Miller Mechanical

CONTRACTORS & ENGINEERS,LLC
America's # 1 Choice for PLUMBING

SUBMITTAL COVER SHEET

PROJECT: The Charles | **DATE:** 11/22/17

TO: Brasfield & Gorrie | **SUBMITTAL NO.:**

ATTN: Andrew Bailey | **SUBM. BY:**

SPECIFICATION SECTION: | **PARAGRAPH REFERENCE:**

DRAWING NUMBER: | **DETAIL REFERENCE:**

QTY.	MARK	DATE	DESCRIPTION
1			Plumbing Submittal

PLUMBER'S REVIEW & APPROVAL	GENERAL CONTRACTOR'S REVIEW & APPROVAL
ARCHITECT'S REVIEW & APPROVAL	ENGINEER'S REVIEW & APPROVAL

1976 Airport Industrial Park Drive Marietta, Georgia 30060 770.952.3864 FAX 770.952-0299

MILLER MECHANICAL
Contractors & Engineers, LLC

The Charles

Atlanta, GA

Plumbing Submittal

1976 Airport Industrial Park Drive Marietta, GA 30060 770-952-3864 Fax 770-952-0299

PLUMBING SUBMITTALS

INDEX

1

Above ground sanitary and storm drain pipe.

CHARLOTTE
PIPE AND FOUNDRY COMPANY
P.O. Box 35430 • Charlotte, North Carolina 28235
704/372-5030 • 800/438-6091 • FAX 800/553-1605
www.charlottepipe.com

CHARLOTTE® CAST IRON SOIL PIPE AND FITTINGS

SPECIFICATIONS

This is to certify that products manufactured by Charlotte Pipe and Foundry, Cast Iron Division, conform to the following standards:

SERVICE WEIGHT HUB AND SPIGOT PIPE AND FITTINGS
Federal Specification WW-P-401F
ASTM A 74
CISPI HS-74
ANSI A 112.5.1

EXTRA HEAVY HUB AND SPIGOT PIPE AND FITTINGS
Federal Specification WW-P-401F
ASTM A 74
CISPI HS-74
ANSI A 112.5.1

NO HUB PIPE AND FITTINGS
ast Iron Soil Pipe Institute Standard No. 301
ederal Specification WW-P-401F
ASTM A 888

NO HUB COUPLINGS
Cast Iron Soil Pipe Institute Standard No. 310

NO HUB HEAVY DUTY COUPLINGS
ASTM C 1277
Meets test criteria of CISPI 310

CHARLOTTE SEAL GASKETS
ASTM C 564
CISPI HSN

WARCO-QUIK-TITE GASKETS
ASTM C 564
CISPI HSN

LIMITED WARRANTY

Charlotte Pipe and Foundry Company® (Charlotte Pipe®) Products are warranted to be free from manufacturing defects and to conform to currently applicable ASTM standards for a period of five years from date of delivery. Buyer's remedy for breach of this warranty is limited to replacement of, or credit for, the defective product. This warranty excludes any expense for removal or reinstallation of any defective product and any other incidental, consequential, or punitive damages. **This limited warranty is the only warranty made by seller and is expressly in lieu of all other warranties, express and implied, including any warranties of merchantability and fitness for a particular purpose.** No statement, conduct or description by Charlotte Pipe or its representative, in addition to or beyond this Limited Warranty, shall constitute a warranty. This Limited Warranty may only be modified in writing signed by an officer of Charlotte Pipe.

This Limited Warranty will not apply if:

1) The Products are used for purposes other than their intended purpose as defined by local plumbing and building codes, and the applicable ASTM standard.
2) The Products are not installed in good and workmanlike manner consistent with normal industry standards; installed in compliance with the latest instructions published by Charlotte Pipe and good plumbing practices; and installed in conformance with all local plumbing, fire and building code requirements.
3) The Products fail due to defects or deficiencies in design, engineering, or installation of the piping system of which they are a part.
4) The Products have been the subject of modification; misuse; misapplication; improper maintenance or repair; damage caused by the fault or negligence of anyone other than Charlotte Pipe; or any other act or event beyond the control of Charlotte Pipe.
5) The Products fail due to the freezing of water in the Products.
6) The Products fail due to contact with chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents that are not compatible.

Any product proved to be defective in manufacture will be replaced F.O.B. point of original delivery, or credit issued, at the discretion of Charlotte Pipe. **Purchaser must obtain written permission and/or a return goods authorization** and instructions for return shipment to Charlotte Pipe of any product claimed defective, shipped in error or excess of inventory needs.

WARNING: Charlotte Pipe products are **not** to be used with compressed air or gases. Charlotte Pipe **does not recommend** that piping systems that include its products be tested with compressed air or gases.

03/16/00

ALL CHARLOTTE PIPE AND FOUNDRY COMPANY® PRODUCTS ARE MADE IN U.S.A.

*UNIVERSAL PRODUCT CODE NUMBERS

Universal Product Code Numbers are recognized worldwide as the preferred means of product identification for electronic data interchange. Each number uniquely identifies a part.

The 11 digit Universal Product Code numbering system uses the first 6 digits to identify Charlotte Pipe as the anufacturer, and the last 5 digits to identify an individual part or product:

611942	00000
(Charlotte Pipe)	**(Product)**

Only the last 5 digits of the Universal Product Code number are needed to order a product by mail, phone, or fax. The entire Universal Product Code number is needed for use with EDI.

CHARLOTTE
PIPE AND FOUNDRY COMPANY

This letter is to certify that all Cast Iron Pipe and Fittings manufactured by Charlotte Pipe and Foundry Company are manufactured in the United States and conform to the following standards:

SERVICE WEIGHT HUB AND SPIGOT PIPE AND FITTINGS
Federal Specification WW-P-401 F
ASTM A 74
CISPI HS 74
IAPMO Listed
ISO 9001, 2000

EXTRA HEAVY HUB AND SPIGOT PIPE AND FITTINGS
Federal Specification WW-P-401 F
ASTM A 74
CISPI HS 74
IAPMPO Listed
ISO 9001, 2000

NO HUB PIPE AND FITTINGS
Cast Iron Soil Pipe Institute Standard No. 301
ASTM A 888
IAPMO Listed
ISO 9001, 2000

NO HUB COUPLINGS
Cast Iron Soil Pipe Institute Standard No. 310

CHARLOTTE SEAL GASKETS
ASTM C 564
CISPI HSN

WARCO-QUIK-TITE GASKETS
ASTM C 564
CISPI HSN

Very truly yours,

Alan Biggers

Alan Biggers, Executive Vice President

Terri L. Wilson

Notary Public
My commission expires July 02, 2007

08/12/03

PO Box 35430 Charlotte, NC 28235 USA 704/372-5030 800/438-6091 FAX 800/553-1605
www.charlottepipe.com

SUGGESTED SPECIFICATION

System: Hubless Cast Iron Soil Pipe and Fittings

Scope: This specification covers hubless Cast Iron pipe, fittings, and couplings used in sanitary drain, waste, and vent (DWV), sewer, and storm drainage applications. This system is intended for use in non-pressure applications.

Specification: Hubless Cast Iron pipe and fittings shall be manufactured from gray cast iron with a tensile strength of not less than 21,000 psi. Hubless couplings shall be shielded and conform to CISPI Standard 310 or ASTM C 1277, with an elastomeric gasket meeting the requirements of ASTM C 564.

Pipe and fittings shall comply with ASTM A 888, and CISPI 301. Hubless couplings shall comply with ASTM C 564, and CISPI Standard 310 or ASTM C 1277. Each length of pipe shall be hydrostatically (water) tested by the manufacturer to verify compliance. All pipe and fittings shall be made in the United States, and marked with the collective trademark of the Cast Iron Soil Pipe Institute, CI®. All pipe and fittings shall be of the same manufacturer. All systems shall utilize a separate waste and vent system.

Installation shall comply with the latest installation instructions published by Charlotte Pipe and Foundry and shall conform to all local plumbing, fire, and building code requirements. Joints shall be made with hubless couplings and tightened using a calibrated torque wrench. The system shall be hydrostatically (water) tested after installation to 4.3 psi. (10 feet of hydrostatic head). Testing with compressed air or gas is not recommended.

Referenced Standards:

ASTM A 888	Hubless Cast Iron Soil Pipe and Fittings
ASTM C 564	Rubber Gaskets for Cast Iron Soil Pipe and Fittings
CISPI 301	Hubless Cast Iron Soil Pipe and Fittings
CISPI 310	Hubless Couplings for Cast Iron Soil Pipe and Fittings
ASTM C 1277	Hubless Heavy Duty Couplings

Note: Latest revision of each standard applies.

Above Ground Sanitary branch drain lines and Sanitary dry vent lines

RECOMMENDED PRODUCT SPECIFICATION

CHARLOTTE PIPE AND FOUNDRY COMPANY

Suggested Specification

System: PVC Schedule 40 Solid Wall Pipe and PVC DWV Fitting System

Scope: This specification covers PVC Schedule 40 solid wall pipe and PVC DWV fittings used in sanitary drain, waste, and vent (DWV), sewer, and storm drainage applications. This system is intended for use in non-pressure applications where the operating temperature will not exceed 140°F.

Specification: Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a Cell Class of 12454-B as identified in ASTM D 1784.

PVC Schedule 40 pipe shall be Iron Pipe Size (IPS) conforming to ASTM D 1785 and ASTM D 2665. PVC DWV fittings shall conform to ASTM D 2665. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer. All pipe and fittings shall be manufactured in the United States. All systems shall utilize a separate waste and vent system. Pipe and fittings shall conform to National Sanitation Foundation Standard 14.

Installation shall comply with the latest installation instructions published by Charlotte Pipe and Foundry and shall conform to all local plumbing, building, and fire code requirements. Solvent cement joints shall be made in a two step process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents not compatible with PVC compounds. Systems shall be hydrostatically tested after installation. Testing with compressed air or gas is not recommended.

Referenced Standards:

ASTM D 1784	Rigid Vinyl Compounds
ASTM D 1785	PVC Plastic Pipe, Schedule 40
ASTM D 2665	PVC Drain, Waste, and Vent Pipe & Fittings
ASTM D 2564	Solvent Cements for PVC Pipe and Fittings
NSF Standard 14	Plastic Piping Components and Related Materials

Note: Latest revision of all standards apply.

Above Ground Domestic
Water Pipe
2 1/2" and larger

CORZAN®

PIPING SYSTEMS

PRODUCT SPECIFICATION

Corzan® CPVC pipe and fittings

SCOPE:

This specification covers the manufacturing requirements for CPVC Schedule 80 Iron Pipe Size (IPS) pipe and fittings. Both the pipe and fittings are manufactured in North America and meet or exceed the requirements set forth by the American Society for Testing Materials (ASTM) and ANSI/NSF Standards 14 and 61.

CPVC Materials:

Corzan® CPVC pipe and fittings are extruded/molded from CPVC compounds manufactured by Noveon. The pipe compound meets cell class 24448 and the fitting compound meets cell class 23447 as defined by ASTM D1784. Both the pipe and the fitting compounds are certified by NSF International for use with potable water.

DIMENSIONS AND PROPERTIES:

Dimensions, tolerances and physical properties meet or exceed the requirements of ASTM Standards F441 for pipe, F439 for socket fittings and ASTM F437 or F439 for threaded fittings. Threaded fittings have taper pipe threads in accordance with ASTM F1498. Unions and flanges meet or exceed the requirements of ASTM F1970.

SOLVENT CEMENT:

All socket type joints shall be assembled employing solvent cements that meet or exceed the requirements of ASTM F493. The standard practice for safe handling of solvent cements shall be in accordance with ASTM F402. Solvent cement shall be listed by NSF International for use with potable water, and approved by the Corzan® pipe and fittings manufacturers.

FLAME AND SMOKE REQUIREMETNS:

Water filled Corzan® pipe and fittings (1/2" through 6") tested in general accordance with UL 723/ASTM E 84 (NFPA 255 and UBC 8-1) meets the 25/50 flame and smoke requirement and shall be permitted to be installed in return air plenums. Test reports from a third party testing laboratory shall be obtained and made available upon request.

MARKING:

The marking on the CPVC pipe meet the requirements of ASTM F441 and the marking on the fittings meets the requirements of ASTM Standards F437, F438 or F1970. The pipe and fittings markings state the pipe/fitting manufacture's name or trademark, the material designation, the size, the NSF mark for potable water and the ASTM designation.

Suggested Specification

System: FlowGuard Gold® CPVC Copper Tube Size (CTS) Hot and Cold Domestic Water Distribution System

Scope: This specification covers Copper Tube Size (CTS) CPVC manufactured to standard dimensional ratio (SDR) 11 for hot and cold domestic water distribution. This system is intended for pressure applications where the operating temperature will not exceed 180°F at 100 psi.

Specification: Pipe and fittings shall be manufactured from virgin rigid CPVC (chlorinated polyvinyl chloride) vinyl compounds with a Cell Class of 23447-B as identified in ASTM D 1784.

FlowGuard Gold CTS CPVC pipe and fittings shall conform to ASTM D 2846. Pipe and fittings shall be manufactured as a system and be the product of one manufacturer. All pipe and fittings shall be manufactured in the United States. Pipe and fittings shall conform to National Sanitation Foundation (NSF) Standard 61.

Installation shall comply with the latest installation instructions published by Charlotte Pipe and Foundry and shall conform to all local plumbing, building, and fire code requirements. Solvent cement joints shall be made in a two step process with primer manufactured for thermoplastic piping systems and solvent cement conforming to ASTM F 493. The system shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents not compatible with CPVC compounds. Systems shall be hydrostatically (water) tested after installation. Testing with compressed air or gas is not recommended.

Referenced Standards:

ASTM D 1784	Rigid Vinyl Compounds
ASTM D 2846	CPVC Plastic Hot and Cold Water Distribution System
ASTM F 493	Solvent Cements for CPVC Pipe and Fittings
NSF Standard 61	Drinking Water System Components - Health Effects

Note: Latest revision of all standards apply.

The Green Solution

Trap guard at water heater closet hub drains and base building floor drains

Inline 3″ Floor Drain Trap Sealer

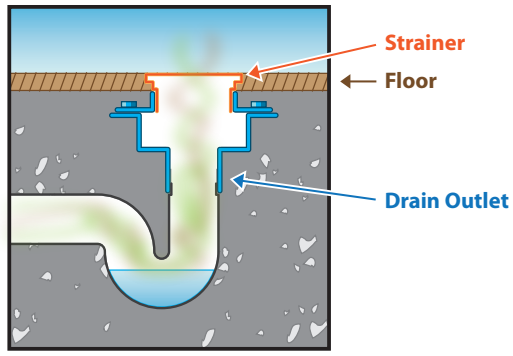
Model SS3009V

Specification: SureSeal Model SS3009V 3″ Inline Floor Drain Trap Seal. Commercial grade UV and Ozone resistant ABS plastic housing with proprietary EPDM rubber diaphragm and soft rubber sealing gasket. Floor rating ASSE – 1072 AF-GW.

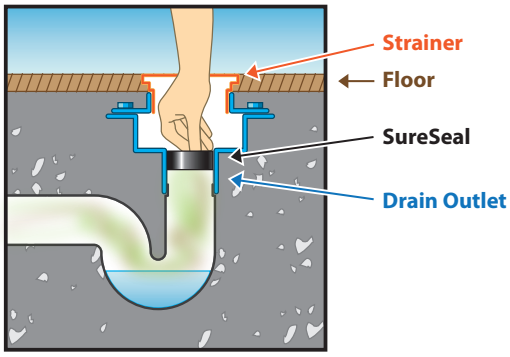
Function: Installed into the outlet of drain bodies, drain strainers, or drain hubs to protect the trap seal from evaporation. Creates a physical barrier that blocks sewer gases and their odors from escaping. Provides waterless trap seal protection equivalent to water based trap primers.
· New Construction: Used as a trap primer replacement or in conjunction with a trap primer to provide protection against escaping sewer gases. Eliminates the need to repair/replace trap primers when they fail.
· Retrofit: Used in situations where trap primers have failed or where trap primers were never installed.

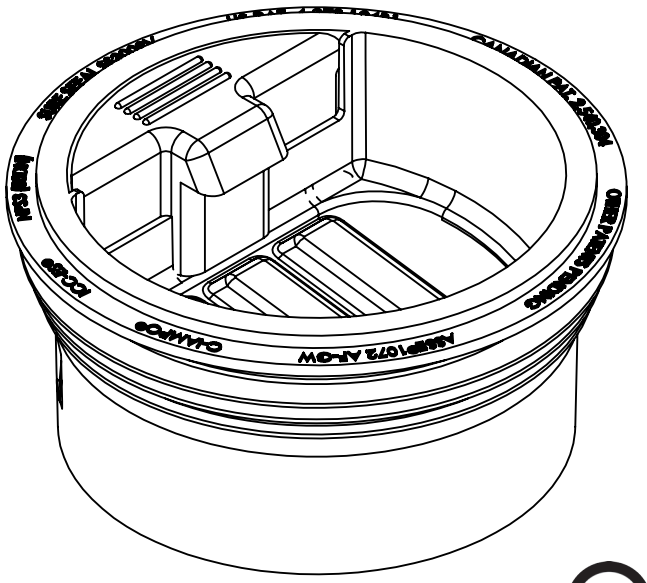
Benefits: Simple to install, eliminates the need for complex, time consuming, and expensive repairs. ECO friendly providing 100% water savings efficiency over traditional methods.

BEFORE

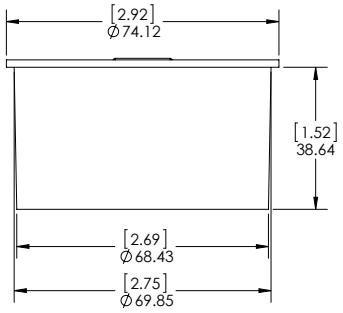


AFTER

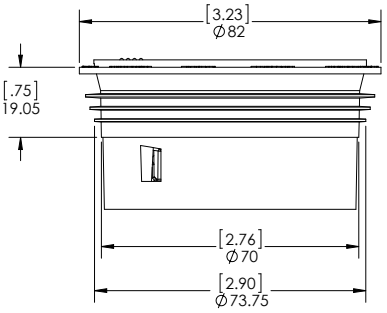




ICC-ES Listed: PMG-1070 IAPMO Listed: C-4165 Patents Pending



HOUSING (NO GASKET)



HOUSING & GASKET

RectorSeal · 2601 Spenwick Drive · Houston, TX 77055 RectorSeal.com Toll Free: (800 231-3345 · (713) 263-8001 · Fax: (800) 441-0051

2

Model ZW209

Pressure Reducing Valve

Pressure Reducing Valve (PRV) for building

Application

The Zurn Wilkins Model ZW209 Pilot Operated Pressure Reducing Valve is designed for many applications where the reduction of high inlet pressures to safe and stable outlet pressure is required. The pilot assembly reacts to changes in downstream pressure allowing the main valve to modulate between the closed and open position ensuring a constant downstream set pressure. Once the downstream pressure reaches the pilot setting, the main valve will seal shut preventing damage downstream. Pressure regulation is not dependent upon flow rate, resulting in minimal pressure loss through the valve. In addition the Model ZW209 comes standard with epoxy coating internally and externally for corrosion protection, as well as isolation valves and pressures gauges for quick and easy maintenance or repair.

Standards Compliance:

- ANSI/AWWA C530
- Meets the requirements of NSF/ANSI 61*

*(0.25% MAX. WEIGHTED AVERAGE LEAD CONTENT)

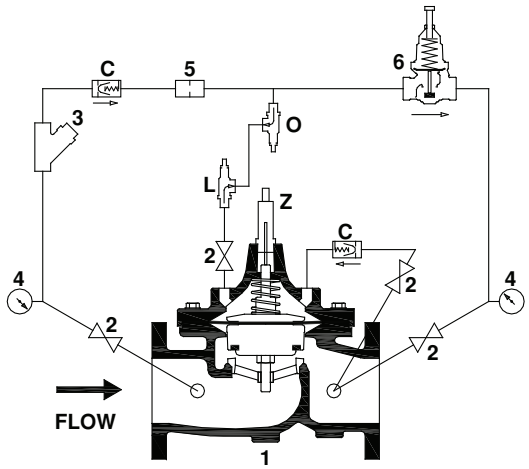
Materials

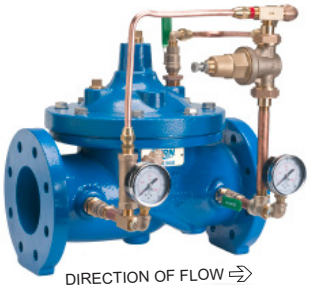
Main Valve Body	Ductile Iron ASTM A536
Main Valve Bonnet	Ductile Iron ASTM A536
Disc Guide	Stainless Steel
Seat	Stainless Steel
Disc	Buna-N Rubber
Diaphragm	Nylon Reinforced Buna-N
Stem	Stainless Steel
Spring	Stainless Steel

*The closing speed control (optional) on this valve should always be open at least three (3) turns off its seat.

