

Part 5

MINIMUM RATES OF PAY

Contractor shall comply with all applicable Federal and State labor regulations, including State of Alaska Title 36, Public Contracts, otherwise known as the Little Davis-Bacon Act, and all labor regulations and minimum rates of pay contained therein.

State Wage Rates

State Wage Rates can be obtained at <http://labor.alaska.gov/lss/pamp600.htm>. Use the State wage rates that are in effect 10 days before Bid Opening.

Part 6

APPENDIX 1

MICROCLOR® ON-SITE HYPOCHLORITE GENERATION SYSTEM (QTY 2 -MC-160)

APPENDIX 1

**MICROCLOR® ON-SITE HYPOCHLORITE GENERATION SYSTEM (QTY 2 -
MC-160)**

PSI Water Technologies, Inc. Project #921011

**PYRAMID WTP
UNALASKA, AK**



**Equipment Submittal
REVISION 2**

Submitted To:

Unalaska Water System
City of Unalaska
Attn: Bob Cummings

Prepared By:

PSI Water Technologies, Inc.
550 Sycamore Drive
Milpitas, CA 95035
Telephone: (619) 578-9977
Project Manager: Tanya Mendez
October 4, 2021

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SECTION 1.0

STATEMENT OF CONFIDENTIALITY

This document and all information contained herein are the property of the PSI Water Technologies, Inc. and/or its affiliates ("PSI"). The design concepts and information contained herein are proprietary to PSI and are submitted in confidence. They are not transferable and must be used only for the purpose for which the document is expressly loaned. They must not be disclosed, reproduced, loaned, or used in any other manner without the express written consent of PSI. In no event shall they be used in any manner detrimental to the interest of PSI. All patent rights are reserved. Upon the demand of PSI, this document, along with all copies and extracts, and all related notes and analyses, must be returned to PSI or destroyed, as instructed by PSI. Acceptance of the delivery of this document constitutes agreement to these terms and conditions.

SECTION 2.0
FORWARDING LETTER



October 4, 2021

PSI File No. 921011

Mr. Bob Cummings
Unalaska Water System
City of Unalaska
43 Raven Way
Unalaska, AK 99685

Re: Pyramid WTP – Unalaska, AK
Design Submittal

Dear Mr. Cummings:

Enclosed please find the final design submittal for the On-Site Hypochlorite Generation System to be installed at Pyramid WTP in Unalaska, AK. The design submittal has been prepared in accordance with Purchase Agreement between City of Unalaska and PSI Water Technologies, Inc. and includes the final as-built drawings.

We would be pleased to provide any additional information, clarifications, or answer any questions.

Regards,

Tanya Mendez
Project Manager

SECTION 3.0

PROCESS DESCRIPTION

- 3.1 Process Description
- 3.2 System Features/Advantages

PROCESS DESCRIPTION AND SYSTEM FEATURES/ADVANTAGES

PROCESS DESCRIPTION

An on-site generation system will be provided that will manufacture a $0.7\% \pm 0.05\%$ solution of sodium hypochlorite (NaOCl) to be used as a disinfectant using salt, water and electricity. The provided on-site hypochlorite generation (OSHG) system will consist of the following major components:

- Two (2) Microclor® OSHG system including a local programmable logic controller (PLC) with color touchscreen human-machine interface (HMI), cells, brine pump, and hydraulic control equipment
- Two (2) skid-mounted transformer rectifier
- Two (2) skid-mounted electrical control panel
- Two (2) dilution blower with airflow switch
- Two (2) water softener
- Two (2) brine storage tank
- Two (2) hypochlorite storage tank
- Two (2) hypochlorite dosing system
- One (1) hypochlorite dilution panel
- One (1) acid cleaning system
- One (1) hydrogen detector

The patented Microclor® system works by feeding softened water into the brine tank to form a saturated salt solution. This brine solution is pumped via a gear pump to a stream of softened water and diluted to approximately 3% salt concentration (a 10:1 ratio of softened water to concentrated brine). This 3% brine solution is fed into the electrolytic cells. A DC voltage from the rectifier is applied to the electrolytic cell, and the brine solution is converted to a 0.8% concentration of sodium hypochlorite. During this conversion, a small amount of hydrogen is produced by the electrolytic process. This hydrogen is released safely through a vent pipe at the top of the electrolytic cell. The small amounts of hydrogen gas are further diluted at a ratio of nearly 100:1 using a dilution air blower which reduces the hydrogen concentration to less than 25% of the Lower Explosive Limit (LEL) of hydrogen gas. An existing hydrogen detector is used to monitor the concentration of hydrogen in the generation room. The detector will shut down the OSHG system and activate an alarm upon detection of the gas above a pre-set threshold.

The Microclor® system under normal operation is designed to automatically start and stop sodium hypochlorite production based upon the storage tank level. When the level reaches a preset low-level point, a signal is sent to an OSHG controller to turn the generator on. Generation will continue while the control system continually monitors the storage tank level sensor, and when the tank is full, and the high-level point is reached, the Microclor® system will cease generation. The system will then remain in standby mode, continuously monitoring the tank level until a low level is reached.

A variable speed pump alters cell feed of the brine, or electrolyte, solution, based on a signal from the PLC and a current transducer. This operation strategy allows the Microclor® system to vary the electrolyte solution conductivity so as to indirectly provide constant current. This philosophy eliminates expensive electronics that would otherwise be necessary to operate in a less reliable fashion.

Instrumentation is included to continuously monitor operation permissives during generator operation (airflow, current draw, water flow, flooded cells, and temperature). If any permissive times out, generator operation is interrupted. If the fault clears, generator operation is again called to run. If the fault reoccurs three additional times for a single generation system, that system is shut down and an alarm condition is sent to plants SCADA.

SYSTEM FEATURES/ADVANTAGES

The Microclor® On-Site Hypochlorite Generation System offers maximum value measured by performance and reliability as well as capital, installation, maintenance, and operating costs. This is illustrated by the following system advantages:

a. **Passive Hydrogen Removal for Superior Safety:**

Cells are configured in a vertical format with a recirculation loop on each cell that allows for optimized brine utilization and passive release of the hydrogen gas from each cell. Hydrogen gas is not allowed to pass from cell to cell. This design radically increases operator safety and substantially reduces the possibility of hydrogen gas build-up in the cell and the potential of catastrophic failure. By removing the hydrogen immediately from each cell eliminates the blinding of the electrodes by the gas bubbles.

b. **Brine Conductivity Control Optimizes Salt Efficiency:**

Constant current is achieved via a current feedback loop where brine pump speed is controlled by the system programmable logic controller. This feedback loop accounts for variations in temperature, conductivity, and water flow. The titanium, Teflon impregnated gear pump is attached to variable speed drives that continually provides a consistent blended electrolyte flow to the cells maximizing salt efficiency.

c. **Indirect Constant Current:**

An active feedback loop which very slightly adjusts the brine flow rate achieves constant current in an indirect fashion. This innovative operational strategy eliminates the excessively high failure rate seen with forty-year-old switching rectifier or phase angle fired SCR voltage correction technology.

d. **Passive No Cell Internal Baffles or Gaskets**

The electrolytic cells consist of thirteen internal bipolar electrodes. All anodic surfaces are coated with DSA catalytic coating. The design of the cells preclude the need for wet D.C. cable connections. There are no internal cell baffles, gaskets, or fasteners found inside the cell. The cells are built with clear acrylic guides that support the internal bi-polar plates and allow for direct visual inspection of the plates.

e. **Easy Access for Maintenance:**

The Microclor® On-Site Hypochlorite Generation System is skid-mounted. The type 304 stainless steel skid construction provides superior structural strength while the electrolytic polishing ensures ultimate passivation, chemical compatibility, and corrosion resistance. Use of an open frame design for the skid and a simple equipment layout facilitates access to each system component from multiple sides for easy inspection and maintenance. The vertical cell design allows for the cell to easily be removed from the cell carrier piping by simply breaking two coupled connections. This makes for simple cell maintenance and/or replacement.

- f. Reliable Performance and Robust Construction:**
The robust construction of the Microclor[®] On-Site Hypochlorite Generation System allows the electrolyte feed, cells, power supply, controls, and monitoring components to be subjected to minimum stress, lowering the maintenance requirements.
- g. Factory-Tested:**
Each system is pre-assembled, piped, and wired at the factory, allowing for thorough factory-testing of not just each component, but of the entire system prior to shipment. At a minimum, a factory quality technician shall operate and calibrate each brine feed pump, verify calibrations for instrumentation, and test the complete control system prior to running the unit in automatic mode for a minimum of four hours.
- h. Minimum Installation Cost and Time:**
Most parts for the Microclor[®] On-Site Hypochlorite Generation System are inventoried at the factory, reducing lead times. By skid-mounting the systems, installation is quick and straightforward, with minimum time and cost. Water line, brine feed, hypochlorite solution, and electrical connections are all predetermined and are clearly indicated.
- i. Proven Track Record:**
The Microclor[®] On-Site Hypochlorite Generation System has been in production for over ten years. This system is a fully-developed, mature product supported by an extensive list of successful installations.

SECTION 4.0

SCOPE OF SUPPLY

- 4.1 Scope of Supply by PSI Water Technologies, Inc.
- 4.2 Scope of Supply by Others
- 4.3 Connections by Contractor

4.1 SCOPE OF SUPPLY BY PSI WATER TECHNOLOGIES, INC.

The following equipment and services are included in our scope of work:

1. (Qty. 2) Skid-Mounted, Pre-Assembled, Piped, Wired, and Factory-Tested Microclor[®] MC-160 On-Site Hypochlorite Generation System, including:
 - 40 ppd Electrolytic Cells (Qty. 4)
 - Stainless Steel Brine Gear Pump with Integral Speed Control
 - Water and Brine Rotameters
 - Magnetic Flow Meter
 - Optical Level Switch (Qty. 4)
 - Temperature Switch (Qty. 3)
 - Temperature Sensor
 - Water and Brine Makeup Solenoid Valves
 - 304 Stainless Steel, Electropolished Open Frame Equipment Skid

2. (Qty. 2) Skid-Mounted Transformer Rectifier, including:
 - NEMA 3R Enclosure – 304 Stainless Steel Construction
 - 19.2 kVA Step-Down Transformer – 240/208/180 VDC @ 80 A
 - DC Bridge Rectifier with Diode Assemblies and Aluminum Heat Sink with Cooling Fan
 - DC Current Transducer
 - Panel-Mounted Disconnect Switch

3. (Qty. 2) Skid-Mounted Electrical Control Panel, including:
 - NEMA 4X Enclosure – 304 Stainless Steel Construction
 - Allen-Bradley MicroLogix 1400 Programmable Logic Controller with Ethernet Communication
 - 7" Color Touchscreen HMI
 - 24 VDC Power Supply
 - Emergency Stop Pushbutton
 - Panel-Mounted Disconnect Switch

4. (Qty. 2) Hydrogen Dilution Blower, including:
 - 163 cfm Maximum Volumetric Flow Rate
 - TEFC Motor
 - Airflow Switch

5. (Qty. 6) Cartridge Filters

6. (Qty. 2) Dual Tank Water Softeners
 - Kinetico Model CP 208s

7. (Qty. 2) Brine Storage Tank, including:
 - Dust Inhibiting Feature
 - Supersack Fill
 - HDLPE Construction
 - 50 Cubic Foot (374 gallon) Capacity
 - Level Control Assembly
 - Under Drain with Valve
 - Dimensions: 48" D x 49" H
 - Bag Dump Port
 - 8" Vent Assembly Including Dust Bag

8. (Qty. 2) Hypochlorite Storage Tank, including:
 - HDLPE Construction
 - 1,100 Gallon Capacity
 - Radar Level Control
 - Top Manway
 - Tank Fittings
 - Dimensions: 86" D x 55" H

9. (Qty. 2) Hypochlorite Dosing System, including:
 - Metering Pump, 154 GPH @ 150 PSI with TEFC Inverter- Duty Motor
 - NEMA 4X Variable Frequency Drive
 - Calibration Column
 - Pressure Relief Valve
 - Backpressure Valve
 - Pulsation Dampener
 - Wye Strainer
 - Pressure Gauge
 - PVC Pump Stand

10. (Qty. 2) Skid-Mounted Heat Exchanger, including:
 - 4" Shell
 - Titanium Construction
 - Teflon and Kynar Interconnection

11. (Qty. 2) Inline Heater

12. (Qty. 1) Hypochlorite Dilution Panel, including:
 - 15 gpm Maximum Volumetric Flow Capacity
 - Venturi Injector
 - Flow Control Valve (Qty. 2)
 - Rotameter (Qty. 2)

13. (Qty. 1) Acid Cleaning System

14. (Qty. 1) Hydrogen Detector
 - Conspec CN06

15. (Qty. 1) Spare Parts, consisting of:
 - Cell Level Switch
 - Cell Temperature Sensor
 - Cell Temperature Switch
 - Air Flow Switch
 - Brine Pump
 - Solenoid Valve (Qty. 2)

16. Manufacturer's Field Services (5 Days at the Jobsite), including:
 - Installation Inspection
 - System Start-Up
 - Operator Training

17. Design Submittals and Operation & Maintenance Manuals as follows:
 - Submittals: Sent Electronically
 - O&M Manuals: Sent Electronically

18. FOB Factory, Milpitas, CA with Full Freight Allowed to Jobsite, Unalaska, AK

SCOPE OF SUPPLY BY OTHERS

This list is provided for your information. It does not include all items required to complete this project.

1. Equipment unloading and installation.
2. All civil works and concrete pad for equipment.
3. Any underground or structural work.
4. Anchor bolts and seismic restraints.
5. All interconnecting piping, including between brine tank, OSHG skid, hypochlorite tank, metering pumps and accessories, and point of hypochlorite injection.
6. Water supply piping to water connection – 1" at 50-80 psi.
7. Valves, fittings, appurtenances not specifically listed under Scope of Supply by PSI Water Technologies, Inc.
8. Heat tracing and insulation of all interconnecting piping, if required.
9. Electrical power to control panels (208-240V/1Ph/60Hz for 30A), transformer rectifiers (480V/3Ph/60Hz for 35A), dilution panel pump (120V/1Ph/60Hz for 15A, and metering pump variable frequency drives (480V/3Ph/60Hz for 2.1A).
10. All power and control/signal, electrical conduit, wiring, electrical material, etc. between control panels, brine tank, OSHG skid, hypochlorite tank, metering pumps, SCADA, etc.
11. Room ventilation, air conditioning, or lighting.
12. Any video recording.
13. All taxes, fees, lien waivers, bonds and licenses.
14. Any permitting or regulatory approvals.
15. Any items not explicitly listed under Scope of Supply by PSI Water Technologies, Inc.

CONNECTIONS BY CONTRACTOR

This list is provided for your information. PSI Water Technologies, Inc. has attempted to make it as complete as possible, but it does not necessarily include all items required to complete this project. Please refer to Section 9.4 of this submittal for connection and piping details.

1. Softened Water Connections
2. Cartridge Filter Connections
3. Drain Connections
4. Brine Feed Connections
5. Sodium Hypochlorite Connections
6. Power Connections to the Electrical Control Panel
7. Power Connections to the Transformer Rectifier
8. Power, Signal, and Communications Connections Between Remote Located Instruments and Equipment and the Electrical Control Panel

SECTION 5.0

CLARIFICATIONS AND NOTES

- 5.1 Clarifications
- 5.2 Notes

5.1 CLARIFICATIONS

1. Please note that it is critical for proper operation of the OSHGS that the water supplied to the system be potable, 50 to 80 psi, and 55 °F - 78 °F (45 °F - 55 °F when using the supplied heat exchanger). Feed water outside of these parameters will impact system efficiency and may cause non-reversible damage to the electrolytic cells or other equipment. Since incoming water temperature is expected to be outside this range, additional in-line heaters are included in PSI's scope of supply. The Contractor shall provide a pressure reducing valve, if necessary, upstream of the water filter and softener to maintain proper feed water pressure.

2. Please review carefully electrical control panel drawings and P&ID in Section 9.0 of this submittal and notify PSI if any changes to the proposed controls are needed.

5.2 NOTES

1. For proper operation of our system, it is necessary that the hydrogen vent header from the electrolytic cell skid be installed at least 4'-0" above the maximum liquid level in the sodium hypochlorite storage tank. Please confirm availability of this required clearance. Please refer to the P&ID in Section 9.4 of this submittal for more information.
2. Note that orientation of dilution blower is CW-UB. If a different orientation is required, please inform PSI Water Technologies, Inc.
3. Please indicate the type of salt that will be used for making brine so that it can be determined if a quartz rock filter bed will be necessary. For optimum performance and ease of maintenance for the Microclor[®] systems, it is strongly recommended that the salt used for the generator system should be a quality coarse crystal, solar dried salt. Poor quality or contaminated salt can result in operational problems and poor performance. A quartz rock filter bed should only be used if fine crystal, solar dried salt will be used. If desired, PSI Water Technologies, Inc. can provide a recommendation for an acceptable salt supplier.
4. The proposed electrical control panel is rated for operation in an ambient temperature not exceeding 90 °F. Please confirm that the air conditioning system for the disinfection building is sufficiently sized to maintain this condition. Please refer to the electrical control panel drawings in Section 9.2 of this submittal for more information.
5. To expedite review and approval of this submittal, and to prevent it from being too cumbersome, with the exception of those for the enclosure, product data sheets for the electrical components used for the Electrical Control Panel have not been included.

SECTION 6.0

SCHEDULE

Please keep in mind that fabrication and shipment of the equipment will require eight (8) weeks following design confirmation. PSI is aware that equipment is expected to deliver to Unalaska, AK by October 1st, 2021, therefore, we ask for your assistance in expediting correspondence regarding the design confirmation. We will inform you of scheduled ship dates when we have received official confirmation of the design.

The commissioning of the equipment will require the attention of PSI personnel. Please keep us posted as to the expected completion of installation, so that we may schedule personnel and travel accommodations in advance. We will be grateful for your help in expediting correspondence with the reviewing engineer.

We look forward to working with you and are ready to offer whatever assistance possible to assure successful and timely completion of the project.

SECTION 7.0

TECHNICAL INFORMATION

7.1 NSF Certification

SECTION 7.1

NSF CERTIFICATION



The Public Health and Safety Organization

NSF Product and Service Listings

These NSF Official Listings are current as of **Monday, June 07, 2021** at 12:15 a.m. Eastern Time. Please [contact NSF](#) to confirm the status of any Listing, report errors, or make suggestions.

Alert: NSF is concerned about fraudulent downloading and manipulation of website text. Always confirm this information by clicking on the below link for the most accurate information:

<http://info.nsf.org/Certified/PwsComponents/Listings.asp?Company=3E440&Standard=061&>

NSF/ANSI/CAN 61 Drinking Water System Components - Health Effects

NOTE: Unless otherwise indicated for Materials, Certification is only for the Water Contact Material shown in the Listing. [Click here for a list of Abbreviations used in these Listings.](#) [Click here for the definitions of Water Contact Temperatures denoted in these Listings.](#)

PSI Water Technologies, Inc.

550 Sycamore Drive

Milpitas, CA 95035

United States

408-370-6540

[Visit this company's website \(http://www.4psi.net\)](http://www.4psi.net)

Facility : Milpitas, CA

Mechanical Devices

Trade Designation	Size	Water Contact Temp	Water Contact Material
Chemical Generators [1] [2]			
LC-20S	N/A	CLD 23	MLTPL
LC-40S	N/A	CLD 23	MLTPL
MC-10	N/A	CLD 23	MLTPL

MC-100	N/A	CLD 23	MLTPL
MC-1000	N/A	CLD 23	MLTPL
MC-1200	N/A	CLD 23	MLTPL
MC-1500	N/A	CLD 23	MLTPL
MC-160	N/A	CLD 23	MLTPL
MC-1600	N/A	CLD 23	MLTPL
MC-1800	N/A	CLD 23	MLTPL
MC-1850	N/A	CLD 23	MLTPL
MC-20	N/A	CLD 23	MLTPL
MC-200	N/A	CLD 23	MLTPL
MC-2000	N/A	CLD 23	MLTPL
MC-2400	N/A	CLD 23	MLTPL
MC-300	N/A	CLD 23	MLTPL
MC-40	N/A	CLD 23	MLTPL
MC-400	N/A	CLD 23	MLTPL
MC-500	N/A	CLD 23	MLTPL
MC-60	N/A	CLD 23	MLTPL
MC-600	N/A	CLD 23	MLTPL
MC-80	N/A	CLD 23	MLTPL
MC-800	N/A	CLD 23	MLTPL
MC-900	N/A	CLD 23	MLTPL
MicrOclor	N/A	CLD 23	MLTPL

[1] Certification is based on a sodium hypochlorite solution of 6,000 mg/L for the MC-10 and 8,000 mg/L for all other models, with a dosage rate yielding a maximum chlorine concentration of 10 mg/L into potable water.

[2] Certification of this product has been performed to the health effects requirements of NSF/ANSI/CAN 61, which assesses the acceptability of potential extractants from the chemical generator. No evaluation has been performed on the strength or efficacy of the chemical(s) generated. As unit operation, maintenance and the consistency of source ingredients may affect the performance of the unit, the ensuing chemical(s) is not Certified by NSF to NSF/ANSI/CAN 60.

Miscellaneous Process Devices/Components [G]

ChemLocker Dosing System (0.25 GPM) [3]	N/A	CLD 23	MLTPL
ChemLocker Dosing System (1.0 GPM)[3]	N/A	CLD 23	MLTPL
TANK Shark®[4]	N/A	CLD 23	MLTPL

[3] Certified for a maximum 15% sodium hypochlorite solution added to drinking water to effect a maximum use level (MUL) of 10 ppm total chlorine, with a minimum of 25,000 gallons of water treated per day.

[4] Certified for use in tanks 25,000 gallons and greater. Certification does not include chemical generator.

[G] Product is Certified to NSF/ANSI 372 and conforms with the lead content requirements for “lead free” plumbing as defined by California, Vermont, Maryland, and Louisiana state laws and the U.S. Safe Drinking Water Act.

Number of matching Manufacturers is 1

Number of matching Products is 28

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SECTION 8.0

EQUIPMENT

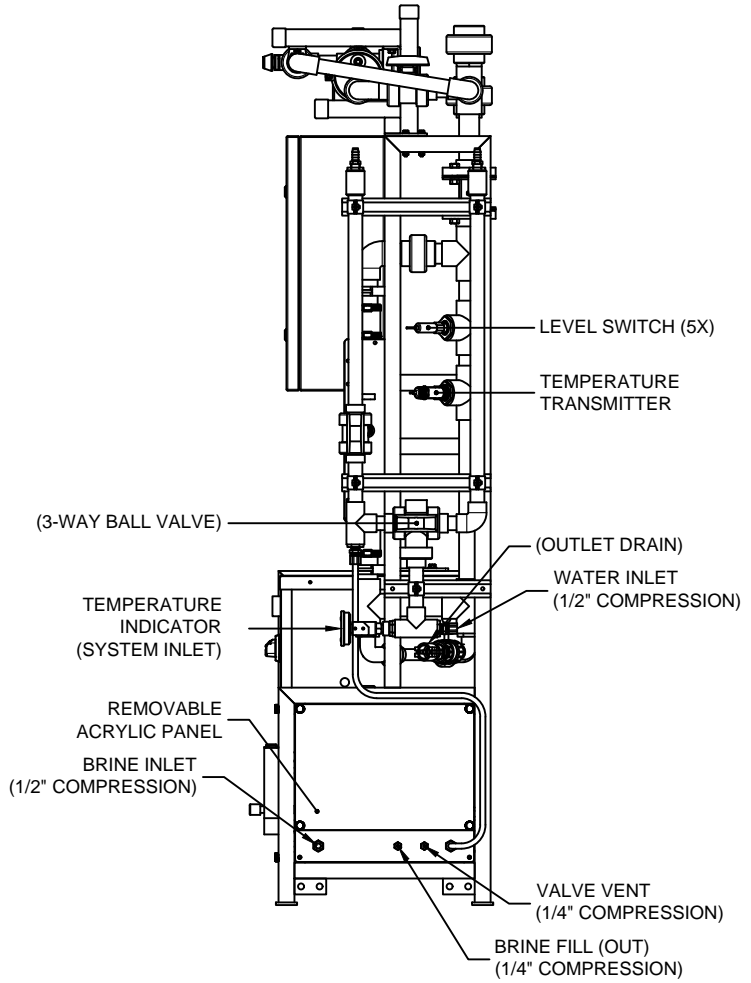
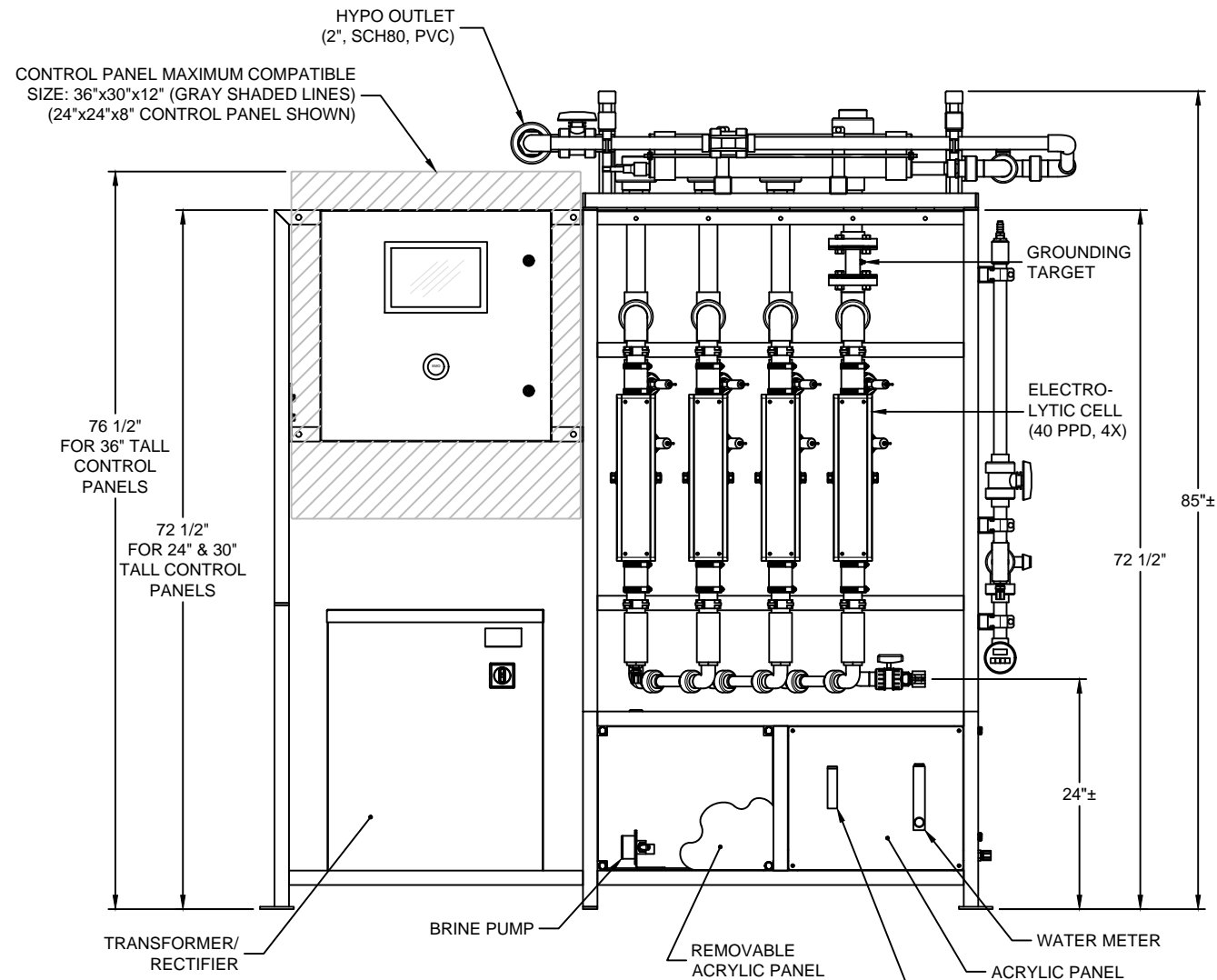
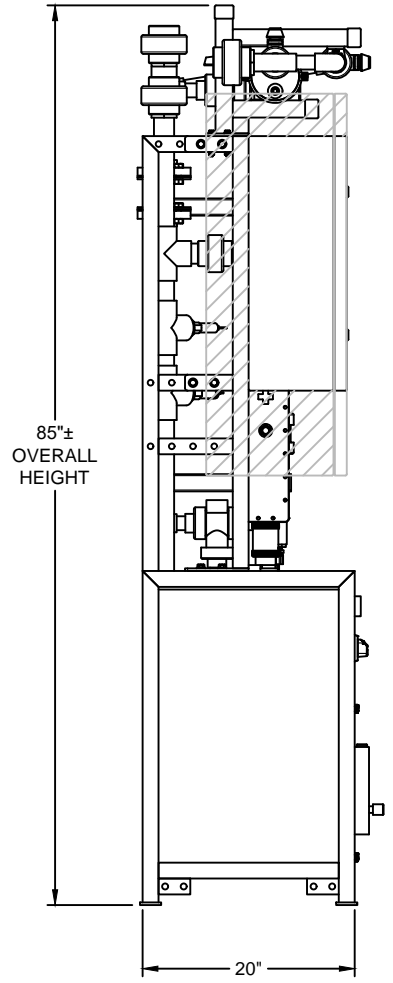
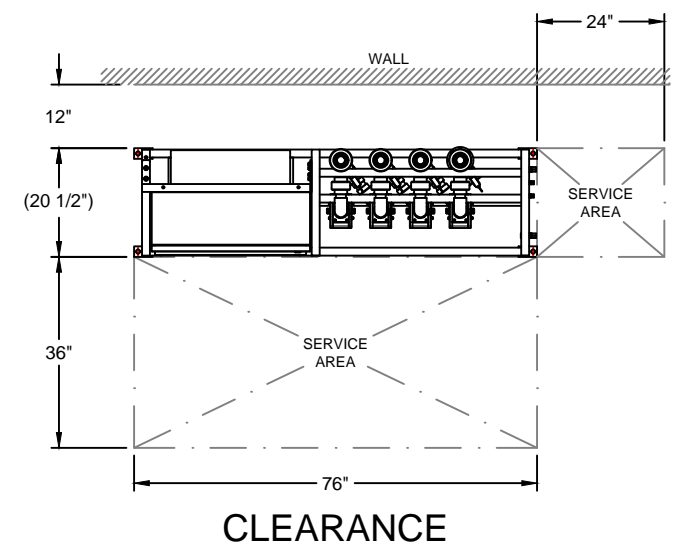
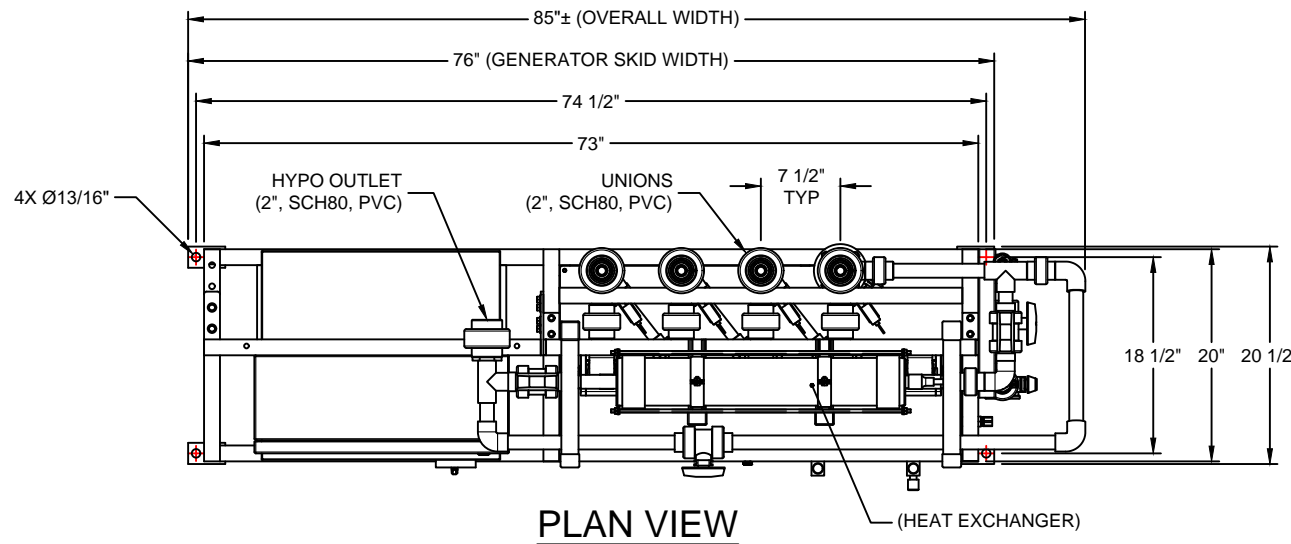
- 8.1 Electrolytic Cell Skid
- 8.2 Hydrogen Dilution Blowers
- 8.3 Water Conditioning System
- 8.4 Brine Storage Tank
- 8.5 Hypochlorite Storage Tank
- 8.6 Hypochlorite Dosing System
- 8.7 Acid Cleaning System
- 8.8 Hypochlorite Dilution Panel
- 8.9 Spare Parts

SECTION 8.1

ELECTROLYTIC CELL SKID

NOTES

1. WEIGHT
A. MICROCLOR SKID (OPERATING): **800 LB**
2. INLETS AND OUTLETS
A. WATER INLET FEED SIZE/MATERIAL: **1/2" KYNAR TUBE FITTING**
B. BRINE INLET FEED SIZE/MATERIAL: **1/2" KYNAR TUBE FITTING**
C. BRINE TANK FILL SIZE/MATERIAL: **1/4" KYNAR TUBE FITTING**
D. VALVE VENT SIZE/MATERIAL: **1/4" KYNAR TUBE FITTING**
E. HYDROGEN HEADER SIZE/MATERIAL: **2" PVC SCH80 (INSTALLED IN FIELD)**
F. HYPO OUTLET (ON H2 HEADER) SIZE/MAT: **1" PVC SCH80 (INSTALLED IN FIELD)**
3. FRAME BASE DIMENSIONS: **7'-1"W x 1'-8"D x 7'-1"H**
4. TRANSFORMER/RECTIFIER ELECTRICAL REQ: **480VAC, 3Ø, 35A SERVICE**
5. CONTROL PANEL ELECTRICAL REQUIREMENTS **SEE CONTROL PANEL DRAWINGS**



REV. Δ	DATE	BY	DESCRIPTION	REV. Δ	DATE	BY	DESCRIPTION
A	06/17/21	LT	INITIAL RELEASE				

This drawing represents an investment by PSI WATER TECHNOLOGIES, INC of substantial sums, including our engineering skills and experience. It is, therefore, loaned without consideration other than the agreement and condition that it is not to be used in whole or in part to assist in making or to furnish any information to others for the making of drawings, print apparatus, or parts thereof. The acceptance of this drawing will be construed as an acceptance of the forgoing conditions and as an admission of the exclusive ownership in and to the drawings of PSI WATER TECHNOLOGIES, INC.

PSI Water Technologies
A USFC SOLUTIONS COMPANY

DRAWN BY: L. TODD
DATE: 06/17/21

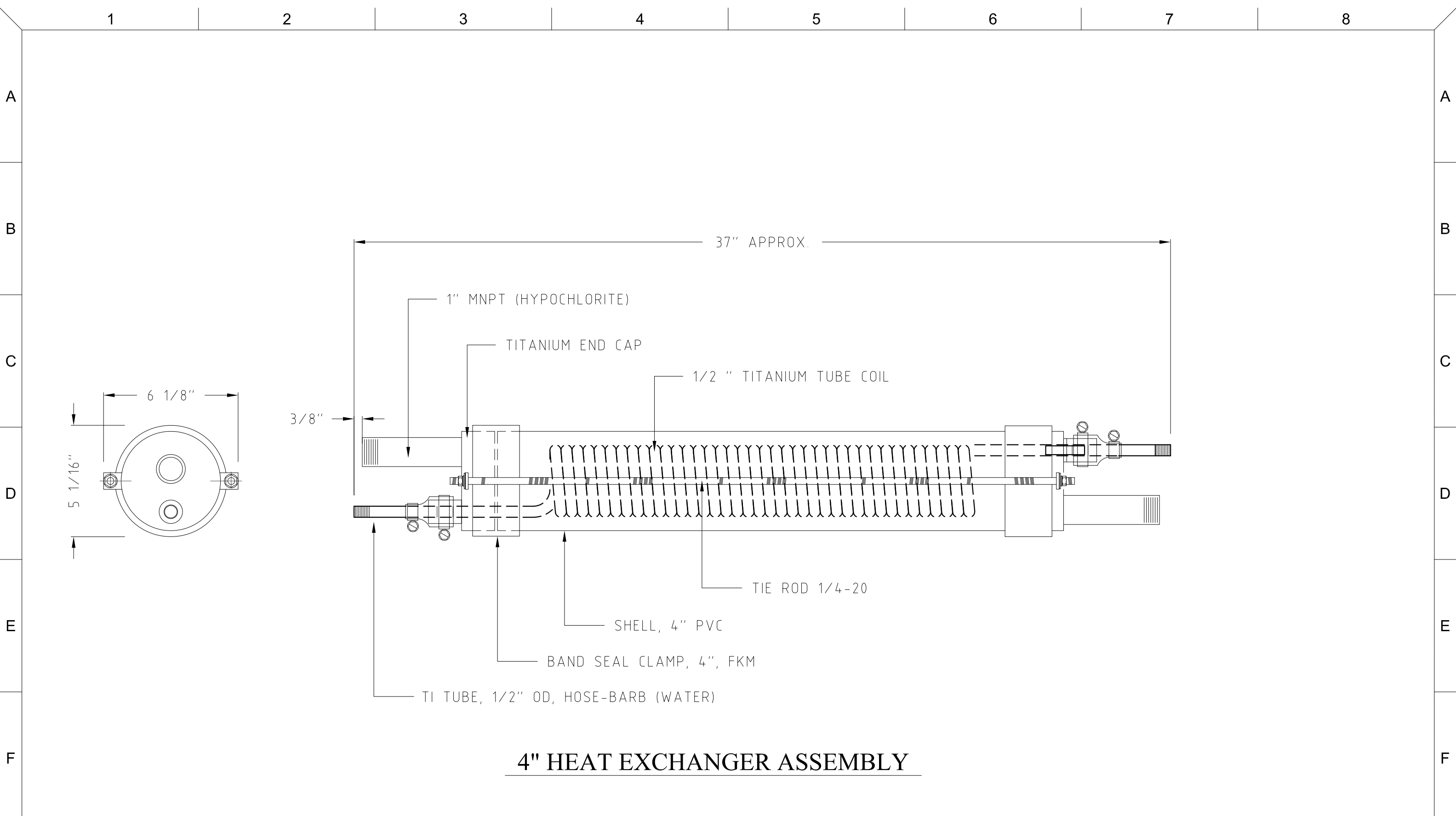
CHECKED BY: B. FRITZ
DATE: 06/17/20

SCALE: 1:8

PROJECT: PSI WATER TECHNOLOGIES, INC STANDARD DRAWING

SUBJECT: MICROCLOR MC-160 WITH HEAT EXCHANGER OUTLINE & UTILITY DRAWING

DWG #: 000000-MC5016-OU SHEET 1 OF 1 REV. A



4" HEAT EXCHANGER ASSEMBLY

REV. Δ	DATE	BY	DESCRIPTION	REV. Δ	DATE	BY	DESCRIPTION	
Δ A	06/02/09	JCR	INITIAL RELEASE	Δ E	02/02/18	MK	REMOVED NOTE 4	This drawing represents an investment by PROCESS SOLUTIONS, INC of substantial sums, including our engineering skills and experience. It is, therefore, loaned without consideration other than the agreement and condition that it is not to be used in whole or in part to assist in making or to furnish any information to others for the making of drawings, print apparatus, or parts thereof. The acceptance of this drawing will be construed as an acceptance of the forgoing conditions and as an admission of the exclusive ownership in and to the drawings of PROCESS SOLUTIONS, INC.
Δ B	10/16/12	JCR	ADDED COIL	Δ F	05/21/18	BF	INCREASED STRUT SUPPORT SPACING	
Δ C	02/06/14	JCR	REVISED VERT DETAIL	Δ				
Δ D	02/25/16	JCR	HOSE BARB PER ECN 16002	Δ				

DRAWN BY: C. ROBERTSON DATE: 06/02/2009

CHECKED BY: DATE:

SCALE: 6"=1'-0" SIZE:

PROJECT: PROCESS SOLUTIONS, INC. STANDARD DRAWING

SUBJECT: HEAT EXCHANGER 4" SHELL GENERAL ARRANGEMENT

DWG #: 0000-MC0864-AB SHEET 1 OF 2 REV. F

NOTE:

1. UNIT MAY BE MOUNTED IN A HORIZONTAL OR VERTICAL POSITION.
 - ×WHEN MOUNTING HORIZONTALLY: IT IS REQUIRED THAT A SLOPE OF 1/4"/FT IS MAINTAINED FOR PROPER HYDROGEN GAS REMOVAL. SEE FIGURE "A".
 - ×WHEN MOUNTING VERTICALLY: PROPER CARE MUST BE TAKEN TO ENSURE THAT HYDROGEN GAS COLLECTION DOES NOT OCCUR. SEE FIGURE "B".
2. USE PROPER ANCHORING HARDWARE WHEN MOUNTING STRUT TO VERTICAL SURFACES.
3. FOLLOW LIQUID FLOW REQUIREMENTS WHEN INSTALLING IN A GRAVITY FEED VERTICAL ARRANGEMENT.

