09 | |

PULSAFEEDER
ENGINEERED PRODUCTS

# PUMP PERFORMANCE CURVE

| PUMP DATA | | ORDER DATA | |
|---|---|---|---|
| MODEL NUMBER: | 55BF | CUSTOMER: | VEOLIA WATER TECHNOLOGIES CANADA INC |
| PISTON DIAMETER: | NA | CUSTOMER PO: | 18000751HD |
| STROKING RATE: | 140 SPM | CUSTOMER ITEM: | P9-514/5 |
| RATED PRESSURE: | 75 PSIG | PART NUMBER: | 55BF-EZ000234UX |
| MA( IMUM RATED FLOW ) ◆ % | **507.24 LPH (100%)** | SERIAL NUMBER: | |
| MINIMUM RATED FLOW ) ◆ % | 50.7 LPH )106 % | DATED: | 4/19/2018 |
| E( PECTED OPERATING POINT ) ◆ % | 500.0 LPH )98.X6 % | TAGGING: | |



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TSEZ000234-001

BALDOR • RELIANCE

# Product Information Packet

# PULSAFEEDER, INC.

# VEM3546-5

## 1HP,1760RPM,3PH,60HZ,56C,3520M,TEFC,F1,N

## Part Detail

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Revision:** | M | **Status:** | PRD/A | **Change #:** | | **Proprietary:** | No |
| **Type:** | AC | **Elec. Spec:** | 35WGM849 | **CD Diagram:** | CD0006 | **Mfg Plant:** | |
| **Mech. Spec:** | 35A013 | **Layout:** | 35LYA013 | **Poles:** | 04 | **Created Date:** | 10-22-2011 |
| **Base:** | N | **Eff. Date:** | 03-02-2018 | **Leads:** | 3#18 | | |

## Specs

| | | | |
|---|---|---|---|
| **Catalog Number:** | VEM3546-5 | **Inverter Code:** | Inverter Ready |
| **Enclosure:** | TEFC | **KVA Code:** | L |
| **Frame:** | 56C | **Lifting Lugs:** | No Lifting Lugs |
| **Frame Material:** | Steel | **Locked Bearing Indicator:** | Locked Bearing |
| **Output @ Frequency:** | 1.000 HP @ 60 HZ | **Motor Lead Quantity/Wire Size:** | 3 @ 18 AWG |
| **Synchronous Speed @ Frequency:** | 1800 RPM @ 60 HZ | **Motor Lead Exit:** | Ko Box |
| **Voltage @ Frequency:** | 575.0 V @ 60 HZ | **Motor Lead Termination:** | Flying Leads |
| **XP Class and Group:** | None | **Motor Type:** | 3520M |
| **XP Division:** | Not Applicable | **Mounting Arrangement:** | F1 |
| **Agency Approvals:** | CSA | **Power Factor:** | 71 |
| | CSA EEV | **Product Family:** | General Purpose |
| | UR | **Pulley End Bearing Type:** | Ball |
| **Auxillary Box:** | No Auxillary Box | **Pulley Face Code:** | C-Face |
| **Auxillary Box Lead Termination:** | None | **Pulley Shaft Indicator:** | Standard |
| **Base Indicator:** | No Mounting | **Rodent Screen:** | None |
| **Bearing Grease Type:** | Polyrex EM (-20F +300F) | **RoHS Status:** | ROHS COMPLIANT |
| **Blower:** | None | **Shaft Extension Location:** | Pulley End |
| **Current @ Voltage:** | 1.200 A @ 575.0 V | **Shaft Ground Indicator:** | No Shaft Grounding |

| | |
|---|---|
| **Design Code:** | B |
| **Drip Cover:** | No Drip Cover |
| **Duty Rating:** | CONT |
| **Electrically Isolated Bearing:** | Not Electrically Isolated |
| **Feedback Device:** | NO FEEDBACK |
| **Front Face Code:** | Standard |
| **Front Shaft Indicator:** | None |
| **Heater Indicator:** | No Heater |
| **Insulation Class:** | F |

| | |
|---|---|
| **Shaft Rotation:** | Reversible |
| **Shaft Slinger Indicator:** | No Slinger |
| **Speed Code:** | Single Speed |
| **Motor Standards:** | NEMA |
| **Starting Method:** | Direct on line |
| **Thermal Device - Bearing:** | None |
| **Thermal Device - Winding:** | None |
| **Vibration Sensor Indicator:** | No Vibration Sensor |
| **Winding Thermal 1:** | None |
| **Winding Thermal 2:** | None |