Schematic Diagram

Item	Description of Standard Features
1	Main Valve
2	850XL Isolation Valve
3	SXL "Wye" Type Strainer
4	Pressure Gauge
5	Restriction Fitting
6	PRXL Pressure Reducing Control





DIRECTION OF FLOW

NSF/ANSI 61

BODY CONFIGURATIONS		GLOBE STYLE BODY		ANGLE STYLE BODY
END CONNECTION	PRESSURE RATING	FULL PORT	REDUCED PORT	
Threaded	400 psi max.	1 1/4"-3"	n/a	1 1/4"-3"
Flanged	ANSI Class 150, 250 psi max.	1 1/2"-16"	3"-10"	1 1/2"-10"
	ANSI Class 300, 400 psi max.			
Grooved	300 psi max.	1 1/2"-10"	n/a	1 1/2"-10"
MINIMUM INLET PRESSURE 10 PSI				

TEMPERATURE RATING: ☐ Water 33°F to 140°F
PILOT SPRING RANGE: ☐ 15-150 psi

Standard Features

- ☐ Epoxy Coated, FDA Approved
- ☐ Pilot Assembly
  - "Wye" Type Strainer
  - Opening Speed Control (sizes 1 1/4" - 4")
  - Isolation Valves
- ☐ Inlet and Outlet Pressure Gauges
- ☐ ANSI Class 150 Flanges
- ☐ Copper Tubing and Brass Fittings

Options (Add suffix letters to ZW209)

Function
- ☐ C - 40XL2 Hydraulic Check with Isolation Valve
- ☐ L - SC1 Closing Speed Control*
- ☐ O - SC1 Opening Speed Control (Standard 1 1/4" -4")

Body
- ☐ A - Angle Style Body
- ☐ R - Reduced Port Body

Connections
- ☐ G - IPS Grooved
- ☐ TH - NPT Threaded
- ☐ Y - ANSI Class 300 Flanges

Main Valve Options
- ☐ V - Viton Rubber Internals, rated 180°F (1-1/4"-6", only available with "LP" or "HP" Option)
- ☐ Z - ZPI Visual Position Indicator

Pilot System
- ☐ LP - 5-25 psi Low Pressure Range PV-PRD Pilot (replaces PRXL)
- ☐ HP - 30-300 psi High Pressure Range PV-PRD Pilot (replaces PRXL)
- ☐ SP - All Stainless Steel Pilotry (replaces all brass fittings, pilot valve and copper tubing. "GL" Option included)
- ☐ SH - Stainless Steel Braided Hoses (only replaces Copper Tubing)
- ☐ RV - Pilot on Reverse Side
- ☐ GL - Liquid Filled Gauge

Zurn Industries, LLC | Wilkins
1747 Commerce Way, Paso Robles, CA U.S.A. 93446 Ph. 855-663-9876, Fax 805-238-5766
In Canada | **Zurn Industries Limited**
3544 Nashua Drive, Mississauga, Ontario L4V 1L2 Ph. 905-405-8272, Fax 905-405-1292
www.zurn.com

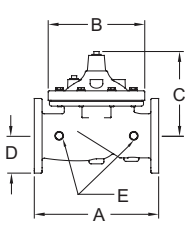
Rev. J
Date: 7/16
Document No. ACV-ZW209
Product No. Model ZW209

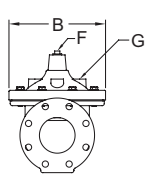
Globe and Angle Main Valve Dimensions

DIM	FULL PORT	VALVE SIZE INCHES (mm)											
		1 1/4 (32)	1 1/2(38)	2 (50)	2 1/2 (65)	3 (80)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)
A	Threaded	7 1/4	7 1/4	9 7/16									
	Class 150 Flange		8 1/2	9 3/8	11	12	15	20	25 3/8	29 3/4	34	39	41 3/8
	Class 300 Flange		9	10	11 5/8	13 1/4	15 5/8	21	26 7/16	31 1/8	35 1/2	40 1/2	43 1/2
	Grooved		8 1/2	9	11	12 1/2	15	20	25 3/8	29 3/4			
B	Diameter	5 5/8	5 5/8	6 3/4	8	9 3/16	11 11/16	15 3/4	20 1/8	23 11/16	27 1/2	31 3/4	34 1/2
C	Max.	5 3/4	5 3/4	6 3/16	7 3/8	8	10 3/16	12 5/16	15 9/16	17 5/8	20 3/16	22 13/16	25 7/8
D	Threaded/Grooved	1 3/8	1 3/8	1 3/4	2 1/8	2 9/16	3 7/16	5	5	5 13/16	6 3/4	8 7/8	8 13/16
	Class 150 Flange		2 1/2	3	3 1/2	3 3/4	4 1/2	5 1/2	6 3/4	8	9 1/2	10 1/2	11 3/4
	Class 300 Flange		3	3 1/4	3 3/4	4 1/8	5	6 1/4	7 1/2	8 3/4	10 1/4	11 1/2	12 3/4
E	NPT Body Tap	3/8	3/8	3/8	1/2	1/2	3/4	3/4	1	1	1	1	1
F	NPT Cvr. Plug Tap	1/2	1/2	1/2	1/2	1/2	3/4	3/4	1	1	1	1	1
G	NPT Cover Tap	3/8	3/8	3/8	1/2	1/2	3/4	3/4	1	1	1	1	1
H	Threaded	3 1/4	3 1/4	4 3/4	5 1/2	6 1/4							
	Class 150 Flange		4	4 3/4	5 1/2	6	7 1/2	10	12 11/16	14 7/8			
	Class 300 Flange		4 1/4	5	6	6 7/16	8	10 1/2	13 1/4	15 9/16			
	Grooved		4 7/16	4 3/4	5 1/2	6	7 1/2	10	12 11/16	14 7/8			
J	Threaded	1 15/16	1 15/16	3 1/4	4	4 1/2							
	Class 150 Flange		4	3 1/4	4	4	5	6	8	8 5/8			
	Class 300 Flange		4 1/4	3 1/2	4 5/16	4 7/16	5 5/16	6 1/2	8 1/2	9 5 /16			
	Grooved		3 3/16	3 1/4	4	4 1/4	5	6	8	8 5/8			
Valve Stem Internal Thread		10-32	10-32	10-32	10-32	1/4-20	1/4-20	1/4-20	3/8-16	3/8-16	3/8-16	3/8/16	3/8-16
Stem Travel (in)		7/16	7/16	3/4	7/8	1	1 3/16	1 3/4	2 3/8	2 13/16	3 7/16	3 13/16	4 5/16
Approx. Wt. (lbs)		22	26	36	55	70	130	240	440	720	820	1200	1550

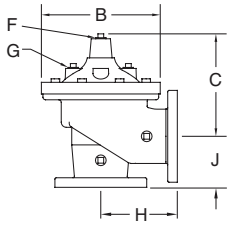
Reduced Port Main Valve Dimensions

DIM		VALVE SIZE INCHES (mm)				
		3" (80)	4" (100)	6" (150)	8" (200)	10" (250)
A	Class 150 Flange	10 1/4	14	17 3/4	21 7/16	26
	Class 300 Flange	11	14 1/2	18 11/16	22 7/16	27 7/16
B	Dia	6 3/4	9 3/16	11 11/16	15 3/4	20 1/8
C	Max	6 3/8	8 7/16	12 5/16	13 1/4	16 3/4
D	Class 150 Flange	3 3/4	4 1/2	5 1/2	6 3/4	8
	Class 300 Flange	4 1/8	5	6 1/4	7 1/2	8 3/4
E	NPT Body Tap	3/8	1/2	3/4	3/4	1
F	NPT Cvr. Plug Tap	3/8	1/2	3/4	3/4	1
G	NPT Cvr. Tap	3/8	1/2	3/4	3/4	1
Valve Stem Internal Thread		10-32	1/4-20	1/4-20	3/8-16	3/8-16
Stem Travel (in)		3/4	1	1 1/5	1 3/4	2 3/8
Approx. Wt. (Lbs)		35	80	140	275	480

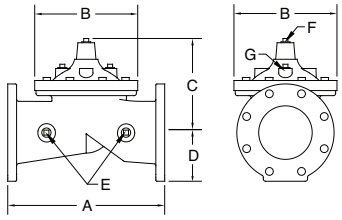




Globe Style Body



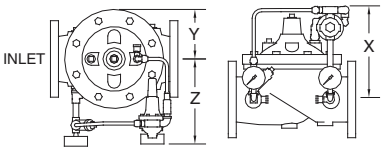
Angle Style Body



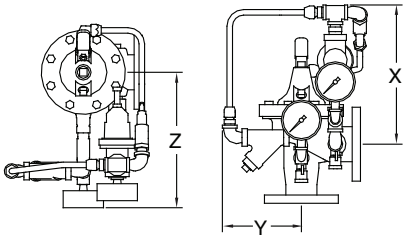
Reduced Port Body

Pilot System Dimensions

PILOT SYSTEM DIMENSIONS	DIM	VALVE SIZE INCHES (mm)											
		1-1/4 (32)	1-1/2 (40)	2" (50)	2-1/2" (65)	3" (80)	4" (100)	6" (150)	8" (200)	10" (250)	12" (300)	14" (350)	16" (400)
Full Port Body	X	8 1/2	8 1/2	8 1/2	8 1/2	9 1/2	12	13	14	17 1/2	20	23	26
	Y	4	4	3 1/2	4	4 1/2	6	8	10	12	14	16	17 1/2
	Z	8 1/2	8 1/2	9	9	9 1/2	10	11 1/2	13	14 1/2	17	19	20 1/2
Reduced Port Body	X					8 1/2	9 1/2	12	13	14			
	Y					3 1/2	4 1/2	6	8	10			
	Z					9	9 1/2	10	11 1/2	13			
Angle Body	X	9	9	9	9	10	12 1/2	13 1/2	14 1/2	18			
	Y	5	5	5	5	5	6	8	10	12			
	Z	9	9	9 1/2	9 1/2	10	10 1/2	12	13 1/2	15			



Globe Pilot System Dimensions



Angle Pilot System Dimensions

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Flow Characteristics

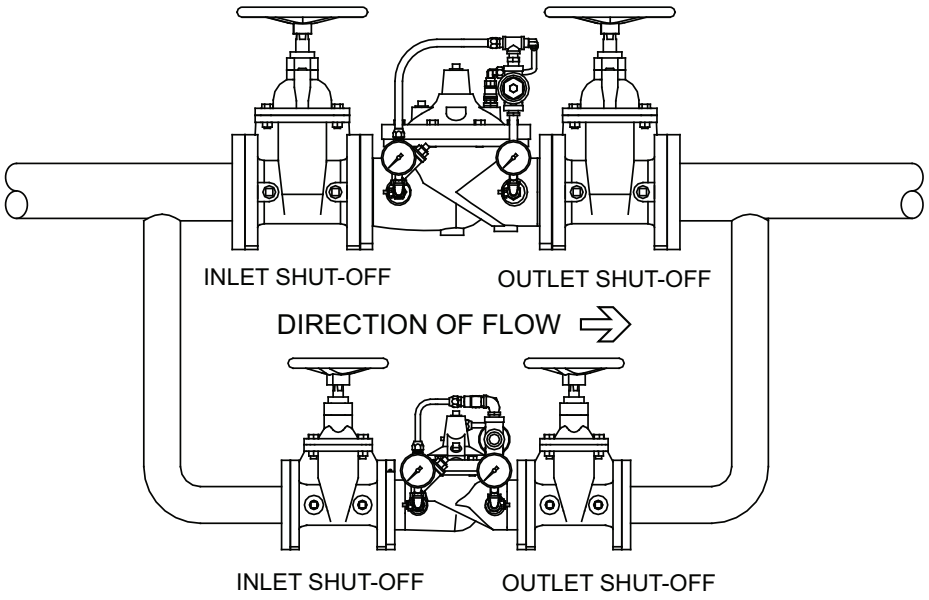
Full Port Globe and Angle Valve size	inches (mm)	1 1/4 (32)	1 1/2 (40)	2 (50)	2 1/2 (65)	3 (80)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)	14 (350)	16 (400)
Reduced Port Globe Valve Size	inches (mm)			3 (80)		4 (100)	6 (150)	8 (200)	10 (250)				
Suggested Flow (GPM)	Max. Continuous	93	125	210	300	460	800	1800	3100	4900	7000	8400	11000
	Max Intermittent	120	160	260	375	600	1000	2250	4000	6150	8700	10500	13800
	Min. Continuous	10	10	15	20	30	50	115	200	300	435	530	690
Suggested Flow (Liters/sec)	Max. Continuous	6	8	13	19	29	50	113	195	309	550	665	870
	Max. Intermittent	7.6	10	16.4	23	37	62	142	246	388	440	530	95
	Min. Continuous	.6	.6	0.9	1.3	1.9	3.2	7.2	13	19	28	33	43

Suggested flow calculations are based on flow through Schedule 40 Pipe. Maximum continuous flow is approx. 20 ft./sec (6.1 meters/sec) & maximum intermittent is approx. 25 ft./sec (7.6 meters/sec) and minimum continuous flow is approx. 1.25 ft./sec (0.4 meters/sec). Many factors should be considered in sizing pressure reducing valves including inlet pressure, outlet pressure and flow rates.

Operation

The Model ZW209 utilizes a pressure reducing pilot valve that installs on the discharge side of the control circuitry. The pilot is a direct acting, normally open, spring loaded, diaphragm actuated valve. The operation of the ZW209 begins with accurately sizing the valve, then fine tuning the control circuit by adjusting the pilot spring to the desired downstream pressure. Inlet pressure is piped to the inlet port of the pressure reducing pilot. A sensing line runs internally from the discharge side of the pilot to its lower control chamber under the diaphragm. Thus, downstream pressure exceeding the preset acts to close the pilot while the adjustable spring seeks to keep it open. The result is a modulating action in the pilot that is transmitted to the bonnet of the main valve. This creates a mirror modulation of the diaphragm assembly in the main valve. Downstream pressure is maintained within narrow limits regardless of changing flow rates or varying inlet pressures.

Typical Installation



Notice:

In cases where design flow falls below the minimum continuous flow rate, a low flow by-pass shall be installed.

Specifications

The Pressure Reducing Valve shall be a diaphragm actuated, pilot controlled valve. The main valve body shall be ductile iron ASTM A 536. The stem of the basic valve shall be guided top and bottom. The diaphragm shall not be used as a seating surface. All internal and external ferrous surfaces shall be coated with a high quality, fusion epoxy coating. The pilot control shall be field adjustable from 15 psi to 150 psi. The valve shall be certified to NSF/ANSI Standard 61. The Pressure Reducing Valve shall be a ZURN WILKINS Model ZW209.

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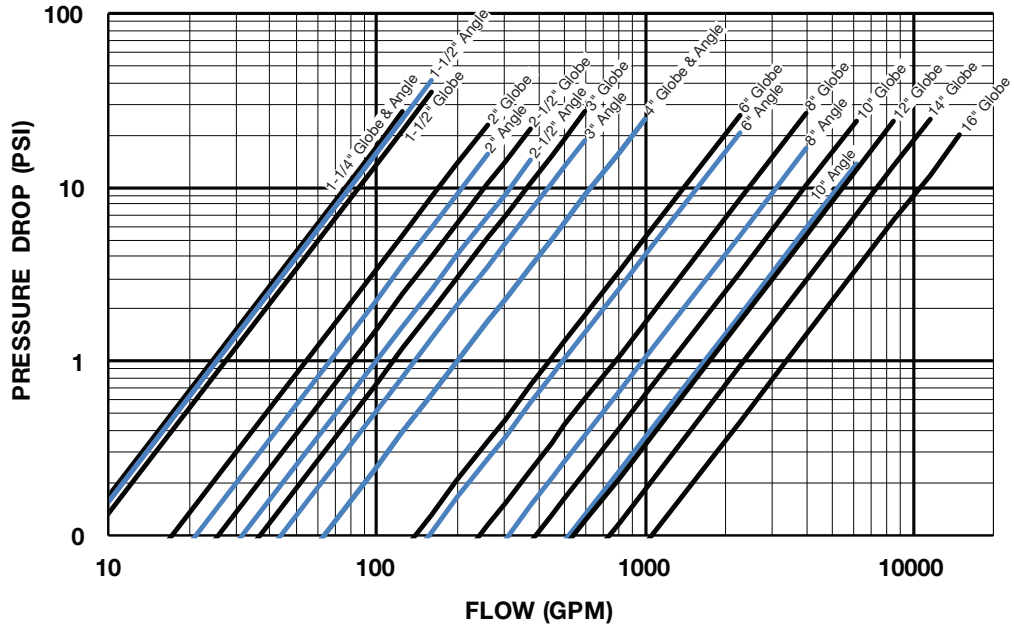
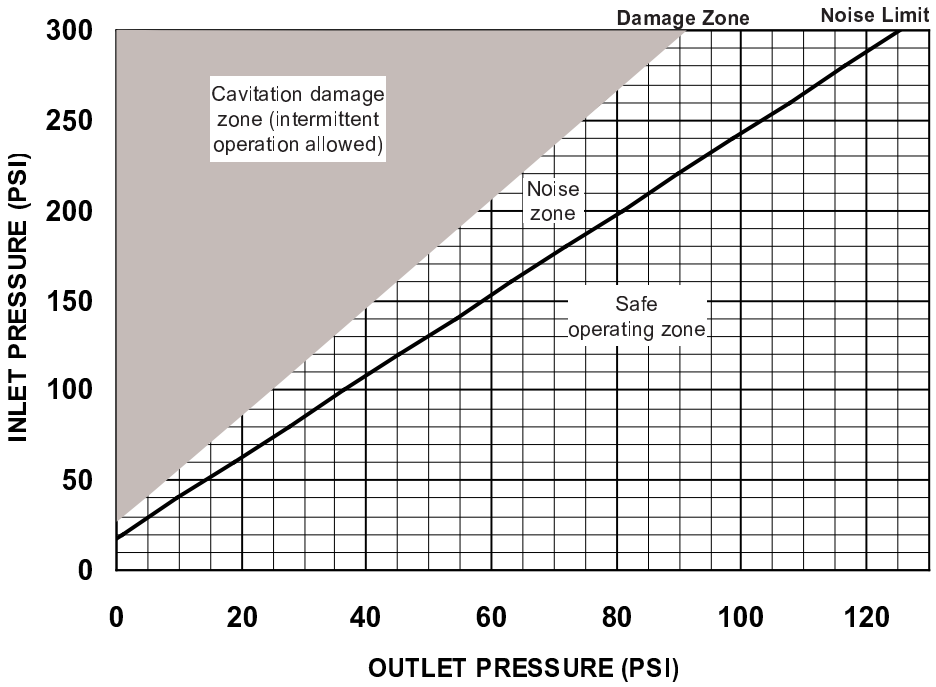
BODY MINIMUM FRICTION LOSS



PRESSURE REDUCTION LIMIT



*** Notes for Body Minimum Friction Loss Chart:**
Minimum inlet pressure is 10 psi higher than set point or the additional body friction loss at intended flow, whichever is higher. (friction loss may be important at flows above 20 ft/s)
Example: A 6" valve intended to flow 2000 GPM at 150 psi has a friction loss of 20 psi at 2000 GPM. The minimum inlet pressure would be 150 + 20 = 170 psi. When inlet pressure is below set point, the outlet pressure will be the pressure at the inlet minus the friction loss.

Job Name _____ **Contractor** _____

Job Location _____ **Engineer** _____

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Model 375XL

Reduced Pressure Principle Assembly

Backflow Preventor (BFP) at Pool Equipment and Trash Rooms

Application

Ideal for use where Lead-Free* valves are required. Designed for installation on potable water lines to protect against both backsiphonage and backpressure of contaminated water into the potable water supply. Assembly shall provide protection where a potential health hazard exists.

Standards Compliance

- ASSE® Listed 1013
- IAPMO® Listed
- CSA® Certified B64.4
- AWWA compliant C511
- Approved by the Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California
- UL® Classified (less shut-off valves only, 3/4"-2")
- C-UL® Classified (less shut-off valves only, 3/4"-2")
- Certified to NSF/ANSI 372* by IAPMO R&T
- NSF® Listed-Standard 61, Annex G*

*(0.25% MAX. WEIGHTED AVERAGE LEAD CONTENT)

Materials

Housing	Reinforced Nylon, FDA approved
Fasteners	Stainless Steel, 300 Series
Elastomers	Silicone (FDA Approved)
	Buna Nitrile (FDA Approved)
Internals	Delrin, Nylon, NSF Listed
Springs	Stainless Steel, 300 series
Ball Valves	Cast Bronze, ASTM B 584
Struts	Forged Brass, ASTM B 124

Features

Sizes: 1/2", 3/4", 1", 1-1/4", 1-1/2", 2"

Maximum working water pressure	175 PSI
Maximum working water temperature	180°F
Hydrostatic test pressure	350 PSI
End connections Threaded FNPT	ANSI B1.20.1

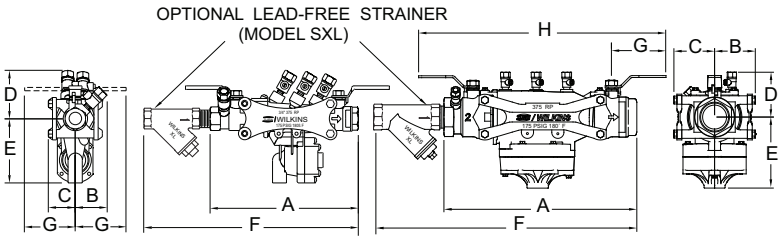
Options

(Suffixes can be combined)

- ☐ - with full port QT ball valves (standard)
- ☐ L - less ball valves, male pipe thread
- ☐ S - with Model SXL lead-free bronze "Y" type strainer
- ☐ SH - with stainless steel handles
- ☐ FT - with integral male 45° flare SAE test fitting
- ☐ AG - with air gap
- ☐ SAG - with Model SXL lead-free bronze "Y" strainer and air gap
- ☐ BOF - with Blow out/Flush fitting
- ☐ B - with black fusion epoxy coated ball valves & struts for theft protection

Accessories

- ☐ Repair kits
- ☐ Thermal expansion tank (Mdl. XT)
- ☐ Soft seated check valve (Mdl. 40XL2)
- ☐ Shock arrester (Model 1250XL)
- ☐ QT-SET Quick Test Fitting Set
- ☐ Blow out / Flush fitting (RK34-375BOF (1/2" or 3/4"), RK1-375BOF or RK114-350-375BOF)



Dimensions & Weights (do not include pkg.)

MODEL 375XL SIZE		DIMENSIONS (approximate)																				WEIGHT			
		A		A LESS BALL VALVES		B		C		D		E		F		G		H		J		LESS BALL VALVES		WITH BALL VALVES	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	kg
1/2	20	8 7/8	225	n/a	n/a	1 15/16	49	1 5/8	41	2 15/16	75	3 7/8	98	12 1/4	311	3	76	10 7/8	276	12 1/4	311	4.7	2.1	5.7	2.6
3/4	20	8 7/8	225	7 1/8	181	1 15/16	49	1 5/8	41	2 15/16	75	3 7/8	98	12 5/8	321	3	76	11	279	12 1/4	311	4.7	2.1	5.7	2.6
1	25	11 3/16	284	8 7/8	225	2 1/4	57	2 1/4	57	3 7/16	87	4	102	14 9/16	370	4	102	13 3/4	349	15 1/4	387	8.2	3.7	9.7	4.4
1-1/4	32	14 7/8	378	14 3/8	367	3 3/8	86	3 3/8	86	3 3/4	95	5 3/4	146	20 1/2	521	3 3/4	95	18	457	18 1/2	470	18.7	8.5	20.5	9.3
1-1/2	40	15 1/4	387	14 3/8	367	3 3/8	86	3 3/8	86	3 3/4	95	5 3/4	146	22	559	4 1/2	114	18 3/4	476	20 1/4	514	18.3	8.0	21.5	9.8
2	50	16	406	14 3/8	367	3 3/8	86	3 3/8	86	3 3/4	95	5 3/4	146	24	610	4 3/4	120.7	20 3/4	527	20 3/4	527	19.4	8.8	23.5	10.7

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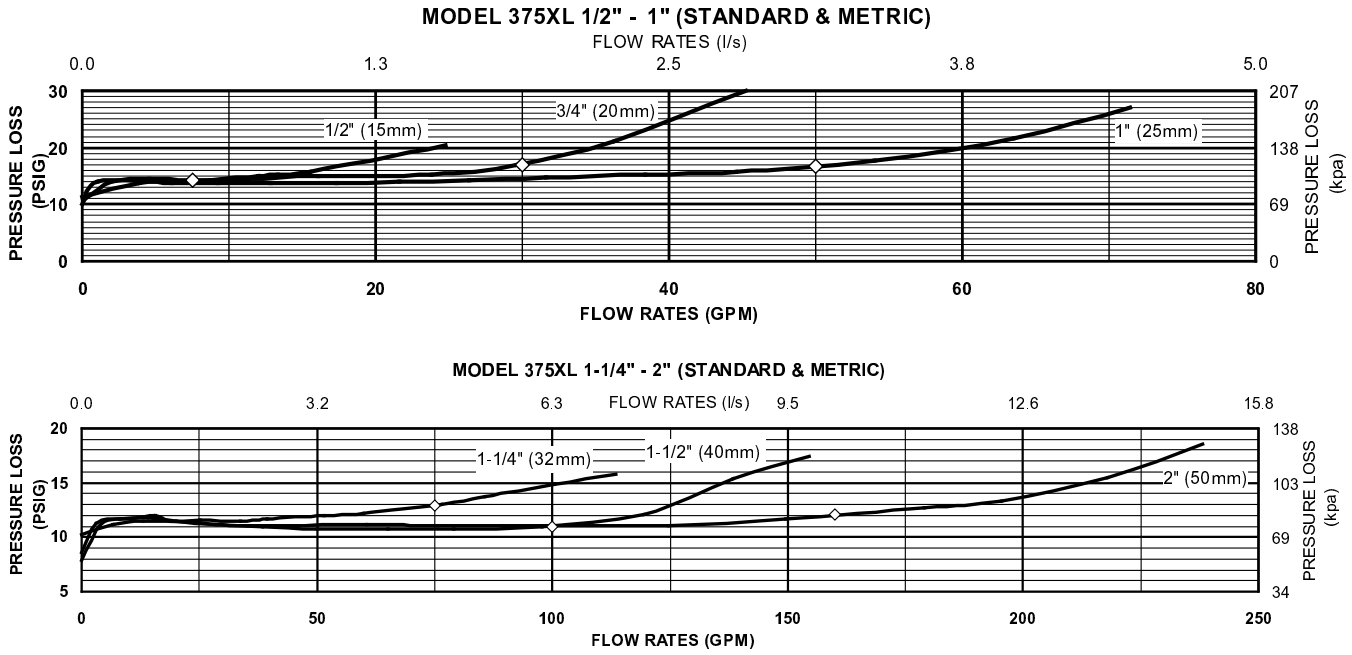
Rev. D
Date: 12/13
Document No. BF-375XL
Patent No. 6, 513, 543, 7,784,483, & 7,905,250
Product No. Model 375XL

Flow Characteristics

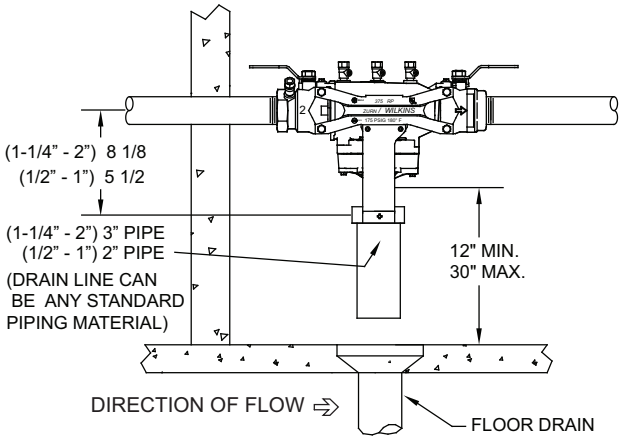
◇ Rated Flow (established by approval agencies)



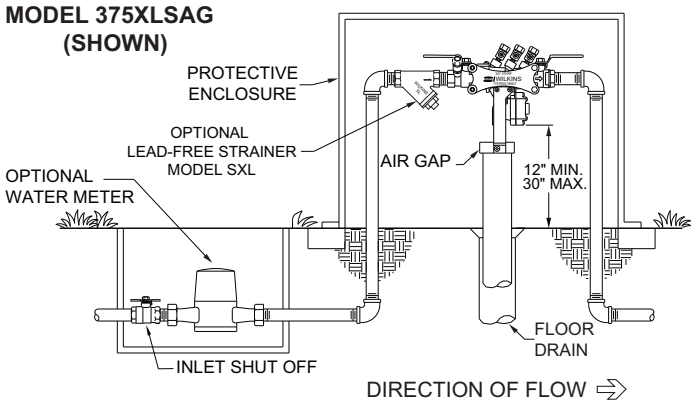
Typical Installation

Local codes shall govern installation requirements. To be installed in accordance with the manufacturers' instructions and the latest edition of the Uniform Plumbing Code. Unless otherwise specified, the assembly shall be mounted at a minimum of 12" (305mm) and a maximum of 30" (762mm) above adequate drains with sufficient side clearance for testing and maintenance. The installation shall be made so that no part of the unit can be submerged.