HEAT EXCHANGER DIM.								
MODEL #	SHELL	WATER TUBE O.D.	WATER TUBE I.D.	HYPO INLET / OUTLET	SHELL LENGTH	OVERALL LENGTH	SHELL DIA.	WEIGHT (OPPER.)
MC0864	4" PVC	TI 0.5"	TI 0.4"	1" MPT	24"	36.125"	4.5"	18.75 lb.

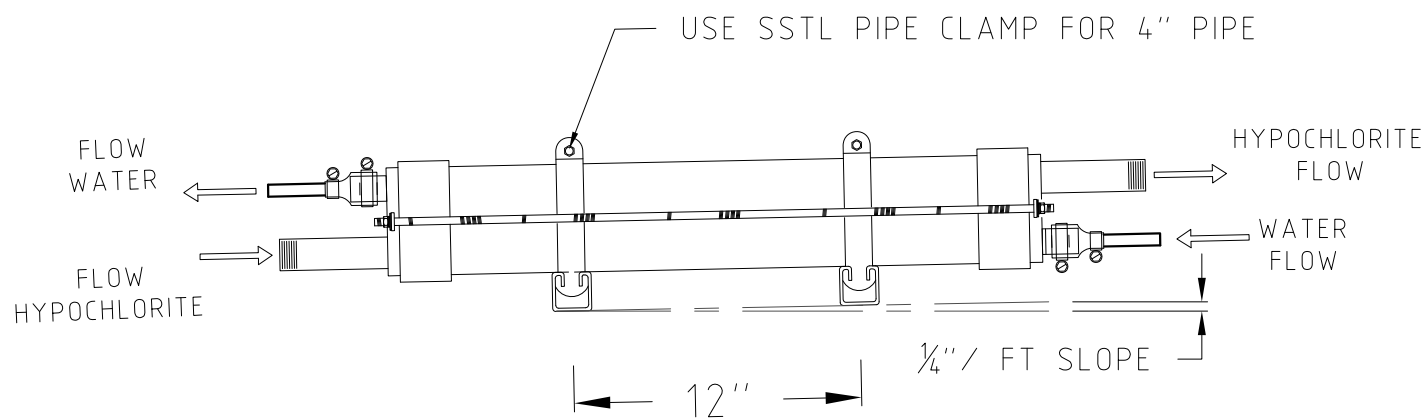


FIGURE "A"

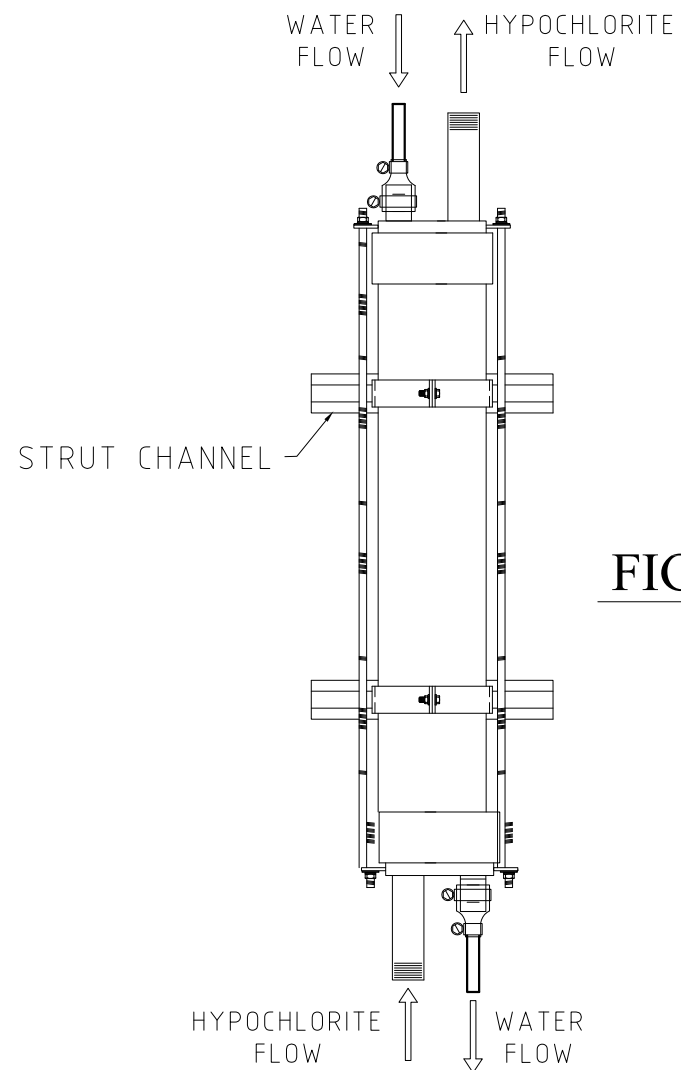


FIGURE "B"

REV. △	DATE	BY	DESCRIPTION	REV. △	DATE	BY	DESCRIPTION
△A	06/02/09	JCR	INITIAL RELEASE	△E	02/02/18	MK	REMOVED NOTE 4
△B	10/16/12	JCR	ADDED COIL	△F	05/21/18	BF	INCREASED STRUT SUPPORT SPACING
△C	02/06/14	JCR	REVISED VERT DETAIL	△			
△D	02/25/16	JCR	HOSE BARB PER ECN 16002	△			

This drawing represents an investment by PROCESS SOLUTIONS, INC of substantial sums, including our engineering skills and experience. It is, therefore, loaned without consideration other than the agreement and condition that it is not to be used in whole or in part to assist in making or to furnish any information to others for the making of drawings, print apparatus, or parts thereof. The acceptance of this drawing will be construed as an acceptance of the foregoing conditions and as an admission of the exclusive ownership in and to the drawings of PROCESS SOLUTIONS, INC.

PSI On-Site Disinfection
A UDSI SOLUTIONS COMPANY

DRAWN BY: C. ROBERTSON DATE: 06/02/2009

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SCALE: 6"=1'-0" SIZE:

PROJECT:	PROCESS SOLUTIONS, INC. STANDARD DRAWING
SUBJECT:	HEAT EXCHANGER 4" SHELL GENERAL ARRANGEMENT
DWG #:	0000-MC0864-AB
SHEET	2 OF 2
REV.	F

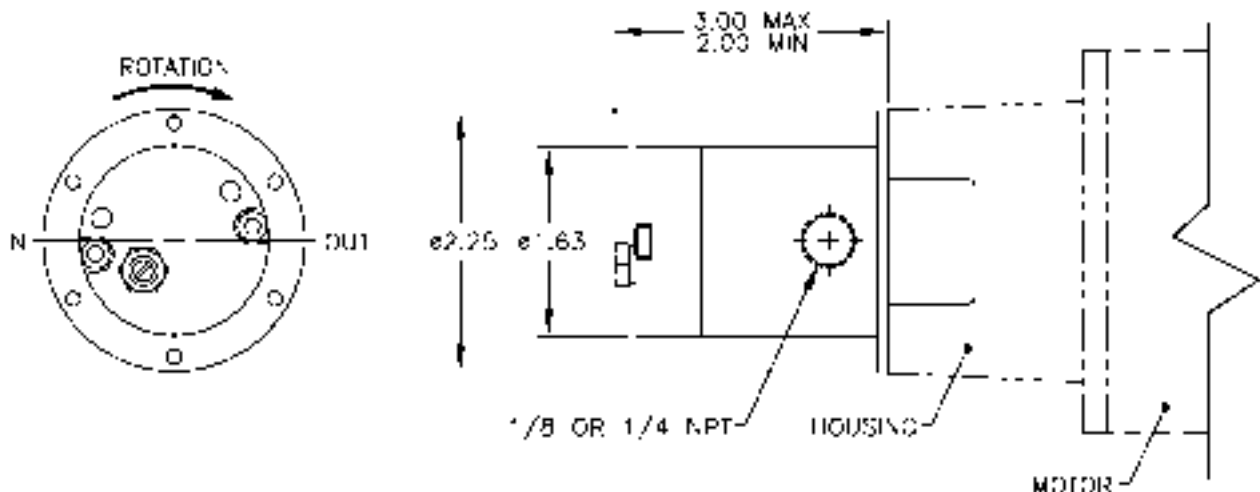
Pump Details

- Magnetic Coupled External Gear Pump
- Non-Pulsing Flow
- Positive Displacement
- Accurate
- Leak Free
- Chemical Resistant
- Long Life



Applications

Tuthill Pump Group specializes in OEM applications. All pumps have a wide range of options. Consult factory for other options and performance requirements. Laboratory Equipment, Water Purification, Heat Transfer, Lubrication, Water Treatment, Lubrication, Fluid Transfer, Recirculation, Cooling, Chemical Metering, Fluid Sampling, Temperature Control, Additive Delivery, Proportioning, Chemical Handling, Refrigerant, Liquid Chromatography, Laser, Oil Filtration, Oil Filtration, Acids, Heat Transfer, X-Ray Equipment, etc.



General Specifications

Flow Rates	< 1 to 121 GPH (< 4 to 458 LPH)	Metal Wetted Parts	316 Stainless Steel, Titanium, or Hastelloy C276
Temperatures	-50 to 350°F (-46 to 176°C)	Ports	1/8 - 27 NPT or 1/4 - 18 NPT
Differential Pressures	250 PSI (17.2 bar)	Speed	5,000 RPM maximum
System Pressures	500 PSI (34.5 bar)	Service Life	Up to 20,000 hours + based on water
Viscosity	0.3 to 2000 cps +	Suction Vacuum	28.5" Hg (724 mm Hg)
Magnet Torque	15 to 240 in-oz	Self Priming	Yes, wetted
Magnet Materials	Ceramic or Samarium Cobalt	Size	1.6" diameter pumphead

Excellence at work. Excellence in life.

Flow @ 3500 RPM

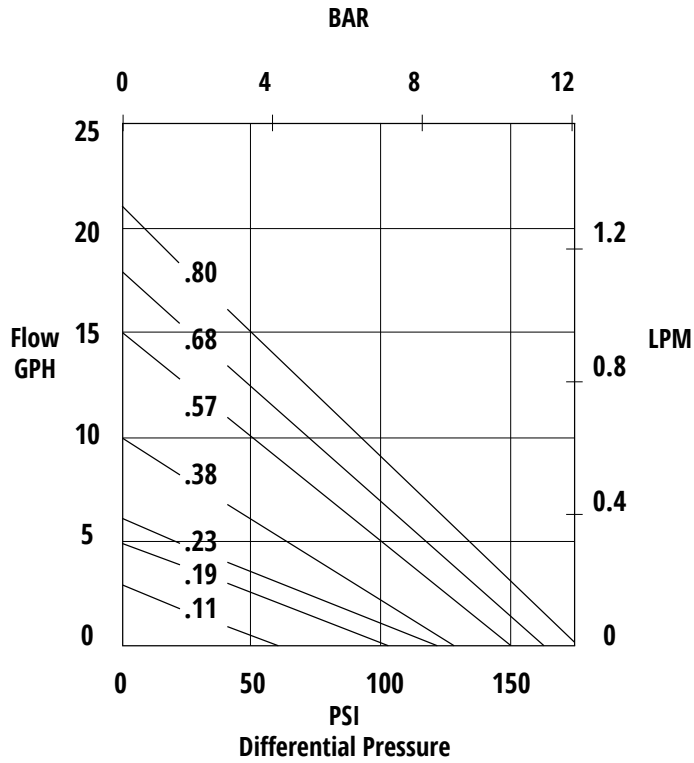
Model ml/rev	GPH @ 0 PSI	LPH @ 0 bar	GPH @ PSI Differential Pressure	LPH @ bar Differential Pressure	Continuous Duty Limit		Intermittent Duty Limit	
					PSI	bar	PSI	bar
.11	6	22	.2 @ 150	.75 @ 10.3	250	17.2	250	17.2
.19	10	38	.7 @ 250	2.6 @ 17.2	250	17.2	250	17.2
.23	12	46	2 @ 250	7 @ 17.2	250	17.2	250	17.2
.38	20	76	5 @ 250	19 @ 17.2	250	17.2	250	17.2
.57	30	114	9 @ 250	34 @ 17.2	250	17.2	250	17.2
.68	36	136	17 @ 250	64 @ 13.8	200	13.8	250	17.2
.80	42	160	21 @ 200	79 @ 13.8	200	13.8	250	17.2
.99	52	198	36 @ 140	136 @ 9.7	140	9.7	200	13.8
1.2	63	239	45 @ 140	170 @ 9.7	140	9.7	200	13.8
1.3	69	259	51 @ 125	193 @ 8.6	125	8.6	175	12.1
1.6	84	319	68 @ 100	257 @ 6.9	100	6.9	150	10.3
2.0	105	399	86 @ 100	325 @ 6.9	100	6.9	150	10.3
2.3	121	459	96 @ 100	363 @ 6.9	100	6.9	150	10.3

Performance Estimate Based on 68°F (20°C) Clean Deionized Water @ 1.0 centipoise fluid viscosity

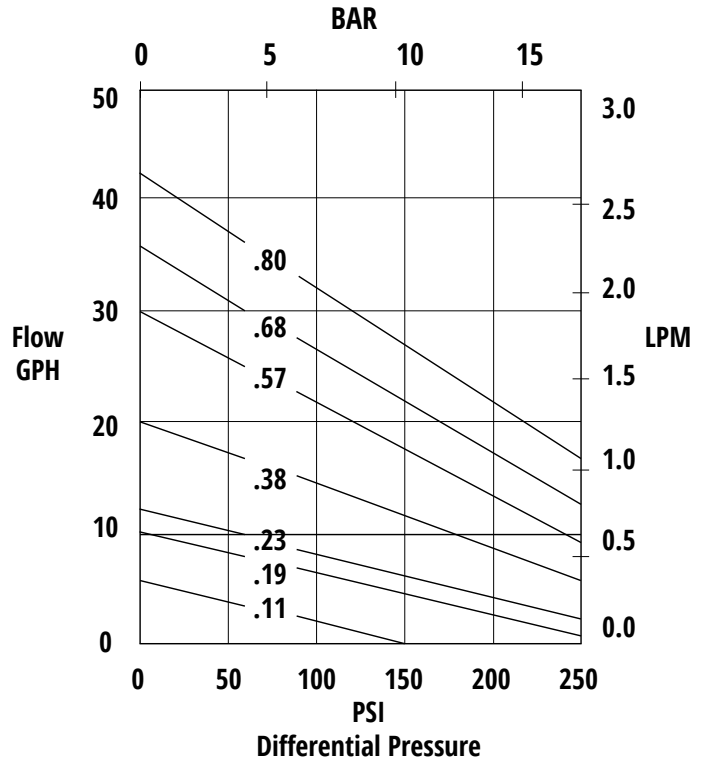
Materials of Construction

Metal Wetted Parts	316 Stainless Steel, Hastelloy C276, or Titanium
Gears & Bearings	PPS (Polyphenylene Sulfide), PEEK (Polyetheretherketone), or PTFE
O-Rings	Viton or PTFE
Ports	1/8 NPT or 1/4 NPT
Magnet Shrouds	Ceramic Magnets (stronium ferrite) may be O-Ring seal shrouded; Samarium Cobalt Magnets are Metal Laser Welded
Magnet Torque	15 in/oz, 30 in/oz, 50 in/oz or 240 in/oz
Bypass	Full flow externally adjustable bypass option available
Suction Vacuum	Pumps self prime when wetted with operating fluid to 28.5 Hg" (724mm Hg). Dry lift not recommended. Fluid viscosity, temperature and pressure may affect the performance.
Motors	AC, DC, BLDC, Air, Variable Speed or Motor Mate Adapter Kits
Operating Temperatures above 140 °F (60 °C)	In the D Series Product line we offer special sizing option for operating at temperatures above 140 °F (60 °C). Consult factory for details.
Gear & Bearing Material Temperature Limit	PPS limit is approximately 250 °F (121 °C) PEEK, Carbon and Metal limits are approximately 350 °F (176 °C) If possible, for temperatures above 250 °F (121 °C) Carbon bearings should be selected.

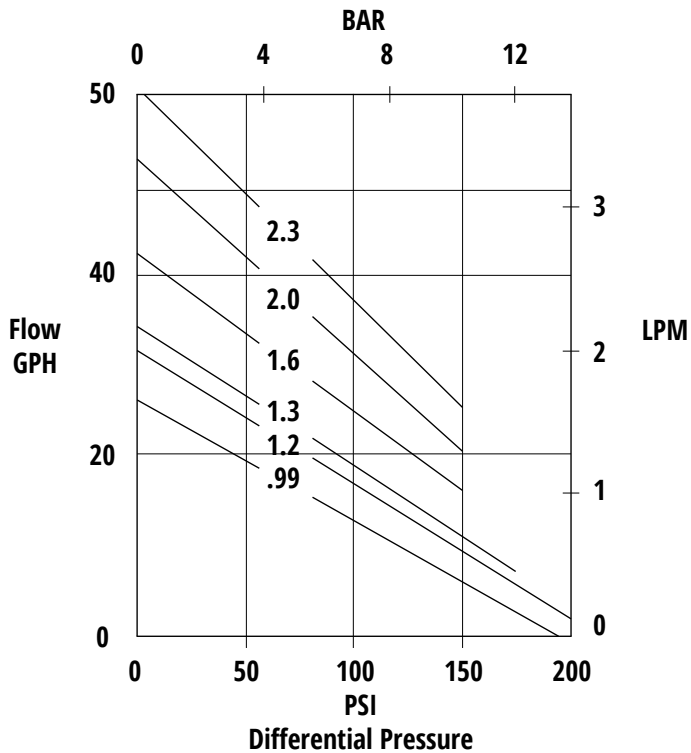
1750 RPM



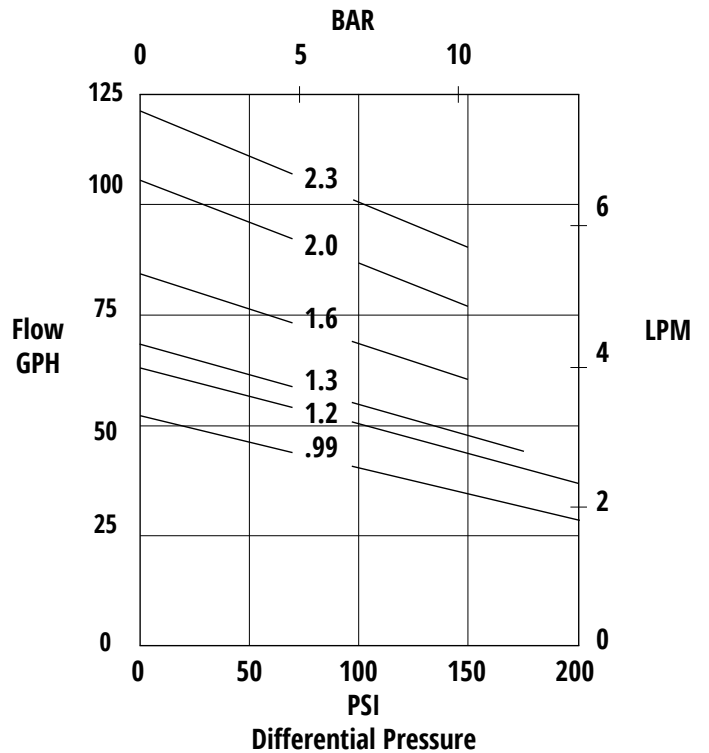
3500 RPM



1750 RPM



3500 RPM



Brushless DC Motors with Integral Speed Drive

KinetiMax 68 EB Series

68 mm diameter, up to 170 mNm cont. torque, up to 50 W output power

The KinetiMax 68 EB series of brushless DC motors with integrated drive electronics are compact yet powerful outer-rotor motors. The external rotor and iron core stator minimize cogging and maximize output torque. The KinetiMax 68 motors are designed with a bearing system capable of handling high side loads.

High quality components ensure the KinetiMax 68 motor life exceeds 20,000 hours. The output torque range of this family has a maximum of 170 mNm, and the speed range extends to 6000 RPM.

Typical applications for the KinetiMax 68 include many types of gear pumps and peristaltic pumps, high-end fans and blowers, and laboratory equipment.

Options & Accessories

- Special shaft diameter and machining
- Customized mounting flange
- Custom leads and connector configurations
- Special winding configurations
- Provisions for gearbox mounting
- IP 55 rating
- PWM or frequency speed set in place of analog input



Features & Benefits

- Outer-rotor precision 68 mm dia. brushless DC motor with integrated drive electronics
- Models rated at 35 and 50 W output power, rated torque up to 170 mNm, no-load speed up to 6000 RPM
- Adjustable speed and direction selection
- Thermal overload protection with automatic recovery
- Low EMI – complies with EN 55014-1/2, EN 61000-6-1/3
- Standard IP43 protection level
- Model 01658033 includes integral electrical brake

QuickShip Products

Some of the part number configurations for this product are in stock and available for ***immediate delivery!***

Look for the QuickShip symbol next to available part numbers. Then, click on the part number to go directly to our online store.



KinetiMax 68 EB – Specifications

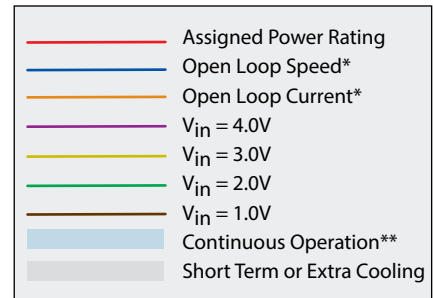
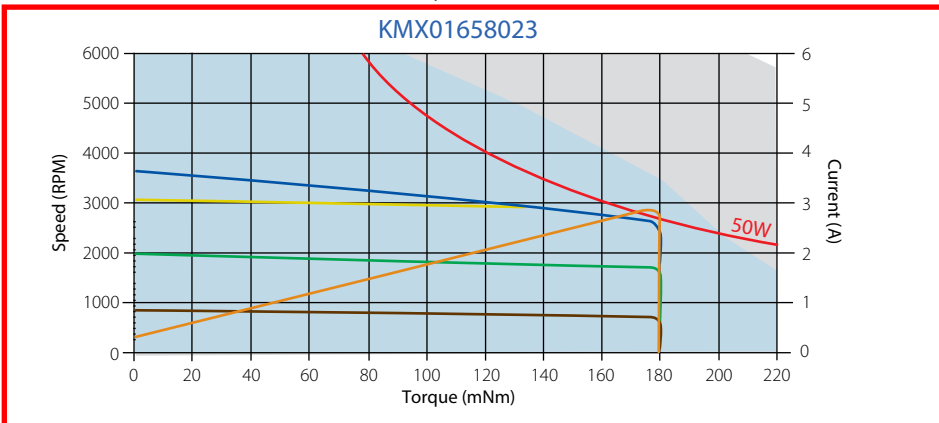
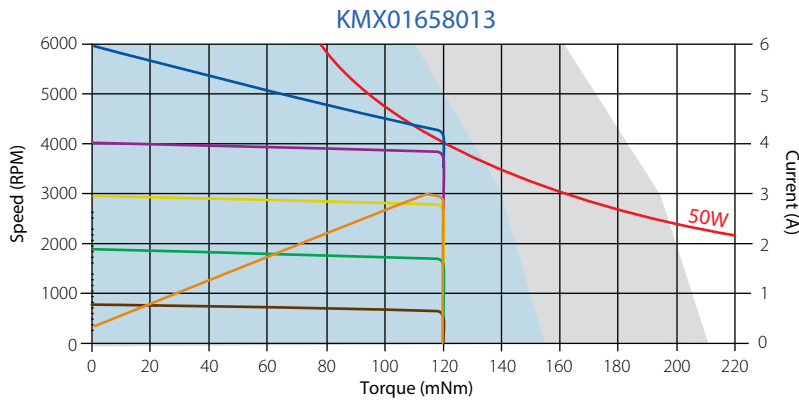
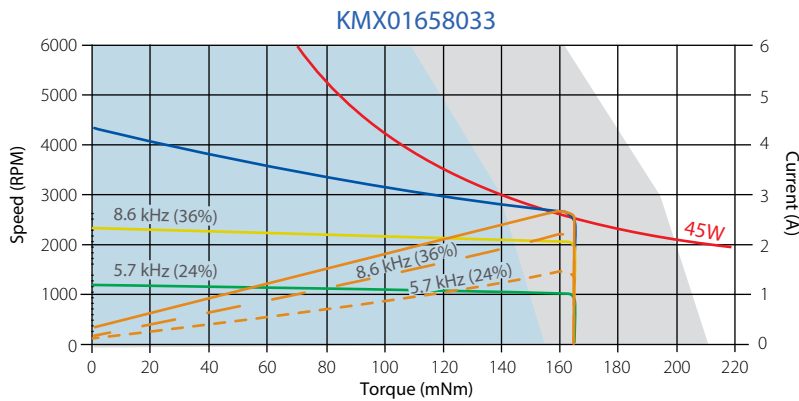
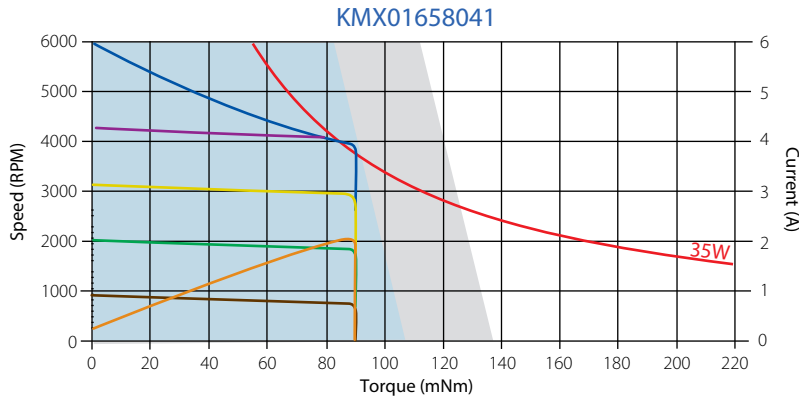
Model		KMX-01658041	KMX-01658033	KMX-01658013	KMX-01658023
Length		49.1 (1.93)		62.1 (2.44)	
Voltage VDC	Nominal	24			
	Range ¹	14 – 30			
Rated Output Power	W	35		50	
Torque mNm (oz.in.)	Rated	70 (9.9)	110 (15.6)		170 (24.0)
	Max	90 (12.7)	150 (21.2)	120 (17.0)	180 (25.5)
Speed RPM	Rated	3650	2500	3750	2400
	No-load	6000	4330	6000	3650
Current A	Rated – A	2		3	
	Max – A	2.3	3.4		
	No-load – mA	215	180	260	265
Rotor Inertia kgm ² (oz.in.s ²)		0.75 E-4 (0.0106)	1.2 E-4 (0.017)		
Mechanical Time Constant ms		30	40	25	
Thermal Resistance Housing-Ambient °C/W		4.2	3.7		
Weight g (oz)		450 (15.9)	550 (19.4)		
Protection Level		IP43			
Gearbox (option)		On request			
Speed-Voltage Input Ratio	RPM/V	1000	1100	1000	
	Set Point	0 - 6			
Speed Input V	Threshold	0.25	N/A	0.25	
	Brake Active	N/A	0 to 0.4	N/A	
	Motor Disable	N/A	0.4 to 0.7..1.05	N/A	
Direction Input V	CCW	< 1			
	CW	> 4			
Speed Output Signal	PPR	36			
	Low Time μsec	168			
Operating Temperature Range °C (°F)		0 – 70 (32 – 158)			
Thermal Limit Protection ² °C		90 (194) flange temp. / 80 (176) restart			

Values valid for nominal voltage and Tamb = 22 °C

¹ Power supply provided with appropriate 1000 μF buffer capacitor between supply voltage and common to comply with EN 55014-1/2.
(See additional EMC information on page 4.)

² Motor temperature measured at aluminum bearing support

KinetiMax 68 EB – Performance

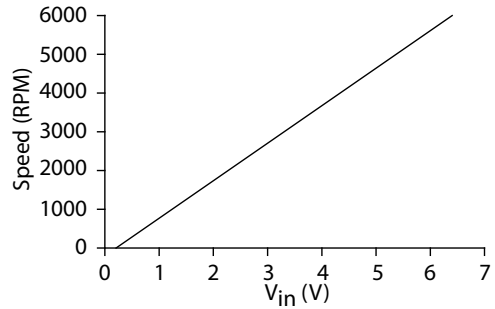
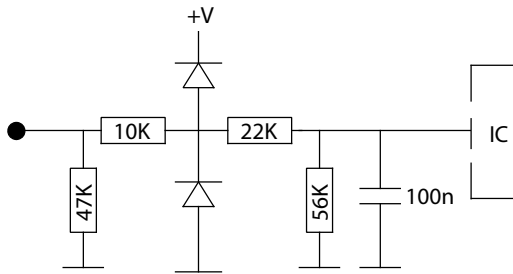


* @ Rated Voltage

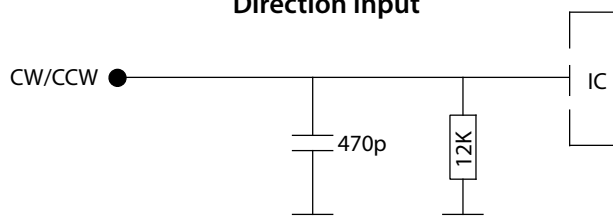
** $T_{amb} = 22^{\circ}C$

KinetiMax 68 EB – I/O Schematics

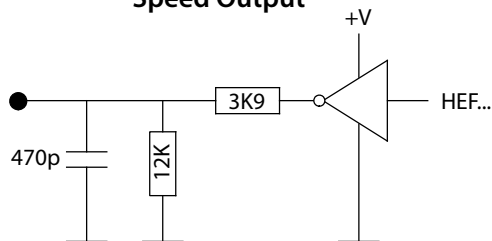
Speed Input



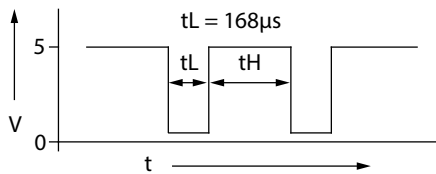
Direction Input



Speed Output

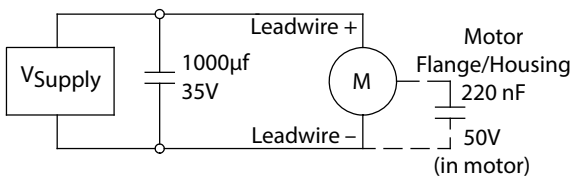


Speed Output Signal



EMC

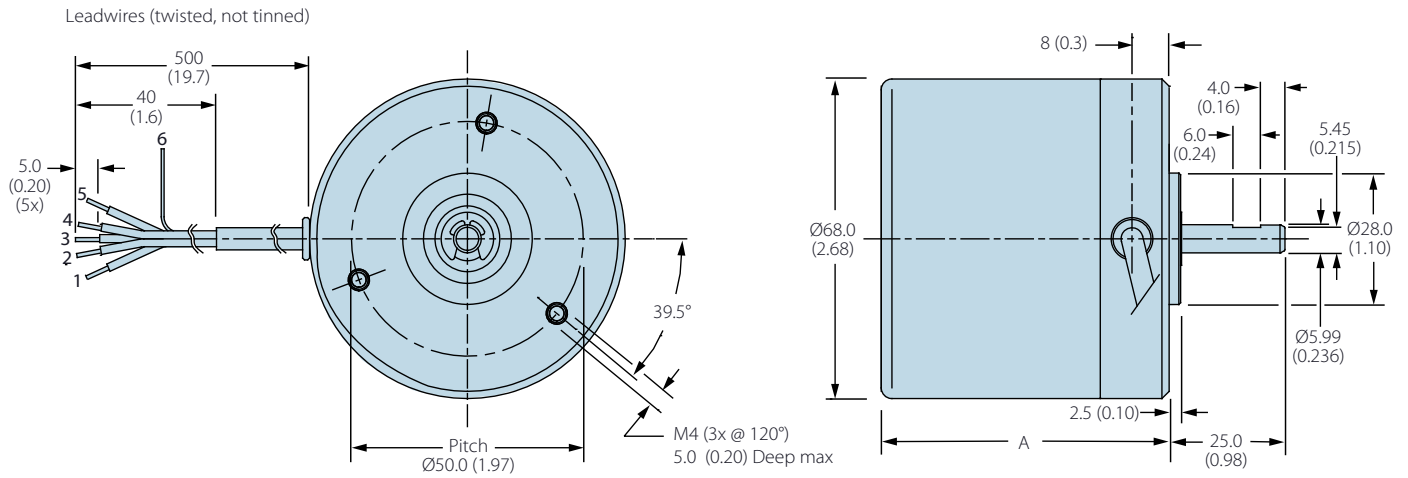
To meet EMC directive EN 55014, the power supply must be provided with a capacitor 1000µf, 35V at the output:



KinetiMax 68 EB – Electrical Connections

Version	Description	Wire Color (AWG 24)
5-Wire	1 Supply voltage (+24V)	Red
	2 Ground	Black
	3 Speed control (V _{in}) 0 – 5V (1V/1000 RPM)	White
	4 Speed output (FG) 36 pulses/rev tachometer	Green
	5 Direction input (Fw/Rv) CCW/CW	Brown
	6 Shield/ground to motor housing	—

KinetiMax 68 EB Dimensions — mm (in)



	Length A
KMX-01658041	49.1 (1.93)
KMX-01658033	
KMX-01658013	62.1 (2.44)
KMX-01658023	

Features

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

Construction

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

Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part Number			
	DC Watts	AC			General Purpose		Explosionproof	
		Watts	VA Holding	VA Inrush	AC	DC	AC	DC
F	-	6.1	15	40	238210	-	238214	-
F	11.6	10.1	25	70	238610	238710	238614	238714
F	16.8	16.1	35	180	272610	97617	272614	97617
F	-	17.1	40	93	238610	-	238614	-
F	-	20	43	240	99257	-	99257	-
F	-	20.1	48	240	272610	-	272614	-
H	30.6	-	-	-	-	74073	-	74073
H	40.6	-	-	-	-	238910	-	238914

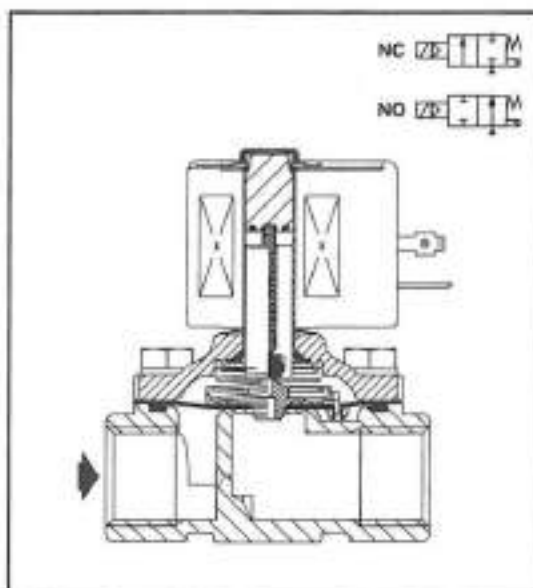
Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz), 6, 12, 24, 120, 240 volts DC. Must be specified when ordering. Other voltages available when required.

Solenoid Enclosures

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

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

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



Nominal Ambient Temp. Ranges

RedHat II/
RedHat AC: 32°F to 125°F (0°C to 52°C)
RedHat II DC: 32°F to 104°F (0°C to 40°C)
RedHat DC: 32°F to 77°F (0°C to 25°C)
(104°F/40°C occasionally)

Refer to *Engineering Section* for details.

Approvals

CSA certified. RedHat II meets applicable CE directives. Refer to *Engineering Section* for details.

Specifications (English units)

Pipe Size (In.)	Orifice Size (In.)	Cv Flow Factor	Operating Pressure Differential (psi)							Max. Field Temp., °F		Brass Body			Stainless Steel Body			Watt Rating/Class of Coil Insulation (1)	
			Max. AC			Max. DC						Catalog Number	Const. Ref. (2)	UL (3) Listing	Catalog Number	Const. Ref. (2)	UL (3) Listing		
			Air-Inert Gas	Water	Light Oil @ 300 SSU	Air-Inert Gas	Water	Light Oil @ 300 SSU	AC	DC									
NORMALLY CLOSED (Closed when de-energized), NBR or PTFE (4) Sealing																			
3/8	3/8	1.5	0	150	125	-	40	40	-	180	150	8210G073 (5)	1P	●	8210G036 (6)	1P	●	6.3/F	11.6/F
3/8	5/8	3	0	150	150	-	40	40	-	180	150	8210G060	20	○	-	-	-	18.1/F	11.6/F
3/8	5/8	3	5	200	150	135	125	100	100	180	150	8210G001	60	○	-	-	-	6.3/F	11.6/F
3/8	5/8	3	5	300	300	300	-	-	-	175	-	8210G006	50	○	-	-	-	17.1/F	-
1/2	3/4	2.2	0	150	125	-	40	40	-	180	150	8210G015 (5)	2P	●	8210G037 (6)	2P	●	6.3/F	11.6/F
1/2	5/8	4	0	150	150	-	40	40	-	180	150	8210G084	50	○	-	-	-	10.1/F	11.6/F
1/2	5/8	4	0	150	150	125	40	40	-	175	150	-	-	-	8210G091	70	●	17.1/F	11.6/F
1/2	5/8	4	5	200	150	135	125	100	100	180	150	8210G062	60	○	-	-	-	6.3/F	11.6/F
1/2	5/8	4	5	300	300	300	-	-	-	175	-	8210G060	50	○	-	-	-	17.1/F	-
1/2	3/4	4	5	-	300	-	-	300	-	180	125	8210G227	50	○	-	-	-	17.1/F	40.6/H
3/4	5/8	4.5	0	150	150	125	40	40	-	175	150	-	-	-	8210G088	70	●	17.1/F	11.6/F
3/4	3/4	5	5	125	125	125	100	90	75	180	150	8210G069	50	○	-	-	-	5.1/F	11.6/F
3/4	3/4	5	0	150	150	-	40	40	-	180	150	8210G085	80	○	-	-	-	10.1/F	11.6/F
3/4	3/4	6.0	0	200	150	100	125	125	125	180	150	8210G063	110	○	-	-	-	6.3/F	11.6/F
3/4	3/4	6	0	-	-	-	200	180	180	-	77	8210B025 (7)	10P	-	-	-	-	-	30.6/H
3/4	3/4	6	0	300	300	200	-	-	200	-	8210G026 (8)	40P	●	-	-	-	-	16.1/F	-
1	1	13	0	-	-	-	100	100	80	-	77	8210B054 (7)	310	-	-	-	-	-	30.6/H
1	1	13	0	100	125	125	-	-	-	180	-	8210G354	410	●	8210G068	450	●	16.1/F	-
1	1	13	5	150	150	100	125	125	125	180	150	8210G394	120	○	-	-	-	6.1/F	11.6/F
1	1	13.5	0	300	225	115	-	-	-	200	-	8210G027 (8)	40P	●	-	-	-	20.1/F	-
1	1	13.5	10	300	300	300	-	-	-	175	-	8210G070 (5)	13P	-	-	-	-	17.1/F	-
1.1/4	1.1/8	15	0	-	-	-	100	100	80	-	77	8210B055 (7)	320	-	-	-	-	-	30.6/H
1.1/4	1.1/8	15	0	150	125	125	-	-	-	180	-	8210G055	430	●	-	-	-	16.1/F	-
1.1/4	1.1/8	15	5	150	150	100	125	125	125	180	150	8210G038	160	○	-	-	-	6.1/F	11.6/F
1.1/2	1.1/4	22.5	0	-	-	-	100	100	80	-	77	8210B056 (7)	300	-	-	-	-	-	30.6/H
1.1/2	1.1/4	22.5	0	180	125	125	-	-	-	180	-	8210G095	440	●	-	-	-	16.1/F	-
1.1/2	1.1/4	22.5	5	150	150	100	125	125	125	180	150	8210G022	180	●	-	-	-	6.1/F	11.6/F
2	1.3/4	40	5	150	125	90	50	50	50	180	150	8210G100	20P	●	-	-	-	6.1/F	11.6/F
2.1/2	1.3/4	40	5	150	125	90	50	50	50	180	150	8210G101	21P	●	-	-	-	6.1/F	11.6/F
NORMALLY OPEN (Open when de-energized), NBR Sealing (PA Dia-Holder, except as noted)																			
3/8	5/8	3	0	150	150	125	125	125	80	180	150	8210G033	230	●	-	-	-	10.1/F	11.6/F
3/8	5/8	3	5	200	200	200	200	200	200	180	180	8210G011 (9)	250	●	-	-	-	10.1/F	11.6/F
1/2	5/8	4	0	150	150	125	125	125	80	180	150	8210G034	230	●	-	-	-	10.1/F	11.6/F
1/2	5/8	4	0	150	150	100	125	125	80	180	150	-	-	-	8210G030	370	●	10.1/F	11.6/F
1/2	5/8	4	5	250	200	200	200	200	200	180	180	8210G012 (9)	260	●	-	-	-	10.1/F	11.6/F
3/4	3/4	5.5	0	150	150	125	125	125	80	180	150	8210G025	250	●	-	-	-	10.1/F	11.6/F
3/4	5/8	3	0	150	150	100	125	125	80	180	150	-	-	-	8210G038	380	●	10.1/F	11.6/F
3/4	3/4	6.5	5	-	-	-	250	200	200	-	180	8210C013	340	●	-	-	-	-	16.6/F
3/4	3/4	6.5	5	250	200	200	-	-	-	180	-	8210C013	480	●	-	-	-	16.1/F	-
1	1	13	0	125	125	125	-	-	-	180	-	8210B057 (7)	340	●	-	-	-	20.1/F	-
1	1	13	5	-	-	-	125	125	125	-	180	8210C014	260	●	-	-	-	16.6/F	-
1	1	13	5	150	150	125	-	-	-	180	-	8210C014	470	●	-	-	-	16.1/F	-
1.1/4	1.1/8	15	0	125	125	125	-	-	-	180	-	8210B058 (7)	350	●	-	-	-	20.1/F	-
1.1/4	1.1/8	15	5	-	-	-	125	125	125	-	180	8210C015	280	●	-	-	-	16.6/F	-
1.1/4	1.1/8	15	5	100	150	125	-	-	-	180	-	8210G016	480	●	-	-	-	16.1/F	-
1.1/2	1.1/4	22.5	0	125	125	125	-	-	-	180	-	8210B059 (7)	360	●	-	-	-	20.1/F	-
1.1/2	1.1/4	22.5	5	-	-	-	125	125	125	-	180	8210C032	290	●	-	-	-	-	16.6/F
1.1/2	1.1/4	22.5	5	150	150	125	-	-	-	180	-	8210G032	490	●	-	-	-	16.1/F	-
2	1.3/4	40	5	-	-	-	125	125	125	-	150	8210 100	30P	●	-	-	-	16.6/F	-
2	1.3/4	40	5	125	125	125	-	-	-	180	-	8210G103	50P	●	-	-	-	16.1/F	-
2.1/2	1.3/4	45	5	-	-	-	125	125	125	-	150	8210 104	27P	●	-	-	-	16.6/F	-
2.1/2	1.3/4	45	5	125	125	125	-	-	-	180	-	8210G104	51P	●	-	-	-	16.1/F	-

① 5 psi on Air; 1 psi on Water.