## Nameplate NP3441L

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **CAT.NO.** | VEM3546-5 | | | | | | | | |
| **SPEC.** | 35A013M849G1 | | | | | | | | |
| **HP** | 1 | | | | | | | | |
| **VOLTS** | 575 | | | | | | | | |
| **AMP** | 1.2 | | | | | | | | |
| **RPM** | 1760 | | | | | | | | |
| **FRAME** | 56C | **HZ** | 60 | | | **PH** | 3 | | |
| **SER.F.** | 1.15 | **CODE** | L | **DES** | B | **CL** | F | | |
| **NEMA-NOM-EFF** | 85.5 | **PF** | 71 | | | | | | |
| **RATING** | 40C AMB-CONT | | | | | | | | |
| **CC** | 010A | | | **USABLE AT 208V** | | | | | |
| **DE** | 6205 | **ODE** | 6203 | | | | | | |
| **ENCL** | TEFC | **SN** | | | | | | | |
| **VPWM INVERTER READY** | | | | | | | | | |
| **CT6-60H(10:1)VT3-60H(20:1** | | | | | | | | | |

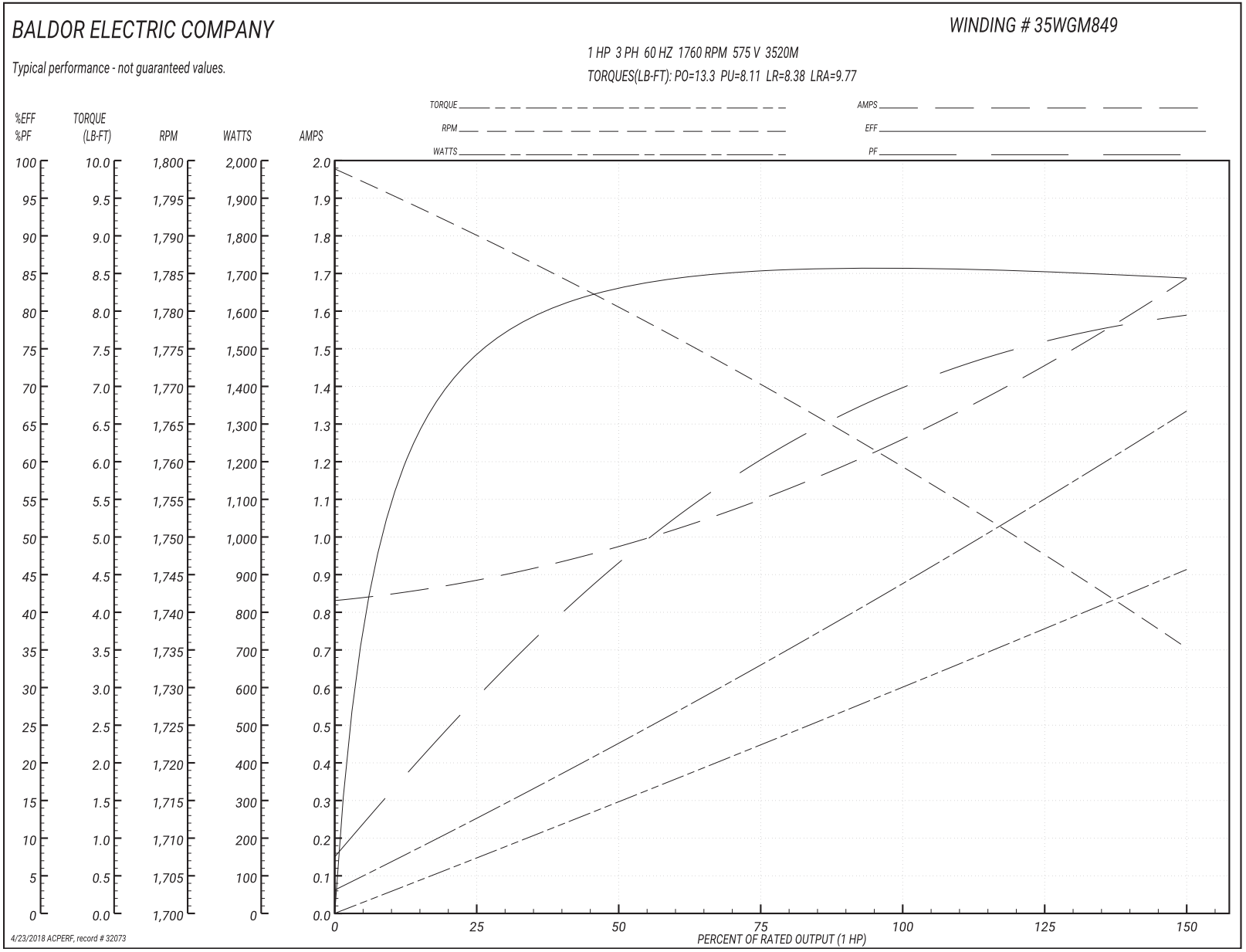
## Parts List

| Part Number | Description | Quantity |
|---|---|---|
| SA233681 | SA 35A013M849G1 | 1.000 EA |
| RA220666 | RA 35A013M849G1 | 1.000 EA |
| 34FN3002B01 | EXTERNAL FAN, PLASTIC, .637/.639 HUB W/ | 1.000 EA |
| NS2512A01 | INSULATOR, CONDUIT BOX X | 1.000 EA |
| 35CB3007 | 35 CB CASTING W/.88 DIA. LEAD HOLE | 1.000 EA |
| 36GS1000SP | GASKET-CONDUIT BOX, .06 THICK #SV-330 LE | 1.000 EA |
| 51XB1016A07 | 10-16 X 7/16 HXWSSLD SERTYB | 2.000 EA |
| 11XW1032G06 | 10-32 X .38, TAPTITE II, HEX WSHR SLTD U | 1.000 EA |