Capacity thru Schedule 40 Pipe				
Pipe size	5 ft/sec	7.5 ft/sec	10 ft/sec	15 ft/sec
3/8"	3	4	6	9
1/2"	5	7	9	14
3/4"	8	12	17	25
1"	13	20	27	40
1 1/4"	23	35	47	70
1 1/2"	32	48	63	95
2"	52	78	105	167



INDOOR INSTALLATION



OUTDOOR INSTALLATION

Specifications

The Reduced Pressure Principle Backflow Preventer shall be certified to NSF/ANSI 372, ASSE® Listed 1013, rated to 180°F, and supplied with full port ball valves. The main body shall be Nylon and the seat disc elastomers shall be silicone. If installed indoors, the installation shall be supplied with an air gap adapter. The Reduced Pressure Principle Backflow Preventer shall be a ZURN WILKINS Model 375XL.

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Model 375A

Reduced Pressure Principle Assembly

Backflow Preventor (BFP) for building

Application

Designed for installation on potable water lines to protect against both backsiphonage and backpressure of contaminated water into the potable water supply. The Model 375A provides protection where a potential health hazard exists. Ideal for use where Lead-Free* valves are required.

Standards Compliance

- ASSE® Listed 1013
- AWWA Compliant C511 (with gates only), and C550
- IAPMO® Listed
- Certified to NSF/ANSI 372* by IAPMO R&T
- CSA® Certified
- UL® Classified
- C-UL® Classified
- FM® Approved
- Approved by the Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California.
- NYC MEA 484-04-M
- NSF® Listed-Standard 61, Annex G*

*(0.25% MAX. WEIGHTED AVERAGE LEAD CONTENT)

Materials

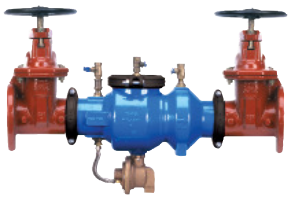
Main valve body	Ductile Iron ASTM A 536 Grade 4
Access covers	Ductile Iron ASTM A 536 Grade 4
Coatings	FDA Approved electrostatic epoxy finish
Internals	Stainless Steel, 300 Series NORYL™, NSF Listed
Fasteners & Springs	Stainless Steel, 300 Series
Seal rings	EPDM (FDA approved)
O-rings	Buna Nitrile (FDA approved)
Sensing line	Stainless Steel, braided hose

Features

Sizes: 2 1/2"*, 3"*, 4", 6", 8", 10"

Maximum working water pressure		175 PSI
Maximum working water temperature		140°F
Hydrostatic test pressure		350 PSI
End connections	(Grooved for steel pipe)	AWWA C606
	(Flanged)	ANSI B16.1 Class 125

*2 1/2 & 3" sizes use 4" body & reducer couplings



(with NRS gates)

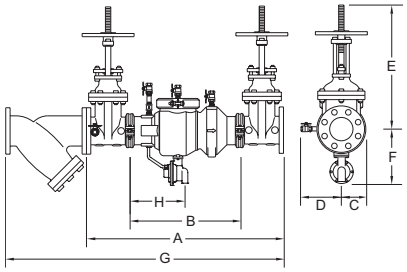
Options (Suffixes can be combined)

- ☐ - with flanged end NRS gate valves (standard)
- ☐ FSC - with epoxy coated wye type strainer (flanged only)
- ☐ G - with grooved end NRS gate valves
- ☐ GF - with grooved inlet gate connection and flanged outlet gate connection
- ☐ FG - with flanged inlet gate connection and grooved outlet gate connection
- ☐ L - less shut-off valves (grooved body connections)
- ☐ MS - with Integral Relief Valve Monitor Switch
- ☒ OSY - with flanged end OS&Y gate valves
- ☐ OSYG - with grooved end OS&Y gate valves
- ☐ BG - with grooved end butterfly valves with integral supervisory switches
- ☐ BF - with flanged end butterfly valves with integral supervisory switches

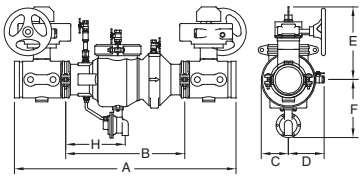
Accessories

- ☐ Repair kit (rubber only)
- ☐ Thermal expansion tank (Model XT)
- ☐ OS & Y Gate valve tamper switch (OSY-40)
- ☐ Air gap (Model AG)
- ☐ Electronic Solenoid Timer (Model EST)
- ☐ QT-SET Quick Test Fitting Set

MODEL 375A with OSY & FSC option



MODEL 375A with BG option



Relief Valve discharge port:
2 1/2" - 6" - 2.75 sq. in.
8" - 10" - 3.69 sq. in.

Attention: Model 375A (grooved body) and Model 375 (flange body) have different lay lengths.

Dimensions & Weights (do not include pkg.)

MODEL 375A SIZE		WEIGHT													
		WITHOUT GATES		WITH NRS GATES (GXF)		WITH OS&Y GATES (GXF)		WITH NRS GATES (GXG)		WITH OS&Y GATES (GXG)		WITH BUTTERFLY VALVES (GXG)		WITH BUTTERFLY VALVES (GXF)	
in.	mm	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg
2 1/2	65	97	44	191	87	199	90	183	83	191	87	139	63	149	68
3	80	96	43.5	211	96	217	98	201	91	207	94	141	64	154	70
4	100	83	38	227	103	237	108	201	91	211	96	131	59	153	69
6	150	136	62	356	162	372	169	326	148	342	155	210	95	240	109
8	200	305	139	757	344	781	355	757	344	757	344	449	204	495	225
10	250	358	162	985	447	1043	473	863	391	921	418	574	260	632	287

MODEL 375A SIZE		DIMENSION (approximate) A		A WITH BUTTERFLY VALVES		B LESS GATE VALVES		C		D		E OS&Y OPEN		E OS&Y CLOSED		E NRS GATE		E WITH BUTTERFLY VALVES		F		G		H	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
2 1/2	65	35 1/8	892	32 1/8	816	20 1/8	511	4 1/2	114	7 1/4	184	16 3/8	416	13 7/8	352	11 3/8	289	8 1/4	210	11	279	45 1/4	1150	9 5/8	247
3	80	36 1/8	918	33	838	20 1/8	511	4 1/2	114	7 1/4	184	18 7/8	479	15 5/8	397	12 3/8	314	8 1/2	216	11	279	46 7/8	1191	9 5/8	247
4	100	38 1/4	972	33 1/4	845	19 7/8	505	4 1/2	114	8	203	22 3/4	578	18 1/4	464	14 3/4	375	9	229	11	279	53 3/8	1356	9 5/8	247
6	150	47 1/4	1200	40 1/4	1022	25 7/8	657	5 1/2	140	10	254	30 1/8	765	23 3/4	603	19	483	10 1/4	260	12 3/8	314	65 3/8	1661	13	330
8	200	62	1575	55	1397	38 1/2	978	10	254	11	279	37 3/4	959	29 1/4	743	22 1/2	572	12	305	15 3/8	391	86 3/8	2194	17 5/16	440
10	250	64 5/8	1641	58 1/2	1485	38 1/2	978	10	254	12	305	45 3/4	1162	35 3/8	899	26 1/2	673	13	330	15 3/8	391	94 3/8	2398	17 1/8	435

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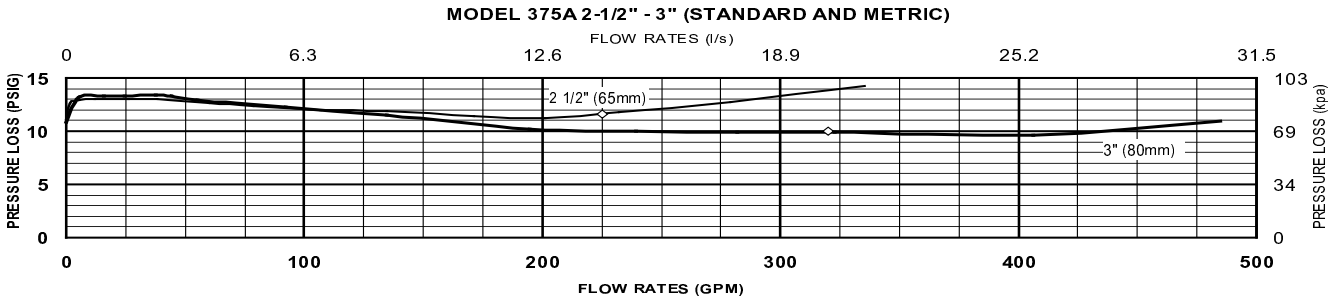
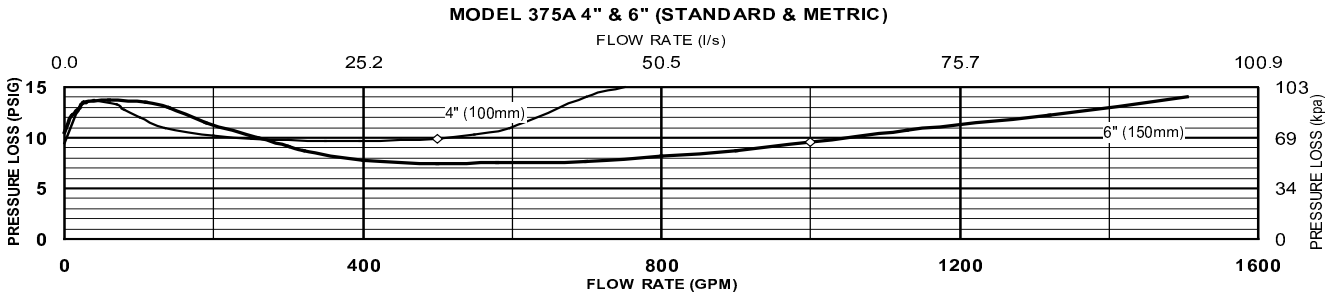
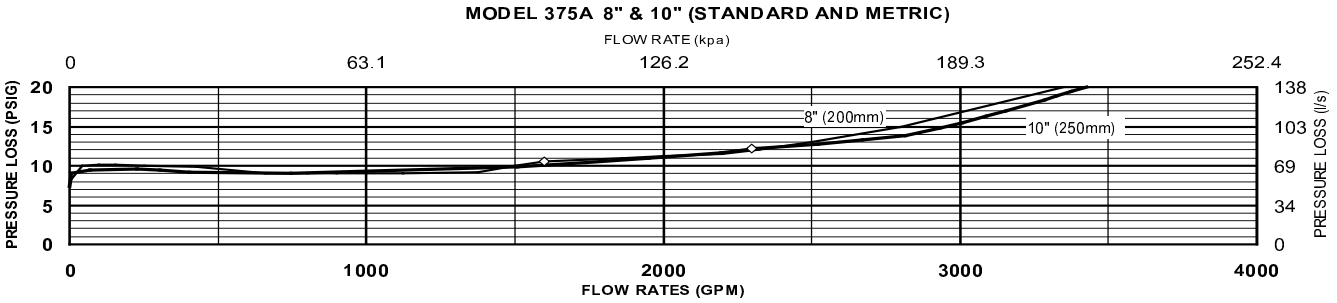
Rev. D
Date: 9/15
Document No. BF-375A
Product No. Model 375A

Flow Characteristics

◇ Rated Flow (established by approval agencies)



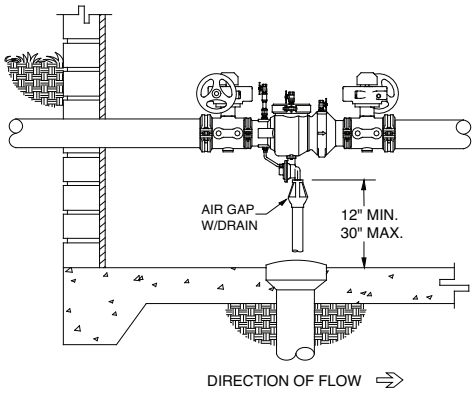




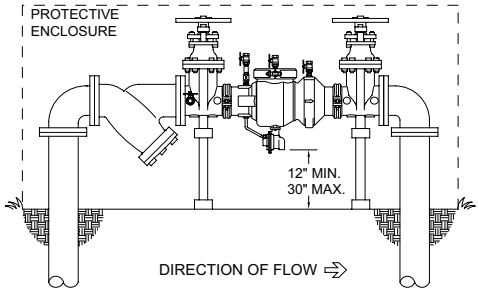
Typical Installation

Local codes shall govern installation requirements. Unless otherwise specified, the assembly shall be mounted at a minimum of 12" (305mm) and a maximum of 30" (762mm) above adequate drains with sufficient side clearance for testing and maintenance. The installation shall be made so that no part of the unit can be submerged.

Capacity thru Schedule 40 Pipe (GPM)				
Pipe size	5 ft/sec	7.5 ft/sec	10 ft/sec	15 ft/sec
2 1/2"	75	112	149	224
3"	115	173	230	346
4"	198	298	397	595
6"	450	675	900	1351
8"	780	1169	1559	2339
10"	1229	1843	2458	3687
12"	1763	2644	3525	5288



INDOOR INSTALLATION (375A with BG option)



OUTDOOR INSTALLATION (375A with FSC option)

Specifications

The Reduced Pressure Principle Backflow Prevention Assembly shall be certified to NSF/ANSI 372, ASSE® Listed 1013, and supplied with full port gate valves. The main body and access cover shall be epoxy coated ductile iron (ASTM A 536 Grade 4), the seat ring and check valve shall be NORYL™, the stem shall be stainless steel (ASTM A 276) and the seat disc elastomers shall be EPDM. The checks and the relief valve shall be accessible for maintenance without removing the device from the line. The Reduced Pressure Principle Backflow Prevention Assembly shall be a ZURN WILKINS Model 375A.

Zurn Industries, LLC | Wilkins
1747 Commerce Way, Paso Robles, CA U.S.A. 93446 Ph. 855-663-9876, Fax 805-238-5766
In Canada | **Zurn Industries Limited**
3544 Nashua Drive, Mississauga, Ontario L4V 1L2 Ph. 905-405-8272, Fax 905-405-1292
www.zurn.com

3

SUBMITTAL

THE CHARLES
ATLANTA, GA
11/20/2017

Customer:
MILLER MECHANICAL
1976 AIRPORT INDUSTRIAL PARK DRIVE
MARIETTA, GA 30060

Submitted By:
Ferguson - Atlanta
11600 Wills Rd.
Alpharetta, GA 30004
Phone: (770) 442-1800

FERGUSON®

Nobody expects more from us than we do®

0413 15417

QUOTE #B107-17-462804

WH1:

AENLB50372053000	AO SMITH	48G 6KW 208V 3PH LB WHTR SWI

Residential Electric Water Heaters

ProMax®

ENLB50 6KW 208V 3PH

ENHANCED HEATING ELEMENTS

- Dual 4500 watt elements for fast recovery and reliable operation.*
- Incoloy stainless steel lower element lasts longer than a standard copper element.

DYNACLEAN™ DIFFUSER DIP TUBE

- Helps reduce lime and sediment buildup and maximizes hot water output. Made from long-lasting PEX cross-linked polymer.

HIGH ENERGY FACTORS

- Eco-friendly non-CFC foam insulation, heat traps and other features combine to yield a higher Energy Factor that maximizes savings on operating costs.

COREGARD™ ANODE ROD

- Our anode rods have a stainless steel core that extends the life of the anode rod allowing superior tank protection far longer than standard anode rods.

BLUE DIAMOND® GLASS COATING

- Provides superior corrosion resistance compared to industry standard glass lining.

ENHANCED-FLOW BRASS DRAIN VALVE

- Our residential water heaters have a solid brass, tamper resistant, enhanced-flow, ball type, drain valve.
- Uses a standard female hose fitting that allows for fast and easy draining during maintenance.
- Designed for easy operation, this valve includes an integral screwdriver slot that features a ¼ turn (open/close) radius, which not only permits full straight-through water flow but also a quick and positive shut off.

*Model ENL-20 has a single element.

CODE COMPLIANCE

- Meets UBC and ICC National Codes and listed with CEC.
- Complies with the Federal Energy Conservation Standards effective April 16, 2015, in accordance with the Energy Policy and Conservation Act (EPCA), as amended.

APPROVED FOR MANUFACTURED HOUSING

- All residential electric water heaters are compliant with HUD Standards for mobile homes/manufactured housing.

CERTIFIED TO UL 174 FOR HOUSEHOLD ELECTRIC WATER HEATERS

CSA CERTIFIED AND ASME RATED T&P RELIEF VALVE

DESIGN-LISTED BY UNDERWRITERS LABORATORIES

- Certified at 300 psi test pressure and 150 psi working pressure.
- Listed according to UL 174 standards governing storage tank-type electric water heaters.

6-YEAR LIMITED TANK AND PARTS WARRANTY

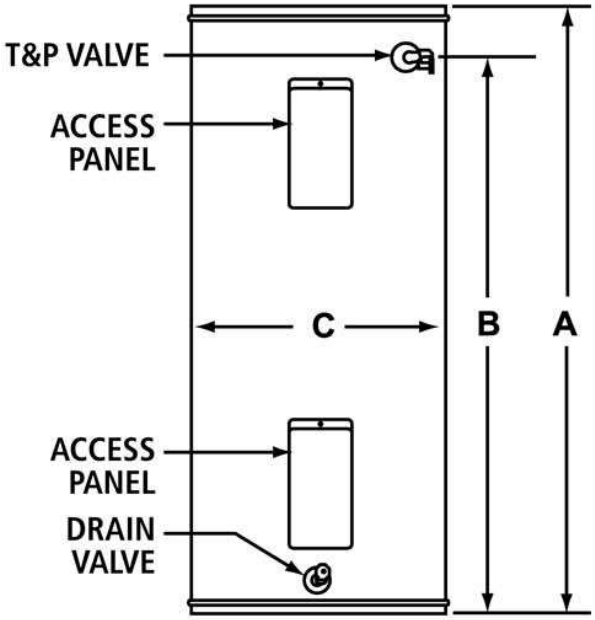
- For complete information, consult written warranty or go to hotwater.com.

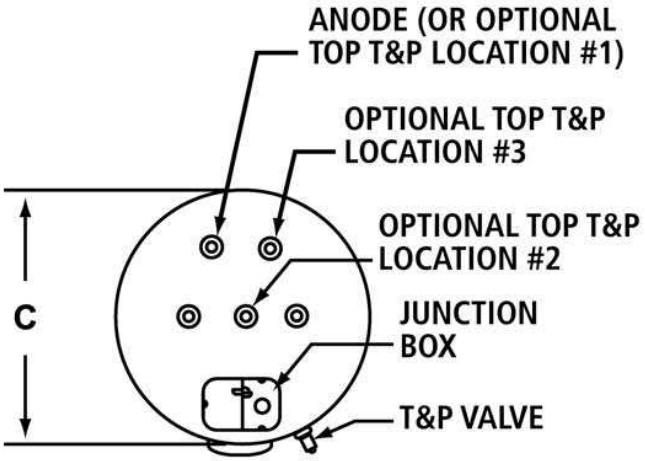
Residential Electric Water Heaters

✓6KW 208V 3PH LB

Model Number	Gallon Capacity	First Hour Rating Gallon	Energy Factor	Recovery @ 90°F Rise Gallon Per Hour	Element Wattage 240V		Dimensions in Inches			Approx. Shipping Weight (lbs)
					Standard	Maximum	A	B	C	
Tall Models										
ENT-30†	30	47	0.95	21	4500	6000	46-1/2	39-1/2	19	95
ENT-40†	40	51	0.95	21	4500	6000	60-1/4	53-1/4	20	118
ENT-50†	50	73	0.95	21	4500	6000	60-1/2	51-1/4	20-1/2	125
ENT-55†	55	76	0.94	21	4500	6000	56-1/2	48-1/2	24	145
Short Models										
ENSB-30*	30	48	0.95	21	4500	6000	39	30-1/2	20	95
ENS-30†	30	49	0.95	21	4500	6000	39-3/4	30-1/2	22	94
ENS-40†	40	55	0.95	21	4500	6000	50	40-3/4	20-1/2	109
ENS-50†	50	62	0.95	21	4500	6000	49-3/4	40-3/8	23	161
Lowboy Top Connect Models										
ENL-20	19.5	N/A	N/A	21	4500	6000	30	21-1/4	20	65
ENLB-30*	28	40	0.95	21	4500	6000	30	21-3/4	20	90
ENL-30†	28	43	0.95	21	4500	6000	31-1/4	21-3/4	24	115
ENLB-40*	38	46	0.95	21	4500	6000	31-3/4	24	24	118
ENL-40†+	38	44	0.95	21	4500	6000	33-1/2	24	26	118
✓ENLB-50*†	48	57	0.95	21	4500	6000	34	25	26-1/2	172

Male 3/4" water connections on 8" center.
*Models ship with supplied insulation blanket.
†For 10-year tank and 6-year parts warranty, change "E" to "P" in the model number (example: ENT-30 becomes PNT-30).
+ Top T&P option not available on this model.
ENL-20 is a single element configuration only
Optional top T&P location #2 is used on the ENT-50, ENT-55, ENS-40 and ENS-50
Optional top T&P location #3 is used on the ENLB-50, ENL-30 and ENLB-30.
Top T&P is not available on the 10 year model PNLB-50.
Dimensions and specifications subject to change without notice in accordance with our policy of continuous product improvement.





For technical information call 800-527-1953. A. O. Smith Corporation reserves the right to make product changes or improvements without prior notice.

WH2:

AENL40202173000	AO SMITH	38 GALLON 4.5 KW 208 VOLTS 1 PH LOBOY WATER HEATER ALUMINUM

Residential Electric Water Heaters

ProMax®

ENL40 4.5KW 208V 1PH

ENHANCED HEATING ELEMENTS

- Dual 4500 watt elements for fast recovery and reliable operation.*
- Incoloy stainless steel lower element lasts longer than a standard copper element.