② Valve provided with PTFE main disc.

③ Valve includes Liftm (G.E. trademark) piston.

④ Letter "D" denotes diaphragm construction; "P" denotes piston construction.

⑤ Safety Shutoff Valve; ● General Purpose Valve.

Refer to Engineering Section (Approach) for details.

⑥ Valves not available with Explosionproof enclosures.

⑦ On 50 hertz service, the watt rating for the 6.3/F solenoid is 8.1 watts.

⑧ AC construction also has PA coating.

⑨ No dia-holder.

⑩ Stainless steel dia-holder.

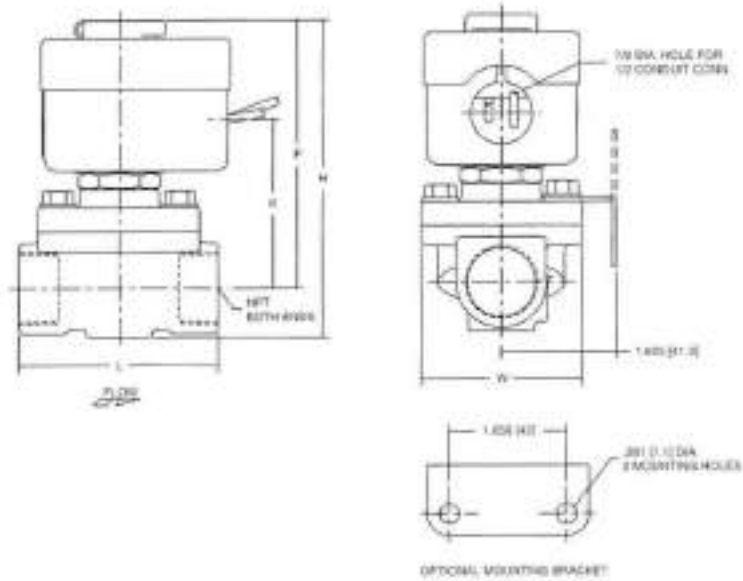
⑪ Must have solenoid mounted vertical and upright.

Dimensions: inches (mm)

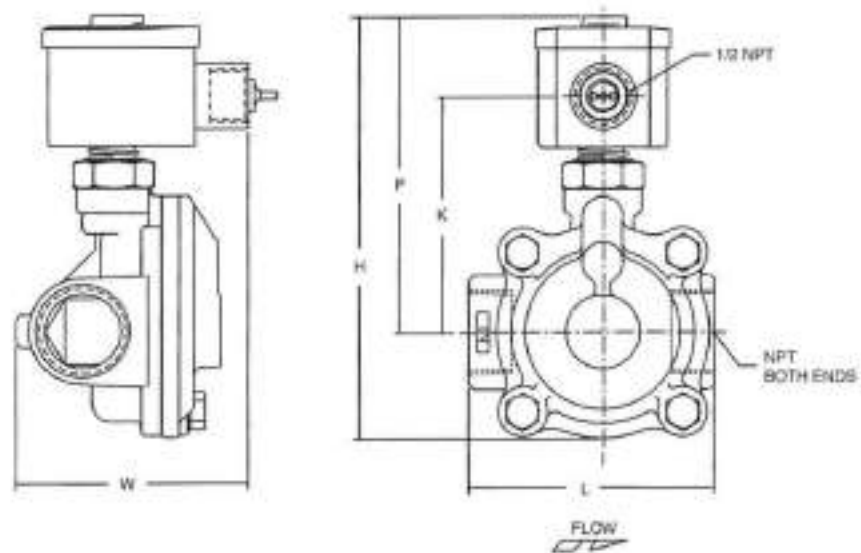
Const. Ref.		H	K	L	P	W
30	ins.	8.22	X	5.06	5.47	4.87
	mm	209	X	129	139	124
31	ins.	5.25	X	3.75	4.44	3.25
	mm	133	X	95	113	83
32	ins.	5.69	X	3.66	4.69	3.25
	mm	145	X	93	119	83
33	ins.	6.06	X	4.38	4.94	3.91
	mm	154	X	111	125	99
34	ins.	6.91	X	3.75	6.09	3.25
	mm	176	X	95	155	83
35	ins.	7.34	X	3.66	6.34	3.25
	mm	186	X	93	161	83
36	ins.	7.66	X	4.38	6.56	3.91
	mm	195	X	111	167	99
37	ins.	4.61	2.75	2.81	3.89	2.39
	mm	117	70	71	99	61
38	ins.	4.61	2.75	2.81	3.89	2.39
	mm	117	70	71	99	61
39	ins.	5.42	2.31	2.75	4.86	3.80
	mm	138	59	70	123	97
40	ins.	5.20	3.29	2.81	4.50	2.28
	mm	132	83	71	114	58
41	ins.	5.13	3.10	3.75	4.32	3.25
	mm	130	79	95	110	83
42	ins.	6.43	4.44	3.93	5.62	3.25
	mm	163	112	100	143	83
43	ins.	5.57	3.35	3.66	4.57	3.25
	mm	142	85	93	116	83
44	ins.	5.90	3.57	4.38	4.79	3.91
	mm	150	91	111	122	99
45	ins.	5.26	3.17	3.75	4.38	3.84
	mm	134	81	95	111	98
46	ins.	4.95	3.10	3.84	4.31	2.75
	mm	126	79	98	110	70
47	ins.	6.43	3.59	3.75	4.81	3.52
	mm	163	91	95	122	90
48	ins.	6.43	3.59	3.66	4.71	3.73
	mm	163	91	93	121	95
49	ins.	6.91	3.75	4.38	4.90	4.40
	mm	176	95	111	126	112
50	ins.	8.13	4.15	5.06	5.37	4.87
	mm	207	106	129	136	124
51	ins.	8.13	4.15	5.50	5.37	5.18
	mm	207	106	140	136	132

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

Const. Ref. 10, 15, 24, 26-36



Const. Ref. 12, 16, 18



Features

- Available with compression fitting ends for metal or plastic tube to save installation cost
- Direct acting for reliable performance; resilient seating for tight shutoff
- Operation similar to 8320, but with plastic body
- Ideal valve for dispensing, damper control, and water applications
- Mountable in any position

Construction

Valve Parts in Contact with Fluids	
Body	CA
Disc	NBR
Disc-Holder	CA
Core Tube	305 Stainless Steel
Core and Plugnut	430F Stainless Steel
Springs	302 Stainless Steel and 17-7PH Stainless Steel
Shading Coil	Copper

Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part Number	
	DC Watts	AC			General Purpose	
		Watts	VA Holding	VA Inrush	AC	DC
F	10.6	6.1	16	30	238210	238310
F	-	9.1	25	40	238210	-

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

Solenoid Enclosures

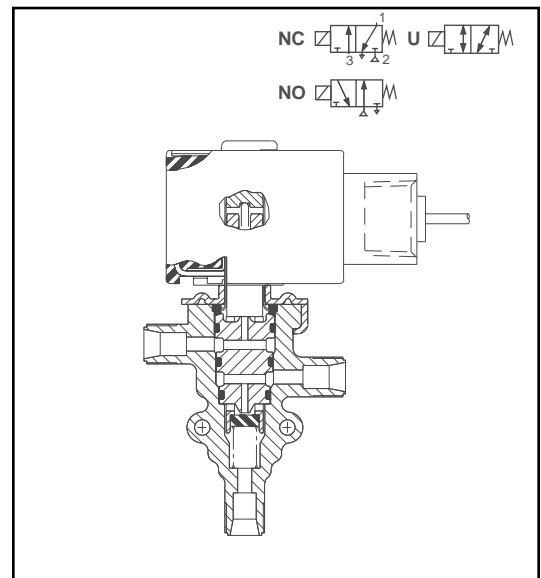
Standard: Watertight, Types 1, 2, 3, 3S, 4, and 4X.

Optional: Open Frame Solenoid, Junction Box.

See *Optional Features* Section for descriptions on these and other available options.



3-WAY



Nominal Ambient Temp. Ranges

AC: 32°F to 125°F (0°C to 52°C)

DC: 32°F to 104°F (0°C to 40°C)

Refer to *Engineering Section* for details.

Approvals

CSA certified. UL recognized components.
 Meets applicable CE directives.

Refer to *Engineering Section* for details.

Specifications (English units)

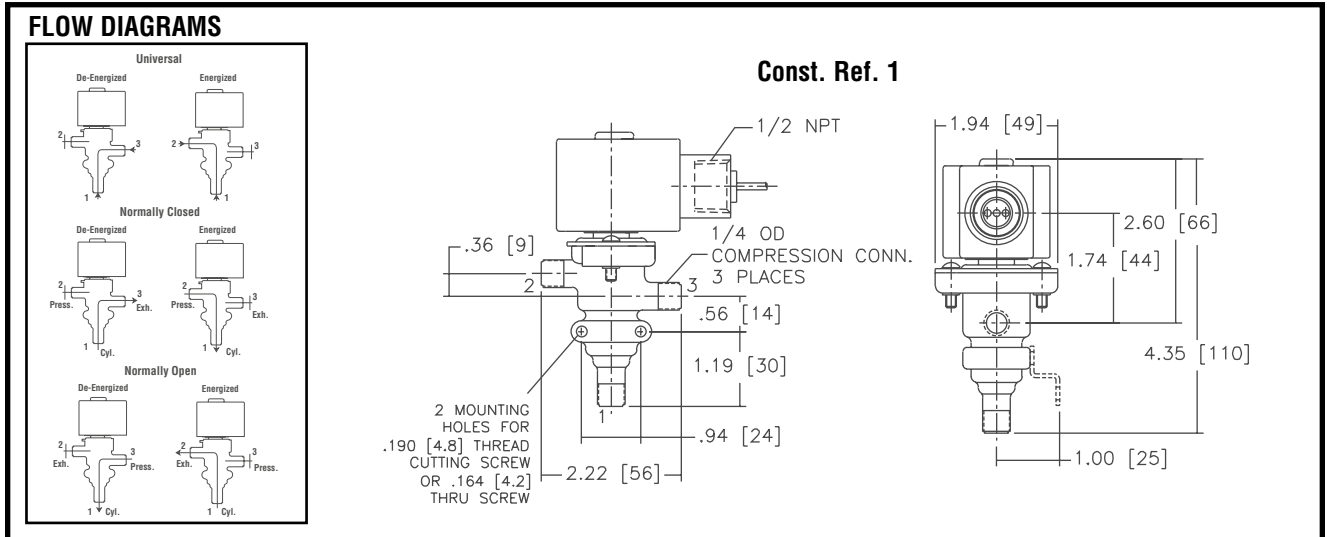
Pipe Connections	Orifice Size (in)	Cv Flow Factor	Operating Pressure Differential (psi)				Max. Fluid Temp. °F		Catalog Number	Const. Ref.	Watt Rating/ Class of Coil Insulation ②	
			Max. AC		Max. DC		AC	DC			AC	DC
			Air-Inert Gas	Water	Air-Inert Gas	Water						
UNIVERSAL OPERATION (Pressure at any port)												
1/4" O.D. Compression ①	1/16	.07	100	100	65	65	130	120	8360G071	1	9.1/F	10.6/F
	3/32	.11	50	50	50	50	130	120	8360G073	1	6.1/F	10.6/F
	1/8	.16	30	30	20	20	130	120	8360G074	1	9.1/F	10.6/F
NORMALLY CLOSED (Closed when de-energized)												
1/4" O.D. Compression ①	1/16	.07	125	125	125	125	130	120	8360G075	1	6.1/F	10.6/F
	3/32	.11	100	100	100	100	130	120	8360G077	1	6.1/F	10.6/F
	1/8	.16	40	40	40	40	130	120	8360G078	1	6.1/F	10.6/F
NORMALLY OPEN (Open when de-energized)												
1/4" O.D. Compression ①	1/16	.07	125	125	125	125	130	120	8360G067	1	6.1/F	10.6/F
	3/32	.11	100	100	100	100	130	120	8360G069	1	6.1/F	10.6/F
	1/8	.16	40	40	40	40	130	120	8360G070	1	6.1/F	10.6/F

① Fittings not supplied with valve. To order, refer to List Price Schedule.
② On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts; the watt rating for the 9.1/F solenoid is 11.1 watts.

Specifications (Metric units)

Pipe Connections	Orifice Size (mm)	Kv Flow Factor (m ² /h)	Operating Pressure Differential (bar)				Max. Fluid Temp. °C		Catalog Number	Const. Ref.	Watt Rating/ Class of Coil Insulation ②	
			Max. AC		Max. DC		AC	DC			AC	DC
			Air-Inert Gas	Water	Air-Inert Gas	Water						
UNIVERSAL OPERATION (Pressure at any port)												
1/4" O.D. Compression ①	1.6	.06	7	7	4	4	54	49	8360G071	1	9.1/F	10.6/F
	2.4	.09	3	3	3	3	54	49	8360G073	1	6.1/F	10.6/F
	3.2	.14	2	2	1	1	54	49	8360G074	1	9.1/F	10.6/F
NORMALLY CLOSED (Closed when de-energized)												
1/4" O.D. Compression ①	1.6	.06	9	9	9	9	54	49	8360G075	1	6.1/F	10.6/F
	2.4	.09	7	7	7	7	54	49	8360G077	1	6.1/F	10.6/F
	3.2	.14	3	3	3	3	54	49	8360G078	1	6.1/F	10.6/F
NORMALLY OPEN (Open when de-energized)												
1/4" O.D. Compression ①	1.6	.06	9	9	9	9	54	49	8360G067	1	6.1/F	10.6/F
	2.4	.09	7	7	7	7	54	49	8360G069	1	6.1/F	10.6/F
	3.2	.14	3	3	3	3	54	49	8360G070	1	6.1/F	10.6/F

Dimensions: inches (mm)

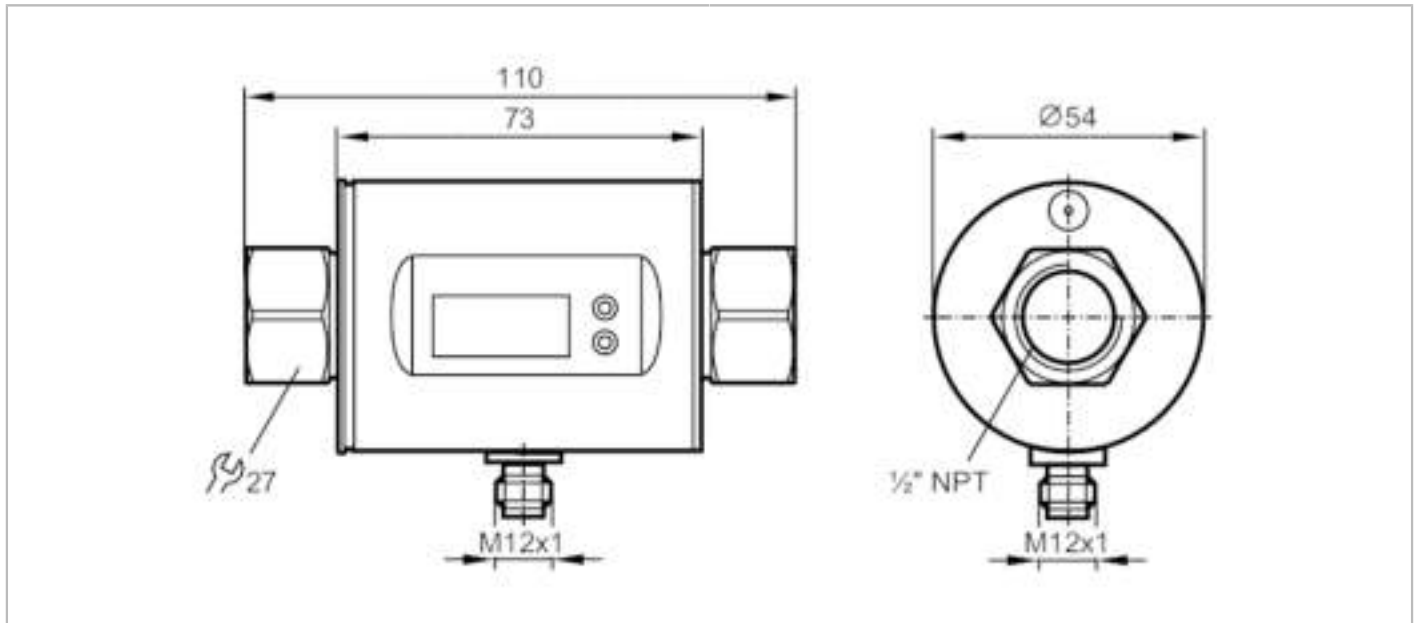


SM6604



Magnetic-inductive flow meter

SMN12GGX50KG/US-100



Product characteristics

Number of inputs and outputs	Number of analog outputs: 2
Process connection	threaded connection 1/2" NPT DN15
Temperature monitoring	
Measuring range [°C]	-20...80

Application

System	gold-plated contacts
Application	for industrial applications
Media	Conductive liquids; water; water-based media
Note on media	conductivity: $\geq 20 \mu\text{S/cm}$ viscosity: $< 70 \text{ mm}^2/\text{s}$ (40 °C)
Medium temperature [°C]	-10...70
Pressure rating [bar]	16
Pressure rating [Mpa]	1.6
MAWP (for applications according to CRN) [bar]	17.7

Electrical data

Operating voltage [V]	20...30 DC; (according to EN 50178 SELV/PELV)
Current consumption [mA]	120; (24 V)
Protection class	III
Reverse polarity protection	yes
Power-on delay time [s]	5

Inputs / outputs

Number of inputs and outputs	Number of analog outputs: 2
------------------------------	-----------------------------

SM6604



Magnetic-inductive flow meter

SMN12GGX50KG/US-100

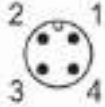
Outputs		
Total number of outputs		2
Output signal		analog signal
Number of analog outputs		2
Analog current output	[mA]	4...20; (scalable)
Max. load	[Ω]	500
Overload protection		yes
Measuring/setting range		
Measuring range	0.1...25 l/min	0.03...6.6 gpm
Display range	-30...30 l/min	-7.92...7.92 gpm
Resolution	0.02 l/min	0.01 gpm
Analog start point ASP	0...20 l/min	0...5.28 gpm
Analog end point AEP	5...25 l/min	1.32...6.6 gpm
In steps of	0.02 l/min	0.01 gpm
Temperature monitoring		
Measuring range	[°C]	-20...80
Resolution	[°C]	0.2
Analog start point	[°C]	-20...60
Analog end point	[°C]	0...80
In steps of	[°C]	0.2
Accuracy / deviations		
Flow monitoring		
Accuracy (in the measuring range)		± (2 % MW + 0,5 % MEW)
Repeatability		± 0,2% MEW
Temperature monitoring		
Accuracy	[K]	± 2,5 (Q > 1 l/min)
Reaction times		
Flow monitoring		
Response time	[s]	0.15; (dAP = 0, T19)
Damping for the switching output dAP	[s]	0...3
Temperature monitoring		
Dynamic response T05 / T09	[s]	T09 = 20 (Q > 1 l/min)
Operating conditions		
Ambient temperature	[°C]	-10...60
Storage temperature	[°C]	-25...80
Protection		IP 67
Tests / approvals		
EMC	DIN EN 60947-5-9	500 V withstand voltage (V DC)
Shock resistance	DIN EN 60068-2-27	20 g (11 ms)
Vibration resistance	DIN EN 68000-2-6	5 g (10...2000 Hz)
MTTF	[years]	175
Pressure equipment directive		sound engineering practice; can be used for group 2 fluids; group 1 fluids on request

SM6604



Magnetic-inductive flow meter

SMN12GGX50KG/US-100

Mechanical data		
Weight [g]	566.5	
Material	stainless steel (1.4404 / 316L); PBT-GF20; PC; FKM; TPE	
Materials (wetted parts)	stainless steel (1.4404 / 316L); PEEK; FKM	
Process connection	threaded connection 1/2" NPT DN15	
Displays / operating elements		
Display	Display unit	6 x LED, green (l/min, m ³ /h, gpm, gph, °C, °F)
	Measured values	alphanumeric display, 4-digit
	Programming	alphanumeric display, 4-digit
Display unit	l/min; m ³ /h; gpm; gph; °C; °F	
Remarks		
Remarks	MW = Measured value	
	MEW = Final value of the measuring range	
Pack quantity	1 pcs.	
Electrical connection		
Connector: 1 x M12; Contacts: gold-plated		
		

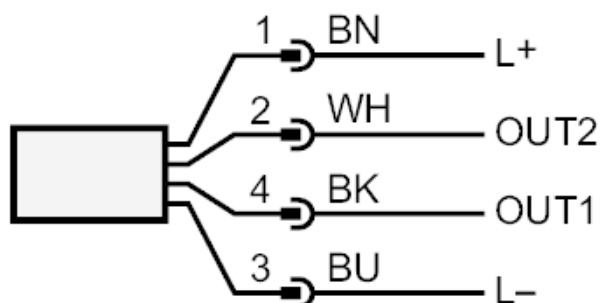
SM6604



Magnetic-inductive flow meter

SMN12GGX50KG/US-100

Connection



Colours to DIN EN 60947-5-2

OUT1: analog output Temperature monitoring

OUT2: analog output Volumetric flow quantity monitoring

Core colors :

BK = black

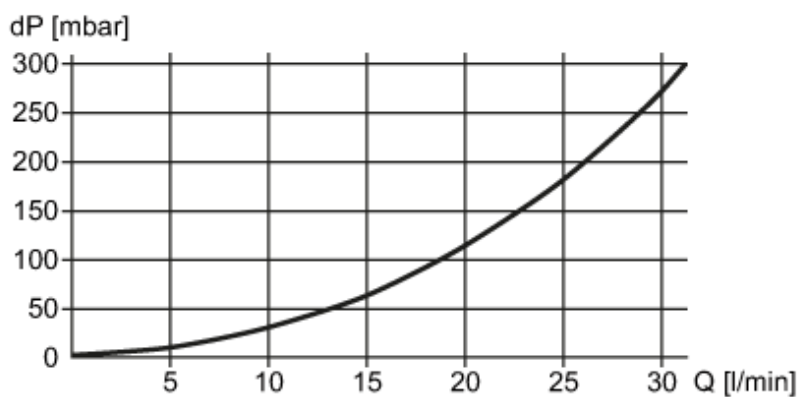
BN = brown

BU = blue

WH = white

Diagrams and graphs

Pressure loss



dP Pressure loss

Q volumetric flow quantity

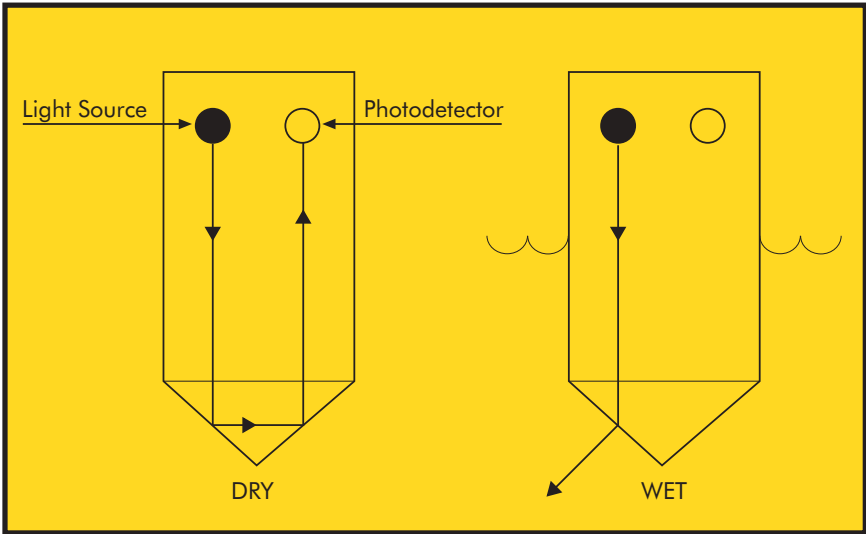
Table of Contents	Page
Sepra-Lite Integral Optic Level Switches	3 - 4
<ul style="list-style-type: none">• Brass Sepra-Lite® with Quartz Window• PFA Teflon Sepra-Lite®• Polysulfone Sepra-Lite®	
Electro Optic Level Systems	5 - 7
<ul style="list-style-type: none">• Electro Optic Level Switch Controller, One Channel• Electro Optic Level Switch and Pump Controller, Two Channel• Polysulfone Electro Optic Probe• Polysulfone Electro Optic Sanitary Probe• PFA Teflon® Electro Optic Probe• Polypropylene Quartz Tip Electro Optic Probe• 316 SS Quartz Tip Electro Optic Probe• Quartz Tips	
Fiber Optic Level Systems	8 - 9
<ul style="list-style-type: none">• Fiber Optic Level Switch and Pump Controller, 2 Channel• PFA Teflon® Fiber Optic Probe• Quartz Tip Polypropylene Fiber Optic Probe• Quartz Tip 316 SS Fiber Optic Probe• Quartz Tips	
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<ul style="list-style-type: none">• Capacitance Proximity Switch• Weld Fittings• Polypropylene Well Fitting• Relay Assembly	
Dual Float Controller	13 - 14

How LEVELITE Works

All LEVELITE optic probes operate by sensing the difference between liquid and air (or other gas) using an infrared light source and detector.

An optic LED produces infrared light that is directed down the probe. When dry, the light is reflected through the probe's conical tip and is sensed by the photodetector. When the probe tip is wet, the light at the photodetector produces a change in the output.

LEVELITE offers self-contained level switches as well as electro optic and fiber optic level systems. Electro optic probes are designed for general purpose areas and fiber optic probes for hazardous areas. These probes are used in conjunction with a universal controller, which can be used for level alarms or pump control. The universal controller has adjustable time delay and field selectable "fail-safe" settings.



Sepra-Lite® Integral Optic Level Switches

Sepra-Lite®**self-contained level switches with removable electronics**

Sepra-Lite® operates by sensing the difference between liquid and air (or other gas) using an infrared light source and detector. When the sensor is wetted, the transmitted light is lost into the liquid. When dry, the transmitted light is reflected by the prism back to the photo detector. This approach does not rely on any electrical interaction with the liquid. It has no moving parts and provides two main advantages: a wide variety of applications and the ability to separate the electronics for safety and troubleshooting.

Separability of the electronics module and sensor body is a key advantage. Since the sensor body is a passive part of the system, there is no need to shut down a machine or process when troubleshooting the Sepra-Lite® assembly. To verify operation, simply remove the electronics module and look into the “window”. If it is dark, liquid is present; if it is light, sensor is dry. By comparing this with the unit’s output or LED indicator, operation is easily and safely verified. Sepra-Lite® eliminates the need to open tanks or remove sensors to troubleshoot or repair.

When applying Sepra-Lite®, specific gravity, conductivity, vibration, and tight mounting constraints are not a problem. Dark, foggy, or colored liquids, such as: oils (light and heavy), glycols, detergents, heavy syrups, or caustics perform well. Sepra-Lite® is available in Brass and Teflon® (PFA). Two different mounting types provide a leak proof and/or high-pressure seal. To make using it even easier, the small overall size and minimal insertion are perfect where “in-pipe” use or “tight quarters” are encountered.

General Specifications

- No external controller required
- Synchronous refractive detection system
- 10.8 to 26.4 VDC operating voltage (30mA consumption)
- NPN open collector output, includes selectable wet or dry sinking
- 100 mA output current (maximum) and adjustable sensitivity
- Easy to see red LED alarm indicator
- EMI, overcurrent and reverse polarity protected.
- NEMA 4X (IP 66) electronics module.

A Popular Industry Choice for...

- Detecting liquid/gas phase change in air conditioners
- Oil levels in gear boxes
- Detecting dangerous leaks in laboratory and analytical machines
- Monitoring leakage in dual containment systems
- Precision control of chemical dispensing equipment

Brass Sepra-Lite® with Quartz Window

Ideal for high pressure applications. The brass body withstands some of the most abusive applications.

- Use as sight glass for level verification when electronics are removed
- Adjustable sensitivity
- 600 psig (42kg/cm²) at -40° F to 185° F (-40° C to 85° C)
- PVC jacketed cable, 4 conductor (user extendable)

**GLL100501E****Description**

- 1/2" NPT, 15' (4.6m) cable
- 3/4" UNF-16 with Viton® O-ring seal, 15' (4.6m) cable
- 3/4" NPT with Neoprene O-ring seal, 15' (4.6m) cable
- 3/4" NPT with Neoprene O-ring seal, 30' (9.1m) cable

Part Number

- GLL100501A
- GLL100501C
- GLL100501E
- GLL100501G

Sepra-Lite® Integral Optic Level Switches (continued)

GLL100504A ▼ PFA Teflon Sepra-Lite®

- Compatible with all acids, bases and solvents
- All PFA wetted parts
- Adjustable sensitivity
- 100 psig (7kg/cm²) at -40° F to 185° F (-40° C to 85° C)
- 1/2" NPT mounting
- 15' (4.6m) PVC jacketed cable, 4 conductor (user extendable)



GLL100504A

GLL100501F ▼ Polysulfone Sepra-Lite®

Food grade polysulfone housing

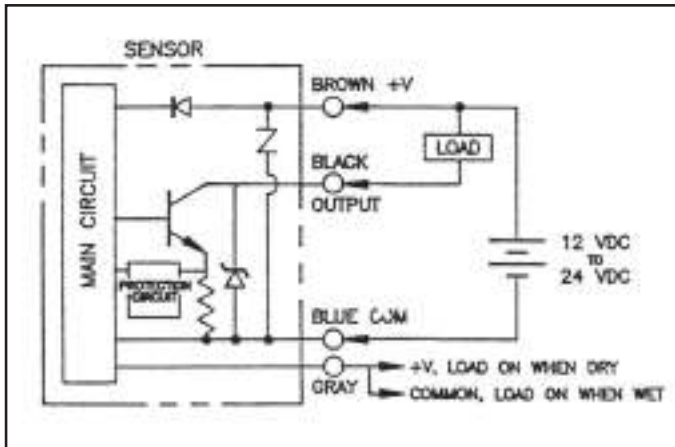
- Mounts on top or side of vessel. 3/4" NPT rear connection is ideal for pipe extension or conduit
- Adjustable sensitivity
- 100 psig (7kg/cm²) at -40° F to 185° F (-40° C to 85° C)
- 1/2" NPT mounting
- 15' (4.6m) PVC jacketed cable, 4 conductor (user extendable)



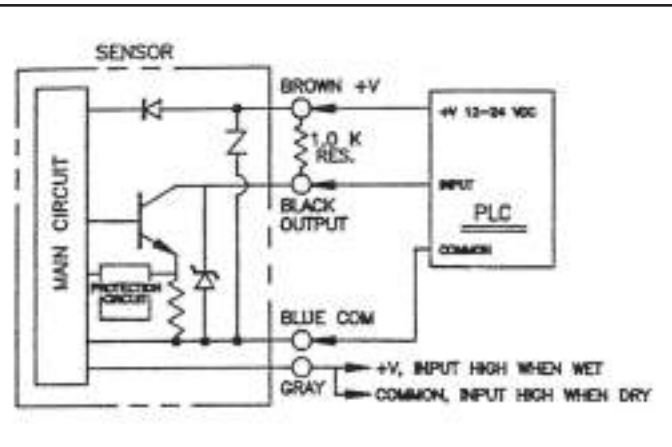
GLL100501F

Typical Wiring

Open Collector Output Hook-Up



PLC Connections Hook-Up



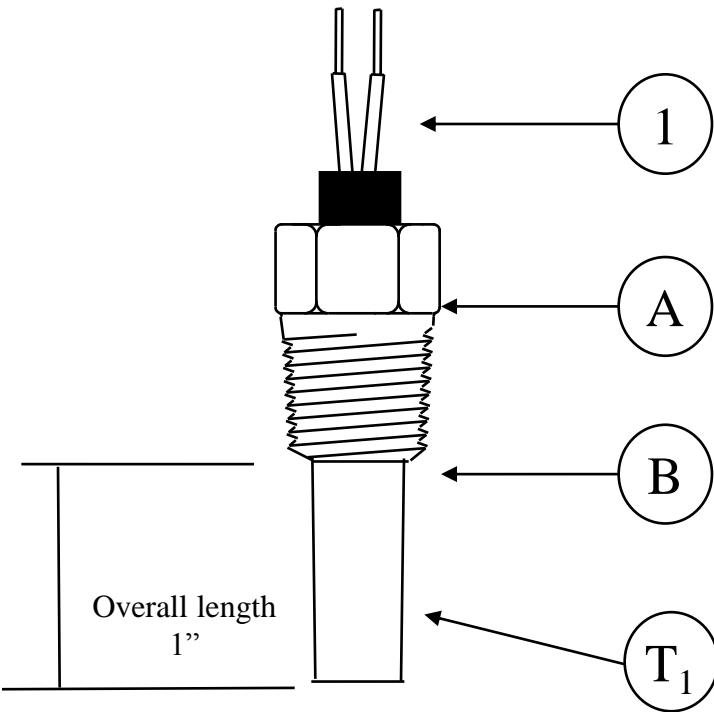
Note: Common wire (gray) must be connected to common (-) or V+(+) supply of power supply.

ADVANCED CONTROL TECHNOLOGY, INC.

- Drawing date: June 5, 2017
- Part number: ACT - 7198
- Revision level: D
- Supersedes: C
- Supersedes date: August 20, 2009
- Customer P/N: None
- Drawing not to scale:

- 7050 East County Road 101
- Shakopee, MN 55379
- Phone: (952) 882-0000
- Fax: (952) 890-3644
- Web site: www.actsensors.com
- E-mail: sales@actsensors.com

The Advanced Control Technology part # ACT-7198D was developed for the specific use with the Microclor System. This is a custom component from Advanced Control Technology.



STEM

- A) 1/2" male NPT mounting fitting
- B) CPVC Type 1 stem
- C) Overall length 1"

HARNESS

- 1) 24" PVC cable - Individual wiring
 - 2) T1 - 4 amp SPST temperature switch
 - Temperature trip point 55° centigrade (131° Fahrenheit)
 - **Normally closed***
- * Temperature switch is set normally closed to open on rising temperature.

OPTIONS

- O₁) NSF traceability required for CPVC
- O₂) P/N tag to be 1/2" from top of sensor.

APPLICATION DATA

Liquid:	.8-1.0% Sodium Hypochlorite
Specific gravity:	Unknown
Temperature:	150° Fahrenheit
Pressure:	Atmosphere
Vacuum:	Atmosphere
Shock/Vibration:	None
Electrical load	PLC

WARNING

All electrical codes relevant to the installation of this control must be followed including, but not limited to, fusing, disconnect, ground fault interrupter etc. Switch failure will occur without proper surge protection.



Blind Transmitter or Digital (S³L) Sensor

The Signet 2350 Temperature Sensor has a one piece injection molded PVDF body that is ideal for use in high purity applications. It also outlasts metal sensors in aggressive liquids and eliminates the need for costly custom thermowells. These sensors are available with a proprietary digital (S³L) output or field-scaleable 4 to 20 mA output.

Dual threaded ends (3/4 in. NPT) allow submersion in process vessels, or in-line installation with conduit connection. An integral adapter kit (sold separately) may be used to create a compact assembly with field mount versions of the Signet 8350 Temperature Transmitter.

Features

- 4 to 20 mA or digital (S³L) output
- Standard 3/4 in. NPT process connection
- One-piece injection molded PVDF body
- PT1000 platinum RTD in extended tip for quick response
- Easy installation
- Threaded for in-line or submersible installation



Applications

- Plating Bath Temperature Control
- Heat Exchange Monitor
- R.O. and D.I. System Monitor
- Hot/Cold Mixing System Monitor
- Data Acquisition
- Cooling Loops
- Effluent Monitoring
- HVAC
- Chemical Processing

Specifications

General	
Output	Digital (S ³ L) output or 4 to 20 mA
Accuracy	±0.5 °C (±0.9 °F)
Response Time, τ	10 secs.
Repeatability	±0.1 °C (±0.2 °F)
Resolution	0.01 °C (0.02 °F)
Sensing-End Connection	¾ in. NPT male thread
Cable-End Connection	¾ in. NPT male thread

Wetted Materials	
Sensor Housing	PVDF

Electrical	
Power Requirements	Type of output is automatically selected when appropriate power is applied.
Digital (S ³ L)	5 to 6.5 VDC ±10%, <1 .5 mA
	4 to 20 mA
Cable Length	4.6 m (15 ft)
	15.2 cm (6 in.); cable length can also be extended up to 121 m (400 ft)
Cable Type	PVC jacketed, 3-conductor with shield 22 AWG, Blk/Red/White/Shld
Digital (S ³ L) Output	Serial ASCII, TTL Level 9600 bps. Reverse polarity and short circuit protected.
4 to 20 mA Output	
Accuracy	±32 µA
Resolution	<5 µA
Span	4 to 20 mA factory calibrated 0 °C to 100 °C (32 °F to 212 °F)
Max. Loop Impedance	50 Ω @ 12 V
	325 Ω @ 18 V
	600 Ω @ 24 V
Update Rate	<100 ms

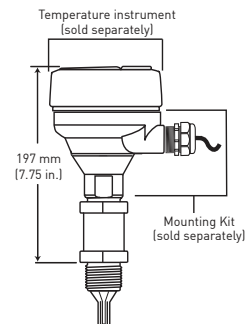
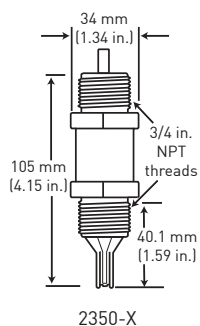
Max. Temperature/Pressure Rating		
Operating Temperature		
In-line Mounting	-10 °C @ 16 bar to 100 °C @ 7.5 bar	14 °F @ 232 psi to 212 °F @ 108 psi
Submersible Mounting	-10 °C @ 16 bar to 85 °C @ 7.5 bar	14 °F @ 232 psi to 185 °F @ 108 psi
Storage Temperature	-55 °C to 100 °C	-67 °F to 212 °F
Relative Humidity	0 to 95% non-condensing	

Shipping Weight	
0.22 kg	0.5 lb

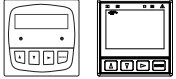




Standards and Approvals	
CE, FCC	
RoHS compliant, China RoHS	
Manufactured under ISO 9001 for Quality and ISO 14001 for Environmental Management and OHSAS 18001 for Occupational Health and Safety	

See Temperature and Pressure graphs for more information.