| 35EP3122K00 | MASTER ODE,203 BRG,.683SH,#26 DRN,FH MTG | 1.000 EA |
| HW5100A03 | WAVY WASHER (W1543-017) | 1.000 EA |
| 35EP3307F00 | MASTER DE,205 BRG,.998SH,#26 DRN | 1.000 EA |
| 51XN1032A20 | 10-32 X 1 1/4 HX WS SL SR | 2.000 EA |
| 51XB1214A16 | 12-14X1.00 HXWSSLD SERTYB | 1.000 EA |
| 35FH4005A32SP | IEC FH NO GRSR W/3 HOLES - PRIMED | 1.000 EA |
| 51XW1032A06 | 10-32 X .38, TAPTITE II, HEX WSHR SLTD S | 3.000 EA |
| 35CB4521GX | CONDUIT BOX LID KIT | 1.000 EA |
| 51XW0832A07 | 8-32 X .44, TAPTITE II, HEX WSHR SLTD SE | 4.000 EA |
| HW2501D13 | KEY, 3/16 SQ X 1.375 | 1.000 EA |
| HA7000A04 | KEY RETAINER 0.625 DIA SHAFTS | 1.000 EA |
| 85XU0407S04 | 4X1/4 U DRIVE PIN STAINLESS | 2.000 EA |
| MJ1000A02 | GREASE, POLYREX EM EXXON (USe 4824-15A) | 0.050 LB |
| MG1000Y03 | MUNSELL 2.53Y 6.70/ 4.60, GLOSS 20, | 0.017 GA |
| HA3100A12 | THRUBOLT 10-32 X 7.375 | 4.000 EA |
| LC0006 | CONNECTION LABEL | 1.000 EA |

## Parts List (continued)

| Part Number | Description | Quantity |
|---|---|---|
| LB1119N | WARNING LABEL | 1.000 EA |
| NP3441L | ALUM SUPER-E VPWM INVERTER READY UL | 1.000 EA |
| 35PA1066 | PKG GRP, PRINT PK1008A06 | 1.000 EA |
| PK3082 | STYROFOAM CRADLE | 1.000 EA |
| MN416A01 | TAG-INSTAL-MAINT no wire (1100/bx) 11/14 | 1.000 EA |
| FE-0000001 | ZRTG FE ASSEMBLY | 1.000 EA |
| PE-0000001 | ZRTG PE ASSEMBLY | 1.000 EA |