DYNACLEAN™ DIFFUSER DIP TUBE

- Helps reduce lime and sediment buildup and maximizes hot water output. Made from long-lasting PEX cross-linked polymer.

HIGH ENERGY FACTORS

- Eco-friendly non-CFC foam insulation, heat traps and other features combine to yield a higher Energy Factor that maximizes savings on operating costs.

COREGARD™ ANODE ROD

- Our anode rods have a stainless steel core that extends the life of the anode rod allowing superior tank protection far longer than standard anode rods.

BLUE DIAMOND® GLASS COATING

- Provides superior corrosion resistance compared to industry standard glass lining.

ENHANCED-FLOW BRASS DRAIN VALVE

- Our residential water heaters have a solid brass, tamper resistant, enhanced-flow, ball type, drain valve.
- Uses a standard female hose fitting that allows for fast and easy draining during maintenance.
- Designed for easy operation, this valve includes an integral screwdriver slot that features a ¼ turn (open/close) radius, which not only permits full straight-through water flow but also a quick and positive shut off.

*Model ENL-20 has a single element.

CODE COMPLIANCE

- Meets UBC, CEC and HUD National Codes.
- Meets the thermal efficiency and standby loss requirements of the U.S. Department of Energy and current edition of ASHRAE/IESNA 90.1.
- Complies with the Federal Energy Conservation Standards effective April 16, 2015, in accordance with the Energy Policy and Conservation Act (EPCA), as amended.

APPROVED FOR MANUFACTURED HOUSING

- All residential electric water heaters are compliant with HUD Standards for mobile homes/manufactured housing.

CERTIFIED TO UL 174 FOR HOUSEHOLD ELECTRIC WATER HEATERS

CSA CERTIFIED AND ASME RATED T&P RELIEF VALVE

DESIGN-LISTED BY UNDERWRITERS LABORATORIES

- Certified at 300 PSI test pressure and 150 PSI working pressure.
- Listed according to UL 174 standards governing storage tank-type electric water heaters.

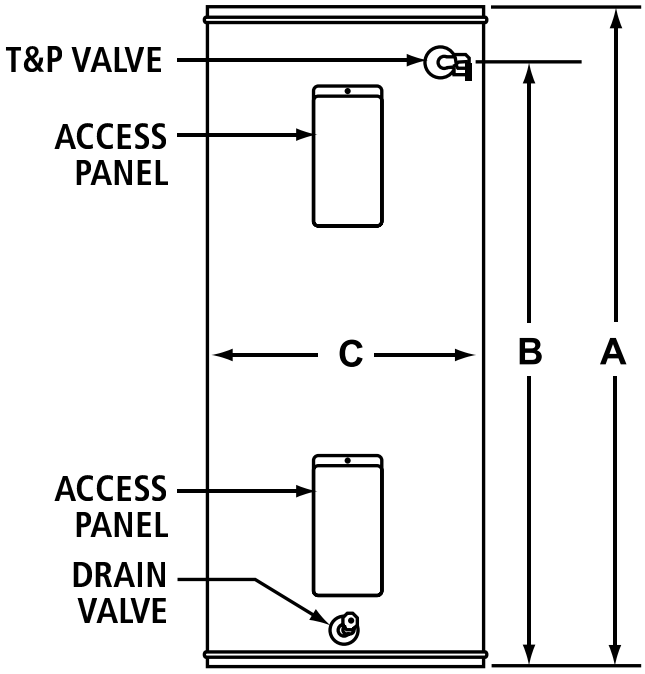
6-YEAR LIMITED TANK AND PARTS WARRANTY

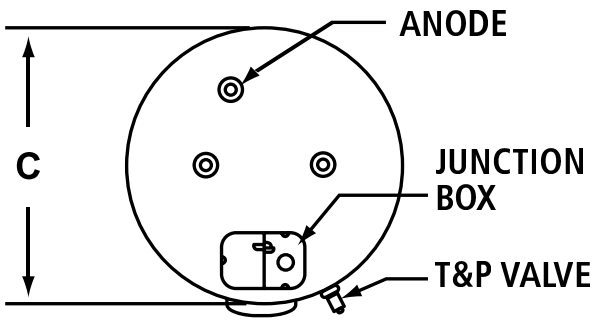
- For complete information, consult written warranty or go to hotwater.com.

Residential Electric Water Heaters

Model Number	Gallon Capacity	First Hour Rating Gallon	Energy Factor	Recovery @ 90° F Rise Gallon Per Hour	Element Wattage 240V		Dimensions in Inches			Approx. Shipping Weight (lbs)
					Standard	Maximum	A	B	C	
Tall Models										
ENT-30†	30	47	0.95	21	4500	6000	46-1/2	39-1/2	19	95
ENT-40†	40	51	0.95	21	4500	6000	60-1/4	53-1/4	20	118
ENTB-50*	50	70	0.95	21	4500	6000	60-1/4	51-1/4	21	131
ENT-50†	50	71	0.95	21	4500	6000	60-1/2	51-1/4	22	134
ENT-55†	55	76	0.94	21	4500	6000	56-1/2	48-1/2	24	145
Short Models										
ENSB-30*	30	48	0.95	21	4500	6000	39	30-1/2	20	95
ENS-30†	30	49	0.95	21	4500	6000	39-3/4	30-1/2	22	94
ENS-40†	40	55	0.95	21	4500	6000	50	40-3/4	22	109
ENS-50†	50	62	0.95	21	4500	6000	49-3/4	40-3/8	24	161
Lowboy Top Connect Models										
ENL-20	19.5	N/A	N/A	21	4500	6000	30	21-1/4	20	65
ENLB-30*	28	40	0.95	21	4500	6000	30	21-3/4	22	96
ENL-30†	28	43	0.95	21	4500	6000	31-1/4	21-3/4	24	115
ENLB-40*	38	46	0.95	21	4500	6000	31-3/4	24	24	118
ENL-40†+	38	44	0.95	21	4500	6000	33-1/2	24	26	118

3/4" water connections on 8" center.
*Models ship with supplied insulation blanket.
†For 10-year tank and 6-year parts warranty, change "E" to "P" in the model number (example: ENT-30 becomes PNT-30).
+ Top T&P option not available on this model.
ENL-20 is a single element configuration only
Dimensions and specifications subject to change without notice in accordance with our policy of continuous product improvement.





For technical information call 800-527-1953. A. O. Smith Corporation reserves the right to make product changes or improvements without prior notice.

WH3:

AENL20261493000	AOSMITH	19.9G LB 1PH ELEC WHTR 4.5KW ALUM

COMMERCIAL-GRADE
RESIDENTIAL ELECTRIC WATER HEATERS

ENL20 4.5KW 208V 1PH

PROLINE® STANDARD
COMMERCIAL-GRADE RESIDENTIAL

ENHANCED HEATING ELEMENTS
- Dual 4500 watt elements for fast recovery and reliable operation.*
- Incoloy stainless steel lower element lasts longer than a standard copper element.

DYNACLEAN™ DIFFUSER DIP TUBE
- Helps reduce lime and sediment buildup and maximizes hot water output. Made from long-lasting PEX cross-linked polymer (diffuser design is not used on lowboy models.)

HIGH UNIFORM ENERGY FACTOR (UEF)
- Eco-friendly non-CFC foam insulation, heat traps and other features combine to yield a higher UEF that maximizes savings on operating costs.

COREGARD™ ANODE ROD
- Our anode rods have a stainless steel core that extends the life of the anode rod allowing superior tank protection far longer than standard anode rods.

BLUE DIAMOND® GLASS COATING
- Provides superior corrosion resistance compared to industry standard glass lining.

ENHANCED-FLOW BRASS DRAIN VALVE
- Our residential water heaters have a solid brass, tamper resistant, enhanced-flow, ball type, drain valve.
- Uses a standard female hose fitting that allows for fast and easy draining during maintenance.
- Designed for easy operation, this valve includes an integral screwdriver slot that features a ¼ turn (open/close) radius, which not only permits full straight-through water flow but also a quick and positive shut off.

*Model ENL-20 has a single element.

CODE COMPLIANCE
- Meets UBC and ICC National Codes and listed with CEC.
- Complies with the Federal Energy Conservation Standards effective April 16, 2015, in accordance with the Energy Policy and Conservation Act (EPCA), as amended.

APPROVED FOR MANUFACTURED HOUSING
- All residential electric water heaters are compliant with HUD Standards for mobile homes/manufactured housing.

CERTIFIED TO UL 174 FOR HOUSEHOLD ELECTRIC WATER HEATERS

CSA CERTIFIED AND ASME RATED T&P RELIEF VALVE

DESIGN-LISTED BY UNDERWRITERS LABORATORIES
- Certified at 300 psi test pressure and 150 psi working pressure.
- Listed according to UL 174 standards governing storage tank-type electric water heaters.

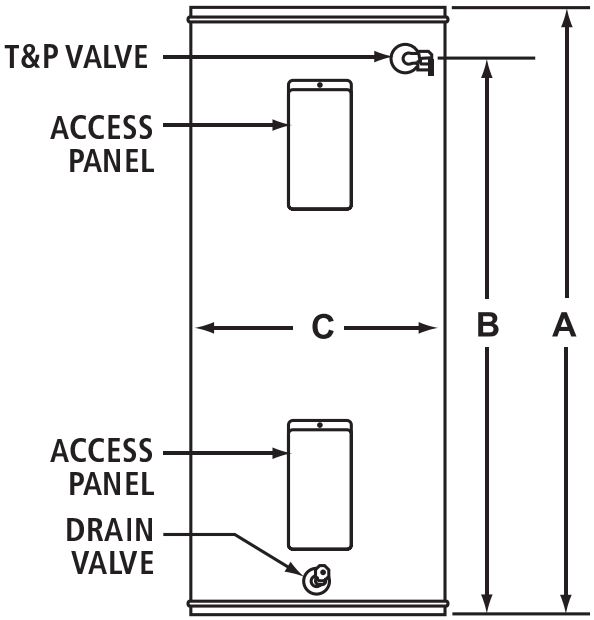
6-YEAR LIMITED TANK AND PARTS WARRANTY
- For complete information, consult written warranty or go to hotwater.com.

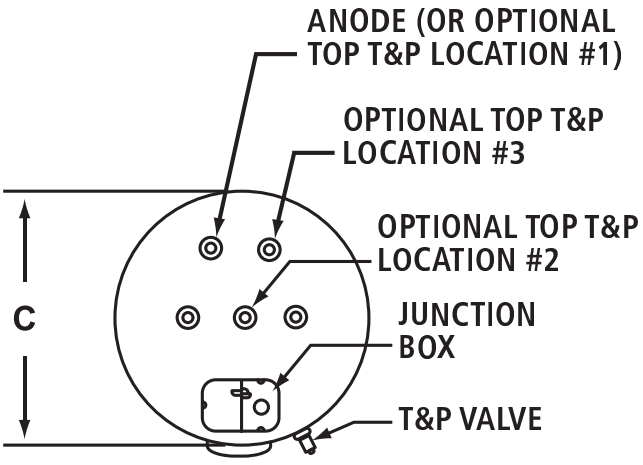
Low Lead Content

COMMERCIAL-GRADE
RESIDENTIAL ELECTRIC WATER HEATERS

Model Number	Nominal Capacity	Rated Storage Volume	First Hour Rating (Gallons)	UEF	Recovery @ 90°F Rise Gallon Per Hour	Element Wattage 240V		Dimensions in Inches			Approx. Shipping Weight (lbs)
						Standard	Maximum	A	B	C	
Tall Models											
ENT-30†	30	27	48	0.89	21	4500	6000	46-1/2	39-1/2	19	95
ENT-40†	40	36	53	0.92	21	4500	6000	61-1/4	53-1/4	18	118
ENT-50†	50	46	62	0.93	21	4500	6000	60-1/2	51-1/4	20-1/2	125
ENT-55†	55	55	72	0.93	21	4500	6000	56-1/2	48-1/2	24	145
Short Models											
ENSB-30*	30	27	50	0.90	21	4500	6000	39	30-1/2	20	95
ENS-30†	30	27	47	0.89	21	4500	6000	39-3/4	30-1/2	22	94
ENS-40†	40	37	55	0.92	21	4500	6000	49-3/4	40-3/4	20-1/2	109
ENS-50†	50	46	57	0.92	21	4500	6000	49-1/4	40-3/8	23	161
Lowboy Top Connect Models											
ENL-20	19.9	19	N/A	N/A	21	4500	6000	30	21-1/4	20	65
ENLB-30*†	28	26	46	0.89	21	4500	6000	30	21-3/4	20	90
ENL-30†	28	26	46	0.90	21	4500	6000	30	21-3/4	22	115
ENL-36†	36	33	51	0.92	21	4500	6000	32	24	24	118
ENL-40†	38	35	49	0.89	21	4500	6000	33 1/2	24	26	118
ENLB-40*†	38	35	47	0.93	21	4500	6000	32	24	23	118
ENLB-50*†	48	44	60	0.93	21	4500	6000	34	25	26-1/2	172
ENL-50†	51	48	54	0.92	21	4500	6000	36	25	26-1/2	172

Male 3/4" water connections on 8" center.
*Models ship with supplied insulation blanket.
†For 10-year tank and 10-year parts warranty, change "E" to "P" in the model number (example: ENT-30 becomes PNT-30).
ENL-20 is a single element configuration only.
Optional top T&P location #2 is used on the ENT-50, ENT-55, ENS-40 and ENS-50.
Optional top T&P location #3 is used on the ENLB-50, ENL-30, ENLB-30, ENLB-40, ENL-50 and ENL-36.
Top T&P is not available on the 10 year lowboy models.
Dimensions and specifications subject to change without notice in accordance with our policy of continuous product improvement.





For technical information call 800-527-1953. A. O. Smith Corporation reserves the right to make product changes or improvements without prior notice.

WH4:

AENL40202173000	AO SMITH	38 GALLON 4.5 KW 208 VOLTS 1 PH LOBOY WATER HEATER ALUMINUM

Residential Electric Water Heaters

ProMax®

ENL40 4.5KW 208V 1PH

ENHANCED HEATING ELEMENTS

- Dual 4500 watt elements for fast recovery and reliable operation.*
- Incoloy stainless steel lower element lasts longer than a standard copper element.

DYNACLEAN™ DIFFUSER DIP TUBE

- Helps reduce lime and sediment buildup and maximizes hot water output. Made from long-lasting PEX cross-linked polymer.

HIGH ENERGY FACTORS

- Eco-friendly non-CFC foam insulation, heat traps and other features combine to yield a higher Energy Factor that maximizes savings on operating costs.

COREGARD™ ANODE ROD

- Our anode rods have a stainless steel core that extends the life of the anode rod allowing superior tank protection far longer than standard anode rods.

BLUE DIAMOND® GLASS COATING

- Provides superior corrosion resistance compared to industry standard glass lining.

ENHANCED-FLOW BRASS DRAIN VALVE

- Our residential water heaters have a solid brass, tamper resistant, enhanced-flow, ball type, drain valve.
- Uses a standard female hose fitting that allows for fast and easy draining during maintenance.
- Designed for easy operation, this valve includes an integral screwdriver slot that features a ¼ turn (open/close) radius, which not only permits full straight-through water flow but also a quick and positive shut off.

*Model ENL-20 has a single element.

CODE COMPLIANCE

- Meets UBC, CEC and HUD National Codes.
- Meets the thermal efficiency and standby loss requirements of the U.S. Department of Energy and current edition of ASHRAE/IESNA 90.1.
- Complies with the Federal Energy Conservation Standards effective April 16, 2015, in accordance with the Energy Policy and Conservation Act (EPCA), as amended.

APPROVED FOR MANUFACTURED HOUSING

- All residential electric water heaters are compliant with HUD Standards for mobile homes/manufactured housing.

CERTIFIED TO UL 174 FOR HOUSEHOLD ELECTRIC WATER HEATERS

CSA CERTIFIED AND ASME RATED T&P RELIEF VALVE

DESIGN-LISTED BY UNDERWRITERS LABORATORIES

- Certified at 300 PSI test pressure and 150 PSI working pressure.
- Listed according to UL 174 standards governing storage tank-type electric water heaters.

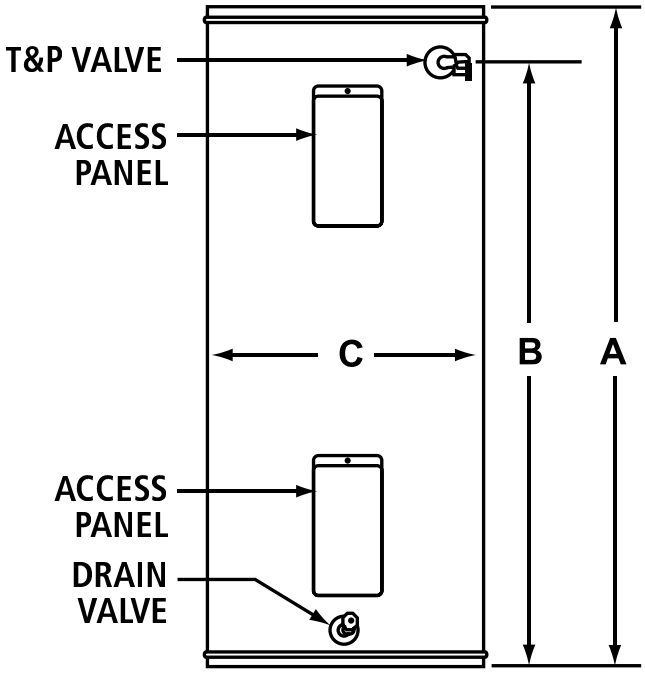
6-YEAR LIMITED TANK AND PARTS WARRANTY

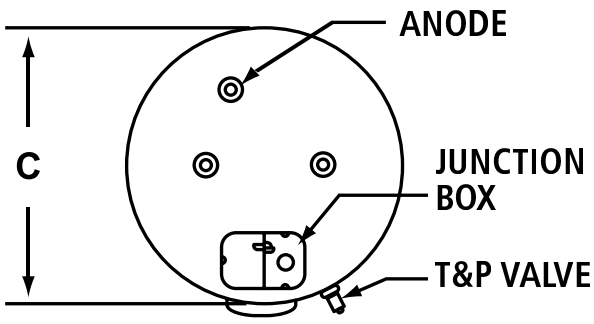
- For complete information, consult written warranty or go to hotwater.com.

Residential Electric Water Heaters

Model Number	Gallon Capacity	First Hour Rating Gallon	Energy Factor	Recovery @ 90° F Rise Gallon Per Hour	Element Wattage 240V		Dimensions in Inches			Approx. Shipping Weight (lbs)
					Standard	Maximum	A	B	C	
Tall Models										
ENT-30†	30	47	0.95	21	4500	6000	46-1/2	39-1/2	19	95
ENT-40†	40	51	0.95	21	4500	6000	60-1/4	53-1/4	20	118
ENTB-50*	50	70	0.95	21	4500	6000	60-1/4	51-1/4	21	131
ENT-50†	50	71	0.95	21	4500	6000	60-1/2	51-1/4	22	134
ENT-55†	55	76	0.94	21	4500	6000	56-1/2	48-1/2	24	145
Short Models										
ENSB-30*	30	48	0.95	21	4500	6000	39	30-1/2	20	95
ENS-30†	30	49	0.95	21	4500	6000	39-3/4	30-1/2	22	94
ENS-40†	40	55	0.95	21	4500	6000	50	40-3/4	22	109
ENS-50†	50	62	0.95	21	4500	6000	49-3/4	40-3/8	24	161
Lowboy Top Connect Models										
ENL-20	19.5	N/A	N/A	21	4500	6000	30	21-1/4	20	65
ENLB-30*	28	40	0.95	21	4500	6000	30	21-3/4	22	96
ENL-30†	28	43	0.95	21	4500	6000	31-1/4	21-3/4	24	115
ENLB-40*	38	46	0.95	21	4500	6000	31-3/4	24	24	118
ENL-40†+	38	44	0.95	21	4500	6000	33-1/2	24	26	118

3/4" water connections on 8" center.
*Models ship with supplied insulation blanket.
†For 10-year tank and 6-year parts warranty, change "E" to "P" in the model number (example: ENT-30 becomes PNT-30).
+ Top T&P option not available on this model.
ENL-20 is a single element configuration only
Dimensions and specifications subject to change without notice in accordance with our policy of continuous product improvement.





For technical information call 800-527-1953. A. O. Smith Corporation reserves the right to make product changes or improvements without prior notice.

WH5:

AENL40202173000	AO SMITH	38 GALLON 4.5 KW 208 VOLTS 1 PH LOBOY WATER HEATER ALUMINUM

Residential Electric Water Heaters

ProMax®

ENL40 4.5KW 208V 1PH

ENHANCED HEATING ELEMENTS

- Dual 4500 watt elements for fast recovery and reliable operation.*
- Incoloy stainless steel lower element lasts longer than a standard copper element.

DYNACLEAN™ DIFFUSER DIP TUBE

- Helps reduce lime and sediment buildup and maximizes hot water output. Made from long-lasting PEX cross-linked polymer.

HIGH ENERGY FACTORS

- Eco-friendly non-CFC foam insulation, heat traps and other features combine to yield a higher Energy Factor that maximizes savings on operating costs.

COREGARD™ ANODE ROD

- Our anode rods have a stainless steel core that extends the life of the anode rod allowing superior tank protection far longer than standard anode rods.

BLUE DIAMOND® GLASS COATING

- Provides superior corrosion resistance compared to industry standard glass lining.

ENHANCED-FLOW BRASS DRAIN VALVE

- Our residential water heaters have a solid brass, tamper resistant, enhanced-flow, ball type, drain valve.
- Uses a standard female hose fitting that allows for fast and easy draining during maintenance.
- Designed for easy operation, this valve includes an integral screwdriver slot that features a ¼ turn (open/close) radius, which not only permits full straight-through water flow but also a quick and positive shut off.

*Model ENL-20 has a single element.

CODE COMPLIANCE

- Meets UBC, CEC and HUD National Codes.
- Meets the thermal efficiency and standby loss requirements of the U.S. Department of Energy and current edition of ASHRAE/IESNA 90.1.
- Complies with the Federal Energy Conservation Standards effective April 16, 2015, in accordance with the Energy Policy and Conservation Act (EPCA), as amended.

APPROVED FOR MANUFACTURED HOUSING

- All residential electric water heaters are compliant with HUD Standards for mobile homes/manufactured housing.

CERTIFIED TO UL 174 FOR HOUSEHOLD ELECTRIC WATER HEATERS

CSA CERTIFIED AND ASME RATED T&P RELIEF VALVE

DESIGN-LISTED BY UNDERWRITERS LABORATORIES

- Certified at 300 PSI test pressure and 150 PSI working pressure.
- Listed according to UL 174 standards governing storage tank-type electric water heaters.

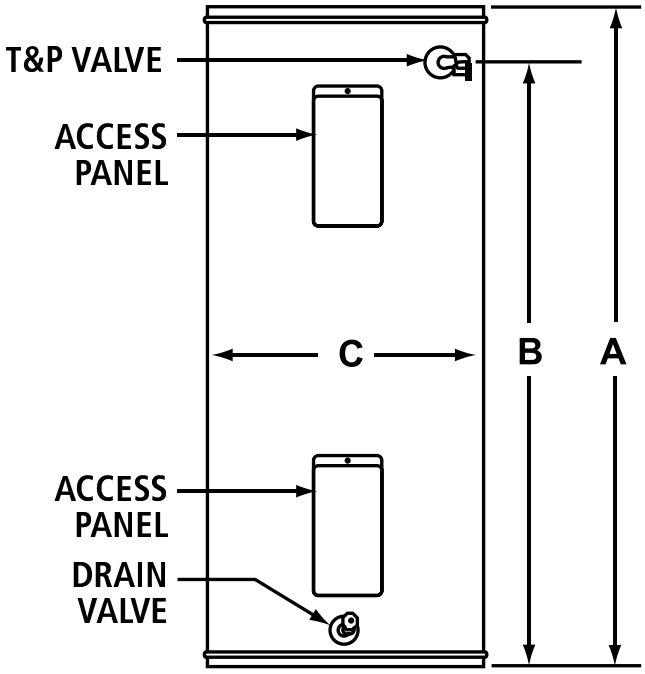
6-YEAR LIMITED TANK AND PARTS WARRANTY

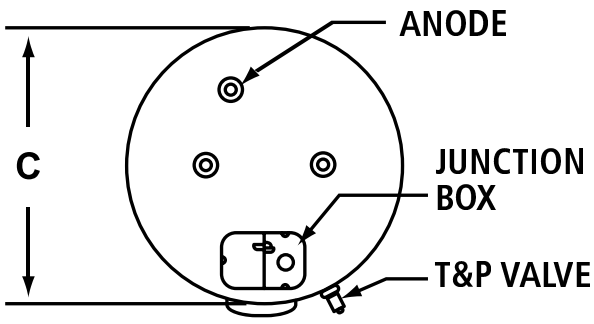
- For complete information, consult written warranty or go to hotwater.com.