Dimensions



In-Line Installation

Panel Mount	Field Mount - Pipe, Tank, Wall	4 to 20 mA input	Integral Mount
Signet Instruments 8350 8900 9900	Signet Instruments 8350 9900 with 3-8050 Universal Mount Kit	Customer Supplied Chart Recorder or Programmable Logic Controller	Signet Instruments 8350 9900 with 3-8052 Integral Mount Kit
			
Signet 2350 Temperature Sensor 			
In-Line Installation - Fittings Customer Supplied		All sold separately	

Submersible Installation

Field Mount - Panel, Pipe, Tank, Wall
Signet Instruments 8350 8900 9900 with customer supplied pipe extension or conduit with 3/4 in. FNPT threads and pipe assembly*

Signet 2350 Temperature Sensor 
All sold separately

*Refer to the Signet Submersion brochure located in the K-Factors Fittings and More Kit (3-0000-709) for installation suggestions and options.
 * For tank or wall mount installations, user must use the Universal Adapter Kit (3-8050).

Ordering Notes

- 3-2350-X sensor can be mounted with an instrument in an integral configuration by doing the following:
- 1) Order Integral adapter kit 3-8052 (sold separately) to connect the instrument (sold separately) directly onto the sensor.
 - 2) Order an instrument (sold separately). The following instrument part numbers are compatible with the 2350 for integral mounting:
 3-8350-3, 3-9900-1
 - 3) Refer to the Signet Submersion brochure located in the K-Factors Fittings and More Kit (3-0000-709) for installation suggestions and options.

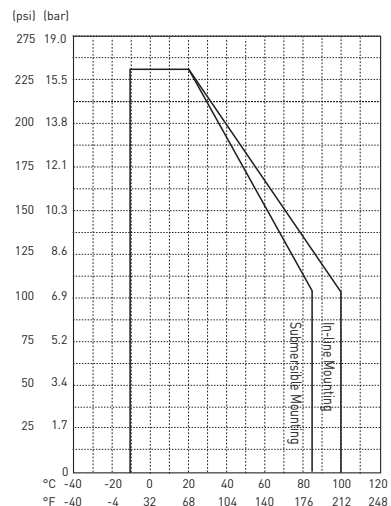
Application Tips

- For submersible sensor mounting, always use a water tight conduit and a cable gland to prevent moisture intrusion.
- To extend the cable, use a 3-conductor shielded cable and junction box.

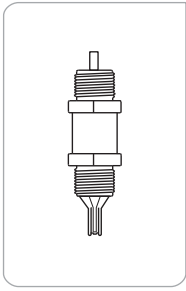
Operating Temperature/Pressure Graphs

Note:

The pressure/temperature graphs are specifically for the Signet sensor. During system design the specifications of all components must be considered. In the case of a metal piping system, a plastic sensor will reduce the system specification. When using a PVDF sensor in a PVC piping system, the fitting will reduce the system specification.



Ordering Information



Mfr. Part No.	Code	Output and Cable Length
Temperature Sensor		
3-2350-1	159 000 021	Digital (S ³ L) and 4.6 m (15 ft) cable
3-2350-3	159 000 920	Current (4 to 20 mA) and 4.6 m (15 ft) cable

Accessories and Replacement Parts

Mfr. Part No.	Code	Description
5523-0322	159 000 761	Sensor cable (per ft), 3 cond. plus shield, 22 AWG
3-8052	159 000 188	¾ in. Integral mounting kit
3-8052-1	159 000 755	¾ in. NPT mount junction box with one liquid tight connector and cap with junction terminals
3-9000.392-1	159 000 839	Liquid tight connector kit, NPT (1 connector)
3-9000.392-2	159 000 841	Liquid tight connector kit, PG 13.5 (1 connector)
3-0250	159 001 538	USB to digital (S ³ L) configuration/diagnostic tool
	Contact Factory	Custom cable length available

Please refer to Wiring, Installation, and Accessories sections for more information.

Economical machined cast acrylic block construction makes these meters great for OEM use. Optional inlet metering valve available



DESCRIPTION

Metering Tube

Machined Cast Acrylic

Internal Components

316L Stainless Steel

Inlet/Outlet Fittings

NPT, Horizontal

Control Valve optional

Fitting Material

Standard: PVC (Brass for 2C block size)

Optional: 316L Stainless Steel or Brass

Elastomers

Standard: EPDM

Optional: Buna N, Viton®, and Kalrez®

PERFORMANCE

Capacities

7 GPM to 20 GPM — Water

2.6 SCFH to 60 SCFM — Air

Scale

50mm, 75mm, 100mm, 127mm, 250mm

Direct reading

Accuracy

± 6% of Full Scale Flow, 50 mm scale

± 4% of Full Scale Flow, 75 mm scale

± 4% of Full Scale Flow, 100 mm scale

± 7% of Full Scale Flow, 6C-04, 6C-06

± 3% of Full Scale Flow, 127 mm scale

± 2% of Full Scale Flow, 250 mm scale

Turndown

10:1 unless otherwise indicated

Repeatability

3%, 50 mm scale

2%, 75 mm scale

2%, 100 mm scale

4%, 6C-04, 6C-06

2%, 127 mm scale

0.5%, 250 mm scale

Max Temperature

130° F (54° C) - Liquid

100° F (38° C) - Gases

Max Pressure

Water — 125 psig

Air — 100 psig

Ambient Temperature

33° F to 125° F (1° C to 52° C)

OPTIONS

Certified Calibrations

Conform to ISA RP 16.6

Scales

Can be produced in any volumetric unit

Order Number	Flow Water	Order Number	Flow Air	Dimensions (Inches)						
				A	B	C	D	E	F	G
Block #3C, 75mm (3 Inch) Scale										
3C-02	1 GPM	3C-01	4 SCFM	6.875	1.20	1.35	6.625	1	1.37	5
3C-04	2 GPM	3C-03	8 SCFM	6.875	1.20	1.35	6.625	1	1.37	5
3C-06	3.5 GPM	3C-05	15 SCFM	6.875	1.20	1.35	6.625	1	1.37	5
3C-08	5 GPM	3C-07	23 SCFM	6.875	1.20	1.35	6.625	1	1.37	5
Block #5C, 127mm (5 Inch) Scale										
5C-10	10 GPH	5C-11	42 SCFH	8.45	1.20	1.35	8.25	1	1.37	6.437
5C-12	20 GPH	5C-13	100 SCFH	8.45	1.20	1.35	8.25	1	1.37	6.437
5C-14	40 GPH	5C-15	175 SCFH	8.45	1.20	1.35	8.25	1	1.37	6.437
5C-02	1 GPM	5C-01	4 SCFM	8.45	1.20	1.35	8.25	1	1.25	6.437
5C-04	100 GPH	5C-03	6.8 SCFM	8.45	1.20	1.35	8.25	1	1.37	6.437
5C-06	2 GPM	5C-05	8.2 SCFM	8.45	1.20	1.35	8.25	1	1.37	6.437
5C-08	5 GPM	5C-07	22 SCFM	8.45	1.20	1.35	8.25	1	1.37	6.437
Block #6C, 100mm (4 Inch) Scale										
6C-02	10 GPM	6C-01	40 SCFM	9.125	1.78	1.812	8.875	1.25	1.875	6.50
6C-04	15 GPM	6C-03	60 SCFM	9.125	1.78	1.812	8.875	1.25	1.875	6.50
6C-06	20 GPM	—	—	9.125	1.78	1.812	8.875	1.25	1.875	6.50
Block #7C, 250mm (10 Inch) Scale										
7C-02	2 GPM	7C-01	8 SCFM	14.50	1.78	1.812	14.25	.75	1.75	12.25
7C-04	3.5 GPM	7C-03	14.4 SCFM	14.50	1.78	1.812	14.25	.75	1.75	12.25
7C-06	5 GPM	7C-05	20 SCFM	14.50	1.78	1.812	14.25	.75	1.75	12.25
7C-08	10 GPM	7C-07	42 SCFM	14.50	1.78	1.812	14.25	.75	1.75	12.25

ORDERING:

Use the following guide to determine the specific product number you require.

7	5									
Meter Series	Fitting Material	O-Ring Material	Valve Material	Order Number						
7520 No valve	Brass - 1	EPR - 1	Brass - 1	See Specifications						
7530 With valve	PVC - 2*	Buna-N - 2	316L SS - 2	Table						
	316L SS - 3	Viton® - 3	Without Valve - 0							

* 7530 6C with valve in brass inlet only

Order Number	Flow Water	Order Number	Flow Air	Dimensions (Inches)						
				A	B	C	D	E	F	G
Block #3C, 75mm (3 Inch) Scale										
3C-02	1 GPM	3C-01	4 SCFM	6.875	1.20	1.35	6.625	1	1.37	5
3C-04	2 GPM	3C-03	8 SCFM	6.875	1.20	1.35	6.625	1	1.37	5
3C-06	3.5 GPM	3C-05	15 SCFM	6.875	1.20	1.35	6.625	1	1.37	5
3C-08	5 GPM	3C-07	23 SCFM	6.875	1.20	1.35	6.625	1	1.37	5
Block #5C, 127mm (5 Inch) Scale										
5C-10	10 GPH	5C-11	42 SCFH	8.45	1.20	1.35	8.25	1	1.37	6.437
5C-12	20 GPH	5C-13	100 SCFH	8.45	1.20	1.35	8.25	1	1.37	6.437
5C-14	40 GPH	5C-15	175 SCFH	8.45	1.20	1.35	8.25	1	1.37	6.437
5C-02	1 GPM	5C-01	4 SCFM	8.45	1.20	1.35	8.25	1	1.25	6.437
5C-04	100 GPH	5C-03	6.8 SCFM	8.45	1.20	1.35	8.25	1	1.37	6.437
5C-06	2 GPM	5C-05	8.2 SCFM	8.45	1.20	1.35	8.25	1	1.37	6.437
5C-08	5 GPM	5C-07	22 SCFM	8.45	1.20	1.35	8.25	1	1.37	6.437
Block #6C, 100mm (4 Inch) Scale										
6C-02	10 GPM	6C-01	40 SCFM	9.125	1.78	1.812	8.875	1.25	1.875	6.50
6C-04	15 GPM	6C-03	60 SCFM	9.125	1.78	1.812	8.875	1.25	1.875	6.50
6C-06	20 GPM	—	—	9.125	1.78	1.812	8.875	1.25	1.875	6.50
Block #7C, 250mm (10 Inch) Scale										
7C-02	2 GPM	7C-01	8 SCFM	14.50	1.78	1.812	14.25	.75	1.75	12.25
7C-04	3.5 GPM	7C-03	14.4 SCFM	14.50	1.78	1.812	14.25	.75	1.75	12.25
7C-06	5 GPM	7C-05	20 SCFM	14.50	1.78	1.812	14.25	.75	1.75	12.25
7C-08	10 GPM	7C-07	42 SCFM	14.50	1.78	1.812	14.25	.75	1.75	12.25

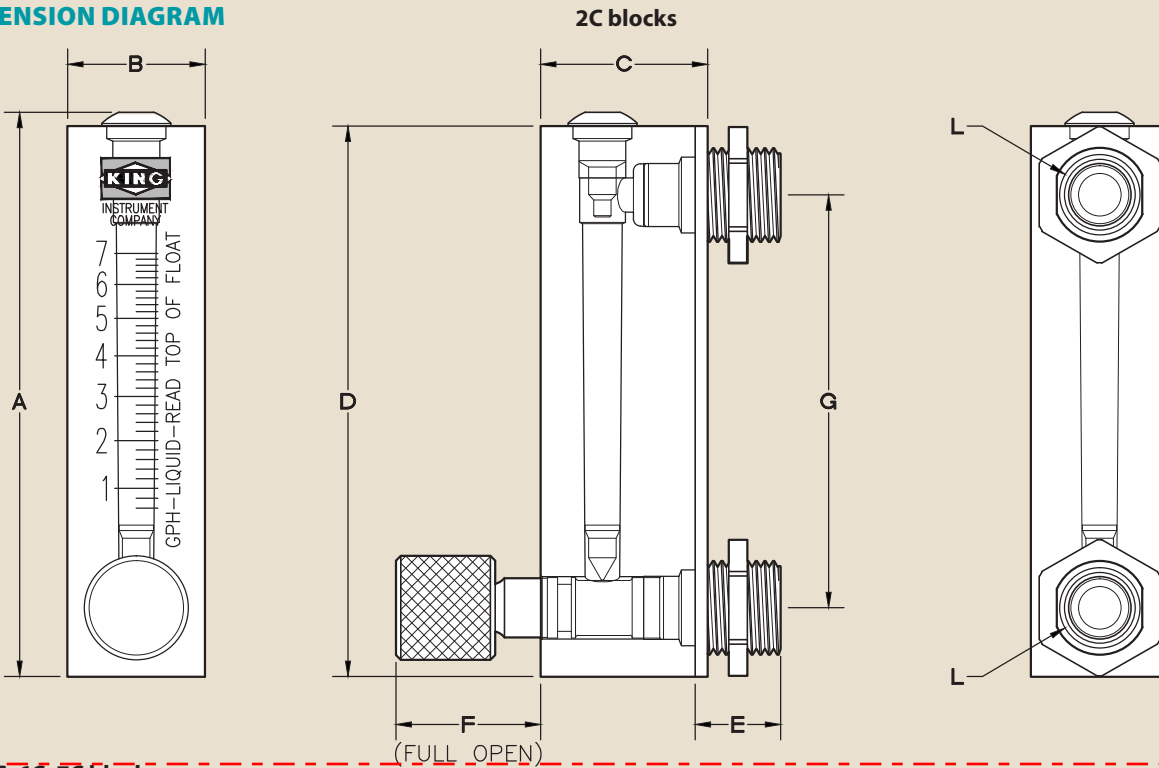
ORDERING:

Use the following guide to determine the specific product number you require.

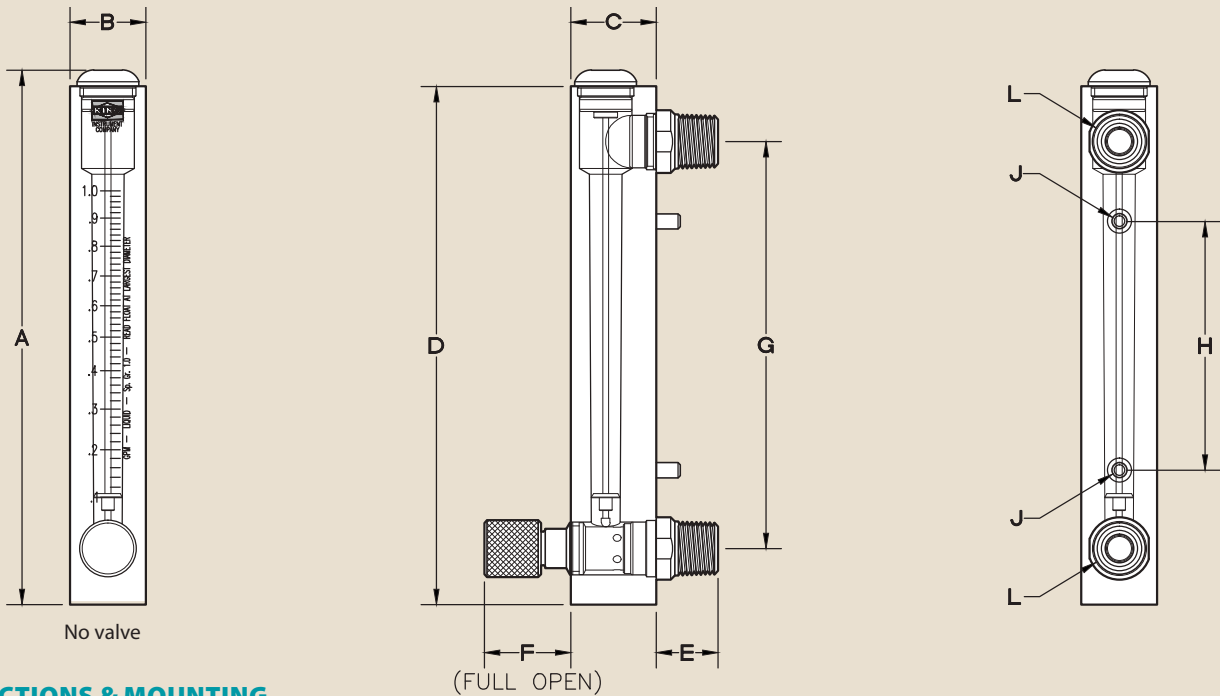
Meter Series	Fitting Material	O-Ring Material	Valve Material	Order Number
7520 No valve	Brass - 1	EPR - 1	Brass - 1	See Specifications Table
7530 With valve	PVC - 2*	Buna-N - 2	316L SS - 2	
	316L SS - 3	Viton® - 3	Without Valve - 0	

* 7530 6C with valve in brass inlet only

DIMENSION DIAGRAM



3C, 5C, 6C, 7C blocks



CONNECTIONS & MOUNTING

Block Number	Connection Size	Centerline H	Thread J	Diameter L
3C	1/2" MNPT x 1/4" FNPT	3	.25 - 20	1
5C	1/2" MNPT x 1/4" FNPT	3.937	.25 - 20	1
6C	1" MNPT	4	.25 - 20	1.375
7C	1/2" FNPT	8.75	.375 - 24	1.25

Blocks 3C, 5C, 6C and 7C have mounting studs depicted in dimension "H" and thread "J".
(Mounting Nuts Not Supplied)

TB Series True Union Ball Valves

1/4" TO 2" PVC AND CPVC



NSF

Sizes 1/4" - 2"

KEY FEATURES

- ~~PVC and CPVC~~
- Full Port Design
- Reversible PTFE Seats
- Double O-Ring Stem Seals
- Easily Actuated
- NSF / ANSI 61 Listed

OPTIONS

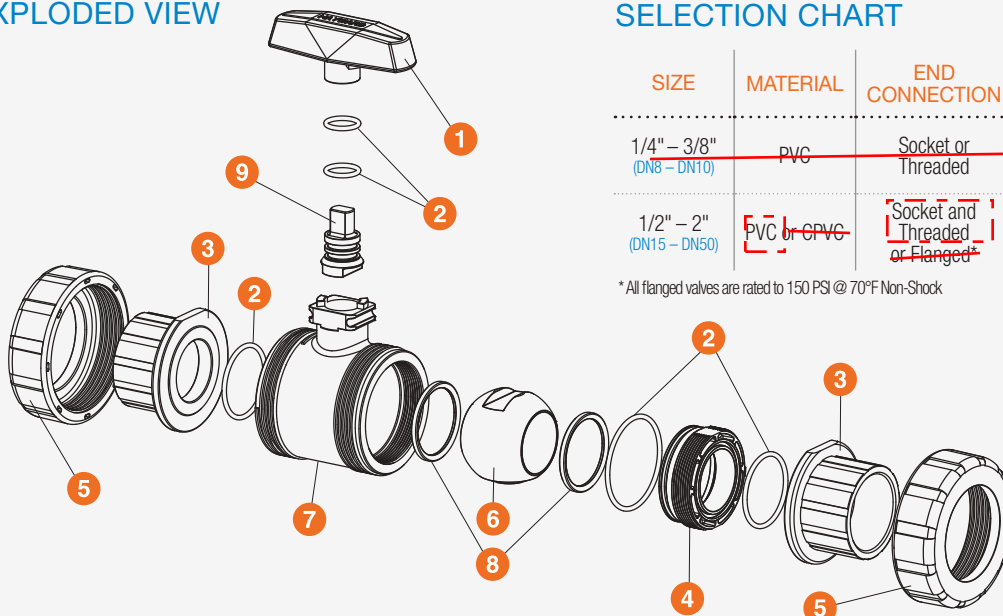
- Lockouts Available
- 2" Square Operating Nut
- Stem Extensions
- Pneumatic and Electric Actuated
- Spring Return Handle

MATERIALS

- ~~PVC Cell Class 12454 per ASTM D1784~~
- ~~CPVC Cell Class 23447 per ASTM D1784~~
- ~~FPM and EPDM O-Ring Seals~~

TECHNICAL INFORMATION

EXPLODED VIEW



SELECTION CHART

SIZE	MATERIAL	END CONNECTION	SEALS	PRESSURE RATING
1/4" - 3/8" (DN8 - DN10)	PVC	Socket or Threaded	FPM or EPDM	250 PSI @ 70°F Non-Shock
1/2" - 2" (DN15 - DN50)	PVC or CPVC	Socket and Threaded or Flanged		

* All flanged valves are rated to 150 PSI @ 70°F Non-Shock

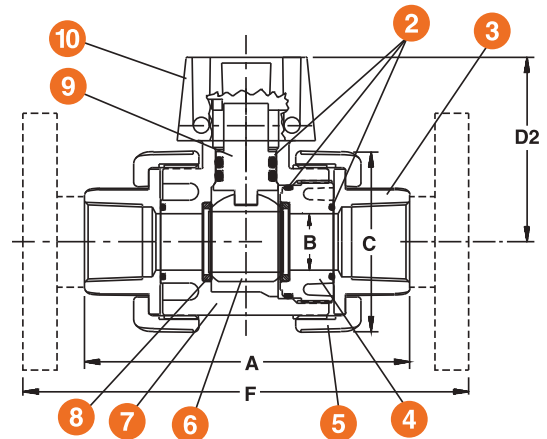
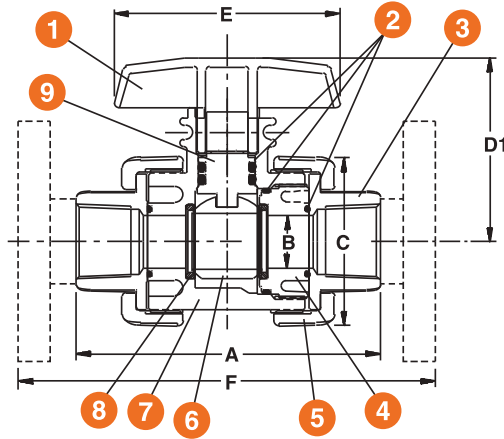
TB Series True Union Ball Valves

1/4" TO 2" PVC AND CPVC

TECHNICAL INFORMATION, CONTINUED

PARTS LIST

1. Handle
2. O-Ring Seals
3. End Connector
4. Seal Retainer
5. Union Nut
6. Ball
7. Body
8. PTFE Seat
9. Stem
10. Actuator Mounting Pad



DIMENSIONS – INCHES / MILLIMETERS

SIZE in / DN	A in / mm	B in / mm	C in / mm	D1 in / mm	D2 in / mm	E in / mm	F in / mm	WEIGHT lbs / kg	
								SOC / THD	FLANGED
1/4 / 8	4.77 / 121	.50 / 13	2.25 / 57	2.81 / 71	2.63 / 67	3.50 / 89	N/A	.75 / .34	N/A
3/8 / 10	4.77 / 121	.50 / 13	2.25 / 57	2.81 / 71	2.63 / 67	3.50 / 89	N/A	.75 / .34	N/A
1/2 / 15*	4.77 / 121	.50 / 13	2.25 / 57	2.81 / 71	2.63 / 67	3.50 / 89	6.75 / 171	.75 / .34	1.00 / .45
3/4 / 20*	4.85 / 123	.75 / 19	2.63 / 67	3.02 / 77	2.81 / 71	3.50 / 89	7.13 / 181	.75 / .34	1.00 / .45
1 / 25*	5.44 / 138	.93 / 24	3.00 / 76	3.26 / 83	3.05 / 77	4.00 / 102	8.09 / 205	1.15 / .52	2.15 / .98
1-1/4 / 32*	6.30 / 160	1.50 / 38	4.00 / 102	3.92 / 100	3.48 / 88	5.00 / 127	9.19 / 233	2.15 / .98	3.50 / 1.59
1-1/2 / 40*	6.85 / 174	1.50 / 38	4.00 / 102	3.92 / 100	3.48 / 88	5.00 / 127	9.88 / 251	2.15 / .98	3.75 / 1.70
2 / 50*	8.00 / 203	1.94 / 49	4.75 / 121	4.43 / 113	4.00 / 102	5.00 / 127	11.4 / 290	3.80 / 1.72	6.30 / 2.86

Dimensions are subject to change without notice – consult factory for installation information

* Metric End Connections Available In: BSP – Straight Thread, BSP TR – Tapered Thread and Metric Socket

Cv VALUES

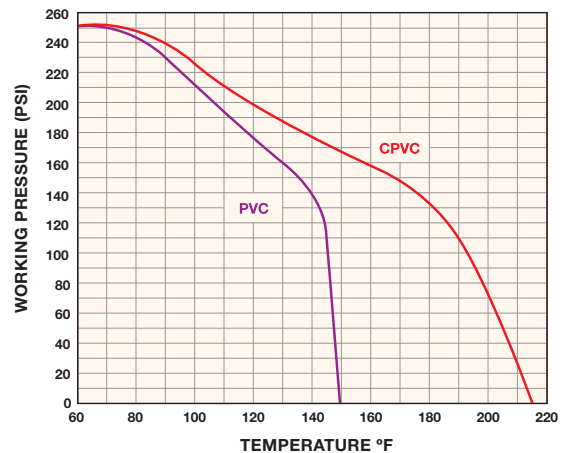
SIZE in / DN	Cv VALUES GPM	SIZE in / DN	Cv VALUES GPM
1/4 / 8	1.0	1 / 25	29.0
3/8 / 10	2.8	1-1/4 / 32	75.0
1/2 / 15	8.0	1-1/2 / 40	90.0
3/4 / 20	16.0	2 / 50	150.0

PRESSURE LOSS CALCULATION FORMULA

$$\Delta P = \left[\frac{Q}{C_v} \right]^2$$

ΔP = Pressure Drop
 Q = Flow in GPM
 C_v = Flow Coefficient

OPERATING TEMPERATURE / PRESSURE



Contact Hayward Flow Control with questions: 1-888-429-4635 • Fax: 1-888-778-8410 • One Hayward Industrial Drive • Clemmons, NC 27012 • USA
 Visit us at: www.haywardflowcontrol.com • E-mail: hflow@haywardnet.com

High Performance Fluid Heating Solution Featuring Watlow's Thermal Spray Technology Improves System Performance



The FLUENT® in-line heater from Watlow® is a small, lightweight, high-performance heater that can replace both a traditional immersion type heater or a heater wrapped around a tube as part of a thermal system. Watlow's FLUENT heater is designed as an integrated solution that replaces multiple components in a system. This heater design reduces overall system cost and complexity. Because of its high watt density, it offers ultra-fast response leading to higher system performance. Featuring Watlow's patented layered heater technology, the heater makes use of its entire surface to produce heat, which optimizes heat transfer and temperature uniformity.

Features and Benefits

Small, lightweight, robust heater construction

- Replaces multiple components in a system
- Reduces overall system size
- Lowers total cost of ownership

Patented circuit patterning process

- Facilitates customizable heating profiles
- Enables distributed wattage and/or multiple zones
- Assures precise and repeatable power distribution

High watt density, low mass heater

- Contributes to fast response time
- Allows for efficient heat transfer
- Enables on-demand process start-up

Typical Applications

- Hemodialysis fluid heating
- Food cooking equipment
- Semiconductor purge and carrier gas heating
- Ink preheating systems
- On demand fluid heating

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Powered by Possibility



To be automatically connected to the nearest
North American Technical Sales Office:

**1-800-WATLOW2 • www.watlow.com
inquiry@watlow.com**

International Technical Sales Offices:

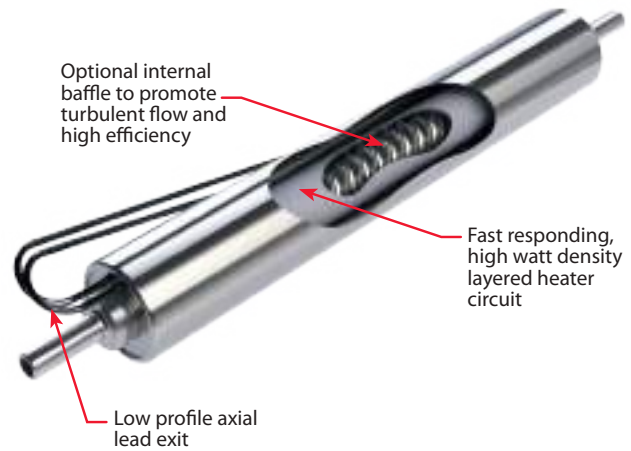
Austria +43 6244 20129 0
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France +33 1 41 32 79 70
Germany +49 7253 9400 0

India +91 40 6661 2700
Italy +39 02 458 8841
Japan +81 3 3518 6630
Korea +82 2 2169 2600

Mexico +52 442 256 2200
Singapore +65 6773 9488
Spain +34 91 675 1292
Taiwan +886 7 288 5168
UK +44 115 964 0777

Specifications

- Substrate tube material: 444 SS
- Fitting and baffle material: 316L SS
- Voltage up to 240V
- Amperage up to 15A per zone
- Resistance tolerance +10%, -5%
- Typical maximum watt densities
 - Air 150 W/in² (23 W/cm²)
 - Water 450 W/in² (70 W/cm²)
- Maximum pressure: 150psi (10.2 bar)
- Maximum temperature: 662°F (350°C) as measured by internal T/C
- UL®/cUL® and CE

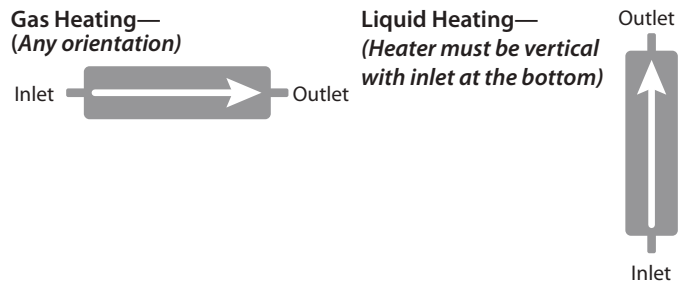


Standard Product Offering: Base Heaters

Volts	Watts	Number of Heating Circuits	Outer Diameter in. (mm)	Protection Tube Length in. (mm)	Watt Density (W/in ²)
240	500	1	1 (25)	3.00 (76)	210
120	250	1	1 (25)	4.25 (108)	57
240	1000	1	1 (25)	4.25 (108)	228
120	375	1	1 (25)	5.25 (133)	62
240	1500	1	1 (25)	5.25 (133)	247
120	500	1	1 (25)	6.50 (165)	63
240	2000	1	1 (25)	6.50 (165)	250
120	750	2	1 (25)	6.50 (165)	94
240	3000	2	1 (25)	6.50 (165)	375
120	1000	2	1 (25)	7.75 (197)	100
240	4000	2	1 (25)	7.75 (197)	400
240	500	1	1 (25)	6.50 (165)	63
120/240	1000/4000	1	1 ⁵ / ₈ (41)	6.50 (165)	75/300
120/240	1500/6000	2	1 ⁵ / ₈ (41)	10.00 (254)	61/245
120/240	2000/8000	2	1 ⁵ / ₈ (41)	12.00 (304.8)	61/245

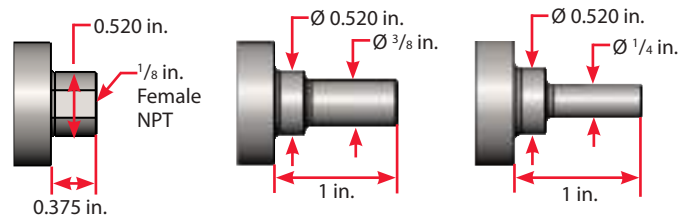
Note: Visit www.watlow.com/fluent for the latest list of standard designs and product information.

Application Orientation

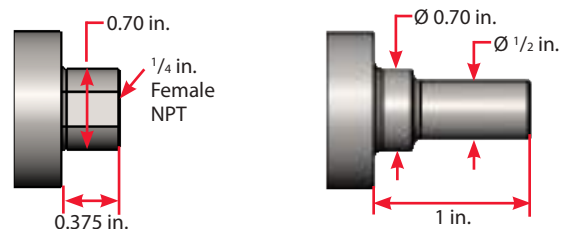


Inlet/Outlet Fitting Options

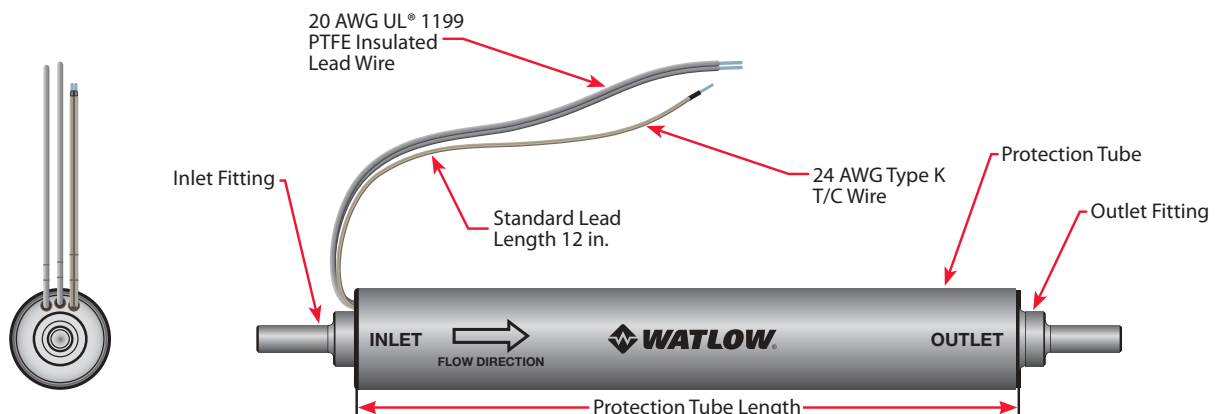
1 Inch Outer Diameter Heaters



1 5/8 Inch Outer Diameter Heaters



Standard Construction



SECTION 8.2

HYDROGEN DILUTION BLOWERS



FAN SELECTION And SPECIFICATIONS

Your Representative:
PSI Water Technologies, Inc.

Phone
Fax

Job Name:
Reference:

Operating Requirements

Volume, ACFM	163
Static Pressure, in. wg	3.19
Density, lb./ft. ³	0.075
<hr/>	
Operating Temperature, °F	70
Site Altitude, Feet ASL	0
Relative Humidity, %	0
Specific Gravity	1.0
Inlet Pressure, ± in. wg	0.0
<hr/>	
AMCA Arrangement No.	#4 (Direct)
Motor Frequency, Hz	60
Start-Up Temperature, °F	70

Fan Selection and Specifications

Model	PB-8
Fan RPM	3,450
Suggested Motor RPM	3,450
Actual Flow, ACFM	174
Actual SP, in. wg	3.6297
Percentage of Peak SP	87.5%
<hr/>	
Wheel Description	8 X 2-3/4 Radial
Wheel Width, %	100%
Wheel Diameter, in.	8.00
Number of Blades	6
WR ² , lb. - ft. ²	.1
Tip Speed, ft./min.	7,226
<hr/>	
Inlet Diameter, in.	4.00
Inlet Area, ft. ²	0.09
<hr/>	
Outlet Dimensions	4.00 in. dia.
Outlet Area, ft. ²	0.09
Outlet Velocity, ft./min.	1,992
<hr/>	
Fan BHP	0.25
Suggested Motor HP	0.33
Static Efficiency, %	40.5%
Cold Start BHP	0.25
<hr/>	
Construction Class	
Maximum Wheel RPM	4,000
Maximum Shaft RPM	N/A

Temperature Notes:
Standard Construction: Arrangements 4 and 4HM are suitable to 150°F. Arrangements 1,2,8, and 9 suitable to 200°F.

Construction Notes:
Discharge flange not available for downblast position. Also available in Arrangement #4HM. WR2 value applies to aluminum wheel only.

Available Frame Size and Weights (without motor):
Frame 56 29 lbs.
Arrangement #4HM 21 lbs.

Job Name:

Reference:

Operating Requirements

Volume, ACFM	163
Static Pressure, in. wg	3.19
Density, lb./ft. ³	0.075
Operating Temperature, °F	70
Site Altitude, Feet ASL	0
Relative Humidity, %	0
Specific Gravity	1.0
Inlet Pressure, ± in. wg	0.0
AMCA Arrangement No.	#4 (Direct)
Motor Frequency, Hz	60
Start-Up Temperature, °F	70

Fan Selection and Specifications

Model	PB-8
Fan RPM	3,450
Wheel Description	8 X 2-3/4 Radial
Wheel Width, %	100%
Wheel Diameter, in.	8.00
Inlet Diameter, in.	4.00
Outlet Velocity, ft./min.	1,992
Fan BHP	0.25
Static Efficiency, %	40.5%
Cold Start BHP	0.25
Construction Class	

Fan Sound Data

Lp = Sound Pressure Level at a specific distance from the fan. Measured in decibels (dB) or A-weighted decibels (dB(A)) re 0.0002 microbar.

Lw = Sound Power Level of the fan. Measured in decibels (dB) or A-weighted decibels (dB(A)) re 1E-12 watt.

dB = Decibel, ten times the logarithm (base 10) of the ratio of a value to a reference value.

dB(A) = A-Weighted decibel. A-weighting corrects the spectrum for human hearing response.

Sound Directivity Factor, Q : 2 - HemiSpherical radiation

Fan Inlet Ducting: Ducted

Fan Outlet Ducting: Ducted

Calculated Octave Band Sound Data (dB)

Quantity	63 Hz	125 Hz	250Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000Hz
Lw Total	82	85	97	94	89	85	77	70
Lw Inlet	79	82	94	91	86	82	74	67
Lw Outlet	79	82	94	91	86	82	74	67
Lp Total	64	68	79	76	72	67	60	53
Lp inlet	61	65	76	73	69	64	57	50
Lp outlet	61	65	76	73	69	64	57	50

Total A-weighted Sound Pressure Level, Lp dB(A) 77 at 5.0 feet from fan

Total A-weighted Sound Power Level, Lw dB(A) 95

Blade Passage Frequency, Hz 345

- Sound Pressure values are calculated based upon assumed environmental conditions. Actual values may vary for specific installations due to environmental factors (other noise sources, walls, duct design, etc.)
- Noise from the driver is not included in these data.
- Sound Pressure Level calculations assume free field propagation occurring outdoors.
- Duct End Corrections applied (AMCA 300-85 Appendix C).

FEATURES/BENEFITS OF CAST ALUMINUM

Cincinnati Cast Aluminum Blowers are a smart buy now and for many years to come because aluminum is:

NON-SPARKING

Cincinnati Cast Aluminum Blowers are AMCA Type B spark resistant. With the addition of a non-sparking shaft, they meet AMCA Type A requirements. See Page 5.

CORROSION-FREE

No painting required. Maintenance free in moist environments.

LIGHTWEIGHT

Aluminum is 1/3 the weight of steel and, therefore, less structural support is required.

NON-TOXIC

Aluminum is friendly to foods, beverages and medicines. Cast Aluminum Blowers are used in many food processing applications where cleanliness is important.

STRONG

Aluminum's strength is exhibited in products such as high-way guard rails, truck trailers and baseball bats. In high speed blower wheels, aluminum is alloyed with magnesium and other metals for greater strength.

ATTRACTIVE

Aluminum's natural appearance is desirable. No other metal accepts a greater variety of finishes. It can be brushed, buffed, colored by anodizing and has excellent paint adhesion.

NON-MAGNETIC

Resists magnetism even in magnetic fields making it ideal in electronic applications where prevention of interference is very important.

WORKABLE

Aluminum can be machined by every known metal working process. This makes future modifications easier.

NOT AFFECTED BY COLD

Unlike many materials that become brittle when super cold, aluminum alloys can actually become stronger. Cast aluminum blowers are used in many sub-zero applications.

AVAILABLE

Approximately eight percent of the earth's crust contains aluminum, making it the most common metal on earth.

SUGGESTED SPECIFICATIONS FOR CAST ALUMINUM BLOWERS

Blowers shall be cast with commercial grade 319 cast aluminum, having a 3/16" minimum wall thickness. Housing halves should be attached with tapered lugs having a minimum 45 degree taper from centerline for additional strength. Inlets and outlets shall be round for convenient slip fit of duct work or hose. Blower sizes 14A and larger shall have a reversible housing that is rotatable. Blowers shall be AMCA type B spark resistant or better. Blower performance shall be derived from data as tested per AMCA Standard 210.

Blower wheels with tip speeds up to 13,000 feet per minute shall be 319 cast aluminum. Blower wheels with tip speeds over 13,000 feet per minute shall be 356 aluminum with a T6 heat treatment. Wheel hub shall be an integral part of the wheel casting. Wheels shall be locked onto the motor or fan shaft with two, knurled, cup point set screws with a locking patch or nylon insert. Set screws shall be 90° – 120° apart with one over shaft keyway. Up to 13" diameter wheels shall have 5/16-18 set screws torqued to 165 inch pounds. Wheels over 13" in diameter shall have 3/8-16 set screws torqued to 228 inch pounds.

Balancing shall be accomplished by removal of material only – no additional weights are to be used in the

balancing process. Wheel diameters up to 13" shall be statically balanced. Wheel diameters above 13" shall be dynamically balanced.

Fan motor and bearing cap vibration levels shall not exceed 1.5 mils displacement at 3450 RPM.

All fan bases shall be a minimum of 12 gauge steel.

All motors shall be continuous duty type.

Inlet or outlet flanges (if required) shall be 319 cast aluminum and shall meet ANSI bolt circle and outside diameter dimensions (see dimensions on page 21).

DANGER

All fans & blowers shown have rotating parts and pinch points. Severe personal injury can result if operated without guards. Stay away from rotating equipment unless it is disconnected from its power source.

Read operating instructions.