## Performance Graph at 575V, 60Hz, 1.0HP Typical performance - Not guaranteed values



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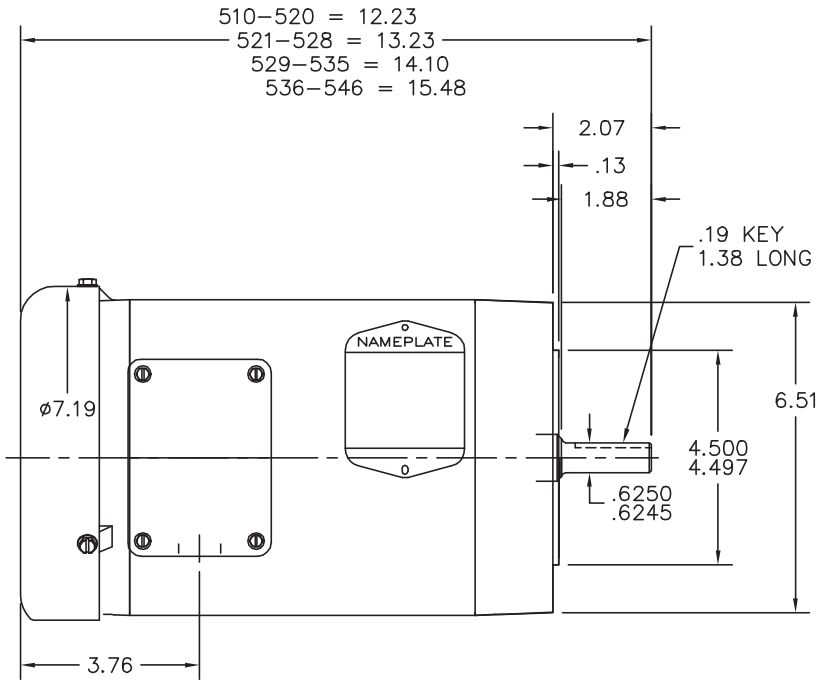
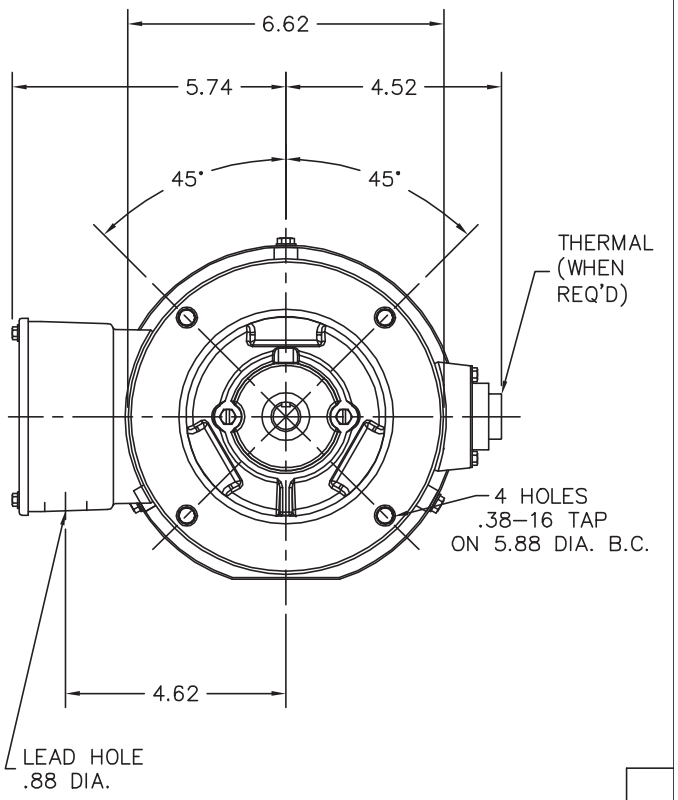


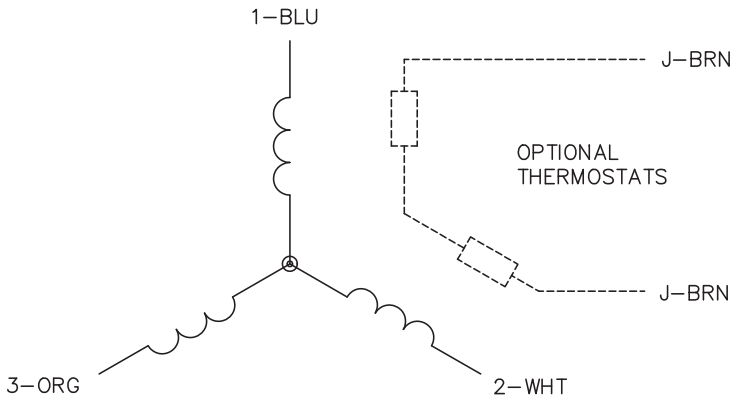

35LYA013

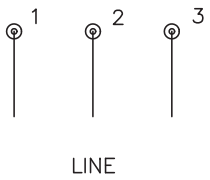
CUSTOMER IS RESPONSIBLE FOR DETERMINING THAT BALDOR'S PRODUCT WILL PERFORM SUITABLY IN THE INTENDED APPLICATION.