Residential Electric Water Heaters

Model Number	Gallon Capacity	First Hour Rating Gallon	Energy Factor	Recovery @ 90° F Rise Gallon Per Hour	Element Wattage 240V		Dimensions in Inches			Approx. Shipping Weight (lbs)
					Standard	Maximum	A	B	C	
Tall Models										
ENT-30†	30	47	0.95	21	4500	6000	46-1/2	39-1/2	19	95
ENT-40†	40	51	0.95	21	4500	6000	60-1/4	53-1/4	20	118
ENTB-50*	50	70	0.95	21	4500	6000	60-1/4	51-1/4	21	131
ENT-50†	50	71	0.95	21	4500	6000	60-1/2	51-1/4	22	134
ENT-55†	55	76	0.94	21	4500	6000	56-1/2	48-1/2	24	145
Short Models										
ENSB-30*	30	48	0.95	21	4500	6000	39	30-1/2	20	95
ENS-30†	30	49	0.95	21	4500	6000	39-3/4	30-1/2	22	94
ENS-40†	40	55	0.95	21	4500	6000	50	40-3/4	22	109
ENS-50†	50	62	0.95	21	4500	6000	49-3/4	40-3/8	24	161
Lowboy Top Connect Models										
ENL-20	19.5	N/A	N/A	21	4500	6000	30	21-1/4	20	65
ENLB-30*	28	40	0.95	21	4500	6000	30	21-3/4	22	96
ENL-30†	28	43	0.95	21	4500	6000	31-1/4	21-3/4	24	115
ENLB-40*	38	46	0.95	21	4500	6000	31-3/4	24	24	118
ENL-40†+	38	44	0.95	21	4500	6000	33-1/2	24	26	118

3/4" water connections on 8" center.
*Models ship with supplied insulation blanket.
†For 10-year tank and 6-year parts warranty, change "E" to "P" in the model number (example: ENT-30 becomes PNT-30).
+ Top T&P option not available on this model.
ENL-20 is a single element configuration only
Dimensions and specifications subject to change without notice in accordance with our policy of continuous product improvement.





For technical information call 800-527-1953. A. O. Smith Corporation reserves the right to make product changes or improvements without prior notice.

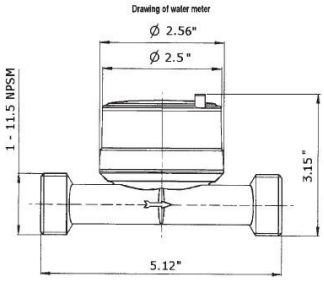
4

Minomess 130
with Reed Switch for Cold Water

Domestic Water Meters

Minol
All that counts.

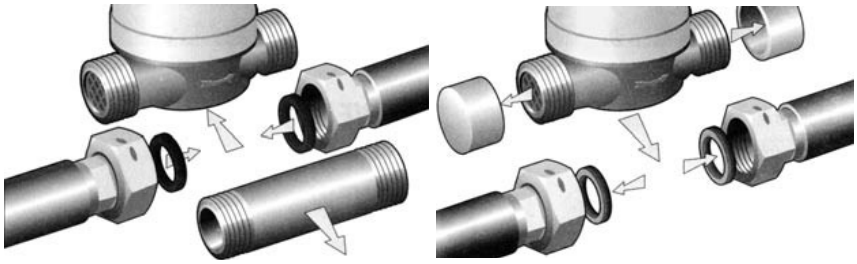
Advantages:
- Cost-effective
- Compact size
- For cold water applications
- Single-jet
- Easy Installation—*As easy as installing a spacer during rough in.*
- Polymer meter body
- 1-year limited warranty
- Lifetime warranty for Minol billing clients
- Pulse output
- 7 digit odometer
- ANSI/NSF 61 Certified



Connection Size	Std. ANSI/ASME b1.20.1-1983 1-11.5 SNPSM thread 5/8 x 3/4 in. ID
Dimensions:	
Mounting length	5.12 in.
Width	2.50 in.
Height	3.15 in.
Weight	1.35 lb.
Water Temperature Range:	40° F to 120° F
Meter Register:	
Maximum reading	9,999,999 US gal.
Resolution (digit register)	1 US gal.
Resolution (indicator dial)	0.05 US gal.
Reed Switch:	
Type	Dry contact
Contact rating	100 mA max.
Resolution	1 contact closure per 1 US gal.
Duty cycle	0.7 gal. open/0.3 gal. closed (typ.)
Cable length (2-wire)	59 inches
Pressure Drop:	
At 22.02 gpm	< 14.50 PSI (typ. <8.70 PSI)
At 11.01 gpm	< 3.625 PSI

Installation:
- Local plumbing codes and regulations must be followed for water meter use and installation.
- A 1 $^{1/2}$" length of straight pipe "settling path" is required just up-stream of the water meter.
- All sediment must be flushed out through a spacer pipe before meter installation.
- Install the meter in an easily accessible area after the shut off valve. Must be accessible for manual readings, repair and/or replacement.
- The flow indicator arrow stamped on the water meter body must be installed in the direction of water flow.
- Meter couplings are required for water meter installations and are available separately.
- Meter register may be turned 360 degrees for easier reading.
- Do not carry or support the meter by cable or wire.
- Indoor installation only.

Options:
- Meter couplings — 2 required per meter
- Meter spacer pipe — (length 5.12 in.)



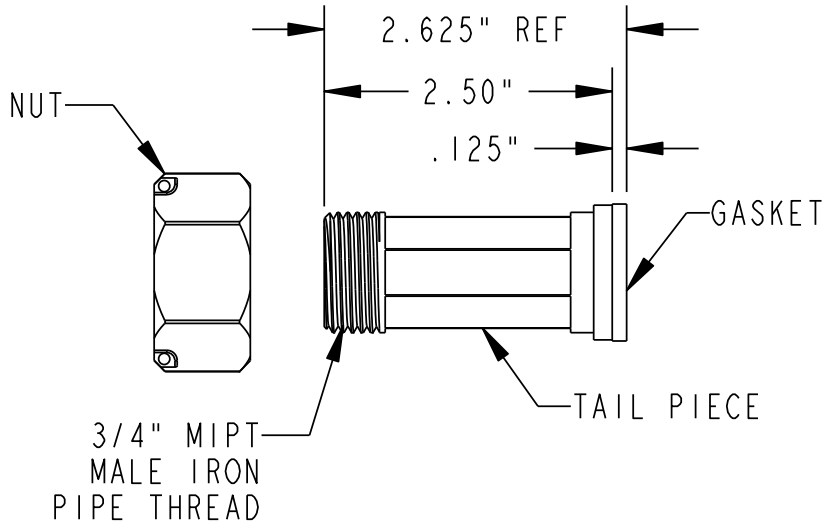
Different Applications:
- Apartments
- Condominiums
- Commercial Buildings
- Assisted Living Communities
- Manufacturing Facilities

(AWWA specification shown for comparison)

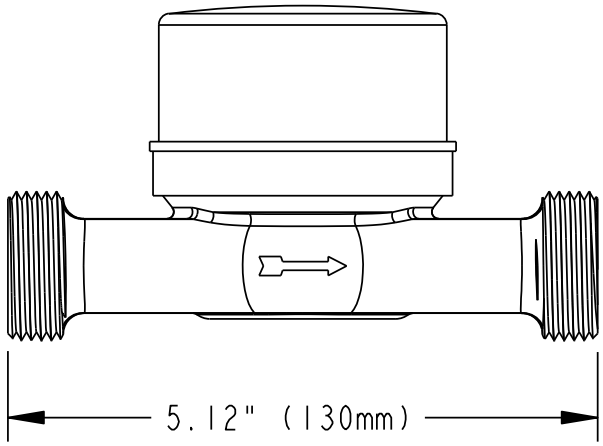
Accuracy	AWWA Spec	Minomess 130
Minimum flow (0.25-1 gpm)	95-101.5%	97-103%
Normal flow (1-20 gpm)	98.5-101.5%	98.5-101.5%
Safe maximum operating capacity	20 gpm	22.02 gpm

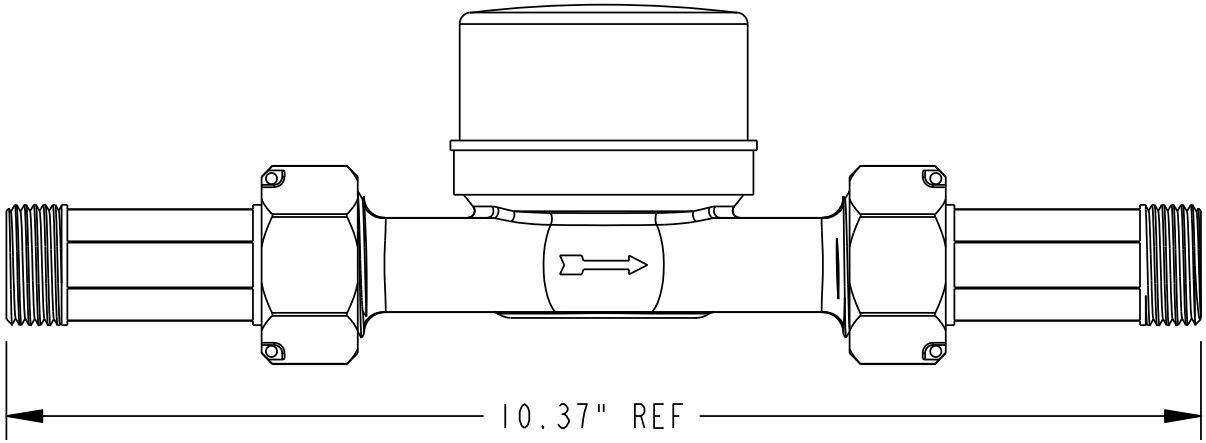
Art-No.137145

3/4" METER COUPLING



MINOMESS 130 METER





NOTES:
1) EACH 3/4" METER COUPLING ADDS APPROXIMATELY 2.625"L WHEN YOU INCLUDE THE .125" THICK GASKET

	SIGNATURE & DATE
DR	S. PALLUTH 02/11/13
CHK	
PE	
APPD	
SCALE 1:.6	WT

MINOMESS 130 METER WITH TWO STANDARD 3/4" METER COUPLINGS

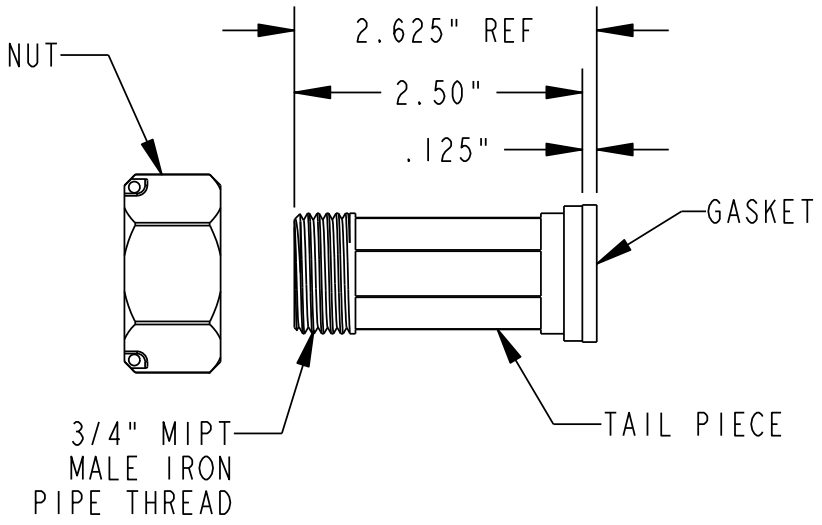
ZENNER PERFORMANCE
1910 E. WESTWARD AVE
BANNING, CALIFORNIA 92220

A DWG SIZE

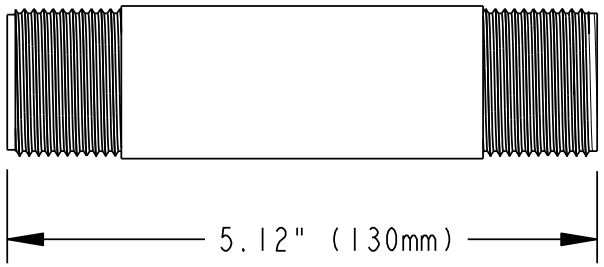
MINOMESS 130

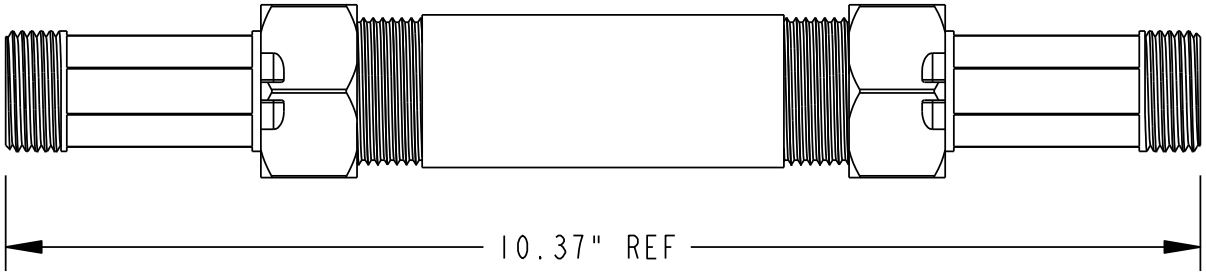
SHEET | OF |

3/4" METER COUPLING



MINOMESS 130 TUBE SPACER





NOTES:
1) EACH 3/4" METER COUPLING ADDS APPROXIMATELY 2.625"L WHEN YOU INCLUDE THE .125" THICK GASKET

	SIGNATURE & DATE
DR	S. PALLUTH 03/04/14
CHK	
PE	
APPD	
SCALE 1:.6	WT

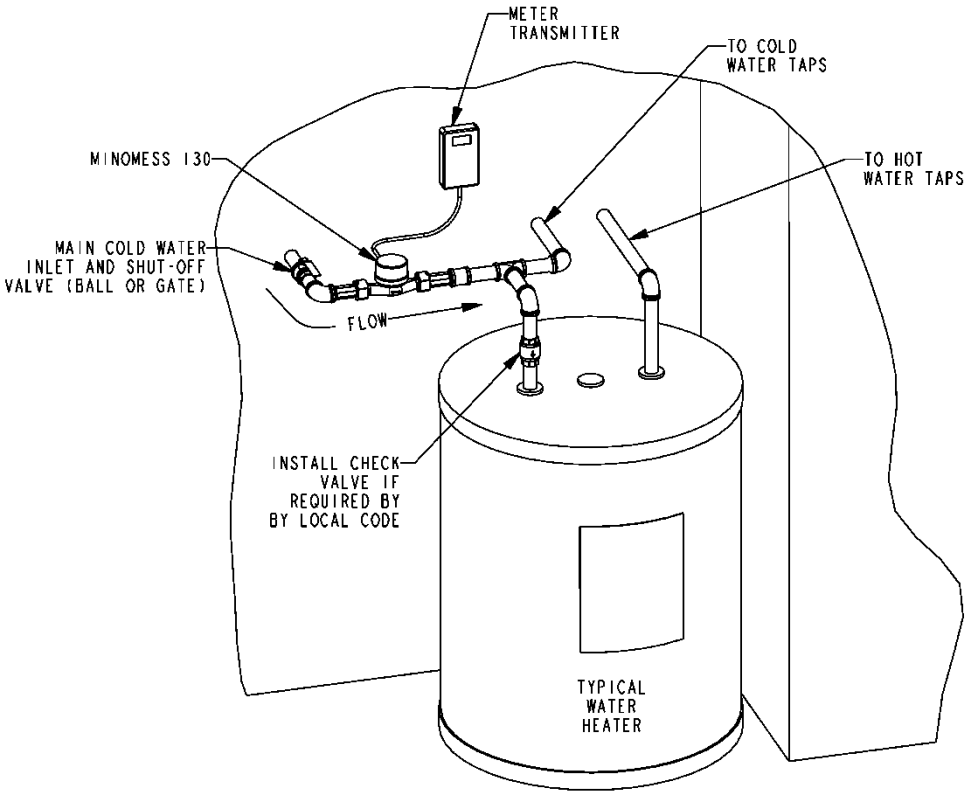
MINOMESS 130 TUBE SPACER WITH TWO STANDARD 3/4" METER COUPLINGS

ZENNER PERFORMANCE
1910 E. WESTWARD AVE
BANNING, CALIFORNIA 92220

A
DWG SIZE

MIN130-TUBE-INSTALL

SHEET 1 OF 1



Notes:

1. Cut cold water pipe and insert idler tube and meter couplings.
2. Install meter, after water heater is installed and pipes are flushed.
3. Mount meter in direction shown.
4. DO NOT carry or support meter by cable!
5. Meter must remain accessible for manual reading, repair and replacement.
6. The plumber is responsible for providing the transition fittings for connection to the threaded meter couplings.
7. The meter couplings and the idler tubes are to be installed by the plumber, during plumbing rough in.

Available From:

EN1501-XL - Pulse counting transmitter with extended life battery

The EN1501-XL pulse counting transmitter provides the means for tracking pulse meter usage information. The meter generated pulses or switch closures are counted by the transmitter and the data is transmitted periodically to the remote data logger. The EN1501-XL features a 20 year battery life which reduces maintenance and lowers operating costs.

Why Inovonics Wireless is Best

The Inovonics Commercial Mesh Network has been specifically developed for commercial applications to provide the most cost effective solution for a wide range of applications, while setting new standards for performance and reliability in a wireless sensor network.

Reliability

Inovonics EchoStream 900MHz radio utilizes a unique frequency hopping, spread spectrum technology to meet the demands of an increasingly cluttered wireless world.

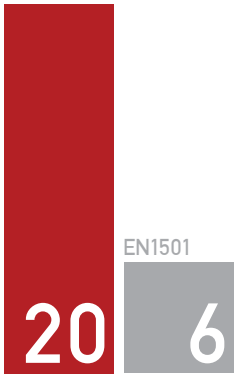
Flexibility

The flexibility of wireless is a necessity in today's dynamic commercial environments. The self-configuring EchoStream Commercial Mesh Network allows you to adapt to changing floor plans and requirements in a matter of minutes. New sensors can be added to the network as fast as they can be mounted.

Scalability

The EchoStream Commercial Mesh Network's backbone of intelligent repeaters can extend coverage to thousands of sensors across entire commercial campuses.

EN1501-XL



The EN1501-XL features an outstanding 20+ years of calculated battery life.

Features

- Long life battery (calculated at over 20 years, warranted for 10 years), which reduces meter maintenance and lowers operating costs
- Case tamper protection
- TapWatch submetering system compatible
- Compatible with virtually any meter with a pulse output

Transmission Frequency

- Approximately once an hour
- Installation rapid transmit mode provides once/minute transmissions for fast site verification

Standards Compliance

- No end user FCC license required

Operating Environment

- 32° to 140°F, up to 90% relative humidity, non-condensing

Battery

- Panasonic BR-AG lithium battery
- Low battery detection provides approximately two week advance notice before battery fails

Input

- Pulse signal from utility meter (consult Inovonics for list of compatible meters)

Dimensions

- 3.5" x 1.7" x 0.9"

Weight

- 1.9 oz

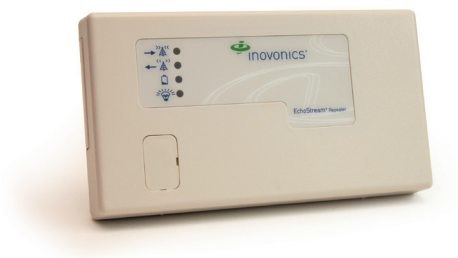
Frequency Options

- 902-928 MHz for North America

- The range and performance of any wireless product depends on the structure and environment in which it operates.
- Continual enhancements to our products may cause specifications to change without notice.

315 CTC Boulevard, Louisville, CO 80027 • Phone: 303.939.9336 • Toll-Free: 800.782.2709 • Fax: 303.939.8977 • E-mail: sales@inovonics.com

www.inovonics.com



EN5040-20T High Power Repeater with Transformer

The EN5040-20T high power repeater with transformer decodes and re-transmits signals from Inovonics transmitters, acting as a range expander for any Inovonics EchoStream transmission that it hears. Several layers of repeaters can be employed to provide coverage of large facilities, multi-story buildings or sites with multiple buildings. It is a line-powered device, and includes an on-board lithium-ion battery for backup power. For applications that require protection from the environmental elements, the EN5040-20T may be placed in an outdoor weatherproof enclosure (ACC650).

Product Features

Supervises for low battery, loss of line power, case tamper, back tamper and jam detection
Incorporates sophisticated signal management
Includes backup battery
Includes power transformer
Self configuring
Case tamper protection

Product Specifications

Dimensions:	6.5" x 3.5" x 1"
Weight:	7.14 oz.
Power requirement:	14 VAC, 60Hz, 250 mA; transformer included
Battery capacity:	3.6 V, 2900 mAhr
Typical back-up battery life:	24 hours
Accessories:	ACC650: weatherproof plastic enclosure for outdoor installations; BAT850: replacement lithium-ion battery assembly
Operating environment:	
Temperature:	32 to 140°F for UL installations (-4° to 140°F)
Humidity:	Up to 90% (non-condensing)
Market:	North America
EchoStream® frequency:	902-928 MHz, frequency hopping spread spectrum
Check-in time frequency:	20 minutes
Regulatory compliance:	FCC, RoHS, UL 2560[1]

Reference Materials (available at www.inovonics.com)

EN5040-20T EchoStream High Power Repeater Installation and Operation Manual

- The range and performance of any wireless product depends on the structure and environment in which it operates.
- Continual enhancements to our products may cause specifications to change without notice.
- Patents: 7,154,866; 7,554,932; 7,746,804; others pending.

[1] Partners must achieve emergency call system certification from a nationally recognized testing laboratory to claim compliance with UL 2560.

RDL8500 Remote Data Logger

The RDL8500 remote data logger is installed at a submetering site's head end location to collect data from transmitters using the EN4000, EN6540 and/or FA403 RF gateways. The RDL8500 can remotely communicate with the billing service or with an onsite technician using the TapWatch.com website or the Inovonics TapWatch 3 software.

Product Features

- Provides reliable data collection for gas, water, electric and run-time meters
- Logs data for up to 2000 individually managed meters
- Stores 90 periods worth of meter reads per individual meter
- Time stamps incoming data
- LAN (RJ45) connection for direct PC connection
- WAN (RJ45) Ethernet for connecting, via the Internet, to TapWatch.com and a PC running TapWatch 3 software
- Analog phone line for remote communication via modem

Product Specifications

Dimensions:	11.5" x 8.75" x 2.25" (29.2 cm x 22.2 cm x 5.7 cm)
Weight:	2 lbs 7 oz (1.1 kg)
Power requirement:	120 VAC; transformer included
Operating environment:	
Temperature:	32 to 130°F (0 to 54.4° C)
Humidity:	Up to 90% (non-condensing)
System requirements:	
EN4000, EN6540 or FA403 receiver	
Analog phone line	
TapWatch 3 software	
Ethernet broadband Internet connection for TapWatch.com	
Regulatory compliance:	FCC, RoHS

Reference Materials (available at www.inovonics.com)

RDL8500 Remote Data Logger Installation Instructions

- The range and performance of any wireless product depends on the structure and environment in which it operates.
- Continual enhancements to our products may cause specifications to change without notice.
- Visit www.inovonics.com for UL information.
- Patent pending.