9 STANDARD ARRANGEMENTS



Arrangement 4
(Foot & flange motor)



Arrangement 4
(Flange mount-footless motor)



Arrangement 4
(Foot mounted motor)



Arrangement 4HM
(Horizontal mount)
(See page 18)



Arrangement 1



Arrangement 2



Arrangement 8
(Shaft/coupling guard standard)



Arrangement 9
(Belt guard standard. Shaft guard optional.)

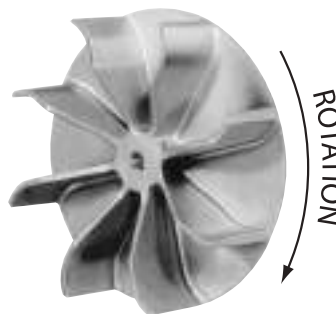


Arrangement 4D
(Double blower unit)

BLOWER WHEELS



CAST ALUMINUM RADIAL



CAST ALUMINUM B.C.
(Backward Curve)



OPTIONAL FABRICATED STEEL or STAINLESS STEEL
(Not available in B.C.)

All wheels have two set screws, 90°-120° apart, with one being over keyway. Up to 13" diameter wheels are dynamically, single plane balanced. Wheels over 13" in diameter are dynamically, 2 plane balanced. Use steel wheel for high abrasive or high temperature application above 200°F. (93° C). Stainless steel or coated wheels should be used in corrosive environments.

OPTIONAL ACCESSORIES



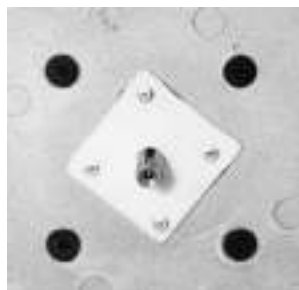
INLET/OUTLET FLANGE
Cast aluminum drilled to ANSI-125 pound flange bolt circle dimensions if requested. **Outlet flange not available in downblast configuration. See dimensions on page 21.**



INLET/OUTLET GUARD
Spiral guard with nickel/chrome/lacquer finish. OSHA type. Available on 4, 5, 6, 7, 8 and 10 inch inlets or outlets. **Required by OSHA on non-ducted inlet and/or discharge.**



SLIDE GATE DAMPER
Available for 4, 5, 6, 7, 8 and 10 inch inlets or outlets. Cast aluminum frame, galvanized steel gate. Suitable for duct work. Dimensions on page 21. **Add inlet/outlet guard if not ducted. Not available on downblast discharge position.**



TEFLON SHAFT SEAL
1/8" thick teflon shaft seal good to 400°F. Ceramic fiber gasket material with steel cover plate above 400°F.



INLET FILTERS
Many layered fine wire mesh. Pleated paper media available on some sizes.



SHAFT and/or HEAT SLINGER GUARD
Available on arrangement 1 and 9. Covers bearings and shaft between fan housing and belt guard. Has extended lube lines. Meets OSHA standards. **Painted safety yellow.**



DRAIN
1/2" drain with plug. Not required on bottom horizontal discharges.



BELT GUARD—STANDARD ARR. 9
Bearing side is enclosed. Not available unless Cincinnati Fan mounts motor. **Painted safety yellow.**



PB SERIES DIRECT DRIVE RATING TABLES at 3450 RPM

CFM and BHP at Static Pressure Shown

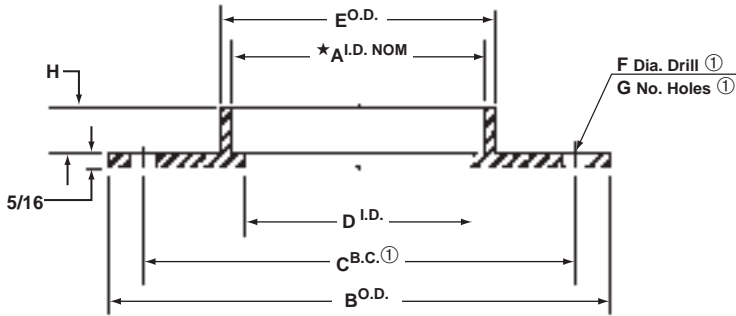
Ratings at 70°F., .075 Density, Sea Level

MODEL NO.	NOMINAL WHEEL DIA. & WIDTH	NOMINAL INLET DIA.	1" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP		8" SP	
			CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP
PB-8	7 x 2 1/16	4"	280	.30	228	.28	138	.26										
	8 x 2 3/4	4"	344	.36	292	.33	228	.28	122	.23								
PB-9	8 x 2 3/4	5"	388	.39	341	.36	285	.32	156	.25								
	8 1/2 x 2 3/4	5"	435	.46	385	.41	324	.37	243	.33								
	9 x 2 7/8	5"	493	.52	445	.48	384	.42	310	.37	196	.31						
	10 1/4 x 3 BC	5"	511	.56	463	.50	404	.45	344	.42	283	.38	211	.33				
	9 3/4 x 2 7/8	5"	549	.81	501	.76	449	.71	395	.66	335	.60	258	.51				
	10 5/8 x 2 5/8	5"	592	.84	552	.78	509	.72	463	.66	415	.59	360	.52	291	.44	141	.31
PB-10A	9 x 2 7/8	6"	576	.70	510	.65	425	.58	325	.50	163	.37						
	10 1/4 x 3 BC	6"	605	.79	547	.72	479	.66	399	.60	299	.53	149	.43				
	9 3/4 x 2 7/8	6"	710	1.02	658	.96	594	.89	517	.82	428	.72	314	.59	109	.42		
	11 x 3 BC	6"	729	1.06	687	1.01	638	.95	580	.88	511	.81	425	.71	306	.59		
	10 5/8 x 2 5/8	6"	826	1.39	763	1.30	699	1.23	632	1.15	559	1.06	476	.96	361	.83		
	11 x 2 3/4	6"	830	1.42	780	1.33	727	1.23	670	1.15	607	1.06	537	.97	450	.87	307	.70
	11 1/2 x 2 7/8	6"	884	1.52	836	1.45	780	1.38	718	1.30	652	1.22	582	1.14	506	1.04	414	.92
	12 x 2 1/8	6"	921	1.93	886	1.89	846	1.84	801	1.78	750	1.70	691	1.61	622	1.51	540	1.39
PB-12A	11 x 3 BC	7"	877	1.10	807	1.04	729	.96	642	.88	543	.79	419	.69	181	.51		
	10 5/8 x 2 5/8	7"	1062	1.62	989	1.53	899	1.42	795	1.29	681	1.15	553	.99	378	.78		
	11 x 2 3/4	7"	1155	2.00	1068	1.85	974	1.71	873	1.56	762	1.40	636	1.23	487	1.04	281	.78
	11 1/2 x 2 7/8	7"	1266	2.39	1183	2.28	1092	2.14	997	2.00	900	1.85	798	1.69	686	1.51	547	1.30
	12 x 2 7/8	7"	1307	2.61	1225	2.46	1139	2.30	1052	2.15	965	2.00	876	1.86	784	1.72	681	1.56
	13 x 3 1/4 BC	7"	1297	2.61	1233	2.51	1164	2.40	1093	2.29	1021	2.17	947	2.06	871	1.96	791	1.84
	12 1/4 x 2 7/8	7"	1363	2.92	1287	2.76	1202	2.58	1114	2.40	1025	2.22	936	2.06	845	1.90	748	1.74
	13 x 3 1/4	7"	1464	3.24	1388	3.08	1306	2.92	1222	2.77	1139	2.61	1056	2.47	978	2.32	897	2.17
		13 x 3 1/4 BC	6"	1317	2.50	1253	2.40	1185	2.31	1114	2.21	1036	2.09	952	1.97	858	1.82	748
PB-14A	13 x 3 1/4 BC	7"	1360	2.51	1284	2.39	1210	2.28	1134	2.17	1054	2.07	968	1.96	872	1.83	759	1.68
	13 x 3 1/4 BC	8"	1413	2.51	1328	2.41	1243	2.31	1157	2.21	1068	2.11	974	1.98	872	1.83	757	1.65
	12 1/4 x 2 7/8	6"	1495	2.98	1406	2.83	1310	2.67	1210	2.50	1107	2.32	1001	2.15	887	1.97	757	1.76
	13 x 3 1/4	6"	1508	3.60	1445	3.47	1380	3.32	1312	3.15	1240	2.98	1163	2.79	1079	2.61	984	2.41
	12 1/4 x 2 7/8	7"	1573	3.33	1477	3.18	1381	3.03	1283	2.87	1178	2.69	1063	2.47	931	2.20	774	1.87
	13 x 3 1/4	7"	1576	3.66	1513	3.52	1447	3.37	1377	3.21	1303	3.04	1222	2.86	1132	2.67	1029	2.45
	14 x 3 1/4 BC	6"	1595	3.87	1521	3.74	1447	3.59	1372	3.44	1296	3.28	1218	3.12	1136	2.95	1049	2.77
	12 1/4 x 2 7/8	8"	1624	3.50	1529	3.34	1433	3.16	1332	2.96	1222	2.75	1097	2.53	954	2.31	784	2.07
	13 x 3 1/4	8"	1637	3.77	1572	3.60	1504	3.43	1431	3.25	1352	3.08	1263	2.89	1162	2.69	1042	2.46
	14 x 3 1/4 BC	7"	1676	4.06	1592	3.87	1507	3.71	1423	3.56	1338	3.42	1254	3.26	1167	3.10	1078	2.91
	14 x 3 1/4	7"	1656	4.61	1606	4.44	1550	4.29	1487	4.15	1418	4.03	1345	3.89	1267	3.73	1185	3.54
	14 x 3 1/4 BC	8"	1741	4.10	1659	3.95	1576	3.79	1492	3.64	1406	3.48	1317	3.32	1225	3.15	1128	2.97
	14 x 3 1/4	7"	1841	5.23	1785	5.04	1722	4.83	1650	4.61	1570	4.37	1482	4.12	1388	3.86	1289	3.63
	14 3/4 x 4	6"	1862	5.82	1796	5.66	1730	5.49	1664	5.32	1597	5.15	1529	4.97	1458	4.79	1385	4.60
	14 x 3 1/4	8"	2021	5.54	1942	5.35	1853	5.13	1754	4.89	1649	4.63	1540	4.35	1429	4.08	1317	3.79
	14 3/4 x 4	7"	1987	6.34	1921	6.16	1852	5.97	1781	5.76	1707	5.54	1631	5.31	1552	5.08	1471	4.84
	14 3/4 x 4	8"	2105	6.82	2038	6.57	1965	6.31	1885	6.02	1801	5.73	1712	5.43	1622	5.14	1529	4.86
PB-15A (1) USE 182T FRAME MIN.	14 x 3 1/4 BC	6"	1768	3.47	1690	3.37	1601	3.24	1500	3.08	1388	2.90	1264	2.70	1132	2.50	992	2.29
	14 x 3 1/4 BC	8"	2112	4.36	2011	4.17	1892	3.92	1756	3.62	1604	3.32	1443	3.02	1275	2.75	1099	2.50
	14 x 3 1/4 BC	10"	2174	4.43	2058	4.24	1929	4.00	1787	3.72	1633	3.41	1466	3.09	1286	2.79	1090	2.49
	15 1/2 x 5 BC	6"	2057	5.37	1971	5.18	1886	5.01	1801	4.84	1715	4.67	1628	4.50	1538	4.34	1445	4.16
	14 x 3 1/4	6"	2206	5.75	2122	5.64	2031	5.48	1934	5.28	1831	5.04	1722	4.77	1606	4.49	1481	4.19
	16 1/2 x 4 3/8 BC	6"	2248	6.47	2182	6.35	2108	6.21	2028	6.06	1942	5.90	1850	5.71	1755	5.51	1656	5.29
	15 1/2 x 5	6"	2379	8.19	2311	8.05	2242	7.89	2171	7.70	2099	7.50	2024	7.28	1947	7.05	1866	6.80
	15 1/2 x 5 BC	8"	2688	7.43	2570	7.18	2448	6.88	2323	6.54	2197	6.18	2069	5.83	1938	5.48	1805	5.14
	16 1/2 x 4 3/8	6"	2618	9.81	2549	9.59	2480	9.38	2408	9.18	2335	9.00	2259	8.81	2182	8.63	2103	8.43
	14 x 3 1/4	8"	2924	8.02	2774	7.64	2624	7.24	2472	6.83	2315	6.40	2150	5.96	1975	5.49	1785	4.99
	16 1/2 x 4 3/8 BC	8"	2711	7.79	2637	7.64	2559	7.46	2475	7.26	2385	7.04	2287	6.79	2182	6.53	2069	6.26
	15 1/2 x 5 BC	10"	2821	7.88	2715	7.62	2599	7.31	2473	6.97	2338	6.59	2197	6.19	2050	5.78	1898	5.36
	14 x 3 1/4 BC	10"	2818	7.86	2748	7.70	2671	7.52	2584	7.32	2487	7.09	2379	6.85	2260	6.58	2129	6.30
16 1/2 x 4 3/8 BC	10"	2995	8.38	2880	8.04	2751	7.68	2607	7.27	2446	6.81	2268	6.30	2073	5.74	1862	5.13	
15 1/2 x 5	8"	3272	11.92	3171	11.60	3062	11.23	2948	10.79	2828	10.31	2702	9.80	2572	9.27	2438	8.74	
15 1/2 x 5	10"	3476	12.90	3394	12.55	3301	12.15	3193	11.69	3068	11.16	2926	10.57	2769	9.93	2605	9.29	
16 1/2 x 4 3/8	8"	3623	13.81	3545	13.62	3458	13.36	3360	13.04	3251	12.64	3130	12.17	2998	11.64	2855	11.08	
16 1/2 x 4 3/8	10"	3705	14.27	3643	14.09	3575	13.88	3499	13.62	3414	13.31	3318	12.94	3209	12.51	3086	12.01	
PB-18 (1) USE 182T FRAME MIN.	14 x 3 1/4 BC	6"	1520	3.35	1438	3.23	1355	3.12	1271	3.00	1185	2.89	1097	2.77	1006	2.64	909	2.50
	14 x 3 1/4 BC	8"	1589	3.41	1517	3.32	1441	3.22	1361	3.12	1277	3.00	1186	2.88	1089	2.75	981	2.59
	14 x 3 1/4 BC	10"	1574	3.34	1508	3.27	1437	3.18	1362	3.09	1279	2.98	1189	2.86	1088	2.72	972	2.56
	14 x 3 1/4	6"	1795	5.29	1729	5.15	1659	4.98	1586	4.79	1510	4.59	1430	4.39	1347	4.18	1260	3.97
	16 1/2 x 4 3/8 BC	6"	1792	5.84	1743	5.72	1693	5.59	1641	5.46	1587	5.32	1531	5.17	1473			



DIMENSIONS and SPECIFICATIONS

INLET AND DISCHARGE FLANGE DIMENSIONS FOR PB-8 THROUGH PB-18WA



Dimensions in inches

A★	B*	C*	D	E	F	G	H
4 ¹ / ₁₆	9	7 ¹ / ₂	3 ¹¹ / ₁₆	4 ⁹ / ₁₆	7 ¹ / ₁₆	4	1 ⁵ / ₁₆
5 ¹ / ₁₆	11	8 ¹ / ₂	4 ³ / ₁₆	5 ⁹ / ₁₆	7 ¹ / ₁₆	4	1 ⁵ / ₁₆
6 ¹ / ₁₆	11	9 ¹ / ₂	5 ¹ / ₂	6 ⁹ / ₁₆	7 ¹ / ₁₆	4	1 ¹ / ₁₆
7 ¹ / ₁₆	11	9	6 ⁷ / ₁₆	7 ¹¹ / ₁₆	7 ¹ / ₁₆	8	1 ⁵ / ₁₆
8 ¹ / ₁₆	13 ¹ / ₂	11 ³ / ₄	7 ¹ / ₂	8 ⁵ / ₈	7 ¹ / ₁₆	8	1
10 ¹ / ₁₆	16	14 ¹ / ₄	9 ¹¹ / ₁₆	10 ⁹ / ₁₆	7 ¹ / ₁₆	8	1

① Holes will not be drilled unless customer specifies. If drilled per our standard, holes will be drilled on centerlines unless specified otherwise on order. Dimensions "C, F & G" can be made to customer specifications; at an additional charge.

② All dimensions are ±1/8" except C & F.

③ All flanges are 319 cast aluminum.

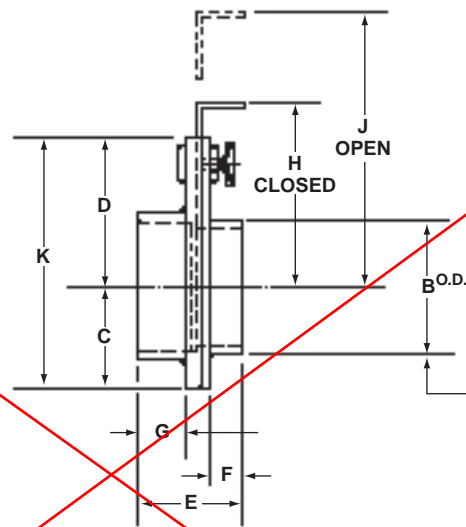
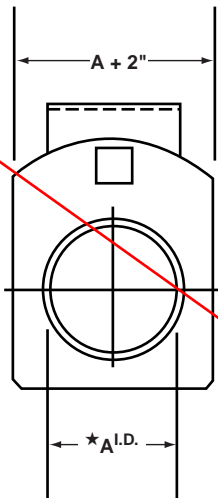
DIMENSIONS SUBJECT TO CHANGE WITHOUT NOTICE.

★ "A" fits over inlet or outlet of blower, "AA" or "DD" dimension.

* Meet ANSI-125 pound flange dimensions.

◆ Discharge flanges not available on downblast or bottom angular down discharge positions.

INLET AND DISCHARGE SLIDE GATE DIMENSIONS FOR PB-8 THROUGH PB-18WA



Flange, filter or guard can be mounted over this O.D.

◆ Not available on downblast or bottom angular down discharge positions.

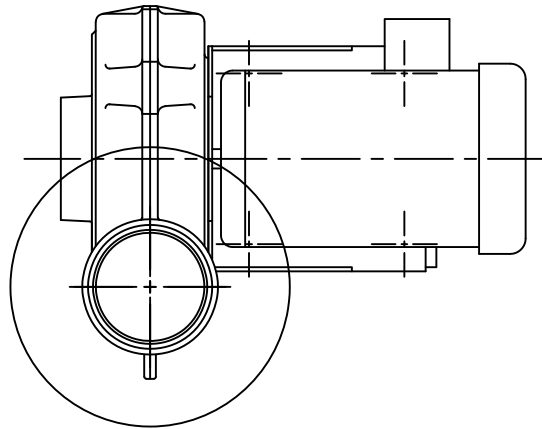
① Gate halves are 319 cast aluminum.
Slide gate is 12 gauge galvanized steel.
Aluminum slide gate available at additional charge.

DIMENSIONS IN INCHES

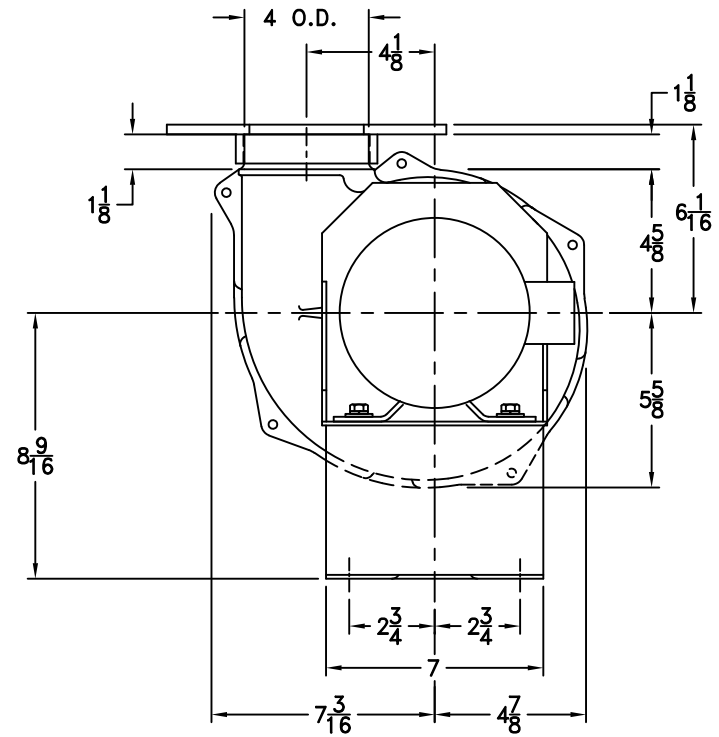
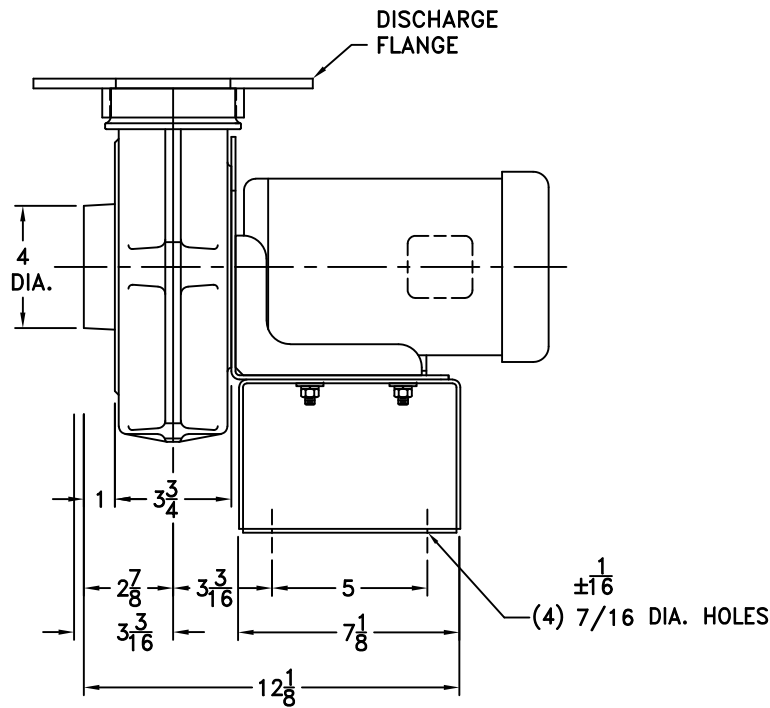
DIMENSIONS SUBJECT TO CHANGE WITHOUT NOTICE.


MODEL	A★	B	C	D	E	F	G	H	J	K
FG-4	4 ¹ / ₁₆	3 ¹⁵ / ₁₆	3 ¹ / ₄	4 ¹ / ₂	2 ¹¹ / ₁₆	1	1 ¹ / ₁₆	5 ⁵ / ₈	9	7 ³ / ₄
FG-5	5 ¹ / ₁₆	4 ¹⁵ / ₁₆	3 ¹ / ₂	5 ¹ / ₂	2 ⁹ / ₁₆	1 ¹ / ₈	7 ¹ / ₈	6 ¹ / ₈	10 ¹ / ₂	9
FG-6	6 ¹ / ₁₆	5 ¹⁵ / ₁₆	4	5 ¹ / ₂	2 ¹¹ / ₁₆	1 ¹ / ₁₆	1	6 ¹ / ₄	11 ¹ / ₂	9 ¹ / ₂
FG-7	7 ¹ / ₁₆	6 ¹⁵ / ₁₆	4 ¹ / ₂	5 ¹ / ₂	2 ⁷ / ₈	1 ¹ / ₈	1 ¹ / ₈	6 ¹ / ₄	12 ¹ / ₂	10
FG-8	8 ¹ / ₁₆	7 ¹⁵ / ₁₆	5	6 ³ / ₄	2 ¹³ / ₁₆	1	1 ³ / ₁₆	7 ³ / ₄	15	11 ³ / ₄
FG-10	10 ¹ / ₁₆	9 ¹⁵ / ₁₆	6	8	3 ¹ / ₁₆	1 ⁵ / ₁₆	1	9	18 ¹ / ₂	14

★ "A" FITS OVER INLET OR OUTLET OF BLOWER, "AA" OR "DD" DIMENSION



NOTES:
 1. 56 FRAME FOOT MOUNT MOTOR SHOWN.
 2. SEE DRAWING A27062 FOR FLANGES.



				SUPERSEDES:	TOLERANCES: FRACTIONS ±1/8 ANGLES: ± 1° DECIMALS: X.XXX = ±0.005 X.XX = ±0.060 X.X = ±0.120 ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED	SCALE: FULL IN CAD DATE: 04/29/13	 cincinnati fan 7697 SNIDER ROAD MASON, OHIO 45040		
				SIMILAR TO:	DR. BY: DCF CHK. BY:	TITLE PB-8 ARR. 4 (CW UB)			
NO.	DESCRIPTION	DATE	INITIALS	MATERIAL:	ASSEMBLY	A	DRAWING NO. PB84	SHEET 17 of 17	REV.
REVISIONS									

Part Detail							
Revision:	R	Status:	PRD/A	Change #:		Proprietary:	No
Type:	AC	Elec. Spec:	34WGX716	CD Diagram:	CD0001	Mfg Plant:	
Mech. Spec:	34H578	Layout:	34LYH578	Poles:	02	Created Date:	
Base:	N	Eff. Date:	07-03-2018	Leads:	6#18		

Specs			
Catalog Number:	VL3503	Insulation Class:	B
Enclosure:	TEFC	Inverter Code:	Not Inverter
Frame:	56C	KVA Code:	L
Frame Material:	Steel	Lifting Lugs:	No Lifting Lugs
Output @ Frequency:	.500 HP @ 60 HZ	Locked Bearing Indicator:	Locked Bearing
Synchronous Speed @ Frequency:	3600 RPM @ 60 HZ	Motor Lead Quantity/Wire Size:	6 @ 18 AWG
Voltage @ Frequency:	230.0 V @ 60 HZ	Motor Lead Exit:	Ko Box
	115.0 V @ 60 HZ	Motor Lead Termination:	Flying Leads
XP Class and Group:	None	Motor Type:	3413L
XP Division:	Not Applicable	Mounting Arrangement:	F1
Agency Approvals:	CSA	Power Factor:	72
	UR	Product Family:	General Purpose
Auxillary Box:	No Auxillary Box	Pulley End Bearing Type:	Ball
Auxillary Box Lead Termination:	None	Pulley Face Code:	C-Face
Base Indicator:	No Mounting	Pulley Shaft Indicator:	Standard
Bearing Grease Type:	Polyrex EM (-20F +300F)	Rodent Screen:	None
Blower:	None	RoHS Status:	ROHS COMPLIANT
Current @ Voltage:	3.500 A @ 230.0 V	Shaft Extension Location:	Pulley End

	4.100 A @ 208.0 V	Shaft Ground Indicator:	No Shaft Grounding
	7.000 A @ 115.0 V	Shaft Rotation:	Reversible
Design Code:	N	Shaft Slinger Indicator:	No Slinger
Drip Cover:	No Drip Cover	Speed Code:	Single Speed
Duty Rating:	CONT	Motor Standards:	NEMA
Electrically Isolated Bearing:	Not Electrically Isolated	Starting Method:	Direct on line
Feedback Device:	NO FEEDBACK	Thermal Device - Bearing:	None
Front Face Code:	Standard	Thermal Device - Winding:	None
Front Shaft Indicator:	None	Vibration Sensor Indicator:	No Vibration Sensor
Heater Indicator:	No Heater	Winding Thermal 1:	None
		Winding Thermal 2:	None

Nameplate NP1256L										
CAT.NO.	VL3503									
SPEC.	34H578X716									
HP	.5									
VOLTS	115/230									
AMP	7/3.5									
RPM	3450									
FRAME	56C				HZ	60			PH	1
SER.F.	1.25		CODE	L	DES	N		CLASS	B	
NEMA-NOM-EFF	66		PF	72						
RATING	40C AMB-CONT									
CC									USABLE AT 208V	4.1
DE	6203				ODE	6203				
ENCL	TEFC		SN							
	SFA 8/4									

AC Induction Motor Performance Data

Record # 7566 - Typical performance - not guaranteed values

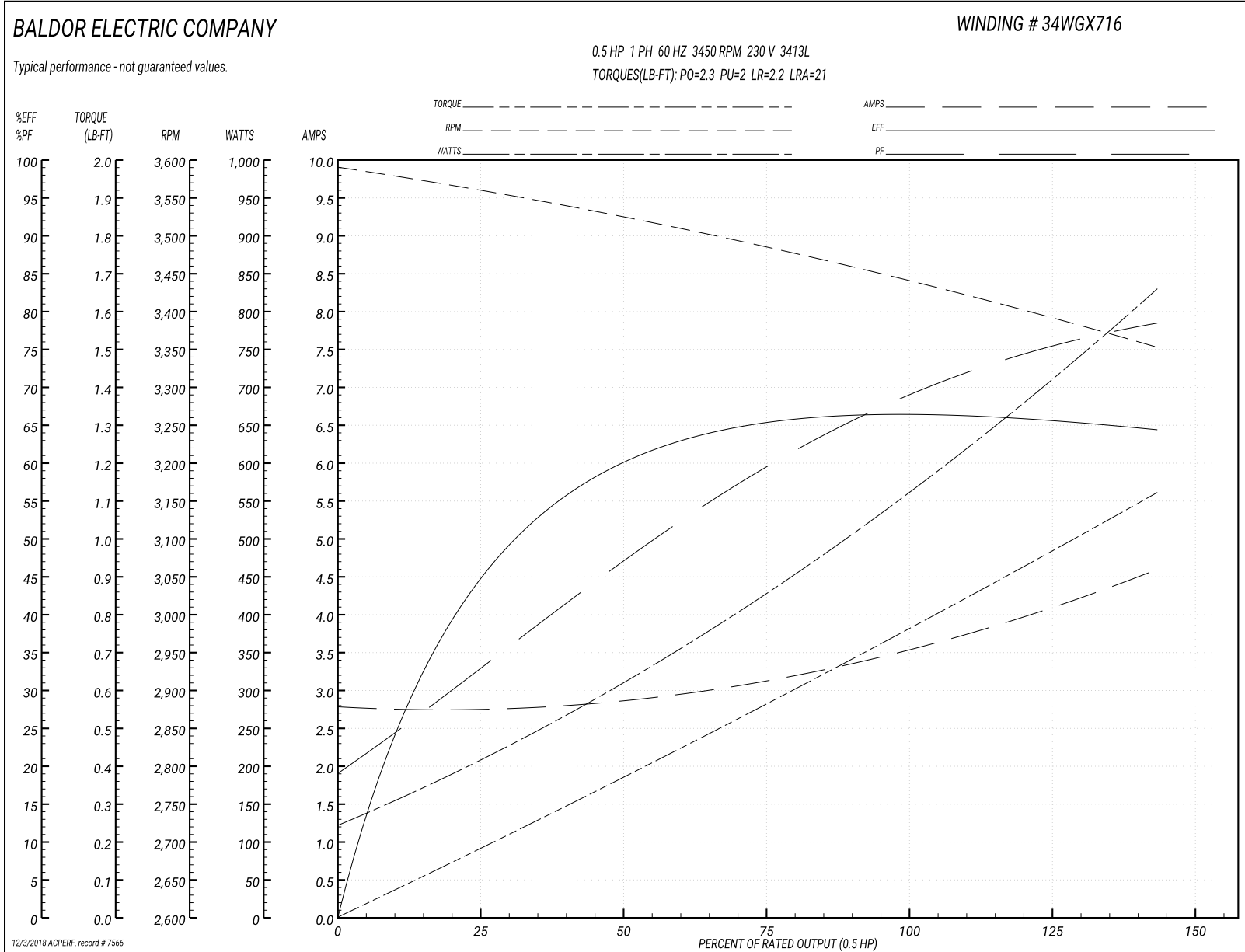
Winding: 34WGX716-R001	Type: 3413L	Enclosure: TEFC
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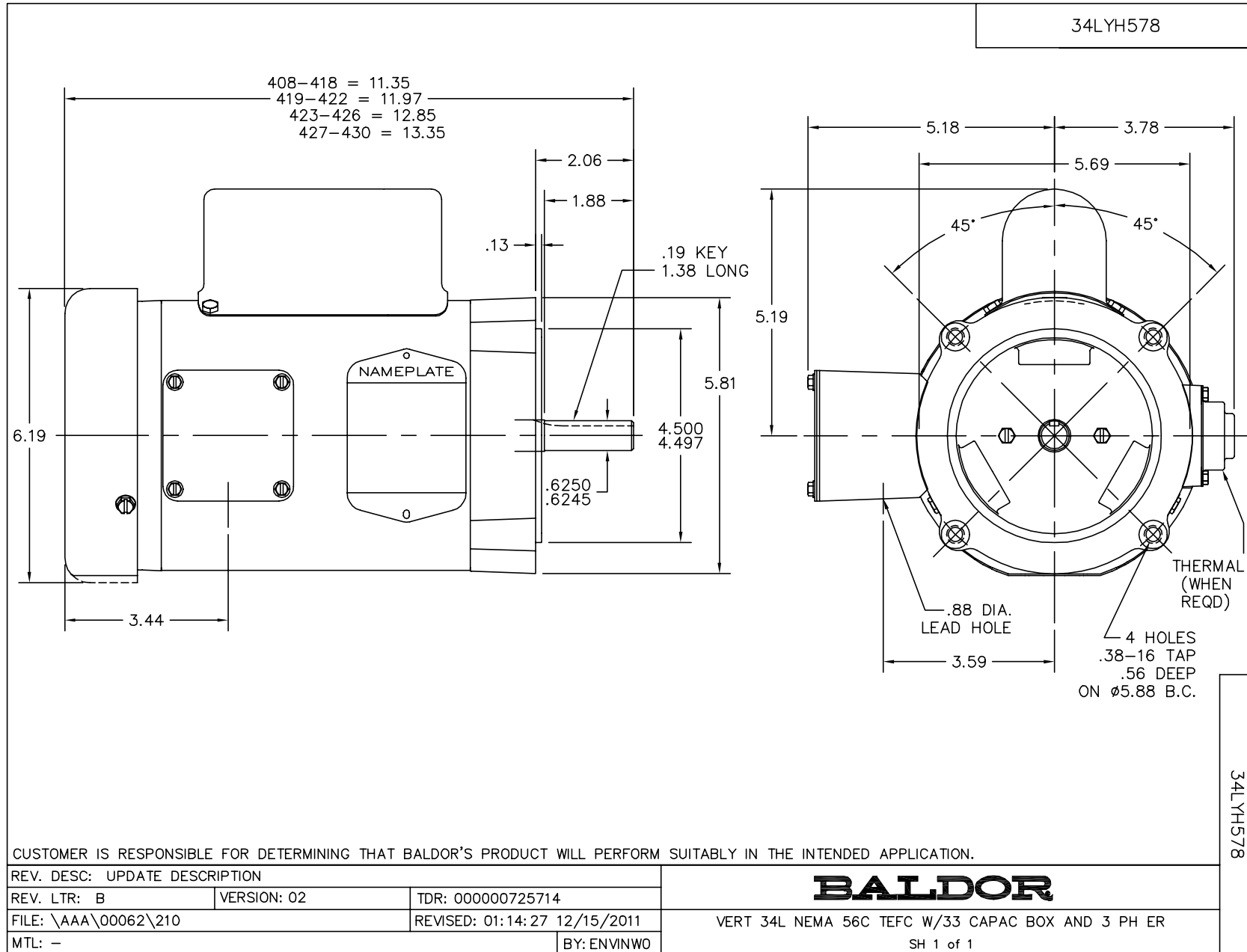
Nameplate Data				230 V, 60 Hz: High Voltage Connection	
Rated Output (HP)	.5			Full Load Torque	0.75 LB-FT
Volts	115/230			Start Configuration	direct on line
Full Load Amps	7/3.5			Breakdown Torque	2.3 LB-FT
R.P.M.	3450			Pull-up Torque	2 LB-FT
Hz	60	Phase	1	Locked-rotor Torque	2.2 LB-FT
NEMA Design Code	N	KVA Code	L	Starting Current	21 A
Service Factor (S.F.)	1.25			No-load Current	2.76 A
NEMA Nom. Eff.	66	Power Factor	72	Line-line Res. @ 25°C	4.163 Ω A Ph 4.624 Ω B Ph
Rating - Duty	40C AMB-CONT			Temp. Rise @ Rated Load	67°C
S.F. Amps	8/4			Temp. Rise @ S.F. Load	84°C

Load Characteristics 230 V, 60 Hz, 0.5 HP

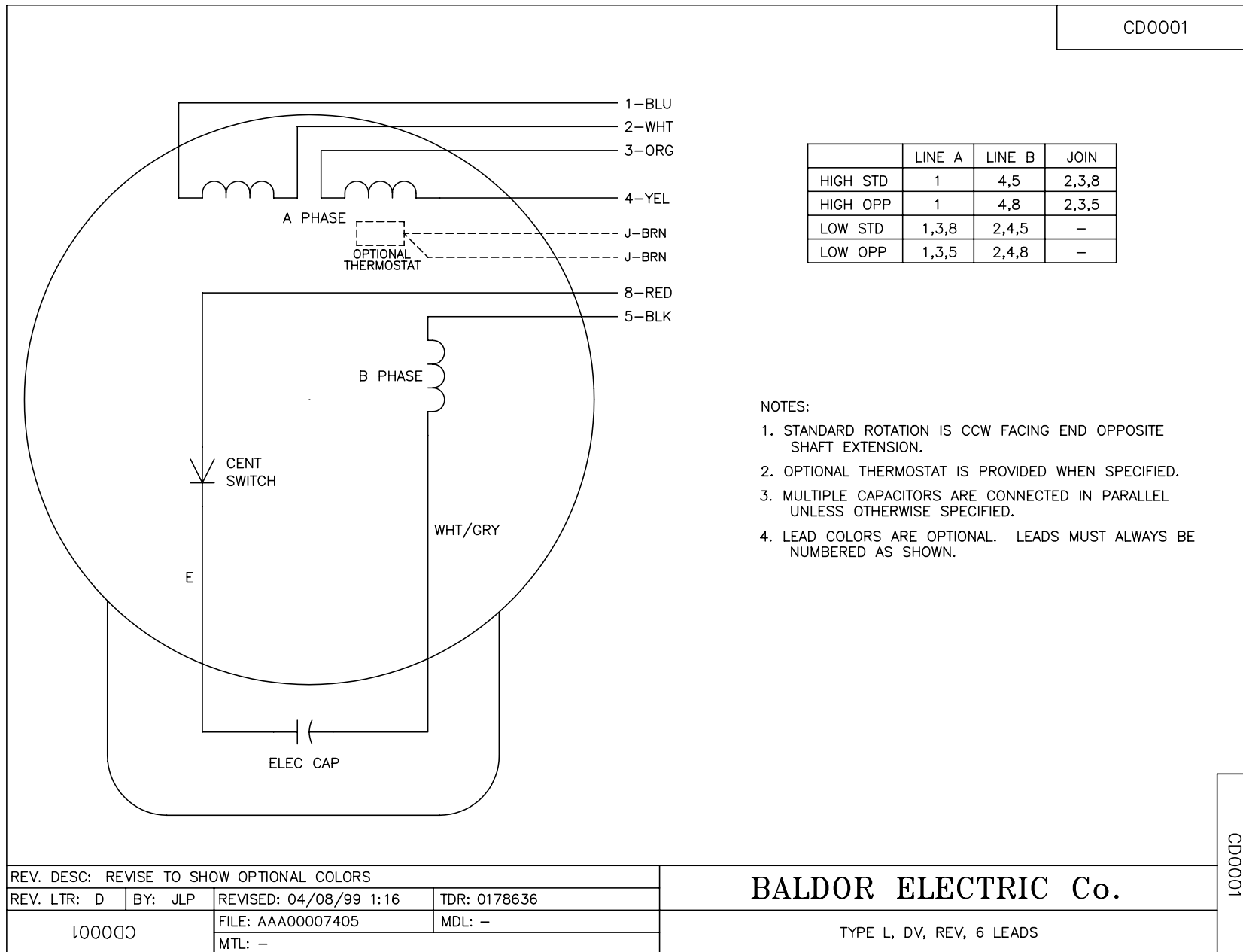
% of Rated Load	25	50	75	100	125	150	S.F.
Power Factor	29	48	60	69	76	78	76
Efficiency	50.7	58.5	64.8	66.2	65.8	64.6	65.8
Speed	3548	3520	3489	3449	3405	3346	3405
Line amperes	2.78	2.88	3.13	3.5	3.95	4.64	3.95

Performance Graph at 230V, 60Hz, 0.5HP Typical performance - Not guaranteed values





CD0001



REV. DESC: REVISE TO SHOW OPTIONAL COLORS			
REV. LTR: D	BY: JLP	REVISED: 04/08/99 1:16	TDR: 0178636
100000		FILE: AAA00007405	MDL: -
		MTL: -	

BALDOR ELECTRIC Co.