| | | | |
|---|---|---|---|
| REV. DESC: REPLACE ENDPLATES | | | BALDOR |
| REV. LTR: N | VERSION: 05 | TDR: 000001063223 | |
| FILE: \AAA\00004\894 | REVISED: 09:23:18 03/06/2018 | BY: USJOBUR22 | STD VERT 56C TEFC 35M |
| MTL: – | | | SH 1 of 1 |

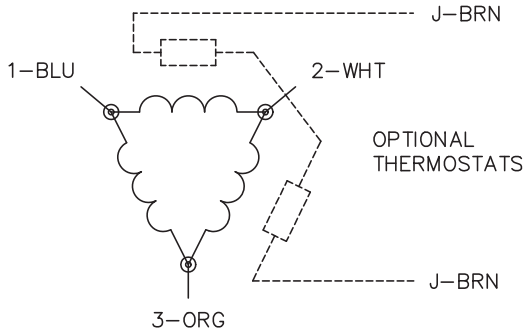
CD0006

TYPICAL WYE–CONNECTED MOTOR




TYPICAL DELTA–CONNECTED MOTOR




NOTES:

1. THREE LEAD MOTOR MAY BE EITHER WYE CONNECTED OR DELTA CONNECTED.
2. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
3. OPTIONAL THERMOSTATS ARE PROVIDED WHEN SPECIFIED.
4. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY VARY.
5. LEAD COLORS ARE OPTIONAL. LEADS MUST BE NUMBERED AS SHOWN.

CD0006

| | | | |
|---|---|---|---|
| REV. DESC: REVISE TO SHOW OPTIONAL COLORS | | | BALDOR ELECTRIC Co. |
| REV. LTR: D | BY: JLP | REVISED: 01/21/99 4:02 | TDR: 0171435 |
| 9000CD | | FILE: AAA00005141 | MDL: – |
| | | MTL: – | 3PH, SV, 3 LEADS, WYE OR DELTA CONNECTED |

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**Project name:** AMARUQ

**Project#:** 5000218009

**Document #:** SPK_0008_PCH

**by:** GH

**chkd:** GP

**appvd:** CB

# COAGULANT DOSING SKID

# VALVES

**OIM manual section:** 4.3.8.4

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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 | VABLPV200249 | P9-513-V003 | DIA: 13 mm (1/2") | CLEANING VALVE | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-005-E-C//CONNECTION TYPE : COMBO \| 13 mm (1/2")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | COAGULANT DOSING SKID | | |
| CHEMLINE | VABLPV200249 | P9-514-V003 | DIA: 13 mm (1/2") | CLEANING VALVE | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-005-E-C//CONNECTION TYPE : COMBO \| 13 mm (1/2")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | COAGULANT DOSING SKID | | |
| CHEMLINE | VABLPV200249 | P9-514-V006 | DIA: 13 mm (1/2") | ISOLATION VALVE (DISCHARGE) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-005-E-C//CONNECTION TYPE : COMBO \| 13 mm (1/2")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | COAGULANT DOSING SKID | | |

| SUPPLIER | EQPT CODE | EQPT TAG NO | DIA | DESCRIPTION | INFO 1 | INFO 2 | INFO 3 | APPLIC. | NOTE | REV |
|---|---|---|---|---|---|---|---|---|---|---|
| CHEMLINE | VABLPV200249 | P9-514-V007 | DIA: 13 mm (1/2") | CLEANING VALVES | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-005-E-C//CONNECTION TYPE : COMBO \| 13 mm (1/2")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | COAGULANT DOSING SKID | | |
| CHEMLINE | VABLPV200249 | PD9-514-V002 | DIA: 13 mm (1/2") | CLEANING VALVES | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-005-E-C//CONNECTION TYPE : COMBO \| 13 mm (1/2")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | COAGULANT DOSING SKID | | |
| CHEMLINE | VABLPV200251 | P9-513-V001 | DIA: 25 mm (1") | ISOLATION VALVE (SUCTION) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | COAGULANT DOSING SKID | | |
| CHEMLINE | VABLPV200251 | P9-513-V002 | DIA: 25 mm (1") | ISOLATION VALVE (SUCTION) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | COAGULANT DOSING SKID | | |
| CHEMLINE | VABLPV200251 | P9-513-V004 | DIA: 25 mm (1") | ISOLATION VALVE (DISCHARGE) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | COAGULANT DOSING SKID | | |