Phone: 303.939.9336 • Toll-Free: 800.782.2709 • Fax: 303.939.8977 • E-mail: sales@inovonics.com
www.inovonics.com

06.19.13-DS1006B

Gas Meters

METRIS® 250

Residential Gas Meter

The METRIS gas meter is constructed uniquely to give utilities the edge they need in an increasingly complex and competitive marketplace. The METRIS offers three versions that provide greater flexibility for your metering needs. The unique modular design of the METRIS offers the advantage of complete customization to fit individual installation needs.

In addition, due to inventory and manufacturing enhancements provided by modularity, this invaluable flexibility also can be delivered with unparalleled speed and scheduling dependability. Itron diaphragm meter products are manufactured at Itron's Owenton, KY, facility where our workers take pride in delivering quality products with the utmost concern for customer satisfaction.

The METRIS gas meter is designed to increase your customer's satisfaction and reduce your total costs by offering modular flexibility and measurement accuracy for residential applications. The METRIS is rated at a full 250 CFH.

TESTING

Itron takes pride in our testing equipment and facilities. All of our calibration instrumentation is NIST traceable. We have an unbroken chain of NIST traceability all the way through each piece of test equipment.

KEY FEATURES

- Common measurement module
- 4-chamber design
- One piece, seamless, convoluted diaphragm
- Tamper resistant design
- Built in pressure taps (RM)
- Lubrication free bearing surfaces
- Top entry adjustment
- EZ-VU Adjustment Port
- 5/16" nut adjustment mechanism
- Easy handling
- Long life
- AMR/AMI Compatible

Meets applicable standards

- ANSI B109.1

Product approvals

- Measurement Canada AG-0393
- CA Weights & Measures 5398-11
- Maryland Public Service Commission COMAR 20.55.07.02

METRIS 250:

Standard Retrofit Application

- 6" center-to-center
- Light weight
- Flat base for handling stability

METRIS RM:

Total Measurement Application

- Integral full performance regulator and meter bar
- Cost saving design
- Remove meter from service independent of regulator
- Three pressure taps for field maintenance

METRIS MB:

Sub-Metering Application

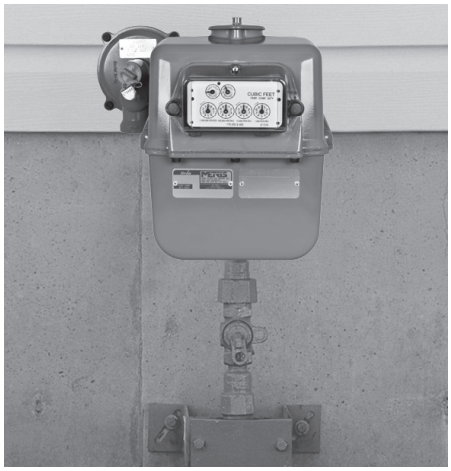
- Back inlet and outlet connections
- Tight meter sets
- ¾" or 1" connections

SPECIFICATIONS

	METRIS 250	METRIS RM	METRIS MB
Meter Capacity	250 CFH Natural Gas @ .5 inch w.c. Differential 400 CFH Natural Gas @ 1.0 inch w.c. Differential		
Hub Center-to-Center	6"	N/A	N/A
Hub Sizes	#1 Sprague Standard, 10 LT, 20 LT, 30 LT, 1-¼"		
Inlet Connection	N/A	¾" or 1" Female NPT	
Meter Type	(TC) Temperature Compensated (NTC) Non-Temperature Compensated		
Units	Imperial (Cubic Feet - ft^3) Metric (Cubic Meters - m^3)		
Index Drive	2 ft^3/revolution 50 cubic decimeters/revolution		
Proving / Test Dials	ft^3 - ½' and 2' Proving Dials m^3 - 10 dm^3 and 50 dm^3 Proving Dials		
Tangent Crank	14 revolutions/ft^3 or .071 ft^3/revolution .5 revolutions/dm^3 or 2 liters/revolution		
Indexes	4 Circle Dial (ft^3 - Standard Pressure, 2 PSIG) 4 Digit Direct Read (ft^3 - Standard Pressure) 5 Digit Direct Read (ft^3 or m^3 - Standard Pressure) Standard = 7 inches w.c. @ 14.73 PSIA base/ 14.4 PSIA atmospheric		
Meter M.A.O.P.	5 PSIG (10 PSIG optional)		
Regulator M.A.O.P.	N/A	125 PSIG	N/A
Meter Operating Temperature Range	-30°F to +120°F -34°C to +49°C		
Surface Treatment	ASA 49 Gray Polyester Powder Coat		

	Meters per Layer	Layers per Pallet	Meters per Pallet	Pallet Dimensions	Pallet Weight (lbs)
METRIS 250	25	4	100	48" x 46" x 52"	950
METRIS 250 with AMR/AMI	20	4	80	48" x 46" x 52"	800
METRIS RM	16	3	48	48" x 46" x 40"	785

All dimensions and weights provided are approximate



INSTALLATION

The METRIS RM offers exactly what the homeowner wants: a clean, simple installation and aesthetics without bulk. The RM solution reduces the number of connections, the amount of piping, and the need to manipulate awkward connection points. As a result, the utility's time and work force investment is reduced.

DIMENSIONS

Imperial - Inches

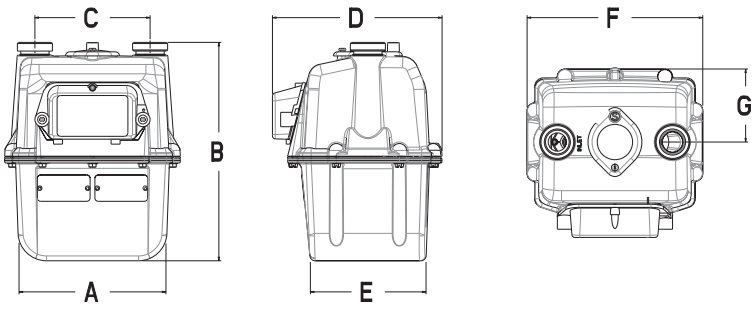
	METRIS 250	METRIS RM	METRIS MB
A	7.7	7.7	7.7
B	11.3	10.0	11.0
C	6.0	2.3	2.3
D	8.8	12.5	12.5
E	6.0	6.0	6.0
F	9.2	12.2	9.2
G	3.8	6.8	6.8
H		5.4	
I		8.5	8.5
J		0.8	0.8
K		2.4	2.4
Wt. (lbs)	9	14.5	13

Metric - Millimeters

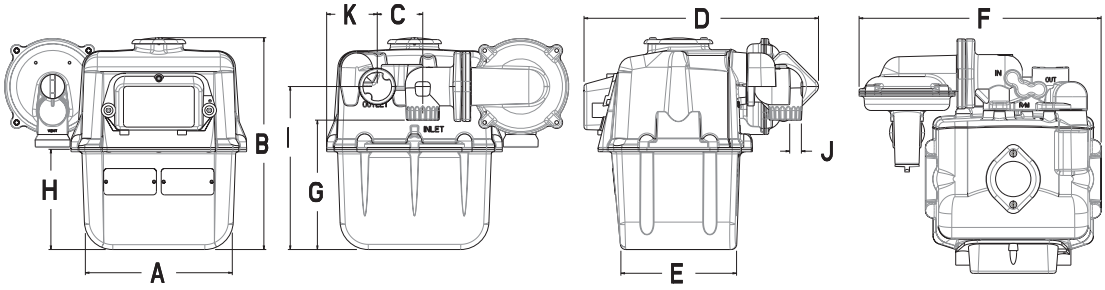
	METRIS 250	METRIS RM	METRIS MB
A	196	196	196
B	288	254	279
C	153	58	58
D	224	318	318
E	152	152	152
F	233	310	233
G	96	173	173
H		137	
I		216	216
J		20	20
K		61	61
Wt. (kg)	4.1	6.6	5.9

All dimensions and weights provided are approximate

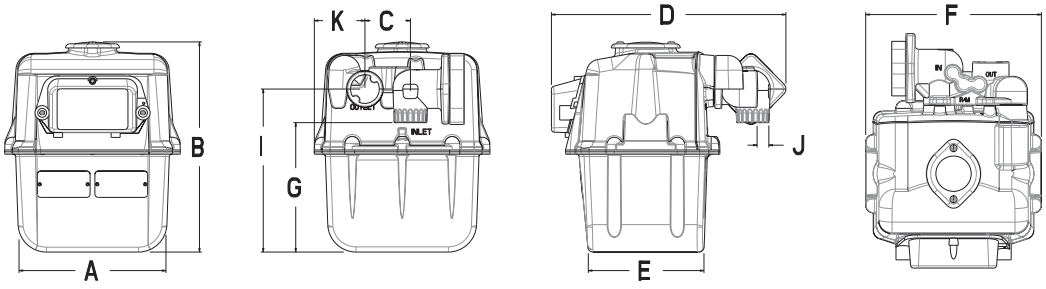
METRIS 250:



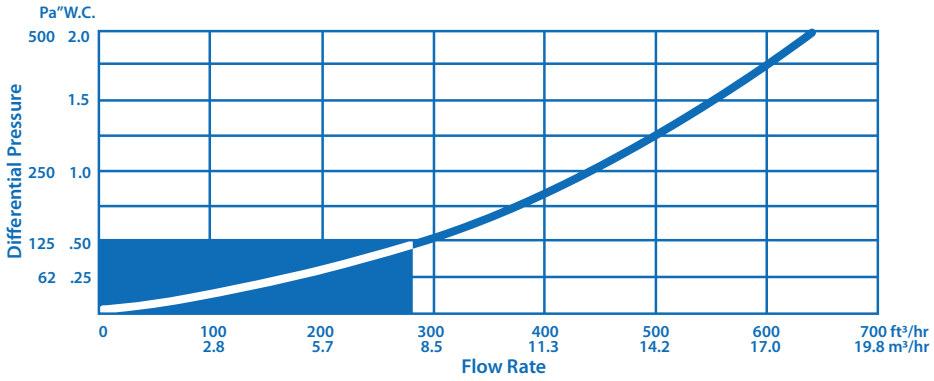
METRIS RM:



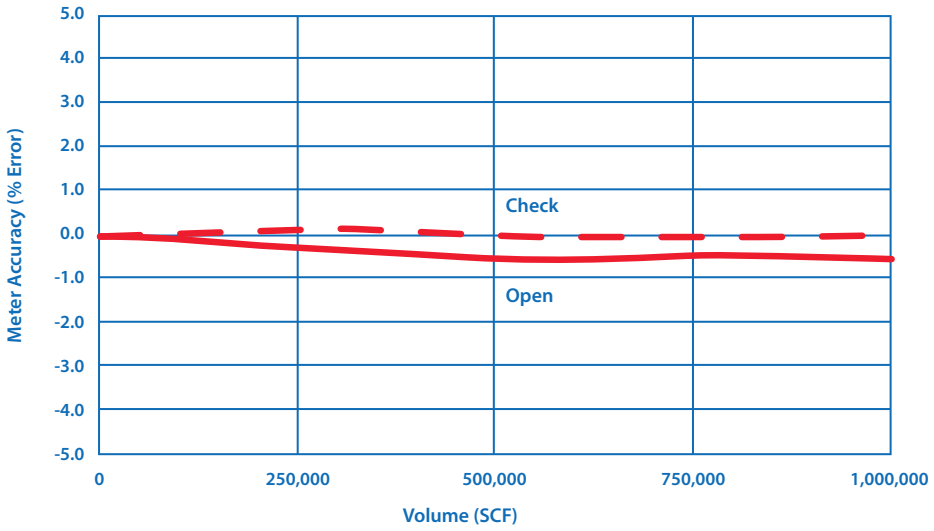
METRIS MB:



Capacity & pressure loss*



Accelerated life test*



*Individual meter performance may vary from data shown.

AMR/AMI COMPATIBLE

The METRIS 250 is compatible with leading AMR/AMI devices.

METRIS 250 shown with 100G Datalogging Gas ERT® Module

Additional Information

- » METRIS Meter Adjustment (TDC-0847**)
- » Diaphragm Type Gas Meters Installation Procedure (TDC-0841**)
- » Diaphragm Meter Product Line (TDC-0858**)
- » METRIS Parts List (TDC-0913**)

**Use most current publication revision.

Itron is the world's leading provider of smart metering, data collection and utility software systems, with over 8,000 utilities worldwide relying on our solutions to responsibly and efficiently manage the delivery and use of energy and water. To realize your smarter energy and water future, start here: **www.itron.com**

ITRON GAS METERING

970 Highway 127 North
Owenton, Kentucky 40359
USA

Phone: 1.800.490.0657
Fax: 1.502.484.6223

CORPORATE HEADQUARTERS

2111 N Molter Road
Liberty Lake, WA 99019
USA

Phone: 1.800.635.5461
Fax: 1.509.891.3355

Itron

Knowledge to Shape Your Future

“A” Series

Gas Meters

Functionality profile

The Itron “A” Series commercial diaphragm meters comprise a range of positive displacement gas measurement devices with capacities of 400 to1000 ft³ hr. Ideally suited for light and higher capacity commercial metering requirements such as dry cleaners, restaurants, schools, hospitals and hotels. The 400A, 800A, & 1000A meters retrofit to any meter set within its capacity range.

These meters use proven, time-tested diaphragm meter technology in a 3-chamber design to provide accurate measurement across their respective flow ranges. Long-life and low maintenance are assured by the combination of a self-lapping orbital valve, single convolution diaphragms, and lubrication-free bearings. Careful attention to design makes them compact and lightweight for their capacity ratings.

Setting the standard

When you combine all of the “A” Series customer-driven features with our tradition for highly accurate meters and good value, it is easy to see why these outstanding meters should have a place in your measurement operation.

Instrumentation Compatible

The “A” Series meters are designed to be fully compatible with all volume and temperature-integrating instruments available today.

Key features

- 3-chamber design
- Wearless orbital valve
- One piece, seamless, convoluted diaphragm
- Lubrication-free bearings
- EZ-VU Adjustment Port
- Parts commonality
- Instrumentation compatible
- Easy Turn (ET) top option for simple installation
- Lightest 400, 800, & 1000 class meters
- Retrofits into any 400, 800 & 1000 installation
- Easy handling
- Long life
- AMR/AMI Compatible

Installation

The Easy Turn (ET) design allows 2 to 3 times more wrench swing than the competition - as much as a full 120 degrees for meters mounted directly against a wall - making the Itron 675A, 800A and 1000A ‘ET’ gas meters the easiest and safest to install in North America.

Meets applicable standards

- ANSI B109.1, ANSI B109.2

Product approvals

- Industry Canada AG-0298, AG-0385
- State of New York Department of Public Service 91-G-0507, 96-G-0885

400A

400A shown with 8-1/4" center-to-center hubs

400A Gas Meter

The compact performer for light commercial metering

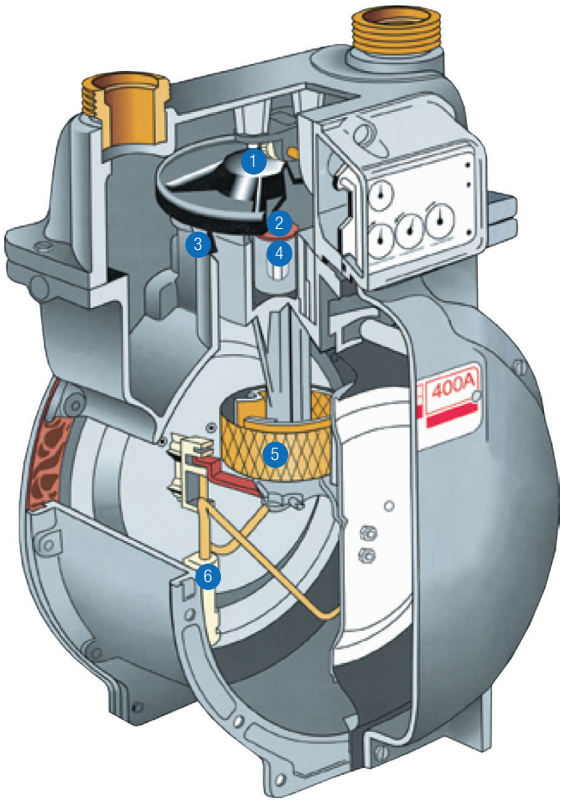
Itron's 400A meter is the most compact and lightweight 400-class meter on the market today. Maintaining the use of a wearless orbital valve, single convolution diaphragms and lubrication free bearings, the 400A delivers maximum initial and sustained accuracy.

Designed to fit

Available with either 6-25/32", 7" or 8-1/4" center-to-center hubs, and with a reduced height of 14.7" the 400A can replace any existing 400-class meter with no need for expensive, time-consuming piping rework.

Ideally suited to light commercial and high-capacity domestic metering requirements, the Itron 400A offers:

- Lightest, narrowest 400-class meter on the market
- Fewer moving parts than any other 400-class meter



1 - Hex bushing

In the valve cover to provide self alignment and ensure consistent orbiting of the valve cover

2 - Web free valve seat

Enables mainshaft and tangent crank to be replaced without removing the valve seat

3 - Mainshaft and tangent crank

One-piece construction minimizing assembly variations

4 - Lubrication-Free bearings

Ensure long maintenance free operation

5 - Carrier bracket

Engineered with tongue and groove design allowing for consistent and precise positioning of wires and reducing wire bending adjustment

6 - Temperature compensation (optional)

Located in the main measurement chamber for more prompt response to changes in temperature

675A, 800A, 1000A Gas Meters

Diaphragm accuracy for higher capacity metering applications

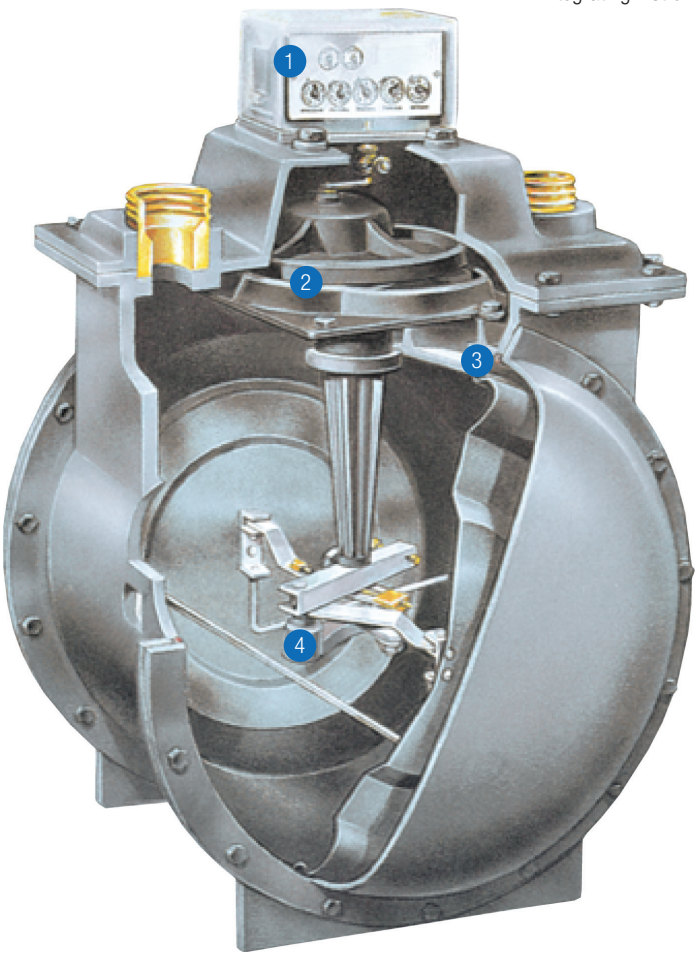
Thanks to modern engineering and production techniques, the larger members of the "A" Series combine accuracy and long life in a smaller package. This smaller size adds up to big advantages in easier shipping, handling and installation - at just 18.5" from base to hub, these meters can be applied wherever capacities of 675-1000 ft^3/h are needed.

Easier to install, easier to use

These high performance meters offer advantage after installation, too. They all feature a top-mounted index drive for full instrumentation compatibility. In addition, the index can be rotated to 180° for installation where it is more convenient to install the meter backwards.