TYPE L, DV, REV, 6 LEADS

CD0001

SECTION 8.3

WATER CONDITIONING SYSTEM

CP SERIES WATER SOFTENERS

CP208s • CP210s • CP213s • CP216s



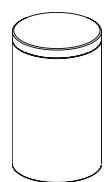
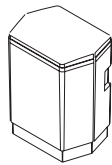
Alternating Systems

Specifications	CP208s	CP210s	CP213s	CP216s
Tank Size	8" x 40"	10" x 54"	13" x 54"	16" x 65"
System Size (width x depth x height)	17" x 8" x 46"	21" x 10" x 60"	27" x 13" x 60"	33" x 16" x 71"
Resin Volume per Tank	.70 ft ³	1.5 ft ³	2.5 ft ³	4.0 ft ³
Regeneration Time / Volume	45 min / 35 gal	90 min / 102 gal	90 min / 142 gal	90 min / 160 gal
Flow Range (15 / 30 psig)	11.5 -18.0 gpm	12-19 gpm	20-30 gpm	23 -30 gpm
Maximum Hardness	66 gpg	70 gpg	51 gpg	49 gpg

Overdrive Systems

Specifications	CP208s OD	CP210s OD	CP213s OD	CP216s OD
Tank Size	8" x 40"	10" x 54"	13" x 54"	16" x 65"
System Size (width x depth x height)	17" x 8" x 46"	21" x 10" x 60"	27" x 13" x 60"	33" x 16" x 71"
Resin Volume per Tank	.70 ft ³	1.5 ft ³	2.5 ft ³	4.0 ft ³
Regeneration Time / Volume	45 min / 35 gal	90 min / 102 gal	90 min / 142 gal	90 min / 160 gal
Flow Range (15 / 30 psig)	20.5-30.0 gpm	21- 31 gpm	28 - 40 gpm	35-47 gpm
Maximum Hardness	29 gpg	57 gpg	40 gpg	40 gpg

Brine Tank Options



Tank Description	12" x 16 x 20"	12" x 40"	K Spray	18" x 35"	24" x 40"
Material	HDPE	HDPE	HDPE	HDPE	HDPE
Salt Capacity	50 lbs	100 lbs	200 lbs	250 lbs	500 lbs
Systems	CP208s	CP208s CP210s	CP208s CP210s	CP208s CP210s	CP213s CP216s

TRADITIONAL STANDARD SERIES FILTER HOUSINGS

EXCELLENT CHEMICAL RESISTANCE FOR MANY RESIDENTIAL, COMMERCIAL AND INDUSTRIAL APPLICATIONS



Pentair Standard Filter Housings are manufactured of a durable polypropylene or clear Styrene-Acrylonitrile (SAN). All are equipped with 3/4" NPT inlet and outlet ports. Standard Filter Housings are available in both 10" and 20" lengths and will accommodate a wide range of 2-1/2" to 2-7/8" diameter cartridges. The reinforced polypropylene cap offers an optional pressure-relief button on the inlet side to relieve pressure inside the housing when changing filter cartridges.

Reinforced polypropylene housings have excellent chemical resistance and are ideal for many residential, commercial and industrial applications. Clear sumps offer on-site examination of the cartridge.

~~Opaque Standard Filter Housings are molded from rugged reinforced polypropylene. They offer excellent chemical compatibility and are ideal for use in a variety of low-flow applications.~~

Clear Standard Filter Housings offer on-site examination of flow, performance, and cartridge life. They are ideal for a variety of applications.

FEATURES/BENEFITS

Ideal for a wide range of applications, including residential, commercial and industrial

Available in 10" and 20" lengths

Thick walls for increased strength

Optional pressure relief/bleed button on inlet side of cap

Leak-proof seal

Available with clear or opaque sumps

SPECIFICATIONS

Housing - Polypropylene (opaque) or Styrene Acrylonitrile (clear)

Cap - Reinforced polypropylene

Button Assembly - 300 Series stainless steel, EPDM, and polypropylene

O-Ring - EPDM

Temperature Rating - 40-125°F (4.4-51.7°C)

Maximum Pressure - 125 psi (8.6 bar)



The 150001, 150002, 150067, 150068, 150071, 150072, 150328, 150435 and 150436 are Tested and Certified by NSF International to NSF/ANSI Standard 42 for material and structural integrity requirements.

SPECIFICATIONS AND PERFORMANCE

PART #	DESCRIPTION	MAXIMUM DIMENSIONS	INITIAL ΔP (PSI) @ FLOW RATE (GPM)
150001*	3/4" #10 Standard Black/Blue w/o PR (Non-Mountable Cap)	12.25" x 5.13" (311 mm x 130 mm)	1 psi @ 10 gpm (0.07 bar @ 38 Lpm)
150002*	3/4" #10 Standard Black/Blue w/PR (Non-Mountable Cap)	12.25" x 5.13" (311 mm x 130 mm)	1 psi @ 10 gpm (0.07 bar @ 38 Lpm)
150067*	3/4" #10 Standard Black/Blue w/PR Mounting Bracket Cap	12.25" x 5.13" (311 mm x 130 mm)	1 psi @ 10 gpm (0.07 bar @ 38 Lpm)
150068*	3/4" #10 Standard Black/Blue w/o PR Mounting Bracket Cap	12.25" x 5.13" (311 mm x 130 mm)	1 psi @ 10 gpm (0.07 bar @ 38 Lpm)
150071*	3/4" #10 Standard Blue/Clear w/ PR Mounting Bracket Cap	12.63" x 5.25" (321 mm x 133 mm)	1 psi @ 10 gpm (0.07 bar @ 38 Lpm)
150072*	3/4" #10 Standard Blue/Clear w/o PR Mounting Bracket Cap	12.63" x 5.25" (321 mm x 133 mm)	1 psi @ 10 gpm (0.07 bar @ 38 Lpm)
150435*	3/4" #10 Standard Black/Clear w/PR Mounting Bracket Cap	12.63" x 5.25" (321 mm x 133 mm)	1 psi @ 10 gpm (0.07 bar @ 38 Lpm)
150436*	3/4" #10 Standard Black/Clear w/o PR Mounting Bracket Cap	12.63" x 5.25" (321 mm x 133 mm)	1 psi @ 10 gpm (0.07 bar @ 38 Lpm)
150328*	3/4" #10 Standard Black/Black w/PR Mounting Bracket Cap	12.25" x 5.13" (311 mm x 130 mm)	1 psi @ 10 gpm (0.07 bar @ 38 Lpm)
150069	3/4" #20 Standard Black/Blue w/PR Mounting Bracket Cap	22.38" x 5.13" (568 mm x 130 mm)	1 psi @ 10 gpm (0.07 bar @ 38 Lpm)
150070	3/4" #20 Standard Black/Blue w/o PR Mounting Bracket Cap	22.38" x 5.13" (568 mm x 130 mm)	1 psi @ 10 gpm (0.07 bar @ 38 Lpm)
150326	3/4" #20 Standard Black/Black w/PR Mounting Bracket Cap	22.38" x 5.13" (568 mm x 130 mm)	1 psi @ 10 gpm (0.07 bar @ 38 Lpm)

CAUTION: Protect against freezing to prevent cracking of the filter and water leakage.

*NSF listed

ACCESSORIES

PART #	DESCRIPTION
150295	SW-2 Wrench for Standard
155003	Cartridge Coupler for Standard Cartridges
151120	EPDM #241 O-ring for Standard
151117	Viton #241 O-ring for Standard
151118	Silicone #241 O-ring for Standard
150578	MC-1A Kit - Zinc Plated Bracket for Standard
244043	MC-1A - Zinc Plated Bracket ONLY for Standard
244686	Two-Housing Standard System Bracket
244687	Three-Housing Standard Bracket



13845 BISHOPS DR., SUITE 200, BROOKFIELD, WI 53005 USA
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310051 REV E DE17

Premium 701 Series Filter Cartridges

Industrial Grade

Designed for Housings That Utilize 2-1/2" O.D. Cartridges, and Harmsco® FSSS, BC and HMC Filter Housings

Highly efficient filter cartridges made of pleated Polyester-Plus™ filter media. The industry's largest surface area.

- Lower overall operating cost
- Longer filter runs for fewer change outs
- Lower initial pressure drops
- Reduced maintenance down time and cost
- Increased contaminant removal
- High flow capability



Certified to
ANSI-NSF 61



Features

- ▶ Pleated filter media provides higher flow rates and lower initial pressure drop
- ▶ Pleated filters offer more surface area providing higher loading capacity for longer filter life and increased particle removal
- ▶ End cap, center tubes and media are thermally bonded as one integral component for added strength
- ▶ Offered in Polyester-Plus™, Harmsco-Free and Poly-Pleat™ media types
- ▶ Color coded end caps for easy micron identification

Applications

- ▶ Reverse Osmosis Pre-filtration
- ▶ Municipal Drinking Water Filtration
- ▶ Commercial/Residential Drinking Water Filtration
- ▶ Desalination Pre-filtration
- ▶ Industrial Water Filtration
- ▶ Cooling Tower Filtration
- ▶ Chill Water Loop Filtration
- ▶ Food & Beverage Filtration
- ▶ Marine/Aquatic Filtration



Premium 701 Series Filter Cartridges

Specifications

- ▶ **Filter media:** Polyester-Plus™, Synthetic and Polypropylene
- ▶ **Center Core:** Rigid PVC with perforations or polypropylene
- ▶ **Outer Support Media:** Polypropylene
- ▶ **Temperature:** 140°F (60°C)
- ▶ **Shrink Wrap:** Standard on all cartridges
- ▶ **End Caps:** Pliable PVC, sealing surface built in
- ▶ **Change Out:** 25 PSI ΔP (1.7 bar)
- ▶ **pH:** 3 to 11



Certified to ANSI-NSF 61

Cartridge Selection/Sizing Guide

2-1/2" O.D.

Cartridge Length

Product Code	Nominal Micron Rating	Media (sq ft)	Recommended Flow Rate* (GPM)	Length (in)	O.D. (in)	No./Case
Polyester-Plus™ - engineered for high efficiency, low pressure drops						
701-0.35z	0.35	5	4	9-3/4	2-1/2	28
701-1	1	5	4	9-3/4	2-1/2	28
701-5	5	5	4	9-3/4	2-1/2	28
701-10	10	5	4	9-3/4	2-1/2	28
701-20	20	5	4	9-3/4	2-1/2	28
701-50	50	5	4	9-3/4	2-1/2	28
701-0.35/10	0.35	5	4	10	2-1/2	28
701-1/10	1	5	4	10	2-1/2	28
701-5/10	5	5	4	10	2-1/2	28
701-10/10	10	5	4	10	2-1/2	28
701-20/10	20	5	4	10	2-1/2	28
701-50/10	50	5	4	10	2-1/2	28
701-0.35/20	0.35	10	8	20	2-1/2	28
701-1/20	1	10	8	20	2-1/2	28
701-5/20	5	10	8	20	2-1/2	28
701-10/20	10	10	8	20	2-1/2	28
701-20/20	20	10	8	20	2-1/2	28
701-50/20	50	10	8	20	2-1/2	28
701-0.35/30	0.35	15	12	30	2-1/2	28
701-1/30	1	15	12	30	2-1/2	28
701-5/30	5	15	12	30	2-1/2	28
701-10/30	10	15	12	30	2-1/2	28
701-20/30	20	15	12	30	2-1/2	28
701-50/30	50	15	12	30	2-1/2	28
701-0.35/40	0.35	20	16	40	2-1/2	28
701-1/40	1	20	16	40	2-1/2	28
701-5/40	5	20	16	40	2-1/2	28
701-10/40	10	20	16	40	2-1/2	28
701-20/40	20	20	16	40	2-1/2	28
701-50/40	50	20	16	40	2-1/2	28
Harmsco-Free - 100% synthetic composite media						
701-1/10-HF	1	5	4	10	2-1/2	28
701-5/10-HF	5	5	4	10	2-1/2	28
701-20/10-HF	20	5	4	10	2-1/2	28
701-1/20-HF	1	10	8	20	2-1/2	28
701-5/20-HF	5	10	8	20	2-1/2	28
701-20/20-HF	20	10	8	20	2-1/2	28
701-1/30-HF	1	15	12	30	2-1/2	28
701-5/30-HF	5	15	12	30	2-1/2	28
701-20/30-HF	20	15	12	30	2-1/2	28
701-1/40-HF	1	20	16	40	2-1/2	28
701-5/40-HF	5	20	16	40	2-1/2	28
701-20/40-HF	20	20	16	40	2-1/2	28
Poly-Pleat™ - 1 micron absolute, multi-layered media						
PP-701-1/10	1	3	1.5	10	2-1/2	28
PP-701-1/20	1	7	3.5	20	2-1/2	28
PP-701-1/30	1	11	5.5	30	2-1/2	28
PP-701-1/40	1	15	7.5	40	2-1/2	28

Six micron ratings and color coded end caps for easy identification.

Nominal Micron:	0.35	1	5	10	20	50
End Cap Color:	Brown	Tan	White	Red	Blue	Yellow

Note: This publication is to be used as a guide. The data within has been obtained from many sources and is considered to be accurate. Harmsco does not assume liability for the accuracy and/or completeness of this data. Changes to the data can be made without notification. Temperature, Pressure, Flow Rates, Differential Pressures, Chemical Combinations and other unknown factors can affect performance in unknown ways. **Limited Warranty:** Harmsco warrants their products to be free of material and workmanship defects. Determination of suitability of Harmsco products for uses and applications contemplated by Buyer shall be the sole responsibility of Buyer. The end user/installer/buyer shall be liable for the product's performance and suitability regarding their specific intended applications. End users should perform their own tests to determine suitability for each application.



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

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www.harmsco.com

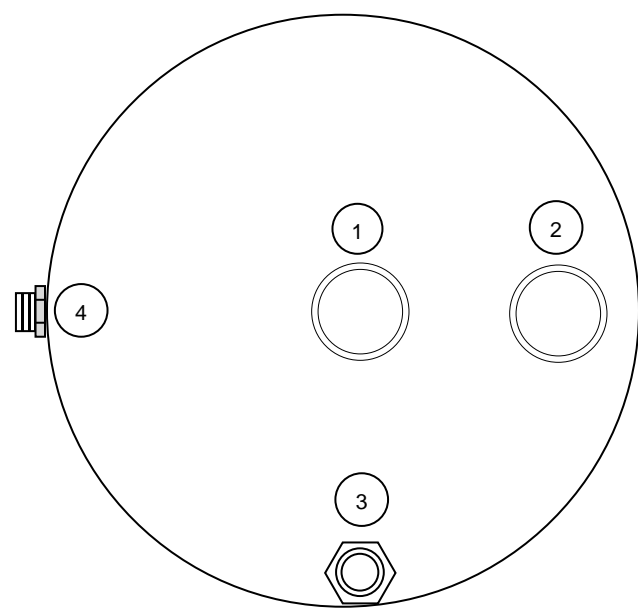
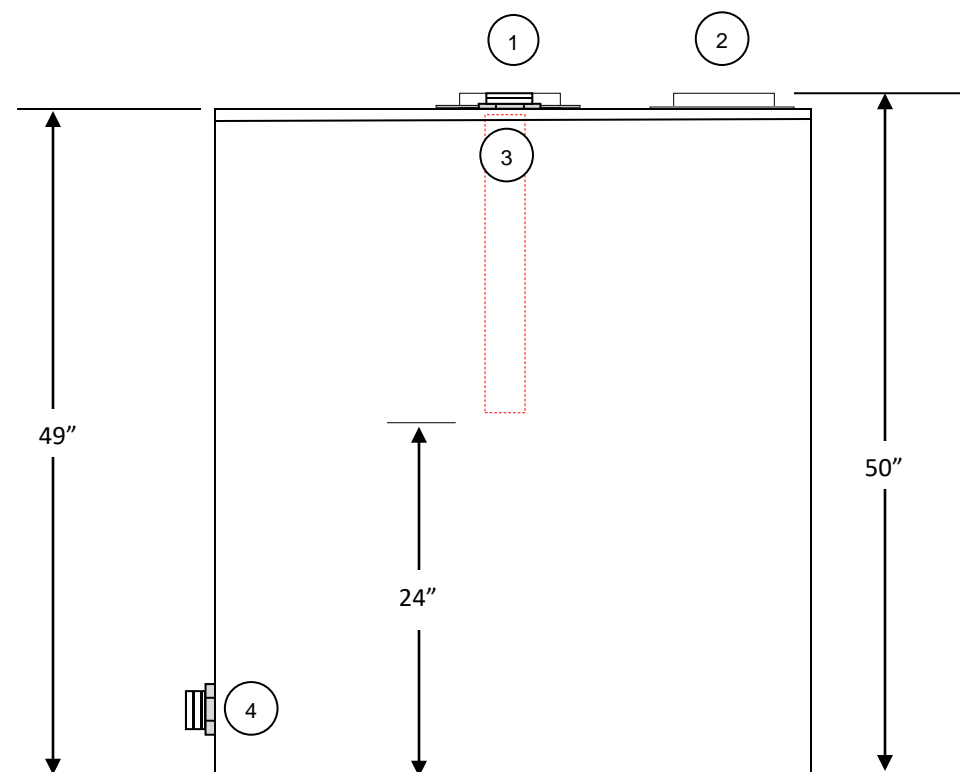


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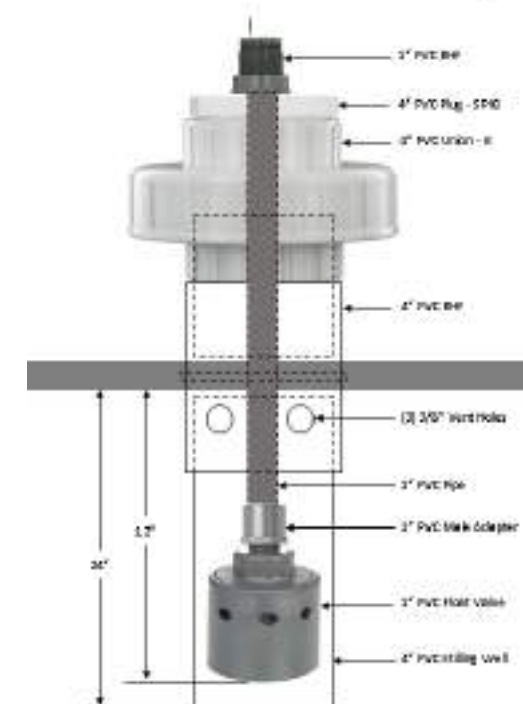
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SECTION 8.4

BRINE STORAGE TANK



EZ-Out Float Valve Assembly



Mark	Degree	Radius	Height	Size	Connection	Material	Gasket	Hardware	Part Numbers & Description
1	TDC	---	1"	8"	Stub	PVC	EPDM	316SS	Salt Dump (from bulk bags)
2	0	16"	1"	8"	Stub	PVC	EPDM	316SS	Vent (including (2) 90's and dust bag)
3	270	18"	---	1"	1" FPT	PVC	EPDM	---	Inlet w/ 4X1 Easy-Out Float Valve Assembly (Hudson Valve #HV1)
4	180	---	6"	1"	FPT	PVC	EPDM	---	Outlet with (slotted pipe) Plenum assembly

Customer	Date
UGSI	June 7, 2021
Purchase Order Number	Project Reference/Location
To Follow	Unalaska Pyramid WTP
Tank Identification	Tank Material(s) of Construction/Resin
1.5 Ton Briner	HDLPE
Tank Model Number	Design Specific Gravity
48x48FBOT	1.90
Capacity	Design Temperature & Pressure
360 Gallons	100° F & Atmospheric
Dimensions (Diameter x Height)	Tank Color
48" x 49"	Natural / Translucent
Drawing Number	Chemical to be Stored
UGSI-360 REV 2	Salt + Saturated Brine



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 800-998-7345
 www.brinemaker.com



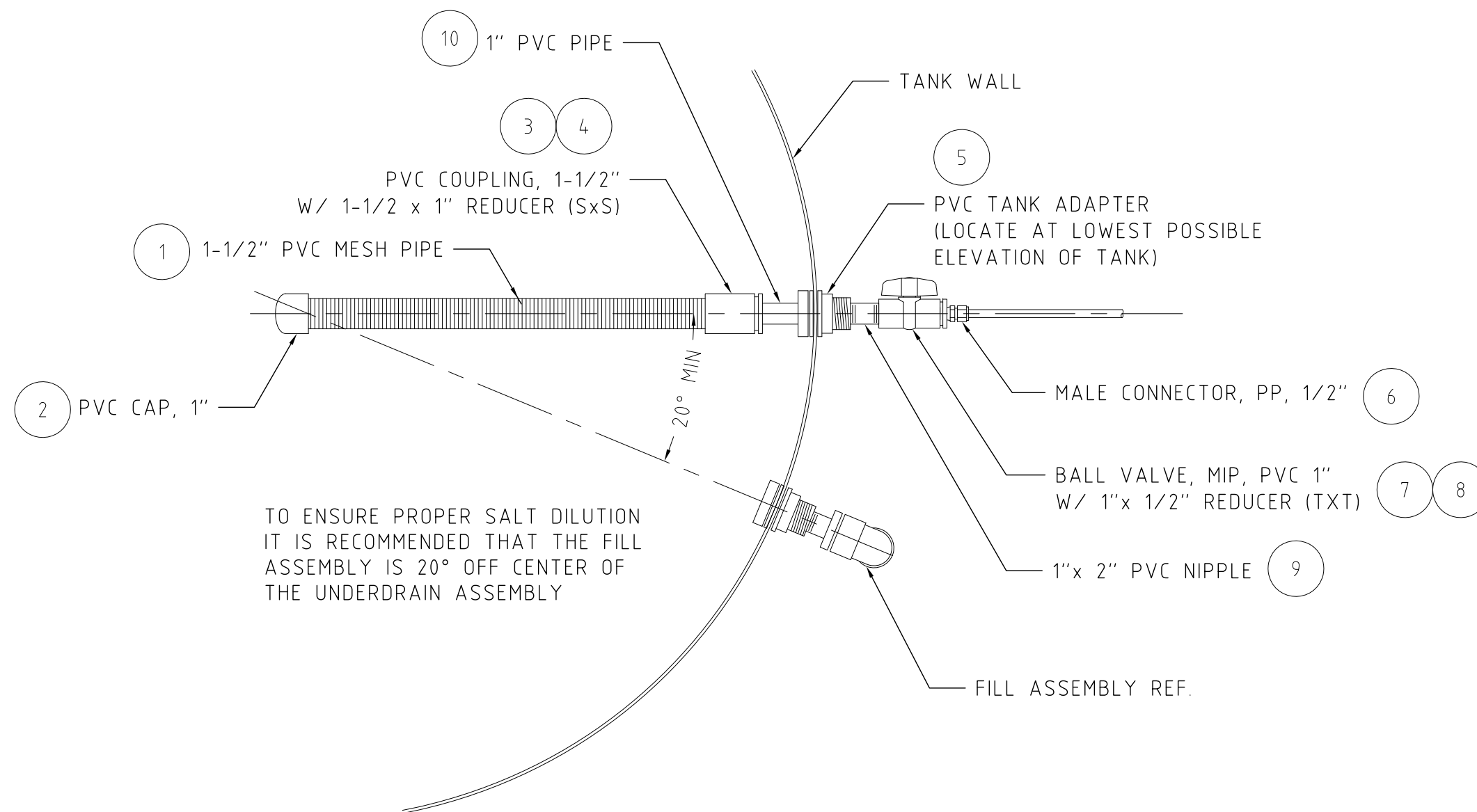
BULKHEAD FITTING

Model: **7020.010**

Category: **Product Home**

Product Details

Product Group	Heavy-Duty Tank Bulkhead Fitting
Manufacturer	M & A Plastics
Manufacturer's part number	7020.010
Material	PVC
Nominal Size	1"
Connections	Soc x MPT/FPT
Color	Gray
Seals	EPDM
Weight (lb)	0.350
Maximum Temperature (°F)	140
Price	\$



BRINE UNDERDRAIN ASSEMBLY PLAN VIEW

△				This drawing represents an investment by PROCESS SOLUTIONS INC of substantial sums, including our engineering skills and experience. It is, therefore, loaned without consideration other than the agreement and condition that it is not to be used in whole or in part to assist others for the making of drawings, print apparatus, or parts thereof. The accept- ance of this drawing will be construed as an acceptance of the forgoing conditions and as an admission of the exclusive ownership in and to the drawings of PROCESS SOLUTIONS INC.	 560 DIVISION STREET, CAMPBELL, CA. 95008	PROJECT:	PROCESS SOLUTIONS INC.
△						SUBJECT:	BRINE TANK PVC UNDER-DRAIN ASSEMBLY
△						DRAWN BY:	C. ROBERTSON
△	7-09-06	JCR	RELEASED FOR FABRICATION			DATE:	7-09-06
△	REV. △	DATE:	BY:			DESCRIPTION:	SCALE:



QV Series QIC2™ Compact Ball Valves

1/2" TO 2" PVC

KEY FEATURES

- Gray PVC
- Rugged, Compact and Lightweight Design
- Full Port Design
- PTFE Seats
- EPDM O-Ring Seals
- Low Torque, Easy 1/4-Turn Operation
- No Integral Parts to Replace
- Perfect for OEM Requirements

MATERIALS

- PVC Cell Class 12454 per ASTM D1784

TECHNICAL INFORMATION

SELECTION CHART

SIZE	MATERIAL	END CONNECTION	SEALS	PRESSURE RATING
1/2" - 2" (DN15 - DN50)	PVC	Socket and Threaded	EPDM	150 PSI @ 70°F Non-Shock

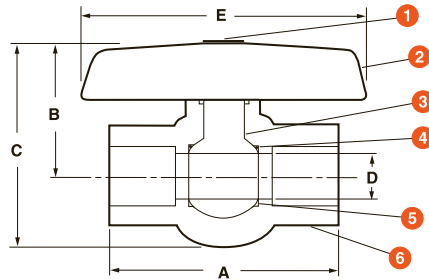
QV Series QIC2™ Compact Ball Valves

1/2" TO 2" PVC

TECHNICAL INFORMATION, CONTINUED

PARTS LIST

Component	Material
1. Cap	ABS
2. Handle	ABS
3. Stem and Ball	PVC
4. O-Ring	EPDM
5. Seat	PTFE
6. Body	PVC



DIMENSIONS

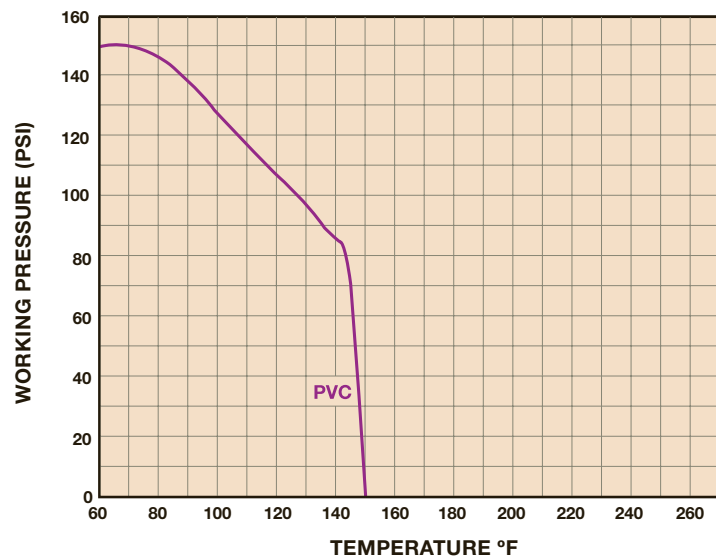
SIZE in/DN	A in/mm	B in/mm	C in/mm	D in/mm	E in/mm	WEIGHT lbs/kg
1/2/15	3.10/78	1.61/41	2.58/66	.59/15	2.83/72	.22/.10
3/4/20	3.57/91	1.93/49	3.11/79	.78/19	3.14/80	.44/.20
1/25	4.16/106	2.21/56	3.46/88	.98/25	3.73/95	.69/.31
1-1/4/32	4.83/123	2.60/66	3.86/98	1.26/32	4.36/111	.90/.41
1-1/2/40	5.09/129	2.85/72	4.34/110	1.53/39	4.63/118	1.19/.54
2/50	5.90/150	3.45/88	5.29/134	1.96/50	5.49/139	1.86/.84

Dimensions are subject to change without notice – consult factory for installation information

Cv VALUES

SIZE in/DN	Cv VALUES	SIZE in/DN	Cv VALUES
1/2/15	8.0	1-1/4/32	75.0
3/4/20	16.0	1-1/2/40	90.0
1/25	30.0	2/50	150.0

OPERATING TEMPERATURE/PRESSURE



PRESSURE LOSS CALCULATION FORMULA

$$\Delta P = \left[\frac{Q}{C_v} \right]^2$$

ΔP = Pressure Drop

Q = Flow in GPM

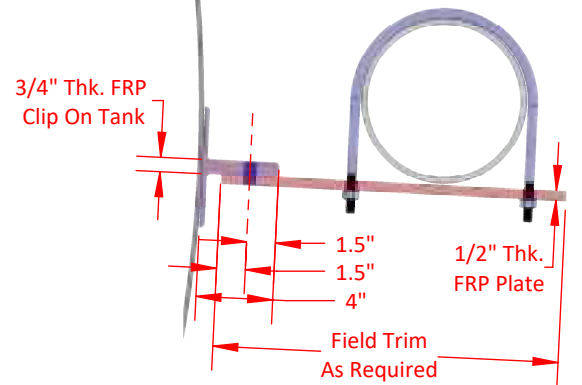
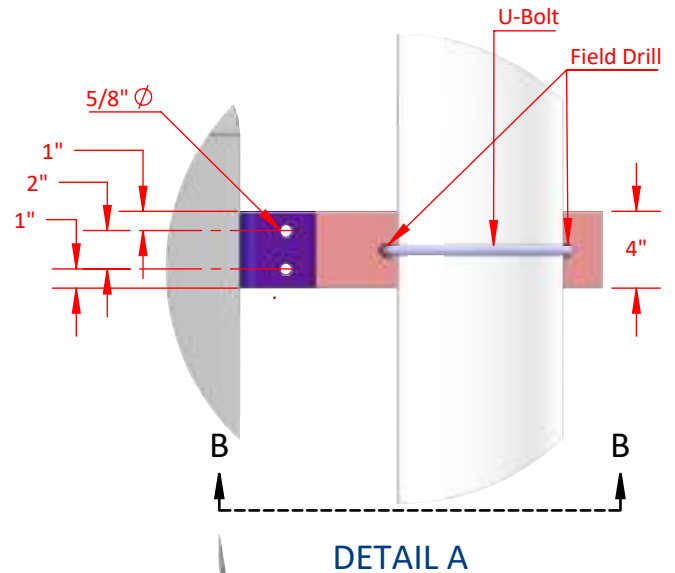
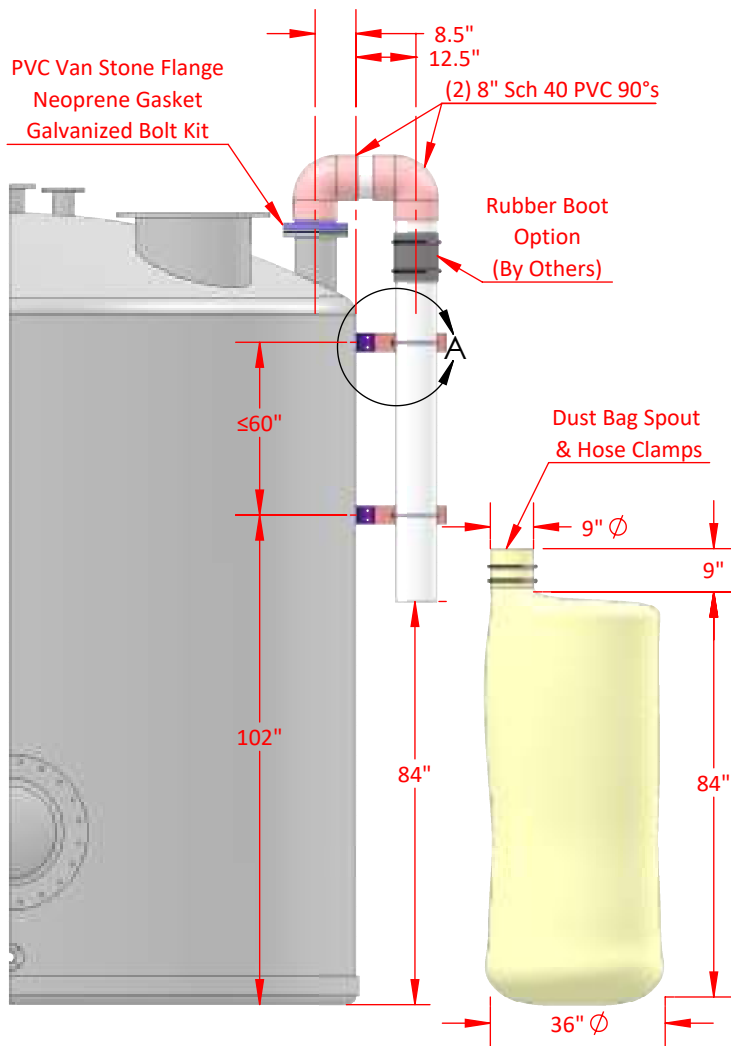
Cv = Flow Coefficient



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Contact Hayward Flow Control with questions: **USA:** 1-888-429-4635 • Fax: 1-888-778-8410 • One Hayward Industrial Drive • Clemmons, NC 27012 USA
Canada: 1.888.238.7665 • Fax: 1.905.829.3636 • 2880 Plymouth Drive • Oakville, ON L6H 5R4 Canada • Email: hflowcanada@haywardnet.com
Visit us at: www.haywardflowcontrol.com • E-mail: hflow@haywardnet.com

FIBERGLASS BRINER: 8" VENT



WHAT WE INCLUDE

- 8" PVC mating flange with 1/8" neoprene gasket and galvanized bolt kit
- (2) sch 40 PVC 90° elbows
- Sch 40 PVC pipe to serve as ducting
- 2-piece FRP pipe supports (as required) with 304SS hardware and galvanized u-bolts
- 36" x 84" dust bag with offset spout and (2) SS hose clamps: 9 oz. scoured & heat-set polysateen

NOTES

- Dust bag maintenance (to prevent blinding) is critical to safe operation of your briner
- We recommend the dust bag be "cleaned" between deliveries to dislodge embedded dust particles
- A rubber boot can be installed in the vent pipe (not included)

INSTALLATION (by others)

- Install 8" PVC flange onto tank flange
- Install supports and 8" vertical pipe section - terminate bottom at 84"
- Measure and cut horizontal section to fit between tank flange and vent pipe
- Bond elbows to horizontal section
- Bond horizontal section into 8" PVC flange and vertical section of vent pipe
- Attach dust bag spout to vent pipe using (2) SS hose clamps

SECTION 8.5

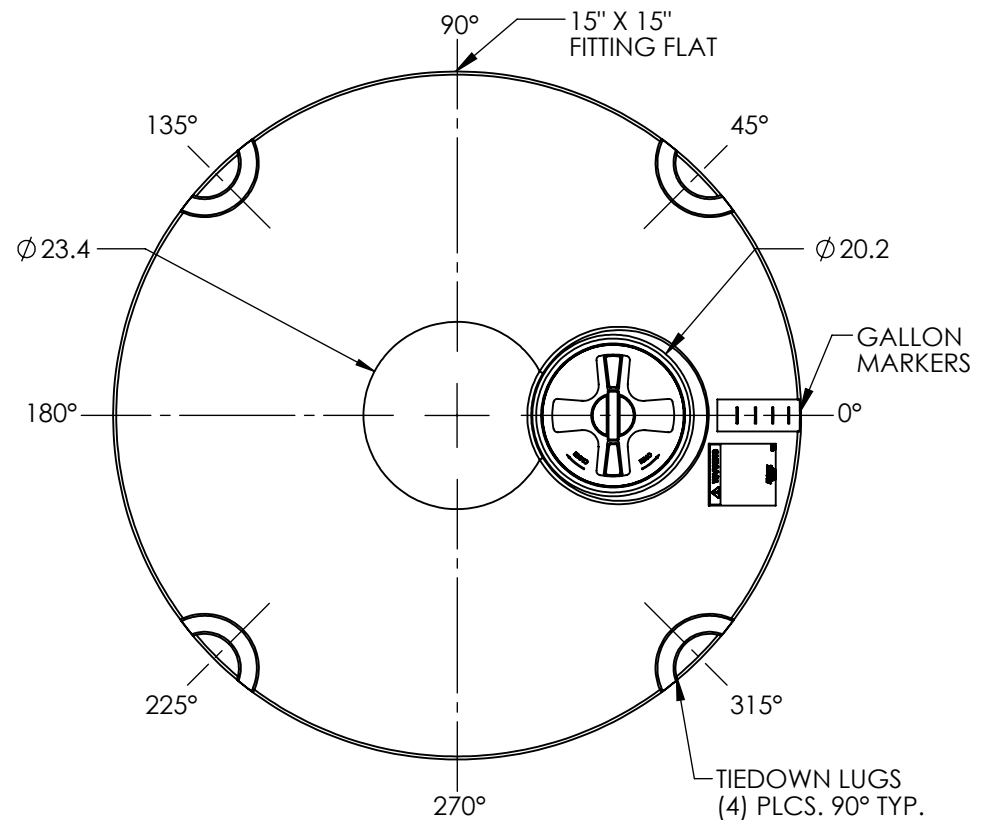
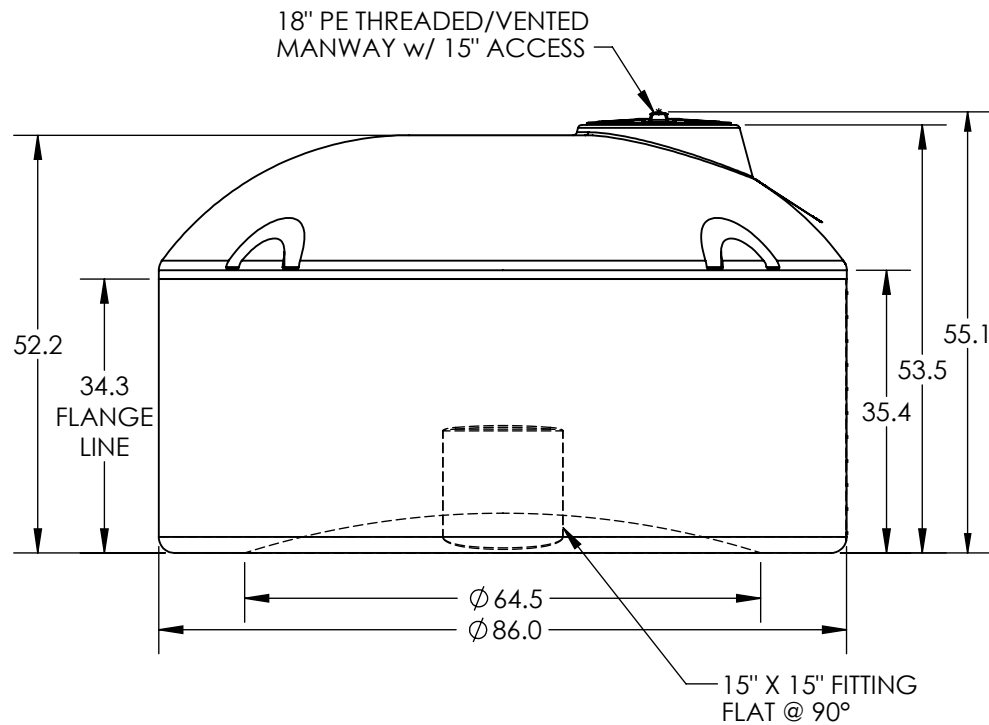
HYPOCHLORITE STORAGE TANK

VERTICAL TANKS

Part No.	Gallons	Brimful	Diameter	Height	Manway
5750100N--	330	342	47"	68"	18"
1630300N--	330	360	48"	55"	10"
1008200N--	330	330	47"	50"	18"
1011600N--	330	330	44"	58"	18"
5760100N--	360	373	53"	59"	18"
1740000N--	400	400	45"	62"	18"
5770100N--	440	456	53"	69"	18"
5780100N--	500	518	53"	77"	18"
1800000N--	550	550	48"	75"	18"
1820000N--	550	580	64"	47"	18"
8060000N--	550	580	64"	46"	18"
1700100N--	700	720	48"	99"	18"
1700200N--	710	710	60"	68"	18"
1810000N--	850	850	48"	117"	18"
1831000N--	1000	1100	60"	89"	18"
1830000N--	1100	1140	64"	90"	18"
1710000N--	1100	1150	86"	55"	18"
8120000N--	1100	1150	86"	55"	18"
1830200N--	1200	1240	60"	109"	18"
1830400N--	1300	1400	72"	87"	18"
1840300N--	1400	1500	60"	128"	18"
1770000N--	1500	1550	86"	72"	18"
8120100N--	1500	1550	86"	72"	18"
1840000N--	1550	1600	64"	124"	18"
1780200N--	1900	1930	72"	119"	18"
8300000N--	1900	1950	64"	147"	18"
5050300N--	2000	2000	96"	84"	18"
5050000N--	2000	2300	90"	88"	18"
8130000N--	2000	2100	90"	88"	18"
5090000N--	2500	2600	90"	107"	18"
8140000N--	2500	2600	90"	107"	18"
5090300N--	2500	2600	96"	98"	18"
8390000N--	2650	3000	102"	97"	18"



- Industrial (ASTM D-1998-13) and Commercial design standards available.
- Material options for a diverse range of application requirements:
 - High-density linear polyethylene (HDLPE) - black and natural white color - Complies with FDA Regulation 177.1520 and NSF standard 61.
 - Cross-linked, high-density polyethylene (XLPE) - black and natural white color.
 - Opaque white sodium hypochlorite resin #880059 up to 12,500 gallons for outdoor application.
 - Sulfuric acid HDLPE resin #880046 up to 15,000 gallons.
- Available with cable restraint systems that meet 150 mph wind load and IBC seismic requirements.
- Specific gravity ratings are based on the industry's most severe calculation.
- Standard specific gravity choices are 1.5 and 1.9, other ratings are available upon request.
- All materials are UV stabilized for long-term outdoor service.