| SUPPLIER | EQPT CODE | EQPT TAG NO | DIA | DESCRIPTION | INFO 1 | INFO 2 | INFO 3 | APPLIC. | NOTE | REV |
|---|---|---|---|---|---|---|---|---|---|---|
| CHEMLINE | VABLPV200251 | P9-513-V005 | DIA: 25 mm (1") | ISOLATION VALVE (DISCHARGE) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | COAGULANT DOSING SKID | | |
| CHEMLINE | VABLPV200251 | P9-514-V001 | DIA: 25 mm (1") | ISOLATION VALVE (SUCTION) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | COAGULANT DOSING SKID | | |
| CHEMLINE | VABLPV200251 | P9-514-V002 | DIA: 25 mm (1") | ISOLATION VALVE (SUCTION) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | COAGULANT DOSING SKID | | |
| CHEMLINE | VABLPV200251 | P9-514-V004 | DIA: 25 mm (1") | ISOLATION VALVE (DISCHARGE) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | COAGULANT DOSING SKID | | |
| CHEMLINE | VABLPV200251 | P9-514-V005 | DIA: 25 mm (1") | ISOLATION VALVE (DISCHARGE) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | COAGULANT DOSING SKID | | |

| SUPPLIER | EQPT CODE | EQPT TAG NO | DIA | DESCRIPTION | INFO 1 | INFO 2 | INFO 3 | APPLIC. | NOTE | REV |
|---|---|---|---|---|---|---|---|---|---|---|
| CHEMLINE | VABLPV200251 | PD9-514-V001 | DIA: 25 mm (1") | ISOLATION VALVE (DISCHARGE) | TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET \| 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL \| SEAT :PTFE \| EPDM// STEM : PVC | | | COAGULANT DOSING SKID | | |

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# 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.

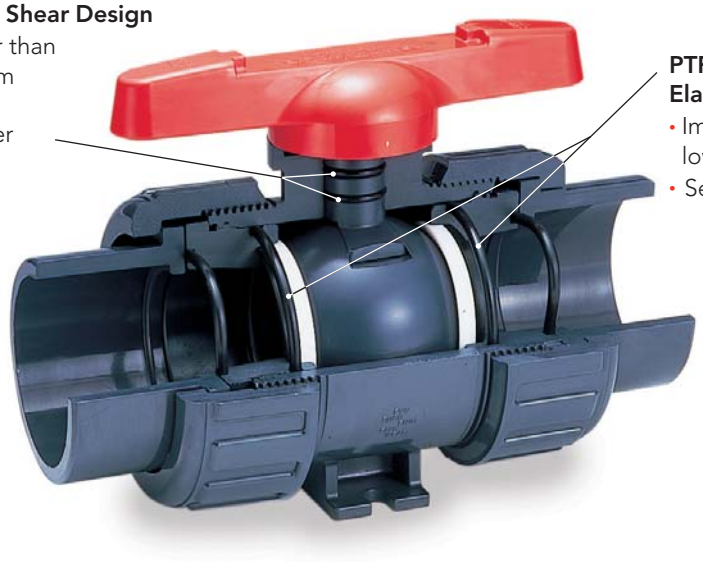
[1] Butt ends for fusion to Chemline metric PP, PVDF or ECTFE (Halar®) piping.
[2] Other materials are available.
[3] CPE=Chlorinated Polyethylene.
[4] PVC, CPVC and PVDF 1/2" to 2" are rated at 230 psi; 2-1/2" to 4" and all size PP valves are rated at 150 psi at 20°C.
[5] PVC valves with EPDM or FKM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

# Type 21 Ball Valves

## features

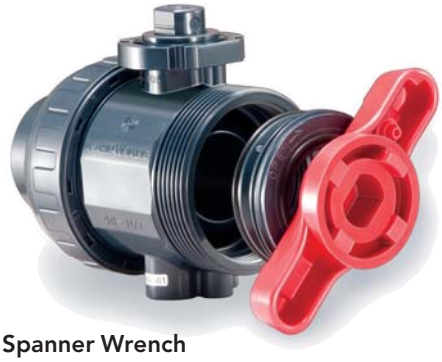
**Double Stem O-Rings – Safety Shear Design**

- 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