Itron 675A, 800A and 1000A meters offer these advantages for commercial metering applications:

- Reduced size and weight compared to the Sprague 675 and 1000 meters
- Fully compatible with volume and temperature-integrating instruments



1 - Reversible top-mount index

Ensures easy installation where the meter inlet and outlet need reversing

2 - Self-dressing orbital valve and seat

Contribute to superior valve wear, lending to improved accuracy and repeatability over the life of the meter

3 - "O"-Ring diaphragm seal

Ensures consistent sealing throughout wide environmental temperature variations. Neoprene gasket material makes repairs simple - eliminates the need for costly cork gasket removal

4 - Temperature compensation (optional)

Located in the main measurement chamber for more prompt response to changes in temperature

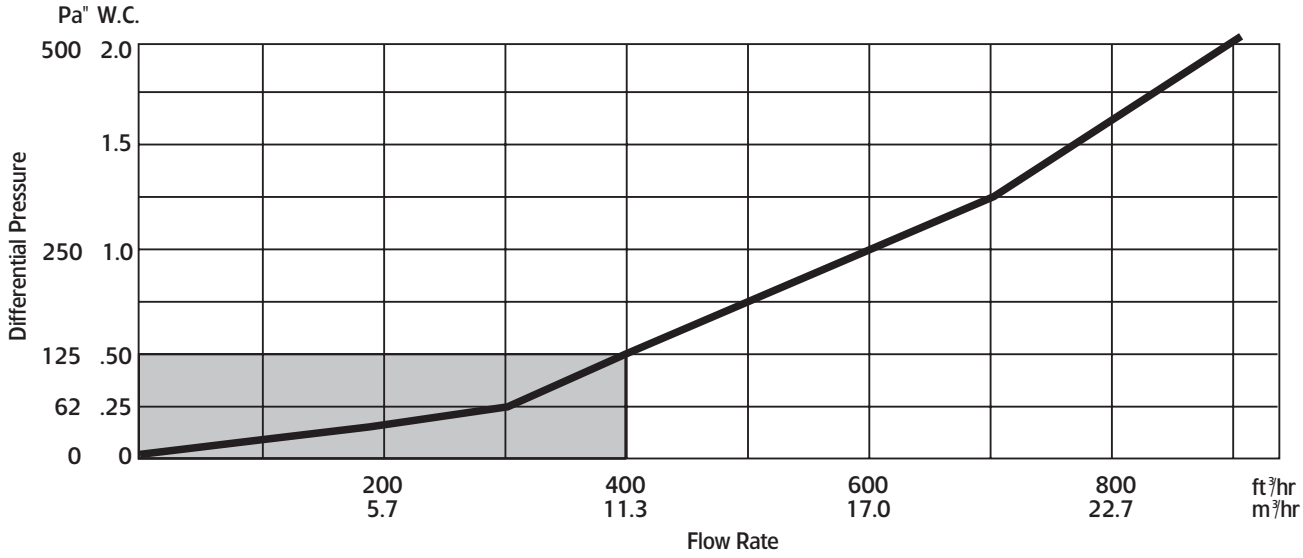
675A, 800A, 1000A

Meter shown with standard top

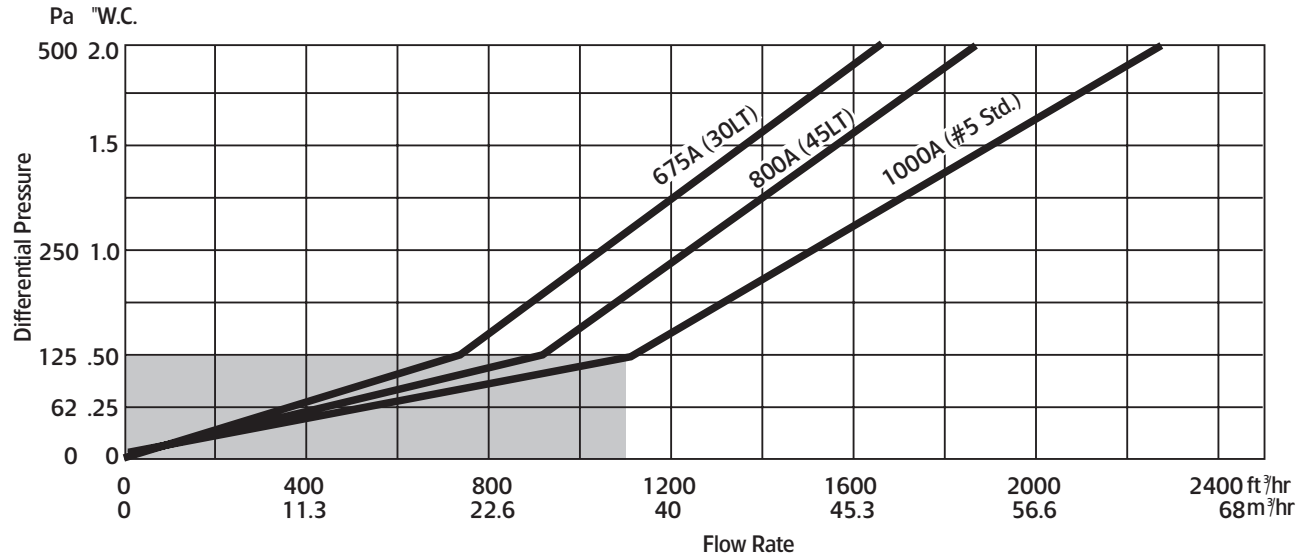
Meter shown with 'ET' top

Capacity & Pressure Loss*

400A

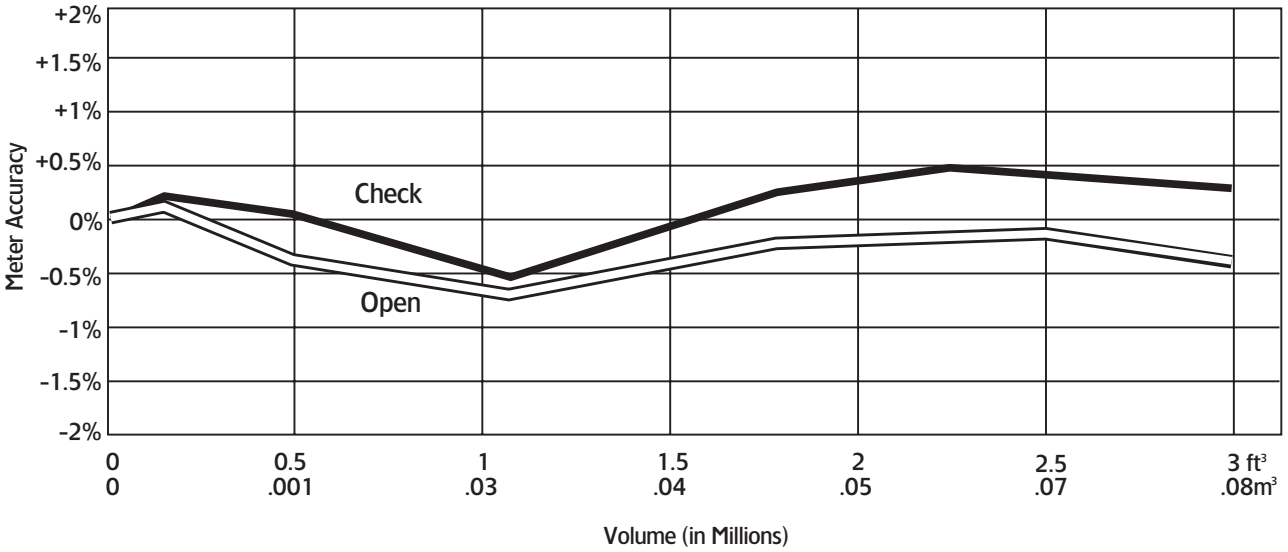


675A, 800A, 1000A

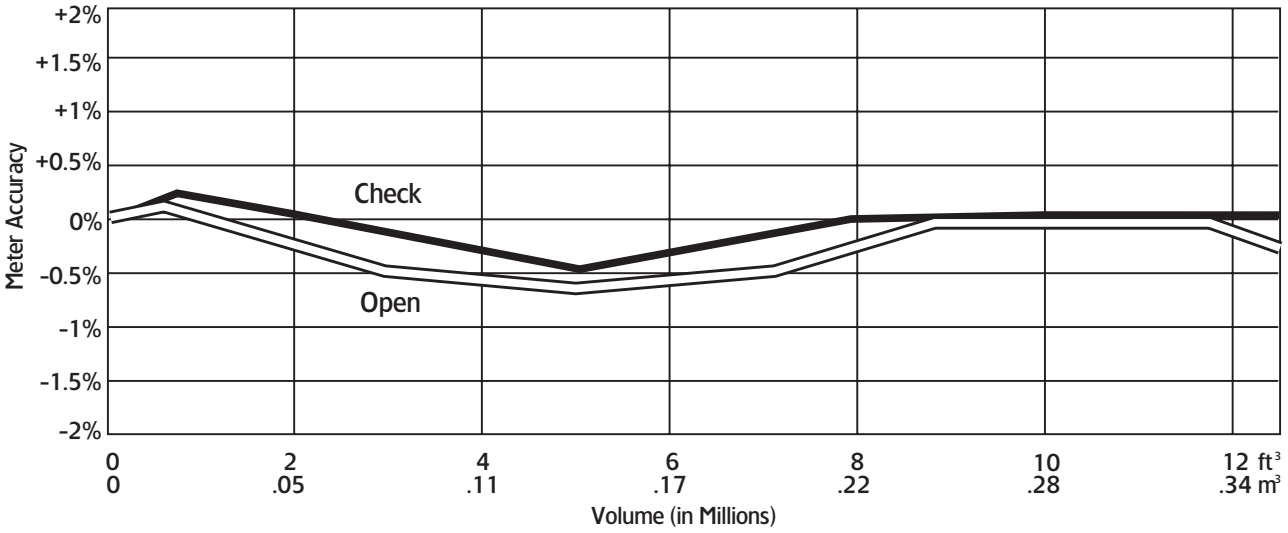


Accelerated Life Test*

400A Running at 800 ft³/hr (22.6 m³/hr)



675A, 800A, 1000A Running at 900 ft³/hr (25.5 m³/hr)



*Individual meter performance may vary

Dimensions

Imperial - Inches

Model	A1	A2	A3	B1	B2	C	D	E	Wt. (lbs)
400A	6.78	7.0	8.25	9.5	10.9	14.7	8.6	8.8	14.1

Model	A	B	B*	C	D	E	Wt. (lbs)
675A	10	23.4	26.1	18.5	15.7	13.9	41.2
800A	11	23.4	26.1	18.5	15.7	13.9	41.2
1000A	11	23.4	26.1	18.5	15.7	13.9	41.2
675A ET	10	25	27.7	18.5	15.7	13.9	41.5
800A ET	11	25	27.7	18.5	15.7	13.9	41.5
1000A ET	11	25	27.7	18.5	15.7	13.9	41.5

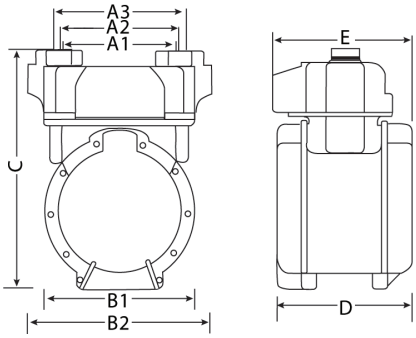
Metric – Millimeters

Model	A1	A2	A3	B1	B2	C	D	E	Wt. (kg)
400A	172	178	210	241	277	373	218	224	6.4

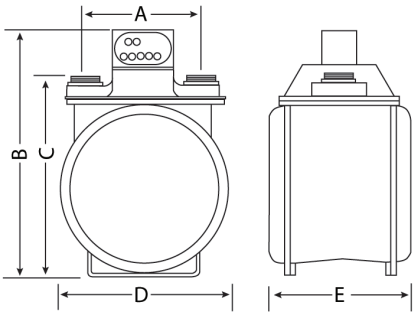
Model	A	B	B*	C	D	E	Wt. (kg)
675A	254	594	663	470	399	353	18.7
800A	279	594	663	470	399	353	18.7
1000A	279	594	663	470	399	353	18.7
675A ET	254	635	704	470	399	353	18.8
800A ET	279	635	704	470	399	353	18.8
1000A ET	279	635	704	470	399	353	18.8

All dimensions and weights provided are approximate

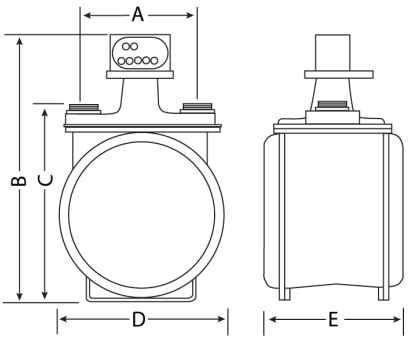
400A



675A, 800A, 1000A



675A, 800A, 1000A ET



Specifications

	400A	675A	800A	1000A
Meter Capacity (CFH Natural Gas)	400 @ .5" w.c. Diff.	790 @ .5" w.c. Diff.	890 @ .5" w.c. Diff.	1040 @ .5" w.c. Diff.
Hub Center-to-Center	6-25/32", 7" or 8-1/4"	10"	11"	11"
Hub Sizes	20 LT, 30 LT, 45 LT, #4 Sprague	30 LT, 45 LT, #4 Sprague	30 LT, 45 LT, 60 LT, #5 Sprague, 100 LT	45 LT, 60 LT, 100 LT, #5 Sprague
Meter Type	(TC) Temperature Compensated or (NTC) Non-Temperature Compensated			
Units	Imperial (Cubic Feet - ft^3) or Metric (Cubic Meters - m^3)			
Index Drive	2 ft^3/revolution 50 cubic decimeters/revolution	10 ft^3/revolution .30 cubic meters/revolution		
Proving / Test Dials	ft^3 - 1/2' and 2' Proving Dials m^3 - 10 dm^3 and 50 dm^3 Proving Dials	ft^3 - 2.5' and 10' Proving Dials m^3 - .3 m^3 and .15 m^3 Proving Dials		
Tangent Crank	9 revolutions/ft^3 or .111 ft^3/revolution 3.2 revolutions/dm^3 or 2 liters/revolution	1.8 revolutions/ft^3 or .8 ft^3/revolution 5.1 revolutions/dm^3 or .196 liters/revolution		
Indexes	4 Circle Dial (ft^3) - Standard 7", 14", 2 PSIG, 5 PSIG 4 Digit Direct Read (ft^3 - Standard Pressure) 5 Digit Direct Read (ft^3 or m^3 - Standard Pressure)	5 Circle Dial (ft^3) - Standard 7", 14", 2 PSIG, 5 PSIG, 10 PSIG, 15 PSIG, 20 PSIG 5 Digit Direct Read (ft^3 - Standard Pressure) 6 Digit Direct Read (m^3 - Standard Pressure) 7 Digit Direct Read (m^3 - Standard Pressure)		
Meter M.A.O.P.	10 PSIG (25 PSIG Optional)	25 PSIG		
Meter Operating Temperature Range	-30°F to +120°F -34°C to +49°C			
Surface Treatment	ASA 49 Gray Polyester Powder Coat			

	Meters per Layer	Layers per Pallet	Meters per Pallet	Pallet Dimensions	Pallet Weight (lbs)
400A	20	3	60	48" x 46" x 53"	906
400A with AMR/AMI	16	3	48	48" x 46" x 53"	785
675A, 800A and 1000A	9	2	18	48" x 46" x 65"	845
675A, 800A and 1000A with AMR/AMI	9	2	18	48" x 46" x 65"	905

All dimensions and weights provided are approximate

AMR/AMI Compatible

Itron gas meters are compatible with leading AMR/AMI devices.

Meters shown with 100G Gas ERT Module

Additional Information

- > Diaphragm Type Gas Meters Installation Instructions (TDC-0841-001)
- > Diaphragm Meter Product Line (TDC-0858-001)
- > 3-Chamber Meter Adjustment (TDC-0848-001)

About Itron Inc.

Itron Inc. is a leading technology provider to the global energy and water industries. Our company is the world's leading provider of intelligent metering, data collection and utility software solutions, with nearly 8,000 utilities worldwide relying on our technology to optimize the delivery and use of energy and water. Our products include electricity, gas, water and heat meters; data collection and communication systems, including automated meter reading (AMR) and advanced metering infrastructure (AMI); meter data management and related software applications; as well as project management, installation, and consulting services. To know more, start here: www.itron.com.

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1.502.484.5747
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Corporate Headquarters
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Fax: 1.509.891.3355
www.itron.com

Publication 100974SP-01 3/10

5

MANSON INSULATION

Insulation for Domestic Water Pipe

ALLEY-K™

Fiberglass Pipe Insulation

0°F to 850°F *(-18°C to 454°C)*

ALLEY-K™ is a preformed pipe insulation composed of high quality glass fibres, bonded together with a thermosetting resin. The 36" pipe sections are available with or without the all service jacket (ASJ). Our all service vapour retarder jacket (ASJ) reinforced with glass fibres comes with a factory applied pressure sensitive self-sealing lap closure system (SSL). Butt strips are also supplied.

USES

ALLEY-K™ is intended as a thermal insulation for hot and cold service piping. Typical uses include domestic hot and cold water, hot water heating, high temperature, dual temperature, steam, condensate and refrigerated lines. As a component of a suitable insulation system, plain ALLEY-K™ may be used for light industrial applications, while ALLEY-K™ with ASJ jacket may be used for commercial and institutional usage.

AVAILABILITY

Manufactured dimensions are listed below.

INSULATION THICKNESS		COPPER PIPE SIZES		IRON PIPE SIZES	
½"	13 mm	5/8" – 4 1/8"	16 mm – 105 mm	½" – 4"	13 mm – 102 mm
1"	25 mm	5/8" – 4 1/8"	16 mm – 105 mm	½" – 24"	13 mm – 610 mm
1 ½"	38 mm	5/8" – 4 1/8"	16 mm – 105 mm	½" – 24"	13 mm – 610 mm
2"	51 mm	5/8" – 4 1/8"	16 mm – 105 mm	½" – 24"	13 mm – 610 mm
2 ½"	64 mm			¾" – 24"	19 mm – 610 mm
3"	76 mm			1" – 24"	25 mm – 610 mm
3 ½"	89 mm			2" – 24"	51 mm – 610 mm
4"	102 mm			2" – 24"	51 mm – 610 mm

CONTRACTOR:

JOB NAME:

DATE:

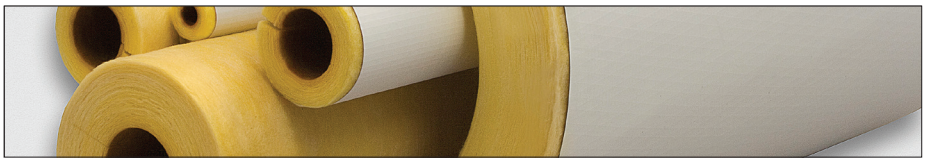
MANSON INSULATION
KEEPING IT SIMPLE.

Manson Insulation Products Ltd.
4805 Lapiniere, Suite 3000
Brossard, QC J4Z 0G2 Canada
Telephone : 800.626.7661
Fax: 450.443.0042
www.imanson.com

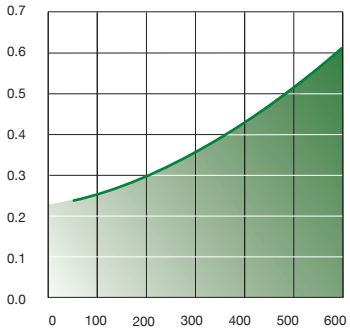
ALLEY-K™

Fiberglass Pipe Insulation

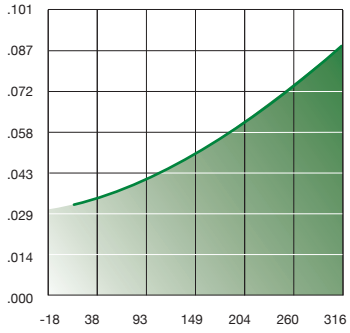
0°F to 850°F *(-18°C to 454°C)*



THERMAL CONDUCTIVITY (Btu.in/hr.ft2.°F)



METRIC THERMAL CONDUCTIVITY (W/m.°C)



THERMAL CONDUCTIVITY (ASTM C335)

MEAN TEMPERATURE		THERMAL CONDUCTIVITY	
°F	°C	Btu.in/ hr.ft².°F	W/m.°C
75	24	0.23	0.033
100	38	0.24	0.035
200	93	0.28	0.040
300	149	0.34	0.049
400	204	0.42	0.061
500	260	0.51	0.074
600	316	0.62	0.089

PRODUCT FEATURES

WATER VAPOUR ABSORPTION
ASTM C1104 - Less than 0.2% by volume

ALKALINITY (ASTM C 871)
Less than 0.6% as Na2O.
pH between 7.5 and 10.0

MICROBIAL GROWTH (ASTM C 1338)
Does not promote microbial growth

HOT SURFACE PERFORMANCE
ASTM C411 - Rated to 850°F (454°C)

LINEAR SHRINKAGE
(ASTM C356) Negligible

STRESS CORROSION
Complies with ASTM C795,
MIL-I-24244C and NRC 1.36.

CORROSIVENESS (ASTM C 665)
No greater than sterile cotton.

SPECIFICATION COMPLIANCE

ASTM C547 - TYPE I
Standard Specifications for Mineral Pipe Insulation

ASTM C795, MIL-I-24244C, NRC 1.36
Specification for wicking-type thermal insulation for use over austenitic stainless steel

CITY OF NEW YORK MEA 325-83-M

NATIONAL FIRE PROTECTION ASSOCIATION
NFPA 90A & 90B

CGSB 51-GP-9M

FIRE HAZARD CLASSIFICATION
(UL 723, CAN/ULC-S102-M88, ASTM E84, NFPA 255)

JACKETING
- UL 723/ASTM E84
- CGSB 51-GP-52M
- ASTM C1136 (Type I, II, III, IV)
- Water Vapour Permeance (ASTM E-96) : 0.02 perms MAX
- ASTM C1338 : Does not promote microbial growth
- TAPPI T803 (Beach Units) Jacket minimum rating of 50 units.

GREENGUARD Environmental Institute™
Children & Schools℠ Certified for superior indoor air quality (IAQ) performance

FIRE HAZARD CLASSIFICATION

	FLAME SPREAD	SMOKE DEVELOPED
Plain	25	50
ASJ	25	50

HEAT UP SCHEDULE

TIME	TEMPERATURE @	TOTAL TIME
3.5 hrs	550°F *(288°C)*	3.5 hrs
2.5 hrs	650°F *(343°C)*	6 hrs
2 hrs	750°F *(399°C)*	8 hrs

USAGE QUALIFICATIONS

1. Hot surface performance: tested to 850°F (454°C) according to ASTM C411.
2. A sufficient thickness of insulation must be used to keep maximum surface temperature of Alley-K™ ASJ pipe insulation below 140°F (60°C).
3. At operating temperatures above 500°F (260°C), Alley-K™ must be applied in a thickness ranging from 2" (51mm) min to 6" (152mm) max.
4. Due to the fact that binder is organic in nature, we recommend the following heat up schedule for operating temperatures from 500°F (260°C) to 850°F (454°C). (SEE TA BLE)
5. When pressure sensitive self-sealing tape and butt strips are used, the material must be stored in a clean, dry environment. When adhering SSL tape and butt strip, rub firmly with a hard object such as a plastic squeegee or back of a knife to assure good vapour seal.
6. Fibrous insulation can emit a acrid odour during the initial heat-up when applied to hot surfaces above 392°F (200°C). It is recommended that adequate ventilation be provided and /or workers be supplied with approved full face respirators.

INSTALLATION

Manson ALLEY-K™ is usually applied in accordance with the procedure in the publication "Commercial & Industrial Standards" by the National Insulation Association.

Manson Insulation products LTD. has no control over installation design, installation workmanship, accessory materials, or conditions of application. Manson does not warrant the performance or results of any installation containing their products. This warranty disclaimer includes all implied warranties, including the warranties of merchantability and fitness for a particular purpose.

member of NIA National Insulation Association www.insulation.org

TIAC•ACIT Thermal Insulation Association of Canada Association Canadienne de l'isolation thermique

Children & Schools GREENGUARD® Indoor Air Quality Certified

MADE IN THE USA

10/2010

6

Wheatland Tube Company
900 Haddon Avenue
Collingswood, NJ 08108-2162
800.257.8182
www.wheatland.com

Wheatland ASTM A 53 Schedule 40 Pipe

Wheatland Steel Pipe is made by specialists who understand that it's the small details that make the difference between average products and superior products. At the Wheatland Plant, most department heads and foremen have been employed in some phase of pipe manufacturing for 25 or more years.

This kind of specialization, experience and knowledge pays off...in workable, threadable, uniform pipe. Delivered clean. Delivered promptly.

Wheatland specializes in manufacturing welded steel pipe in 1/2 through 4 nominal sizes. Available inventory in 1/8 to 12 pipe sizes produced to various ASTM standards is maintained to meet your pipe requirements.

Care, pride and personal concern are bonus features that go into every inch of Wheatland Pipe. Don't settle for less.

Make sure it's quality. Make sure it's Wheatland.

Standard Pipe Schedule 40

NPS Designator	DN Designator	Outside Diameter		Inside Diameter		Wall Thickness		Nominal Weight (Mass) per unit Length			
		(Inches)	(mm)	(Inches)	(mm)	(Inches)	(mm)	Plain End (lb/ft)	Plain End (kg/m)	Threads & Couplings (lb/ft)	Threads & Couplings (kg/m
1/8	6	0.405	10.3	0.269	6.8	0.068	1.73	0.24	0.37	0.25	0.37
1/4	8	0.540	13.7	0.364	9.2	0.088	2.24	0.43	0.63	0.43	0.63
3/8	10	0.675	17.1	0.493	12.5	0.091	2.31	0.57	0.84	0.57	0.84
1/2	15	0.840	21.3	0.622	15.8	0.109	2.77	0.85	1.27	0.86	1.27
3/4	20	1.050	26.7	0.824	20.9	0.113	2.87	1.13	1.69	1.14	1.69
1	25	1.315	33.4	1.049	26.6	0.133	3.38	1.68	2.50	1.69	2.50
1-1/4	32	1.660	42.2	1.380	35.1	0.140	3.56	2.27	3.39	2.28	3.40
1-1/2	40	1.900	48.3	1.610	40.9	0.145	3.68	2.72	4.05	2.74	4.04
2	50	2.375	60.3	2.067	52.5	0.154	3.91	3.66	5.44	3.68	5.46
2-1/2	65	2.875	73.0	2.469	62.7	0.203	5.16	5.80	8.63	5.85	8.67
3	80	3.500	88.9	3.068	77.9	0.216	5.49	7.58	11.29	7.68	11.35
3-1/2	90	4.000	101.6	3.548	90.1	0.226	5.74	9.12	13.57	9.27	13.71
4	100	4.500	114.3	4.026	102.3	0.237	6.02	10.80	16.07	10.92	16.23
5	125	5.563	141.3	5.047	158.2	0.258	6.55	14.63	21.77	14.90	22.07
6	150	6.625	168.3	6.065	154.1	0.280	7.11	18.99	28.26	19.34	28.58
8	200	8.625	219.1	7.981	202.7	0.322	8.18	28.58	42.55	29.35	43.73
10	250	10.750	273.0	10.020	254.5	0.365	9.27	40.52	60.29	41.49	63.36
Standard Pipe											
12[1]	300	12.750	323.8	12.000	304.8	0.375	9.52	49.61	73.78	51.28	76.21
Note[1] NPS 12 dimensions are for standard wall pipe, not schedule 40.											