NOTE:
GALLONAGE MARKS MAY BE REMOVED FOR FITTING PLACEMENT AS NEEDED.

***ALL EXTERNAL PIPING MUST BE INDEPENDENTLY SUPPORTED.**
***ONLY BASE FITTINGS TO BE LEFT INSTALLED AT TIME OF SHIPMENT PER SII PROCEDURE.**
***Consult Snyder's Guidelines for Use and Installation prior to delivery.**
 Available on-line at <http://www.snyderindustriestanks.com/Technical>
ALL DIMENSIONS ARE IN INCHES, NOMINAL, & SUBJECT TO CHANGE WITHOUT NOTICE.
ALL DIMENSIONS ON ROTATIONAL MOLDED PARTS ARE SUBJECT TO A ± 3% TOLERANCE.

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					SHEET 1 OF 1

Specification sheet

VEGAPULS 31

Two-wire 4 ... 20 mA/HART

Radar sensor for continuous level measurement



Application area

The VEGAPULS 31 is the ideal radar sensor for non-contact level measurement in standard applications in all industrial plants.

It is particularly suitable for level measurement and measured value visualisation in water treatment, storage tanks with acids and lyes, additives in all industrial areas or for measuring levels through a plastic tank or IBC container.

The sensor is suitable both for measuring liquids and for use on small bulk solids silos or bulk solids containers.

Your benefit

- Maintenance-free operation due to non-contact 80 GHz radar technology
- Exact measurement results independent of medium properties and process conditions
- Local display for easy checking of the level. Maintenance-free operation due to non-contact measuring principle

Function

The sensor emits a continuous radar signal through the antenna. The emitted signal is reflected by the medium and received as an echo by the antenna.

The frequency difference between the emitted and received signal is proportional to the distance and depends on the filling height. The determined filling height is converted into a respective output signal and output as measured value.

Technical data

Measuring range up to	15 m (49.21 ft)
Deviation	≤ 2 mm
Beam angle	8°
Measuring frequency	W-band (80 GHz technology)
Output signal	4 ... 20 mA/HART
Process fitting	Thread G1½, 1½ NPT, R1½
Process pressure	-1 ... +3 bar (-100 ... +200 kPa/-14.5 ... +43.51 psig)
Process temperature	-40 ... +80 °C (-40 ... +176 °F)
Bluetooth standard	Bluetooth 5.0 (downward compatible to Bluetooth 4.0 LE)
Max. effective range	25 m (82 ft)
Operating voltage	12 ... 35 V DC
Protection rating	IP66/IP67 acc. to IEC 60529, Type 4X acc. to UL 50

Materials

The wetted parts of the instrument are made of PVDF. The process seal is made of FKM.

You will find a complete overview of the available materials and seals in the "Configurator" at www.vega.com and "Products".

Housing versions

The housing is made of PBT plastic and is available in protection rating IP66/IP67.

Electronics versions

The instrument is available in the 4 ... 20 mA/HART electronics version.

Approvals

Worldwide approvals are available for VEGA instruments, e.g. for use in hazardous areas, on ships or in hygienic applications.

The technical data in the respective safety instructions are valid for approved instruments (e.g. with Ex approval). In some cases, these data can differ from the data listed herein.

You can find detailed information on the existing approvals with the appropriate product on our homepage.

Adjustment

Adjustment on site

On-site adjustment of the device is carried out via the integrated display and adjustment unit.

Adjustment via the signal cable

The adjustment of the instrument is carried out via the interface adapter VEGACONNECT and a PC with the adjustment software PACTware and corresponding DTM.

Wireless adjustment via Bluetooth

The Bluetooth version of the device enables wireless connection to smartphones/tablets (iOS/Android) or Windows PCs.



Wireless connection to standard operating devices

Operation is via a free app from the "Apple App Store", the "Google Play Store" or the "Baidu Store". Alternatively, adjustment can also be carried out via PACTware/DTM and a Windows PC.

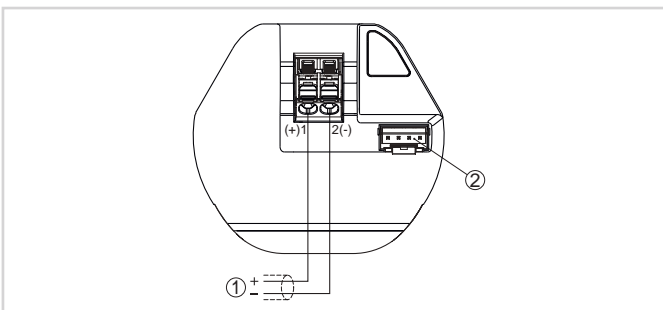


Adjustment via PACTware or app

Adjustment via remote systems

Further adjustment options are possible via a HART Communicator as well as manufacturer-specific programs such as AMS[†] or PDM.

Electrical connection



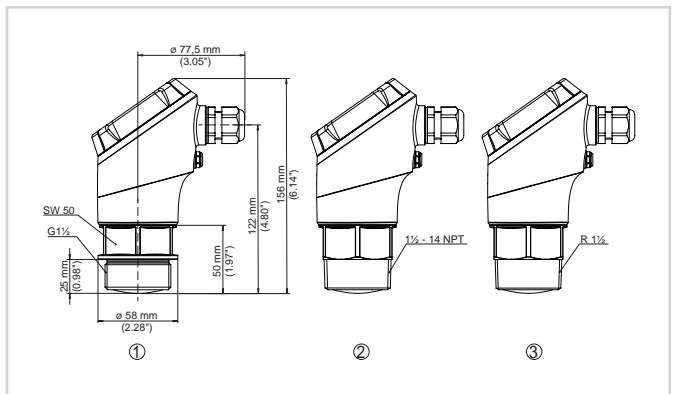
Connection compartment VEGAPULS 31

- 1 Voltage supply, signal output
- 2 Plug connector for the display and adjustment module or interface adapter

You can find details on electrical connection in the instrument operating instructions at www.vega.com/downloads.

Dimensions

VEGAPULS 31



Dimensions VEGAPULS 31

- 1 Thread G1½
- 2 Thread 1½ NPT
- 3 Thread R1½

Mounting accessories

For the VEGAPULS 31 the suitable mounting accessories for ceiling or wall mounting is available.



Mounting strap with adjustable sensor holder for sensors with lateral cable outlet - Wall mounting (example)

You can find further information on the mounting accessory on our homepage.

Information

You can find further information on the VEGA product line on our homepage.

In the download section on our homepage you'll find operating instructions, product information, brochures, approval documents, instrument drawings and much, much more.

Software accessories such as the current device software and the appropriate operating software are also available there.

Instrument selection

On our homepage under "Products" you can select the suitable measuring principle and instrument for your application.

You can find detailed information on the instrument versions at www.vega.com and "Products".

SECTION 8.6

HYPOCHLORITE DOSING SYSTEM

Liquid Feed Systems

Encore[®] 700 Diaphragm Metering Pump

The Encore[®] 700 diaphragm metering pump combines the robustness of hydraulic diaphragm pumps with the unparalleled economy, simplicity, and serviceability of a mechanical pump. The Encore[®] 700 pump is engineered to handle industrial and municipal metering applications in water and wastewater treatment, swimming pools, food processing, chemical processing, brewing and distillation, and agriculture.

Handles capacities to 2500 l/h (660 US GPH), back pressures to 12 bar (175 psi)

Non-loss-motion (amplitude modulation) variable eccentric stroke adjust mechanism renders efficiency, longevity, and reliability, as well as a smooth discharge pattern

Flexibility of direct coupled or pulley driven, for an additional 4:1 turndown on stroke frequency with a standard induction motor

Precision-engineered liquid ends meter mild solutions, aggressive chemicals, high-viscosity polymers, and slurries with greater efficiency than conventional liquid ends

Clear PVC cartridge valves for fast service with no piping disturbances and built-in visual indication of operation

Premium composite diaphragm design ensures high metering accuracy, even at varying discharge pressures

Key Benefits

Efficient, reliable and smooth discharge pattern through the use of a variable non-loss-motion eccentric stroke adjustment

High metering accuracy even at varying discharge pressures

Choice of direct coupled or pulley driven, for an additional 4:1 turndown on stroke frequency

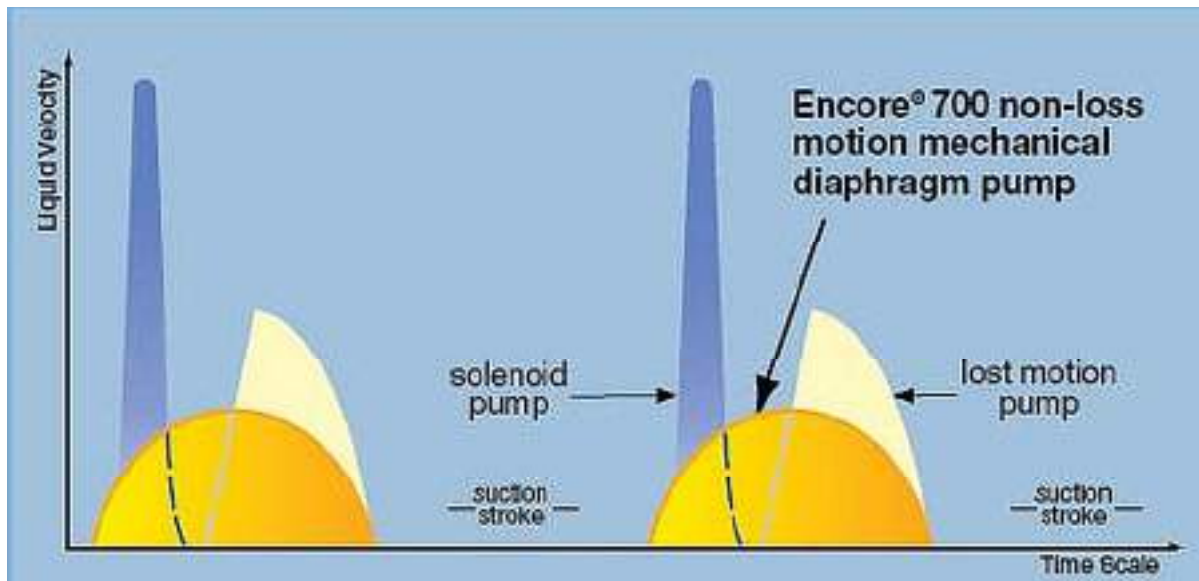
Fast and easy service of valve assemblies without disturbing the suction and discharge piping

Visual indication of operation with standard clear PVC valves housing

Choice of configurations:- simplex, duplex and double simplex



Technical Data



This graph shows the velocity profiles for each pump type. For any given output, the areas circumscribed by each curve are identical. Note the difference in non-loss-motion designs.

Metering Pump manufacturers generally use one of three diaphragm action methods.

Solenoid Pumps

The most simple and economical type of pump, these provide a pulsed flow with huge pressure spikes, considerable noise and wear.

Loss Motion Pumps

These motor-driven pumps are higher in capacity than solenoid pumps, but also give rapid acceleration to the liquid at rest in the pump head due to non-continuous diaphragm motion.

Non-Loss-Motion Pumps

Unlike solenoid or loss of motion pumps, the Encore® 700 diaphragm metering pump is driven by a rotating crankshaft, where the eccentricity can be smoothly adjusted during operation. There are no return springs, and the diaphragm moves with simple harmonic motion. The fluid velocity profile is sinusoidal at all stroke lengths; adjusting stroke length simply alters the amplitude of the sine wave. This design provides reliability and longevity, and pump valves operate with far greater efficiency and minimal system vibration.

Features

1. Short suction and discharge ports minimize friction losses and cavitation, improving hydraulic characteristics and providing far more efficient fluid metering than conventional liquid end designs.
2. Our premium composite diaphragm is manufactured to stringent specifications to ensure long life even with the most demanding applications. The design incorporates Teflon® facing, for the highest degree of chemical resistance, and nylon reinforcements, all bonded to a pre-formed elastomeric support. We've added convolutions for unconstrained rolling action, a steel backing plate to assure volumetric accuracy even at varying discharge pressures, and an O-ring groove in the head's diaphragm cavity for complete sealing.
3. A secondary diaphragm seal completely separates the pump head from the drive unit. This double diaphragm isolating design eliminates the risk of cross-contaminating gearbox lubricant and process fluid.

4. High precision guided, ball and seat, clear PVC cartridge valves are available to provide built-in sight flow indication and fast, foolproof service. The patented design includes wide flow paths and four-point guides to control ball rise and assure proper seating. The valve housing is compression-sealed to the pump head and pipe connectors by O-rings and is easily removed for service or replacement without disturbing the external piping.

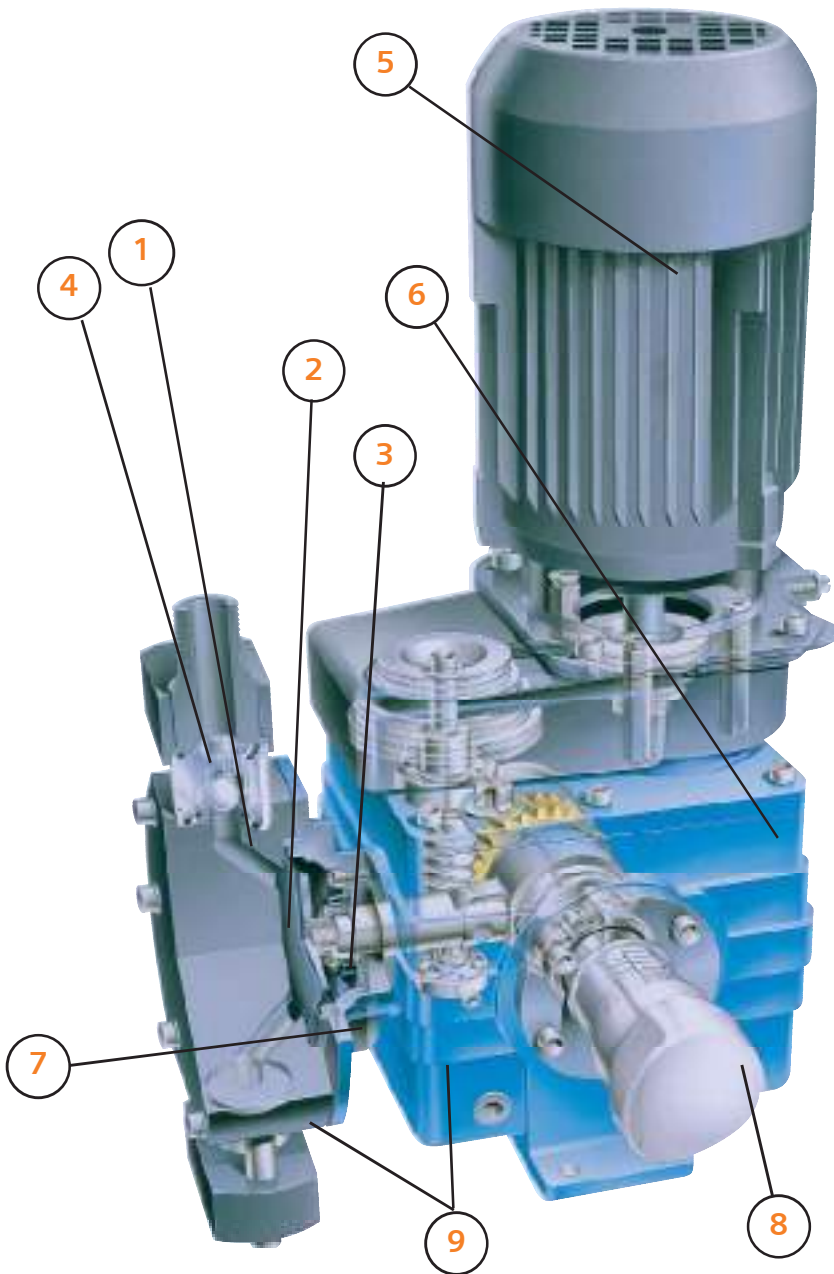
5. Available with standard induction, variable speed, or inverter duty motors for wider operating ranges and automatic process control.

6. This patented robust mechanical assembly features liberal use of heavy-duty parts, including an epoxy-painted cast iron gearbox for superior corrosion resistance, stainless steel fasteners, load-absorbing tapered roller bearings, robust gears, and steel and nodular iron drive components.

7. An optional diaphragm leak detection system senses the early stages of diaphragm failure. The system consists of a solid-state, electro-optic sensor that mounts to the liquid end and a control box. This box, which can be mounted at the pump, or up to 30m (100ft) away, can monitor two liquid ends. LED's and a relay provide both local and remote indication of failure.

8. Obtain precise and highly repeatable feed rate settings with a 10-turn, micrometer-type stroke length adjuster. A percent scale and vernier indicate stroke length in 0.25% increments. Feed rate is infinitely adjustable from 0 to 100%. Optional automatic capacity control via stroke length is also available.

9. Patented drive and control mechanism with precision liquid end design offer superior metering and process control performance.



The Encore® 700 diaphragm metering pump is available in two compact drive arrangements: direct drive or pulley drive for an additional 4:1 range ability on stroke frequency with a standard induction motor. When the pulley drive arrangement is combined with a DC variable speed motor, total operating turndown can be as high as 800:1.

Configurations

Simplex Pump

Offers single head design on single gear box with stroke control.

Duplex Pump

Offers two identical sized heads on single gear box with common stroke length control, and a direct drive arrangement

Double Simplex

Offers two heads with two gear boxes each with independent stroke length control, and a common motor.



Simplex



Double Simplex

Controls

The Encore® 700 diaphragm metering pump can be controlled by varying the stroke length or stroke frequency. The following control schemes are available:

Manual or Automatic Control

Start-Stop Control where the motor is wired into the circuit of a transfer pump, switch, timer, or controller.
Flow Proportional Control from a single process variable
Residual, Compound Loop, or Set point Control using one or two process variables

Manual Stroke Length Control

A 10-turn micrometer gives continuous feed rate adjustment over a 10:1 range. A percent scale and vernier indicate stroke length setting to 1 part in 400. Each revolution of the knob changes feed rate by 10%. Stroke length is infinitely adjustable from 0 to 100%. The stroke control mechanism provides positive positioning and locking of the stroke mechanism, eliminating the need for external manual locks.

Automatic Stroke Length Control

For automatic capacity control via stroke length, our NEMA® 4X (IP66) actuator is used in conjunction with either of two process-variable controllers or direct mA input. The compact, field-retrofitable actuator easily installs on the pump and features local manual override and a window for clear indication of stroke length.



Duplex

Single Function Controller - Signal Control (SFC-SC)

The economical SFC-SC gives automatic process control in response to one process variable, typically flow rate. Housed in a NEMA® 4X (IP66) enclosure, the SFC-SC features an alphanumeric LCD display with nine-button keypad and menu-driven operator prompts for simple operation, setup, and calibration. Input flow scaling and output dosage adjustment allow independent scaling from 10 to 400%.



Single Function Controller - Process Control (SFC-PC)

The SFC-PC is a full-feature setpoint controller. It provides automatic process control in response to two process inputs, typically flow rate and chlorine residual. The SFC-PC can operate in any of four different control modes, including residual feedback, compound loop, dual signal feed forward (for dechlorination), and flow proportional. Housed in a NEMA® 4X (IP66) enclosure, the SFC-PC features a large alphanumeric display bar graph to indicate flow input or actuator position, a nine-button keypad, and menu-driven operator prompts for simple operation, setup, and calibration.



Direct mA Input

For remote or automatic control, the optional stroke length controller accepts a direct 4-20 mA control signal, typically from a SCADA or centralized control system. Stroke length is linear and proportional to the mA input. See WT.040.050.000.IE.PS for more details.

Variable Speed or Variable Frequency Control Precise and accurate feed rate control via stroke speed control of a DC motor or a variable frequency drive for inverter duty motor is available. Stroke frequency can be regulated manually by potentiometer setting, or automatically via a 4-20 mA process variable input signal (optional). Closed loop speed regulation provides feed rate control accurate to 1% of full scale. Dosing or scaling of a process variable can be accomplished by means of an SFC-SC used in conjunction with a variable speed or variable frequency drive.

For more complex control, an SFC-PC can be used to provide setpoint control in response to two process variables, such as plant flow and chlorine residual.

Technical Information

Accuracy

Repeatable metering accuracy is $\pm 2\%$ of full scale, at constant hydraulic conditions, over a 10:1 operating range.

Liquid Ends

Diaphragm sizes are 35mm (1-3/8"), 50mm (2"), 75mm (3"), 100mm (4"), 125mm (5"), and 165mm (6-1/2").

Feed Rate Adjustment

Feed rate is infinitely adjustable from 0 through 100%. A percent scale and vernier indicate stroke length setting in 0.25% increments. Each revolution of the knob changes stroke length by 10%.

Operating Range

Direct Drive Arrangement:

Stroke length is adjustable over a 10:1 range; stroke frequency is adjustable over a 20:1 range (using an optional variable speed drive and DC motor) and 10:1 (using an optional variable frequency drive and inverter duty motor). Total combined maximum operating turndown can be as high as 200:1. Above 100:1 continuous turndown, total available operating range should be evaluated against specific chemicals being metered.

Pulley Drive Arrangement:

Stroke length is adjustable over a 10:1 range; stroke frequency is adjustable over an 80:1 range (using an optional variable speed drive), and 40:1 range (using an optional variable frequency drive). Total combined maximum operating turndown can be as high as 800:1. Above 100:1 continuous turndown, total available operating range should be evaluated against specific chemicals being metered.

Speed of Response

Automatic stroke length control response time is 100 seconds from 0 to 100%.

Variable speed control response time is under three seconds from 0 to 100%.

Suction Lift

The pump will self-prime with a 3m (10ft) of water suction lift (wetted valves, zero back pressure, full stroke and speed, water-like solutions). Once primed, the pump will operate with a 3m (10ft) suction lift. Flooded suction is recommended.

Weight and Shipping Weight

Single simplex 50 kg; 58 kg (110 lb; 127 lb); double simplex 73kg; 84kg (160 lb; 184 lb) duplex 64 kg (140 lb). For arrangements with automatic stroke length control add 5.5 kg; 7.3 kg (12 lb; 16 lb).

Single Head Capacities and Discharge Pressures															
Diaphragm Size mm (inches)	50 Hz Stroke Frequency SPM	1450 RPM		60 Hz Stroke Frequency SPM	1750 RPM		Pulley Steps**	Maximum Discharge Pressure bar (PSI)			Connections BSP (NPT) [tubing]				
		Capacity*			Capacity*			Motor Kilowatts (Horsepower) @ 1750 rpm {Variable speed}							
		l/h	USGPH		l/h	USGPH		.19(1/4)	.37 (1/2)	.55(3/4)					
35 (1 3/8")	30	3.9	1	36	4.7	1.3	1	.19(1/4)	.37 (1/2)	.55(3/4)	R1/2(1/2") [1/4" IDx3/8" OD]				
	60	7.9	2.1	72	9.5	2.6									
	120	15.8	4.2	144	18.9	5									
	144	18.9	5												
50 (2")	30	20.5	5.4	36	24.6	6.5		1	.37(1/2)	.56(3/4)		.75 (1)	R1/2(1/2") [1/4" IDx3/8" OD]		
	60	41	10.8	72	49.2	13									
	120	82	21.7	144	98.4	26									
	144	98.4	26												
75 (3")	30	39.5	10.4	36	47	12.5			1	10(150)		10(150)		10(150)	R1/2(1/2")
	60	79	21	72	95	25									
	120	158	41	144	190	50									
	144	190	50.2												
100 (4")	30	60.7	16	36	72.9	19.3	1			9(130)	9(130)	9(130)		R3/4(3/4")	
	60	121.4	32.1	72	145.7	38.6									
	120	242.9	64.2	144	291.4	77.2									
	144	291.4	77												
125 (5")	30	141.9	37.5	36	170.3	45		1		5(75)	5(75)	5(75)	R1(1")		
	60	283.9	75	72	340.7	90									
	120	567.8	150	144	681.4	180									
	144	681.3	180												
165 (6 1/2")	30	260	68.7	36	312.3	82.5			1	3(45)	3(45)	3(45)			R 1 1/2 (1 1/2")
	60	520	137.4	72	624.6	165									
	120	1040	275	144	1250	330									
	144	1250	330												

* Reflects simplex capacities, double-simplex arrangements must be configured with the same stroke frequency on both liquid ends.

** For pulley drive arrangements capacities listed are for pulley step 1. Capacities for steps 2, 3 and 4 are 75%, 50% and 25% respectively.

Note: Minimum motor horsepower for 6-1/2" head is 1/2 Induction (1 variable speed)

Temperature Limits

With PVC liquid end: ambient temperatures from 2-52°C (35-125°F), process fluid temperatures up to 52°C (125°F).

With Kynar® and Stainless Steel liquid end: process fluid temperatures up to 82°C (180°F).

Electrical Requirements

Standard induction motor arrangement is 1450 rpm (50 Hz)/1725 rpm (60Hz), single phase, TEFC, UL® Listed, CSA® Approved. Motors with other electrical characteristics are available as an option. Diaphragm leak detector requires 115/230 Volts. Relay rating 5 Amps @ 250 Volts, 30 VDC. NEMA® 4X (IP66) enclosure. Variable speed drive control unit requires 115/230 Volts, 50/60 Hz, single phase, 200 mA (115V, 100 mA (230V)). Variable Frequency Drive requires 230 or 460 Volt, 3-phase power. Automatic stroke length actuator - three alarm contacts (high, low, actuator disengaged) N.O., rated 5 Amps @ 250 Volts.

Materials of Construction

Gear box and liquid end adapter: epoxy painted, cast iron

Actuator enclosure: epoxy painted, cast aluminum

Pump head: PVC, Kynar®, or Stainless Steel

Suction and discharge valve housings: clear PVC, grey PVC, Kynar®, or stainless steel

Valve balls: 316 stainless, TFE, ceramic, glass, and polyurethane (for slurry service)

Valve seals: Hypalon®, Viton®, and EPDM

Valve seats: PVC, Kynar®, 316 SS, ceramic (for slurry service)

Diaphragm: TFE-faced, fabric reinforced, elastomer backed, with a steel backing plate

Mounting base: A mounting base is available with single simplex pumps and standard with double simplex and duplex pumps. The pump is UV resistant

Polymer and Slurry Handling Capabilities

Polymer solutions at viscosities up to 5,000 cPs at 144 spm. Viscosities measured with a Brookfield® Viscometer with No. 2 spindle at 3 rpm

Hydrated lime slurries up to 455kg/m³ (3.8 lbs per US gallon) of water; activated carbon slurries up to 131kg/m³ (1.1 lbs per US gallon of water); diatomaceous earth slurries up to 204kg/m³ (1.7 lbs per US gallon) of water.

Chemical Metering Integrated Skid System

To simplify liquid feed system design, installation, and startup, integrated pump skid packages are available from stock components. All systems are laid out on an easily accessible and open frame design with a small foot print. Skid systems also include standard metering pump control panels that are pre-tested and fully integrated with the liquid feed system. They are pre-piped and include many installation accessories, such as back pressure and relief valves, pulsation dampeners, and calibration chambers. Multiple sizes provide a unit tailored to meet a wide range of flows and pressures.



V1000-4X

1/8 to 25 HP

NEMA 4X Current Vector Microdrive



Washdown - Dust Tight!

The V1000-4X is a version of the standard V1000 in an integral enclosure that meets NEMA type 4X/12 indoor use requirements, UL type 4X/12 standards, and the IP66 rating of IEC 60529. This enclosure provides the protection required in tough washdown or dust-tight environments, common in Food and Beverage Processing, Packaging, Metal Machining, Woodworking, Pumping, Refrigeration, and Printing. The enclosure is epoxy-coated to protect against the harmful effects of sanitizing chemicals commonly used in food industries.

200-240VAC Single Phase 50/60 Hz							
Model Number CIMR-VU <input type="checkbox"/> GAA	BA0001	BA0002	BA0003	BA0006	BA0010	BA0012	
Motor Capacity ND	1/4	1/4	3/4	1	3	3	
(HP) HD	1/8	1/4	1/2	1	2	3	
Output Current A ND	1.2	1.9	3.3	6.0	9.6	12.0	
(rms) HD	0.8	1.6	3.0	5.0	8.0	11.0	

200-240VAC Three Phase 50/60 Hz											
Model Number CIMR-VU <input type="checkbox"/> GAA	2A0001	2A0002	2A0004	2A0006	2A0010	2A0012	2A0020	2A0030	2A0040	2A0056	2A0069
Motor Capacity ND	1/4	1/4	3/4	1	3	3	5	10	10	20	25
(HP) HD	1/8	1/4	1/2	1	2	3	5	7.5	10	15	20
Output Current A ND	1.2	1.9	3.5	6.0	9.6	12.0	19.6	30	40	56	69
(rms) HD	0.8	1.6	3.0	5.0	8.0	11.0	17.5	25	33	47	60

380-480VAC Three Phase 50/60 Hz											
Model Number CIMR-VU <input type="checkbox"/> GAA	4A0001	4A0002	4A0004	4A0005	4A0007	4A0009	4A0011	4A0018	4A0023	4A0031	4A0038
Motor Capacity ND	1/2	1	2	3	4	5	7.5	10	15	20	25
(HP) HD	1/2	3/4	2	3	3	4	5	10	10	15	20
Output Current A ND	1.2	2.1	4.1	5.4	6.9	8.8	11.1	17.5	23	31	38
(rms) HD	1.2	1.8	3.4	4.8	5.5	7.2	9.2	14.8	18	24	31

Options*

- 120 VAC Interface
- Network Communications: Profibus-DP, DeviceNet, EtherNet/IP, Modbus TCP/IP

* Although the V1000-4X is compatible with most V1000 options, those options may not be waterproof. These options require special consideration regarding proper wiring techniques, including cable glands.

Features

- NEMA Type 4X/IP66 enclosure
- Corrosion-resistant
- Current vector control, open loop
- RoHS compliance
- On-line tuning
- Induction motor (IM) or permanent magnet synchronous motor (PM) operation
- Function Block Diagram (FBD) programming via DriveWorksEZ™
- Starting torque of 200% at 0.5 Hz
- Removable terminal block with parameter backup function
- “One-touch” copy function with verify
- Super-fast 2 ms scan cycle with dual CPU
- EN954-1 Safety Cat. 3, Stop Cat. 0
- Increased vibration resistance, from 20 Hz to 50 Hz (0.65G)
- 1 in 10,000 failure rate
- Swing PWM function to decrease noise at low carrier frequencies
- Pre-maintenance function
- Modbus communication
- MTBF: 28 years
- Short Circuit Current Rating (SCCR): 30kA rms symmetrical
- Common programming with all other Yaskawa drives



V1000-4X

1/8 to 25 HP

Specifications

Item	Specification
Overload Capacity	150% Overload for 60 sec. (Heavy Duty)
	120% Overload for 60 sec. (Normal Duty)
Output Frequency	0-400 Hz (higher frequencies available with custom software)
Control Methods	Open Loop Current Vector Control, V/f Control, PM Open Loop Vector Control
	Simple closed loop speed control available
Protective Design	NEMA Type 4X/IP66 (dust/water-proof)
Braking Transistor	Standard in all models
Braking Torque	20 - 40% increase with intelligent high-slip braking function
KEB Function	Uses mechanical energy to continue operation during momentary power failure, standard
Overvoltage Function	Prevention function for die-cushion in a hydraulic mechanical press and other applications
Maintenance	Elapsed timer assists in preventative maintenance for cooling fan, capacitors, and transistors
	Easily replaceable cooling fan
Global Certification	CE, UL, cUL, RoHS, TUV
Available I/O	(7) multi-function digital inputs
	(1) hardwire baseblock
	(2) multi-function analog inputs
	(1) multi-function pulse input
	(1) multi-function relay output
	(2) multi-function photo-coupler outputs
	(1) multi-function 0-10 Vdc analog output
	(1) multi-function pulse output
Network Communication	Standard: RS-422/485 MODBUS 115 kbps
	Optional: DeviceNet, EtherNet/IP, Profibus-DP, Modbus TCP/IP
Keypad Operator	Standard LED 5 digit display
	Optional multi-lingual, full-text remote LCD

Major Applications



Food & Beverage



Packaging



Pump



Conveyor

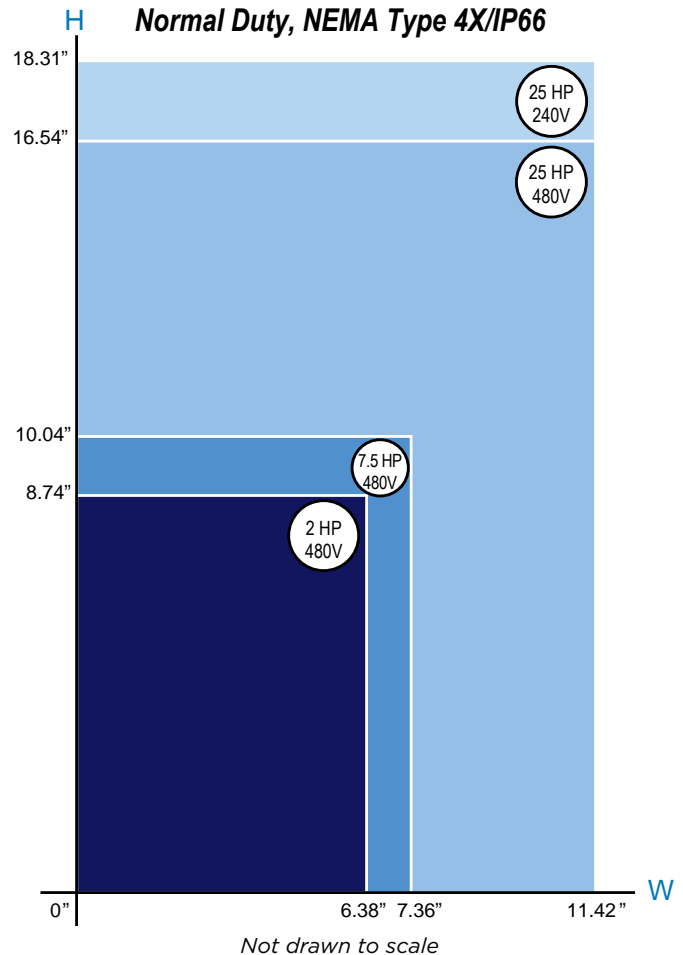


Industrial Washer



Refrigeration

Size Comparison





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PVC CALIBRATION COLUMNS



Griffco calibration cylinders are designed to enhance the performance of chemical feed systems by providing a verification of the flow rate of the chemical feed pump. Robust construction of clear PVC with an easy to read graduation in mL and gph. Available in three models: EZ-Clean, Vented, and Open Top; and in 15 sizes: 100 mL through 40,000 mL as detailed here.

Features:

- High Reliability / Low Cost
- High Contrast Graduation Markings
- Clear Easy-View Tube
- Robust Schedule 40 Pipe Construction
- Direct GPH Readout
- Sealed Top with Overflow Connection
- Optional EZ-Clean Model
- Optional Open Top with Dust Cap

Operation:

Griffco calibration cylinders are installed in the suction line to the chemical metering pump. Two isolating valves, (not supplied) must be installed in the suction line as per the drawing below. The top of the cylinder should be vented back to the storage tank or to drain.

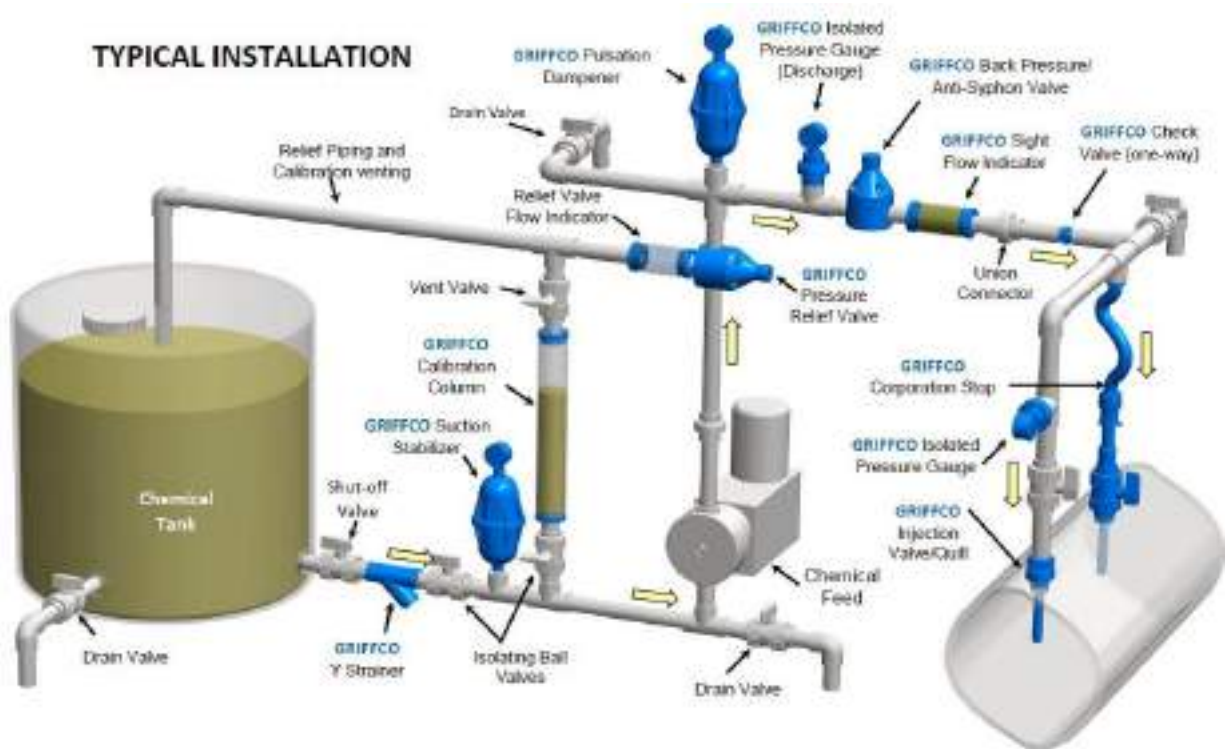
Fill the cylinder to the top mark then close the valve from the chemical tank. Switch on the chemical feed pump and draw down the chemical in the cylinder for 30 seconds. Switch the pump off. The reading on the right side of the cylinder is a direct readout of USgph.

Alternatively, observe the volume withdrawn on the mL scale. To convert to LPH or GPH use this formula:

$$\text{LPH} = 3.6 \times [\text{mL}] \div \text{Time (sec)}$$

$$\text{GPH} = 0.951 \times [\text{mL}] \div \text{Time (sec)}$$

Note: Max. cylinder pressure is 15 psi.



Description of models:



Sealed:

Top is glued to cylinder and contains a vent or overflow connection. (FNPT). Used in applications where there is a positive suction head and a permanent installation is desired.



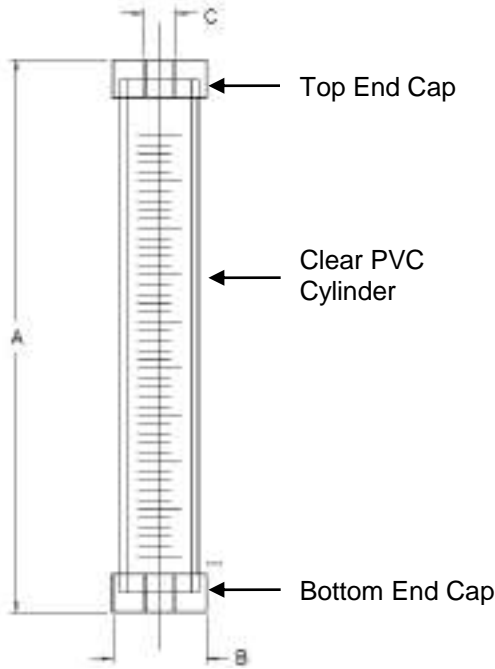
Loose Cap: (Avail. up to 20,000 mL)

Top is loose and does not have a connection in the top. Dust cover only. Used in applications where there is no positive suction head and the cylinder must be filled from the top.



EZ-Clean: (Avail. 100 – 7000 mL only)

Top is sealed with an O-ring and has a vent connection, but removable for easy cleaning. Used in applications where frequent cleaning is required such as polymer, alum, ferric chloride or chlorine.



Capacity (mL) \diamond	Max Flow (USgph)	Max Flow (lph)	Scale (mL)	Scale (gph)	A (in)	B (in)	C (in)
100	3.17	12	1	.1	11	1.5	1/2
200	6.34	24	1	.1	19	1.5	1/2
300	9.51	36	5	.2	13	2.2	1/2
500	15.85	60	5	.2	13	2.5	3/4
1,000	31.70	120	5	.2	22	2.5	3/4
2,000	63.40	240	10	1	20	3.7	1
3,000	95.10	360	10	1	17	4.9	1 1/2
4,000	126.8	480	10	1	37	3.7	1
5,000	158.5	600	10	1	28	4.9	1 1/2
7,000	221.9	840	10	1	38	4.9	1 1/2
10,000	317.0	1200	100	5	25	6.95	2
15,000	475.5	1800	100	5	36	6.95	2
20,000	634.0	2400	100	5	47	6.95	2
30,000	952.0	3600	200	10	65*	9.5*	4
40,000	1,268.0	4800	200	10	77.5*	9.5*	4

▲ Max Flow and gph scale are based on 30 second drawdown

* Reference only

◇ For 60 sec draw down, double capacity in mL or flow size

Codes for Ordering PVC Calibration Columns:

CC

1 2 3 4

1 = Size

0100 – 100 mL
 0200 – 200 mL
 0300 – 300 mL
 0500 – 500 mL
 1000 – 1000 mL
 2000 – 2000 mL
 3000 – 3000 mL
4000 – 4000 mL
 5000 – 5000 mL
 7000 – 7000 mL
 10000 – 10000 mL
 15000 – 15000 mL
 20000 – 20000 mL
 30000 – 30000 mL
 40000 – 40000 mL

2 = Top End Cap Style (Top Cap Only)

S – Sealed
 L – Loose (up to 20000mL)
 EZ – EZ Clean (up to 7000mL)

3 = Connections

Blank – Threaded
 S – Socket
 F – Flanged
 U – Union

4 = O-ring Material (Union & EZ end cap orings)

Blank – FKM (Viton®)
 E – EPDM

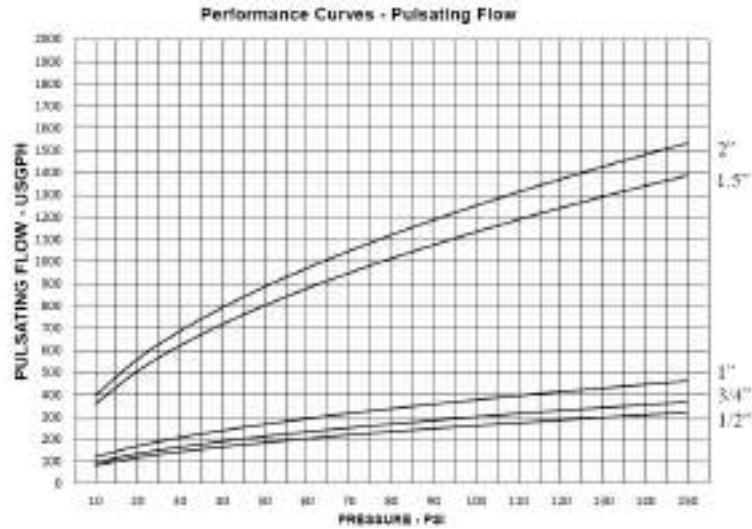
Available O-ring Options:

PTFE Encapsulated
 or FFKM are available
 upon request

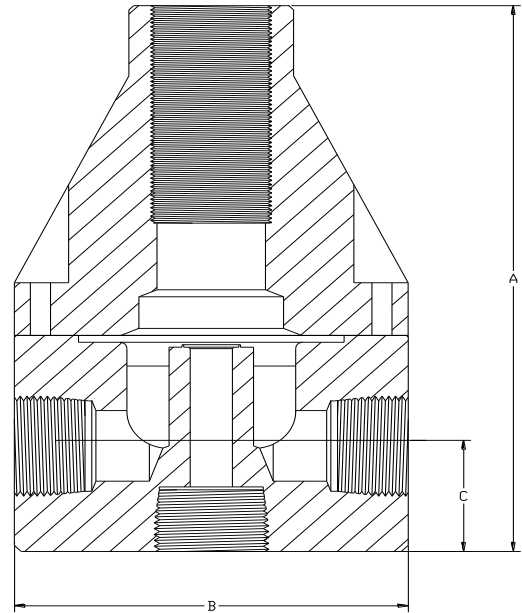
Technical Data:

Model PRG Sizes: PRG, PRG2 (2 port)		1/2", 3/4", 1", 1 1/2", 2", 3", 4"			
Connections:		NPT Socket, Union, & Flange			
Pressure Adjustment		Standard: 10 - 150 psi, Optional: 0 - 50 psi, 10 - 250 psi, 50 - 350 psi *Note: Size 1 1/2" and larger PRG valves 10 - 250 psi Max range ONLY.			
Flow Rates @ 150 psi		Shipping Weight: lbs			
Size	Pulsating	Continuous	Plastic	Metal / Plastic Top	Metal / Metal Top
1/2"	320 USgph	16.7 USgpm	3.0	5.5	6.5
3/4"	367 USgph	19.2 USgpm	3.0	5.5	7.0
1"	462 USgph	24.2 USgpm	3.5	6.0	7.0
1 1/2" (2 port only)	1388 USgph	72.7 USgpm	7.0	14.0	23.0
2"	1533 USgph	80.3 USgpm	9.0	20.0	30.0
3"	5157 USgph	270 USgpm	28.0		
4"	5157 USgph	270 USgpm	30.0		
Max Temperature: (°F)		PVC: 140° CPVC & PP: 195°; PTFE, PVDF, & Metal: 300°, (Peak 390°)			
Max Operating Pressure (psi) @ 70 deg. F		Plastic/Noryl: 375 psi		Metal/Metal: 2000 psi	
Materials of Construction:					
Diaphragm		PTFE / EPDM, Optional: Viton, Hypalon, & PTFE / Viton			
Valve Top		Standard: Noryl (1/2" - 2") PVC (3" & 4") Optional: 316 SS L			
Valve Body		PVC, CPVC, PP, PTFE, PVDF, Halar, 316 SS L, A 20, Hast. C			

Performance Curves: (3" & 4" curves on request)



Dimensions:



Product Codes For Ordering Pressure Relief Valves:

PRG, PRG2 (2 port) or

1 2 3 4

1 = Size 2 = Material 3 = Spring Opt 4 = Options

050 - 1/2" P - PVC Blank - 10-150 psi Blank - NPT Threaded
 075 - 3/4" CP - CPVC 1 - 0 - 50 psi V - Viton Diaphragm
 100 - 1" PP - Polypro 2 - 10 - 250 psi TV - PTFE/Viton Diaph.
 155 - 1 1/2" T - PTFE For 50-350 psi spring use option F - Flange Connection
 200 - 2" K - PVDF code "MSS" U - Union Connection
 300 - 3" H - Halar OSS - 316 SS Top
 400 - 4" S - 316 SS MSS - 50 - 350 psi
 A - Alloy 20 AR - Priming Valve
 C - Hastelloy C 90 - 90° Configuration

DIMENSIONS: PRG - Series

All Materials (See Note below for 4" PVC & CPVC)

Size	A (in.)	B (in.)	C (in.)	Orifice (in.)
1/2"	5.560	3.500	1.125	0.375
3/4"	5.560	3.500	1.125	0.375
1"	5.860	3.500	1.250	0.437
1.5"	8.350	4.90	1.825	0.750
2"	8.900	4.90	2.150	0.875
3" *	11.25	15.0 *	3.0	1.500
4" **	11.25	15.0 **	3.0	1.500

Note: For Optional 2-Port pressure relief valve put "2" after PRG
 Note: Option MSS only for use with 316SS, A20 & Hast C. valves
 Note: 1.5" and larger are 2 port only, there is no bottom port.

* Note 3"&4" are flanged only. **Dim B on 4" PVC & CPVC is 17"



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G-SERIES BACK PRESSURE VALVES

Features:

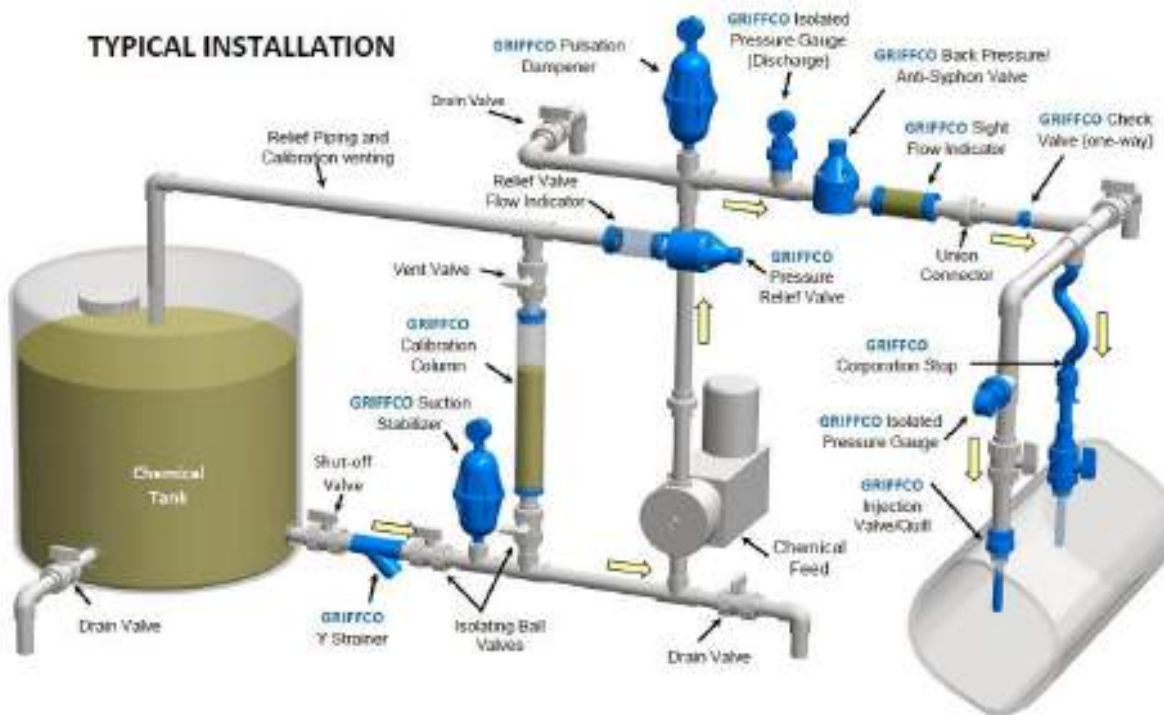
- Molded Noryl Top
- High Reliability/Low Cost
- Molded PTFE/EPDM Diaphragm
- Adjustable Relief Settings
- Optional Pressure Rated Valves
- Anti-Siphon Function
- Robust, Machined Construction
- Tamper Resistant Adjustment Screw
- Wide Range of Materials

Operation:

Griffco diaphragm back pressure valves apply positive discharge pressure to a metering pump system to prevent siphoning and eliminate varying dosage rates caused by fluctuating downstream pressure. The diaphragm is held against the valve seat by an internal spring. When the preset pressure is exceeded, the diaphragm is forced up and chemical flows through the valve to the injection point. The valves are preset for 50 psi, however they are field adjustable from 10 - 150 psi via the adjustment screw. Installation should be as close to the injection point as possible to prevent chemical line drainage and it is most important that all chemical system equipment such as pulsation dampeners and pressure gauges are between the pump and back pressure valve.

Griffco G-Series diaphragm back pressure valves are designed to enhance the performance of chemical feed systems by applying a continuous back pressure to the chemical feed pump, while also acting as an anti-siphon valve. Robust construction ensures reliability in the rigorous service of municipal and industrial applications. Wetted materials include: **PVC, CPVC, PP, PVDF, PTFE, Halar, 316 SS, A20 and Hast. C.** Available sizes: 1/2" - 4".

TYPICAL INSTALLATION



CALL 1 - 800 - GRIFFCO

Bulletin # BPG1003-2017-01

Line Strainer Type 306

Standard Features

- Condition of screens clearly visible from outside
- Screens easily removed for cleaning

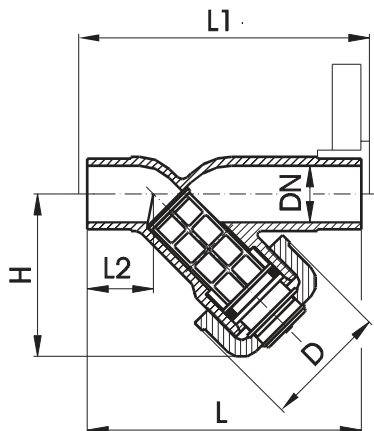


General

The Line Strainer Type 306 is suitable for protecting valves, pumps, and other equipment against solid particles. It is available in transparent PVC in sizes ½" through 3".

Installation position is dependent on flow direction. Screens can be removed and cleaned without removing strainer from line.

Dimensions Line Strainer Type 306



Inch	DN [inch]	PSI	kg	D [inch]	L [inch]	L1 [inch]	L2 [inch]	H [inch]
½	0.59	150	0.243	1.69	5.63	5.87	1.46	2.56
¾	0.79	150	0.375	1.85	6.30	6.54	1.77	2.99
1	0.98	150	0.562	2.20	6.85	7.09	1.85	3.54
1¼	1.26	150	0.902	2.52	7.40	7.64	2.09	4.09
1½	1.57	150	1.400	3.23	8.07	8.31	2.13	4.88
2	1.97	150	2.205	3.74	8.86	9.09	2.48	5.83
3	3.15	150	6.173	4.72	12.24	12.64	3.54	8.07

Strainer Type 306

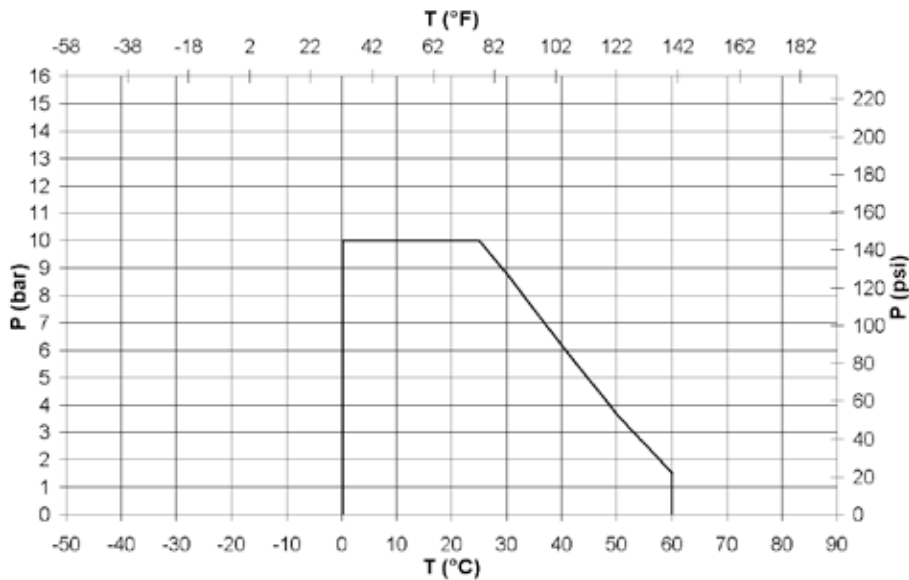
PVC/PP Screen hole diameter 0.5 to 2.2 mm

Stainless steel screen mesh size 0.5 mm

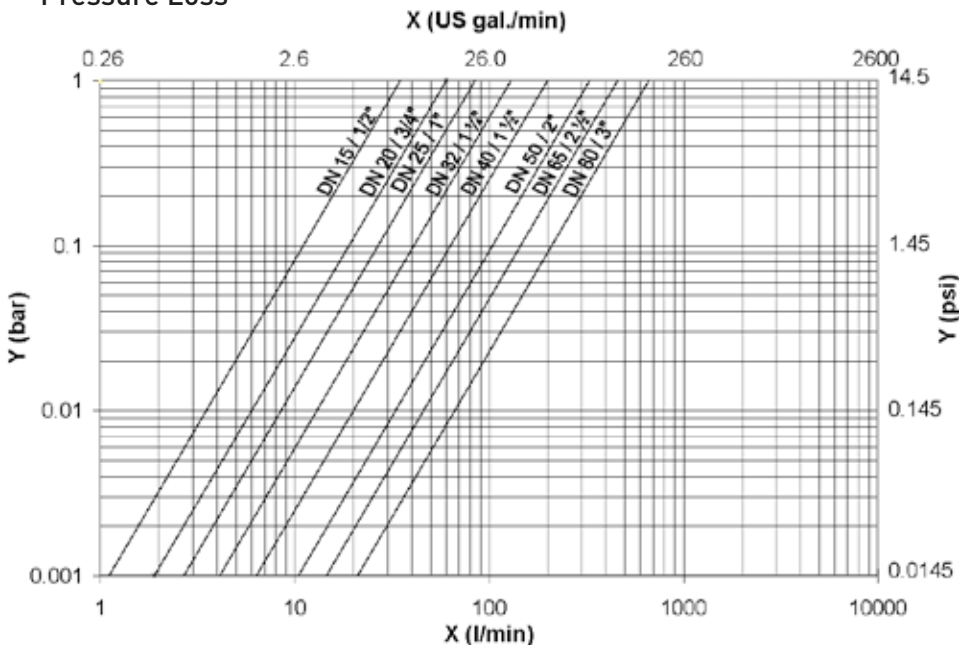
Inch	d mm	kv 100 l/min (Δp = 1 bar)	Cv 100 US gal/min (Δp = 1 psi)
1/2	20	35	2.5
3/4	25	65	4.6
1	32	90	6.3
1 1/4	40	155	10.9
1 1/2	50	225	15.8
2	63	370	25.9
2 1/2	75	575	40.3
3	90	955	66.9

Inch	d mm	kv 100 l/min (Δp = 1 bar)	Cv 100 US gal/min (Δp = 1 psi)
1/2	20	35	2.5
3/4	25	60	4.2
1	32	85	6.0
1 1/4	40	130	9.1
1 1/2	50	200	14.0
2	63	330	23.1
2 1/2	75	460	32.2
3	90	665	46.6

Pressure-Temperature



Pressure Loss



Materials: PVC, CPVC, Natural Polypropylene, & PVDF

Marquest Scientific's complete line of TUFF GUARD gauge and instrument isolators are engineered to provide total isolation of all instruments from corrosive and ultra pure fluids while offering a design with the most rugged and complete features in the industry.

Features & Benefits

- Provides a compatible, protective barrier between process fluids and instruments
- Adds system reliability by eliminating instrument failures
- SS reinforcement of the instrument connection to prevent fracturing associated with metal to plastic threads. Integrally molded into port
- Integral wrench provisions for field service
- Diaphragms in Modified PTFE, Viton®, EPDM, and Composite PTFE/FKM for each application
- Displacement capacity for up to 4" diameter gauges and large fill volume sensors
- Self-venting, 1/4" & 1/2" female NPT instrument connections with Viton® O-ring instrument seal

Specifications

Instrument Connection: Venting 1/4" & 1/2" Female NPT

Process Connections: 1/4" & 1/2" Fem NPT, Soc "Slip"

Materials of Construction:

Housing: PVC, CPVC, Polypropylene, & PVDF

Diaphragm: Modified PTFE, Viton®, EPDM, & Composite PTFE/FKM

Working Pressure: 0 - 250 psi at 70 Deg Fahrenheit

Codes & Standards: ARRA Section 1605 "Buy American" Compliant. ASME A112.18.1M

SERIES TG-25XXX-CPV

NO GAUGE INSTALLED
1/4" Vent & 1/2" Fem NPT Inlet
CPVC Body



SERIES TG-25S-PVC

2.5" ECONOMY GAUGE
1/2" Fem NPT Inlet
PVC Body



SERIES TG-25SB-PPR

2.5" STAINLESS/BRASS GAUGE
1/2" Fem NPT Inlet
Polypropylene Body



SERIES TG-25SS-PVD

2.5" ALL STAINLESS GAUGE
1/2" Fem NPT Inlet
PVDF Body



(1) Please see backside of data sheet for ordering info, including configuration & material options.

Markets / Applications

- Wastewater Treatment
- Semiconductor Manufacturing
- Chemical Plants
- Chemical Feed Systems
- Food & Beverage
- Desalination Plants
- Wet Processing
- Chemical Odor Control
- PCB Manufacturing
- Pharmaceutical Processing
- Alternative Fuel



Where Quality Meets Service & Value™



MARQUEST SCIENTIFIC
Fluid Handling Products



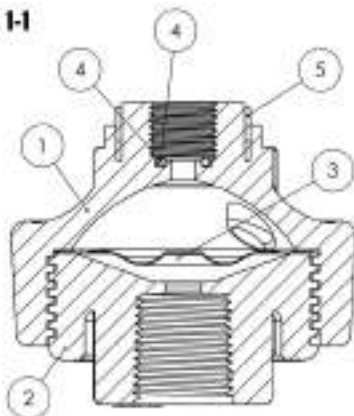
Gauge Guards

TUFF GUARD™

Series TG

Dimensional Data / Parts List

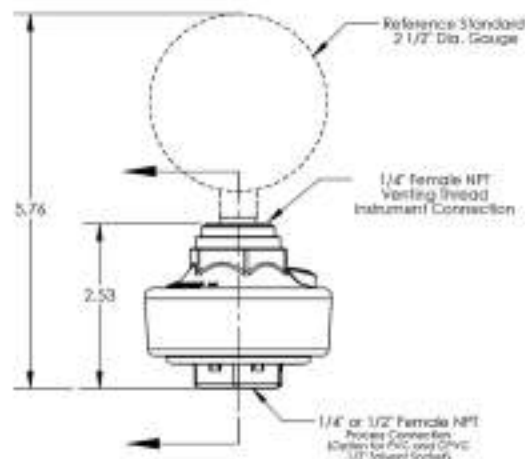
Fig. 1-1



ITEM NO.	DESCRIPTION	QTY
1	Upper Chamber	1
2	Lower Chamber	1
3	Diaphragm	1
4	O-Ring, Instrument Seal, FKM	1
5	Ring, Reinforcing 316 SS	1

*Dimensions in inches

(1) Model TG-25 shown to the right with 2.5" diameter case 1/2" dimension. Optional 1/2" instrument connections available (See instrument port ordering info below).



Pressure / Temperature Data

MAX WORKING PRESSURES PSI (water, non-shock)

WEIGHTS

Material	10°C 50°F	20°C 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 Weight Pounds*
PVC	200	250	250	220	140	135	—	—	—	—	—	0.387
CPVC	230	250	250	230	200	200	150	120	60	—	—	0.40
PP	200	240	240	210	145	125	75	60	—	—	—	0.318
PVDF	240	250	250	250	250	230	220	200	160	140	80	0.45

Temperature Ranges: PVC: 14 to 140°F (10 to 60°C), CPVC: 50 to 194°F (10 to 90°C), PP: 46 to 176°F (8 to 80°C), PVDF: -22 to 248°F (-30 to 120°C). *Weights are for unfilled 1/4" Female NPT x 1/2" Female NPT without gauge.

How to Order Tuff Guard

Part No: **TG - 2 5 T 060 SS - PVC**

DIAPHRAGM MATERIAL

T = Modified PTFE
 V = Viton®
 E = EPDM
 C = Composite PTFE/FKM

MODEL	INSTRUMENT PORT	PROCESS INLET PORT	GAUGE PRESSURE RANGE*	GAUGE INSTALLED	BODY MATERIAL
Tuff Guard	2 = 1/4" Vented Female NPT 5 = 1/2" Vented Female NPT <small>(1) Viton FKM O-ring seal is used for sealing instrument to thread. Zero pressure build during instrument install.</small>	2 = 1/4" Female NPT 5 = 1/2" Female NPT 2S = 1/4" Solvent Soc 5S = 1/2" Solvent Soc	XXX = No Gauge Installed H030 = 0-30 in Hg Vacuum 015 = 0-15 PSI 030 = 0-30 PSI 060 = 0-60 PSI 100 = 0-100 PSI 160 = 0-160 PSI 200 = 0-200 PSI 300 = 0-300 PSI	LEAVE BLANK = No Gauge S = Standard 2.5" Black Painted Steel Case, Marquest, Dry Case, 2-3-2% Accuracy SB = Stainless Case / Brass Internals 2.5" Wika 212.53, Glycerin Filled Case, 2.5% Accuracy SS = All Stainless 2.5" Ashcroft 1008s, Glycerin Filled Case, 1.5% Accuracy	PVC = Polyvinyl Chloride CPV = CPVC, Chlorinated Polyvinyl Chloride PPR = Reinforced, Glass Filled Polypropylene PVD = 100% HP Virgin PVDF

Example: TG-25T060SS-PVC (Gauge Installed)

PVC Tuff Guard Isolator, 1/2" Female NPT Inlet, Modified PTFE Diaphragm, 0-60 PSI All Stainless 2.5" Dia, Ashcroft 1008s Glycerin Filled Gauge Installed, Assembly Tested.

Example: TG-22CXXX-PVDF (No Gauge Installed)

PVDF Tuff Guard Isolator, 1/4" Vented Female NPT x 1/4" Female NPT Inlet, PTFE/FKM Composite Diaphragm, No Gauge Installed

(1) Assemblies with gauge installed have an Aqueous Glycerin (70% USDA 99.5% Glycerin / 30% Distilled Water) internal fill in the upper chamber and gauge stem internals. Silicone, Halocarbon, and Glycol fills available. Units ordered with out an instrument, need to be filled per installation instructions.

(1) Only specify pressure range when ordering with a gauge installed. When ordering a unit with no gauge installed, please place "XXX"

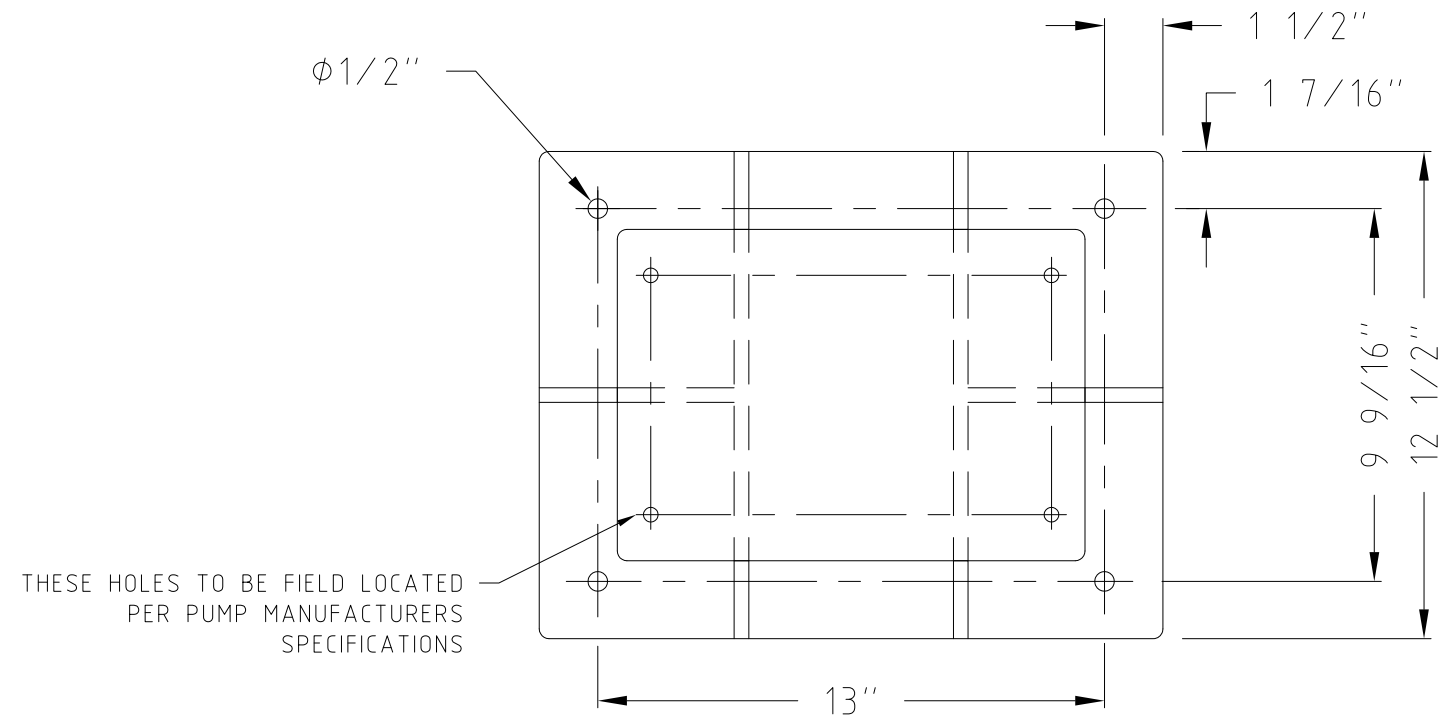
(2) We offer both dual scale and compound pressure ranges. Please contact factory.

(1) We offer a variety of other gauge & instrument options from Ashcroft, Wika, & US Ametek including 3.5", 4" Dial Sizes. The Tuff Guard is also perfectly suited for a variety of pressure sensors. Please contact factory.

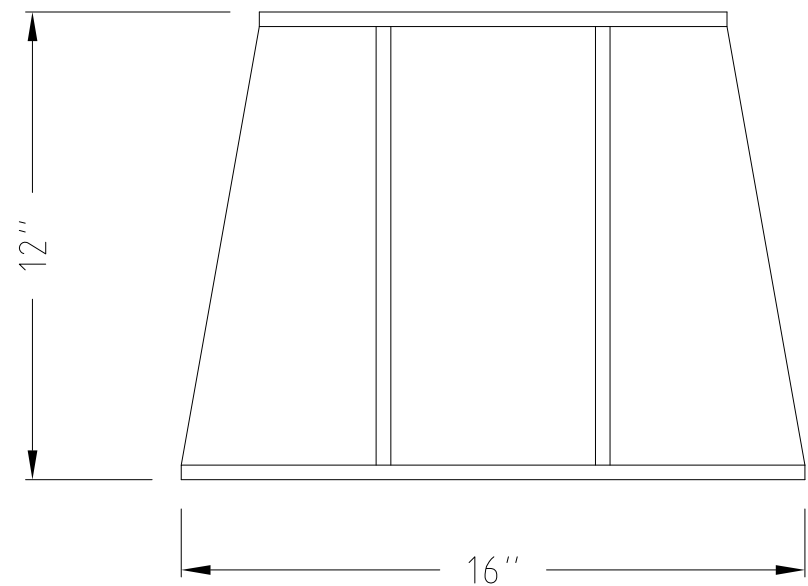
Marquest Scientific, Inc.
 2950 Airway Avenue, Costa Mesa, 92626 California
 Toll Free 866 452 2349 Fax 714 491 9199
www.marquestscientific.com | www.GaugeGuards.com



MARQUEST SCIENTIFIC
 Fluid Handling Products



PLAN



ELEVATION

GENERAL NOTES:

1. MATERIAL IS 3/8" THK, TYPE 1, GRAY PVC
2. ALL WELDS ARE TO BE CONTINUOUS
3. ALL NON-WELDED EDGES ARE TO BE ROUTERED
4. FINAL ASSEMBLY SHALL BE SQUARE, TRUE AND FREE FROM CUTS/ SCRAPES OR DISCOLLORING

△				This drawing represents an investment by PROCESS SOLUTIONS INC of substantial sums, including our engineering skills and experience. It is, therefore, loaned without consideration other than the agreement and condition that it is not to be used in whole or in part to assist in making or to furnish any information to others for the making of drawings, print apparatus, or parts thereof. The acceptance of this drawing will be construed as an acceptance of the foregoing conditions and as an admission of the exclusive ownership in and to the drawings of PROCESS SOLUTIONS INC.	1077 DELL AVE, SUITE A, CAMPBELL, CA. 95008 DRAWN BY: C. ROBERTSON CHECKED BY: SCALE: N/A	PROJECT: PROCESS SOLUTIONS INC. 1077 DELL AVE. CAMPBELL CA. 95008 SUBJECT: PVC PUMP STAND FOR MICROCLOR INSTALLATIONS ASSEMBLY WITH PARTS DETAIL DWG # 0000-MC0950-DT SHEET 1 OF 1 REV. A
△			DATE: 7-09-09			
△						
△	7-09-09	JCR	RELEASED FOR FABRICATION			
REV. △	DATE:	BY:	DESCRIPTION			

SECTION 8.7

ACID CLEANING SYSTEM

1

2

3

4

5

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8

A

B

C

D

E

F

A

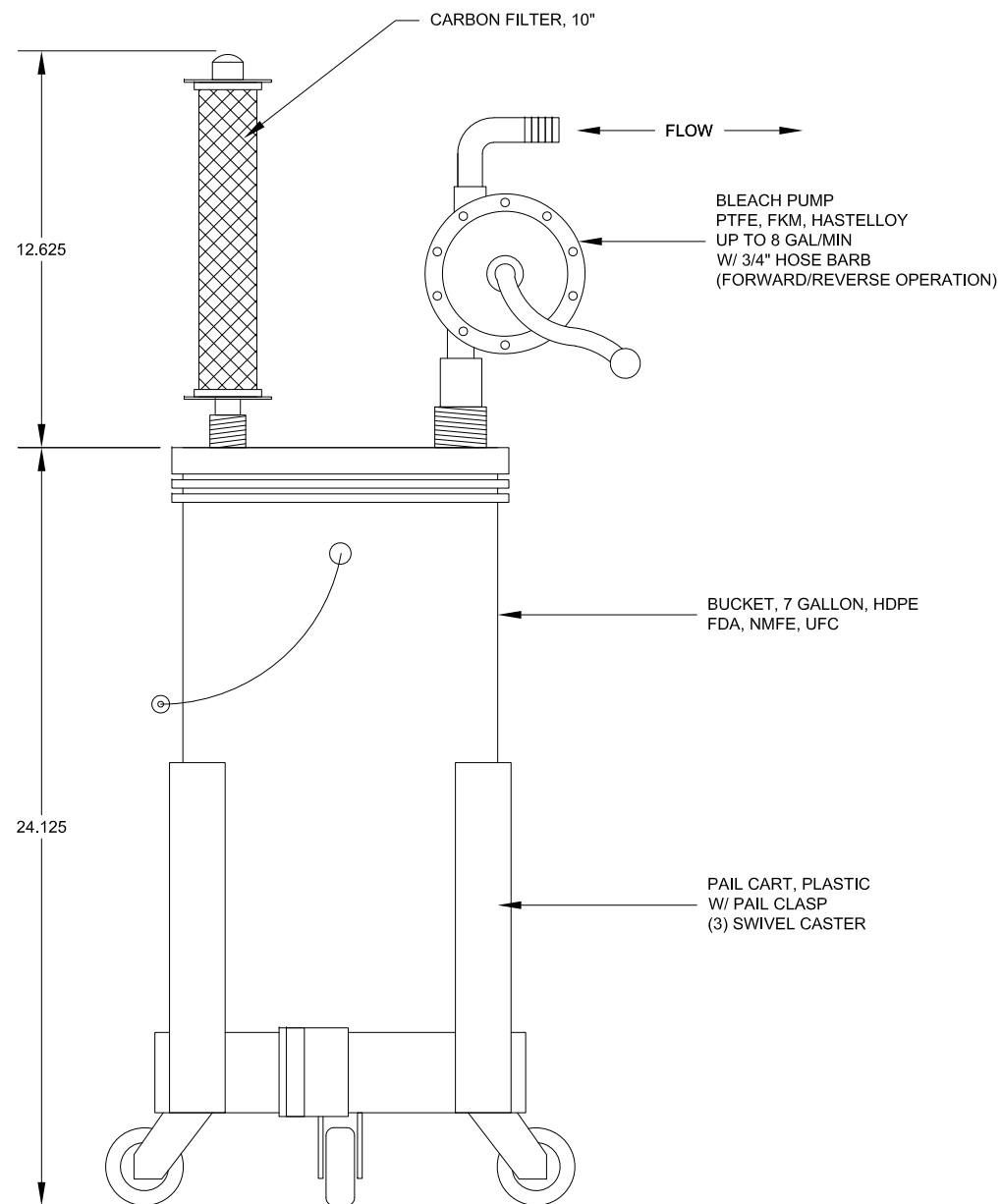
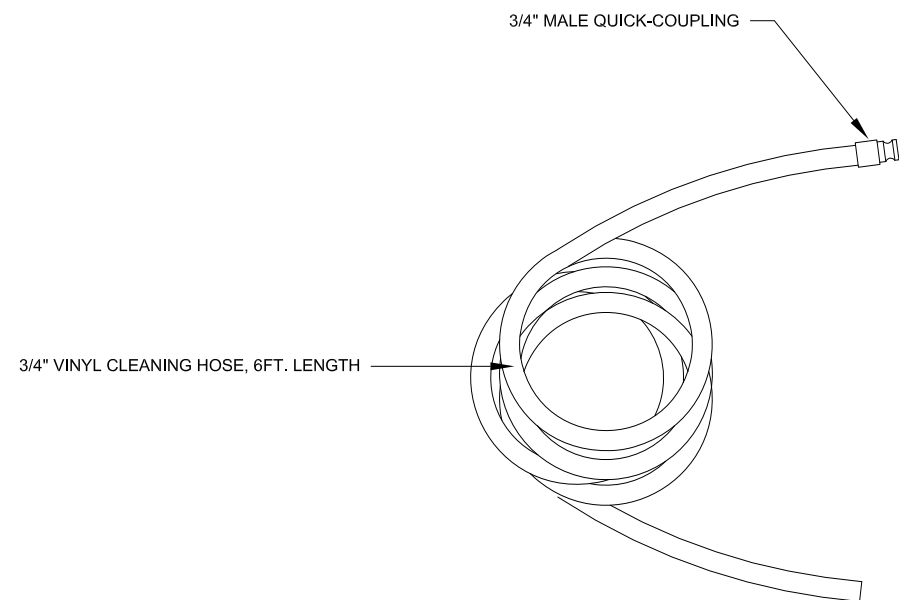
B

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D

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F



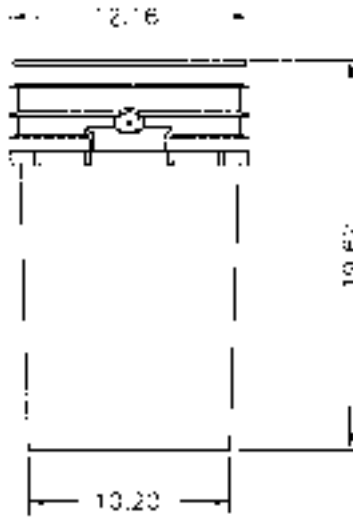
REV. Δ	DATE	BY	DESCRIPTION	REV. Δ	DATE	BY	DESCRIPTION
Δ A	08/22/18	CGS	CHANGED DWG # FROM 0000-MC0303-AB-A	Δ			
Δ				Δ			
Δ				Δ			
Δ				Δ			

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DRAWN BY:	C. STOTHERS
CHECKED BY:	M. KUSHMAN
SCALE:	4"=1'-0"
DATE:	08/22/2018
DATE:	08/22/2018
SIZE:	

PROJECT:	PSI WATER TECHNOLOGIES, INC. STANDARD DRAWING
SUBJECT:	ACID CLEANING SYSTEM 7 GALLON OUTLINE & UTILITY DRAWING
DWG #:	000000-MC0303-OU
SHEET	1 OF 1
REV.	A

7 Gallon Round Container



Features

- Large integrated handles provide comfort in handling
- Reinforcing ribs maintain container shape
- Tapered design allows for container nesting
- Accepts metal handle

PRODUCT CODE.....7R

COMPATIBLE LIDS..... 5LTB, 5LHV, 5NLR & 5LTEO

SPECIFICATIONS

Height.....19.62"
 Outer Diameter.....12.16"
 Thickness.....100 mil
 Print Area.....32" x 14.25"
 Resin.....HDPE

VOLUME

Practical Fill.....7.00 gal. / 26.50 liters
 Overflow.....7.39 gal. / 27.97 liters

PACKAGING

Pack Count.....84
 Pack Dimensions.....48.9" x 36.6" x 47.1"
 Cubic Feet.....48.7
 Packs per Pallet.....2

ORDER QUANTITIES (53' Truckload)

7R & 5LTB.....4,704 bases & 4,800 lids

52585 Dequindre Road
 Rochester, MI 48308

Phone 248-652-0557
 Toll Free 800-Letica-1
 Fax 248-608-2092
 letica.com



Coast to Coast
 Manufacturing Capabilities

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Rev. 0



Red Lid with Spout

Item #: 2285

Product Description

This red spout lid fits the 3-1/2, 5, 6 and 7 gallon buckets. The pour spout pulls up and has a 58mm thread. This lid must be put on the bucket with a mallet for it to go on properly. These lids are slotted to provide tamper evidence. Some or all of the areas directly below the slots around the rim will have to be broke or cut to remove the lid. Lids can be reused but you will be able to tell that the bucket has already been open after the first time it is taken off. Lid has a styrene butadiene gasket which provides a secure seal. This lid is recessed for stacking stability and it has reinforced ribs to provide stacking strength. The tapered design of the lid allows for nesting. Lid is 12.14" outside diameter, 1.06" high and 90 mil thick. Meets FDA standards.

Specifications

Item #: 2285	Weight in pounds: 0.757
Availability: In Stock, Ships Soon	Manufacturer: Letica®
Sold By: Each	Manufacturer Part #: UGI 5NLR RD45
Catalog Page Number: P-220	