Product Type and Specification:
Standard welded pipe is produced in 1/2 to 6 trade sizes. Wheatland pipe is produced to ASTM A 53, A 501, and A 589 Type II, API 5L and Federal Specification WW-P404. All pipe threads conform to ANSI B1.20.1. Merchant couplings comply with ASTM A 865.

Wheatland ASTM A 53 Schedule 40 Pipe

Wheatland Tube Company

900 Haddon Avenue
Collingswood, NJ 08108-2162
800.257.8182

www.wheatland.com

Wheatland ASTM A 53 Schedule 40 Pipe

Permissible Variations for ASTM A 53 A Pipe			
	O.D.	Over	Under
Outside Diameter	NPS 1/8 to 1-1/2 DN 6 to 40	1/64" (0.4mm)	1/64" (0.4mm)
	NPS 2 and up DN 50 and up	1%	1%
Wall Thickness at Any Point		--------	12.5%

ASTM A 53 A: Black and Galvanized Pipe is manufactured for ordinary use in steam, water,gas, and air lines. UL Listed and FM Approved, sizes 1” through 6” nominal, for use in Fire Sprinkler Pipe Applications.

Mechanical Properties

Grade A: Yield 30,000 [205 Mpa] psi minimum Tensile: 48,000 psi [415 Mpa] minimum

Grade B: Yield 35,000 [240 Mpa] psi minimum Tensile: 60,000 psi [240 Mpa] minimum

For additional information or to order , contact our pipe department at 800.257.8182, Fax: 856.854.0616, e-mail info@wheatland.com

7

Your Peace of Mind is Our Top Priority®

Elevator Sump Pump

SECTION: 2.60.090
FM2193
0513
Supersedes
1012

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

ZOELLER®
PUMP COMPANY
Zoeller Family of Water Solutions™

MAIL TO: *P.O. BOX 16347 • Louisville, KY 40256-0347*
SHIP TO: *3649 Cane Run Road • Louisville, KY 40211-1961*
(502) 778-2731 • 1 (800) 928-PUMP • FAX (502) 774-3624

visit our web site:
www.zoeller.com

DESIGNED • MACHINED • ASSEMBLED IN THE USA

THE ZOELLER Oil Guard® SYSTEM

FOR SUBMERSIBLE DEWATERING APPLICATIONS

APPLICATIONS:

Designed to help protect the environment and equipment from the dispersion of oils and/or hydrocarbons.

- Elevator Sumps
- Transformer Vaults
- Manufacturing Facilities

SYSTEMS:

- Operation of the Zoeller Oil Guard® System has been independently verified by OnSpeX, div. of CSA, when installed in accordance with our instructions.
- Choose from four model pumps. Includes pump, Oil Smart® switch and alarm (optional control panel).
- Control systems are ASME A17.1 compliant.

Oil Smart® SWITCH AND ALARM PANEL FEATURES:

- NEMA-4X alarm panel enclosure
- Audible, light alarms and dry contacts
- Preset “on” and “off” points differentiate oil and water and alerts maintenance personnel of high water or oil detected conditions
- 20 ft. piggyback electrical supply cord
- 20 amp internal relay
- Alarm test and silence switches
- 304 stainless steel probes
- UL508 approved switch

POWDER COATED TOUGH™

Model 940-0011 shown. Product may not be exactly as shown.

PUMP FEATURES:

- Pumps are durable cast iron construction with powder coated epoxy finish and all stainless steel fittings. See back page for a list of pump catalog sheets
- Tested to UL Standard UL778 and Certified to CSA Standard CSA 22.2 No. 108

SIMPLEX PANEL FEATURES:

- Oil Smart® liquid alarm switch
- Oil Smart® pump switch (10-2282)
- 115 volts, single phase
- NEMA 4X watertight enclosure with lockable latch
- 30 amp motor start relay
- Pump HOA switch
- Top-mounted red alarm beacon light
- 81 - 84 decibel rated alarm horn
- Horn silence and alarm test switches
- Alarm automatically resets
- Dry auxiliary alarm contacts
- Separate circuit protection for alarm
- Circuit breaker protection
- Pump “Run” indicator light

Model 10-2149

C SP® US
229594

DUPLEX ALTERNATING PANEL FEATURES:

- Oil Smart® liquid alarm switch
- Oil Smart® pump switch (10-2283)
- Oil Smart® high water alarm switch for high demand two pump operation
- 115 volts, single phase
- NEMA 4X watertight enclosure with lockable latch
- Two 30 amp motor start relays
- Pump HOA switches
- Top mounted red alarm beacon light
- 81 - 84 decibel rated alarm horn
- Horn silence and alarm test switches
- Alarm automatically resets
- Dry auxiliary alarm contacts
- Separate circuit protection for alarm
- Pump “Run” indicator light

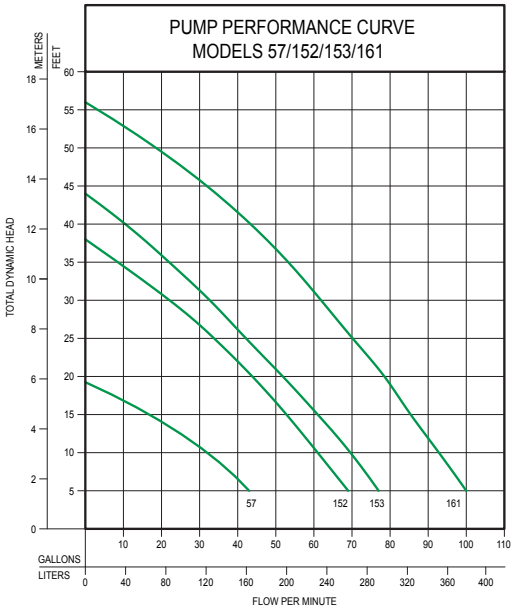
Model 10-2150

C SP® US
229594

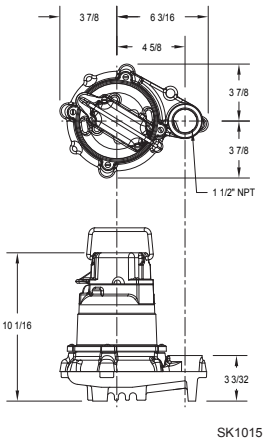
TOTAL DYNAMIC HEAD/FLOW PER MINUTE
EFFLUENT AND DEWATERING

MODEL		57		152		153		161	
Feet	Meters	Gal.	Liters	Gal.	Liters	Gal.	Liters	Gal.	Liters
5	1.5	43	163	69	261	77	291	100	379
10	3.0	34	129	61	231	70	265	93	352
15	4.6	19	72	53	201	61	231	85	322
20	6.1	--	--	44	167	52	197	79	299
25	7.6	--	--	34	129	42	159	70	265
30	9.1	--	--	23	87	33	125	62	235
35	10.7	--	--	--	--	22	83	54	204
40	12.2	--	--	--	--	11	42	45	170
50	15.2	--	--	--	--	--	--	20	76
Shut-off Head:		19.25 ft (5.9 m)		38 ft (11.6 m)		44 ft (13.4 m)		56 ft (17 m)	

018939



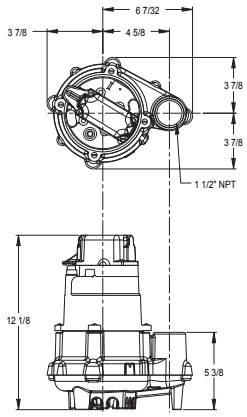
Model 57



SK1015

(See FM0493)

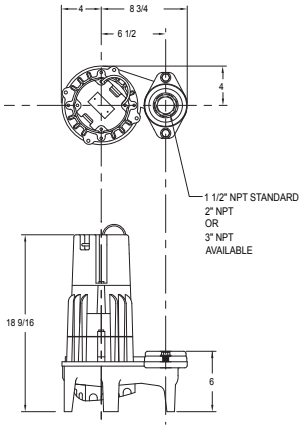
Model 152/153



SK2064

(See FM1919)

Model 161



SK2644

(See FM0460)

COMPONENTS:

Part Number	Description	Alarm Panel	Oil Smart® Pump Switch	Oil Smart® High Liquid Alarm Switch	Oil Smart® High Liquid Switch
10-1526	Oil Smart® Alarm Panel	✓	---	✓	---
10-1528	Oil Smart® Pump Switch	---	✓	---	---
10-1727	Oil Smart® Pump Switch w/o Plug	---	✓	---	---
10-2149	Oil Smart® Simplex Panel	✓	✓	✓	---
10-2150	Oil Smart® Duplex Panel	✓	✓	✓	✓
10-2516	Oil Smart® Simplex Panel w/ Mtr. Cont.	✓	✓	*	---

√ INCLUDED * VARIABLE LEVEL FLOAT SWITCH

These systems are not designed for Explosion Proof Environments. Please consult factory for special options and requirements.

⚠ CAUTION

All installation of controls, protection devices and wiring should be done by a qualified licensed electrician. All electrical and safety codes should be followed including the most recent National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).

CHOOSE A PREPACKAGED SYSTEM:

Part Number	Description	Alarm Panel	Oil Smart® Pump Switch	Nonauto Pump	Pump Part Number	Voltage	HP	Amps	Elevator System
940-0005	Oil Guard® Pump Switch and Panel	10-1526	10-1528	N57	57-0002	115	3/10	9.7	---
940-0006	Oil Guard® Pump Switch and Panel	10-1526	10-1528	N152	152-0002	115	4/10	8.5	---
940-0007	Oil Guard® Pump Switch and Panel	10-1526	10-1528	N153	153-0002	115	1/2	10.5	---
940-0008	Oil Guard® Pump Switch and Panel	10-1526	10-1528	N161	161-0002	115	1/2	15.0	---
940-0012	Oil Guard® Pump Switch and Panel	10-1526	10-1528	*N152	*152-0028	115	4/10	8.5	✓
940-0013	Oil Guard® Pump Switch and Panel	10-1526	10-1528	*N153	*153-0027	115	1/2	10.5	✓
940-0014	Oil Guard® Pump Switch and Panel	10-1526	10-1528	*N161	*161-0090	115	1/2	15.0	✓

* 6' SO JACKETED CORD FOR OIL-RESISTANCE

NOTE: BUILD YOUR OWN SYSTEM. CONTACT FACTORY FOR SPECIFICATIONS.

Delta P Carver
Creating Value.

Domestic Water Booster Pump (DBPS)

SUBMITTAL PACKAGE

FEATURES

- Pre-engineered standard system, fits most common duplex and triplex applications
- VFD Controls for each pump to minimize energy usage and maximize pump life
- Programmable setpoints
- Simple system design uses multiple transducers to allow for variable suction pressure and no flow shut down
- Energy savings
- 24 volt control system
- 15, 25 or 65 kAIC breakers available
- All 304 SS frame, manifolds and pumps
- NEMA 1 through 12 compliant
- NSF 61 and 372
- UL listed 508A and 67YF

INTRODUCTION

Delta P Carver offers a broad range of standard booster packages; custom engineered packages, as well as retro-fitted control panels for existing systems. Delta P Carver was the pioneer in development for the Quiet Pak, using submersible pumps for low noise applications in hotels and condominiums. You can count on Delta P Carver to create lasting value from solid, straightforward and proven designs that provide many years of reliable service. See our full line of Delta Pak at our website www.deltapcarver.com

SUBMITTAL FOR:

Project: Charles Condominiums	**Contractor:** Miller Mechanical
Engineer: PGE	**Representative:** Mechanical Products, Inc.

14 Sunshine Blvd, Ormond Beach, FL. 32174
Website: DeltaPCarver.com
Phone: 386-236-0950 Fax: 386-236-0955
Email: sales@deltapcarver.com

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Delta P Carver
Creating Value.

SUBMITTAL PACKAGE SYSTEM DATA

QUOTE

Charles Condominiums BP-1

2/8/2017 2:08:38 PM QT11286R1

(3) pumps 125 GPM furnished (N +1 redundancy)

Quoted To:
Rob Freeman
Mechanical Products
770.595.7372

rfreeman@mechanicalproducts.net

10472 Big Canoe
Jasper, GA 30143

Sizing Information:

TDH: 220 ft **Rated System GPM: 250 GPM**

Street + Boost: 141 PSI **Pump GPM: 125 GPM**

per engineer sizing for a minimum suction pressure at pump inlet of 46 PSI and a boost of 95 PSI thus system discharge pressure is 141 PSI

Delta P Carver Inc. is pleased to quote the following:

ADEA-3ATE-AITB-EAAA-A00 - Triplex, Delta Pak End Suction

System Details:	Power Available: **460 - 3 PHASE**	460v FLA: **54 A**	Control Cabinet: **UL508A, NEMA Rating 1**	
Pump Details:	Part Number: **A3U-40-200B150D3C**	Horsepower: **15 HP**	Category: **END SUCTION**	Qty: **3**
Motor Details:	Frame: **215JM**	Speed & Enclosure: **3600 RPM, TEFC**		
Drive Details:	Manufacturer: **Variable Speed ABB**	Model No: **ACS310**		

VERIFY 460/480V

System Features:

304 SS structural support frame	Touchsafe 24 volt control logic circuitry
24V Control Circuitry, UL 489 circuit breaker	Pump Thermal Protection
Pump motor branch circuitry protection UL 508A rated to 65K AIC	Single Point electrical power input connection
Main disconnect with door interlock	Non-slam, soft seated, pump discharge check valve
Standard Programmable Touchscreen User Interface	Delta P Carver Certified 3 year Warranty

304 SS suction and discharge manifolds with **4" inter-changable Rolled Groove Flange and Cap system connections.**

Discharge Pressure Transducer, Secondary Discharge System Switch, Suction Pressure Transducer, Mechanical Thermal Relief.

Hydrostatic pressure test & performance test included.

Start-up and owner training not included.

NSF Certified to NSF/ANSI 61 & 372

NOTE: This system utilizes variable speed drives with fully automatic shutdown.
This system may require an ASME Hydro Storage tank.
Standard delivery is approximately 4-6 weeks unless prior arrangements are made.

This proposal is valid for 30 Days unless prior written notice is obtained from the manufacturer. This is our best interpretation of plans and specifications available. Compliance must be verified by contractor.

Additional Accessory Packages:

Below is a breakdown of the packages that were selected for this system.

316SS Push-Lock Fittings

Upgrade from standard push-lock fittings. Four (4) fittings rated at 290 psi to accommodate increased system pressure.

Item:	Price:	Qty:	Ext. Price:
316SS Push-Lock Fittings		**1**	

Lightning and Surge Protection

Arrestor installed in control enclosure to protect against voltage surges and lightning strikes

Item:	Price:	Qty:	Ext. Price:
Lightning and Surge Protection		**1**	

QUOTE – OPTIONS CONTINUED

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SYSTEM SPEC SHEET

MOTOR DATA						
PUMP	**RPM**	**FRAME**	**VOLTAGE**	**HP**	**AMPS**	**ENCLOSURE**
P-1						
P-2	3600	215JM	460			
P-3						
P-4						
P-5						
P-6						

PUMP DATA: 3U-40-200B						
PUMP	**SIZE**	**GPM**	**TDH**	**PSI/BOOST**	**TRIM**	**PUMP TYPE**
P-1	2-1/2" x 1-1/2"	125				
P-2			220	95	N/A	ES
P-3						
P-4						
P-5						
P-6						

SYSTEM DATA			
MANIFOLDS	**SIZE (INCHES)**	**CONNECTION TYPE**	**VELOCITY (fps)**
SUCTION		ROLL GROOVE	<9
DISCHARGE		ROLL GROOVE	<9

PANEL DATA						
VOLTAGE	**PHASE**	**HERTZ**	**DISC. AMPS**	**ENCLOSURE**	**ALTERNATION**	**SEQUENCE**
460	3	60	80.0	NEMA 1		
SYSTEM FLA						

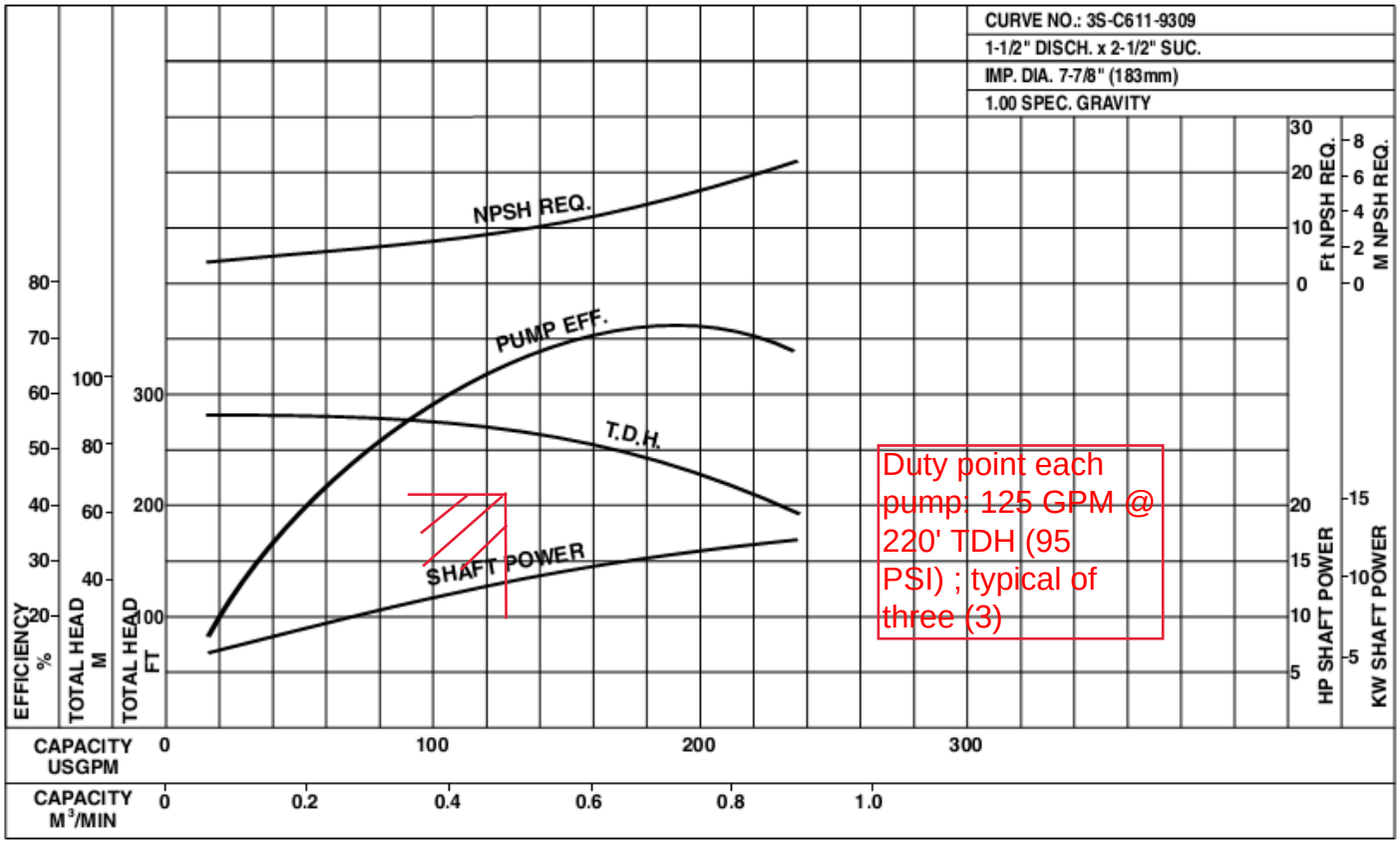
CONTROL DEVICE RANGES				
LEAD TRANSDUCER	**LAG TRANSDUCER**	**HIGH SYSTEM**	**LOW SUCTION**	**FLOAT SWITCH**
			10	N/A

VARIABLE FREQUENCY DRIVE DATA				
MANUFACTURER	**MODEL**	**HP**	**SETPOINT**	**LAG CALL (Hz)**
				59
ABB	ACS310-03U-25A4-4	15	165	59

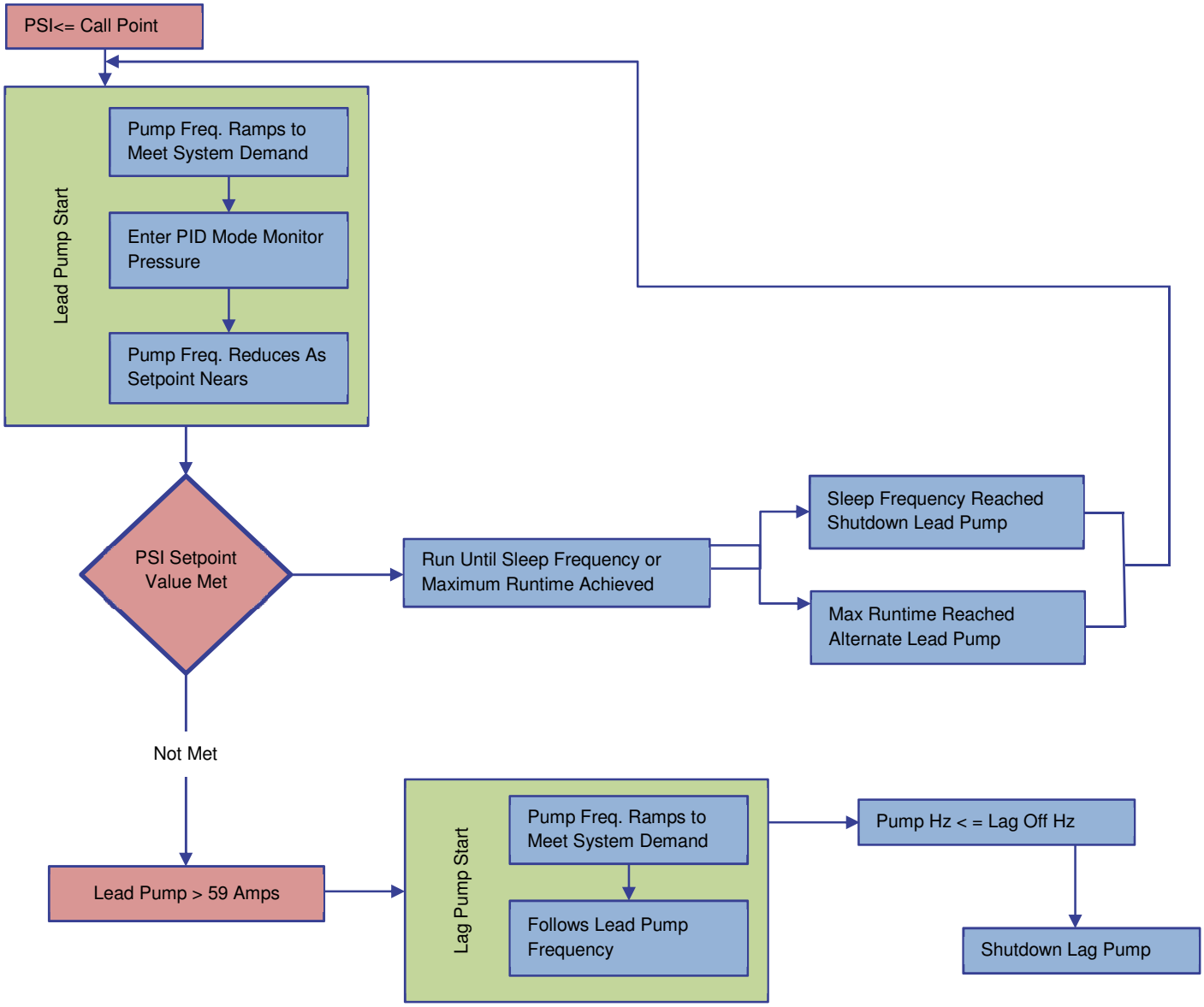
PUMP PERFORMANCE CURVE

Model 3U

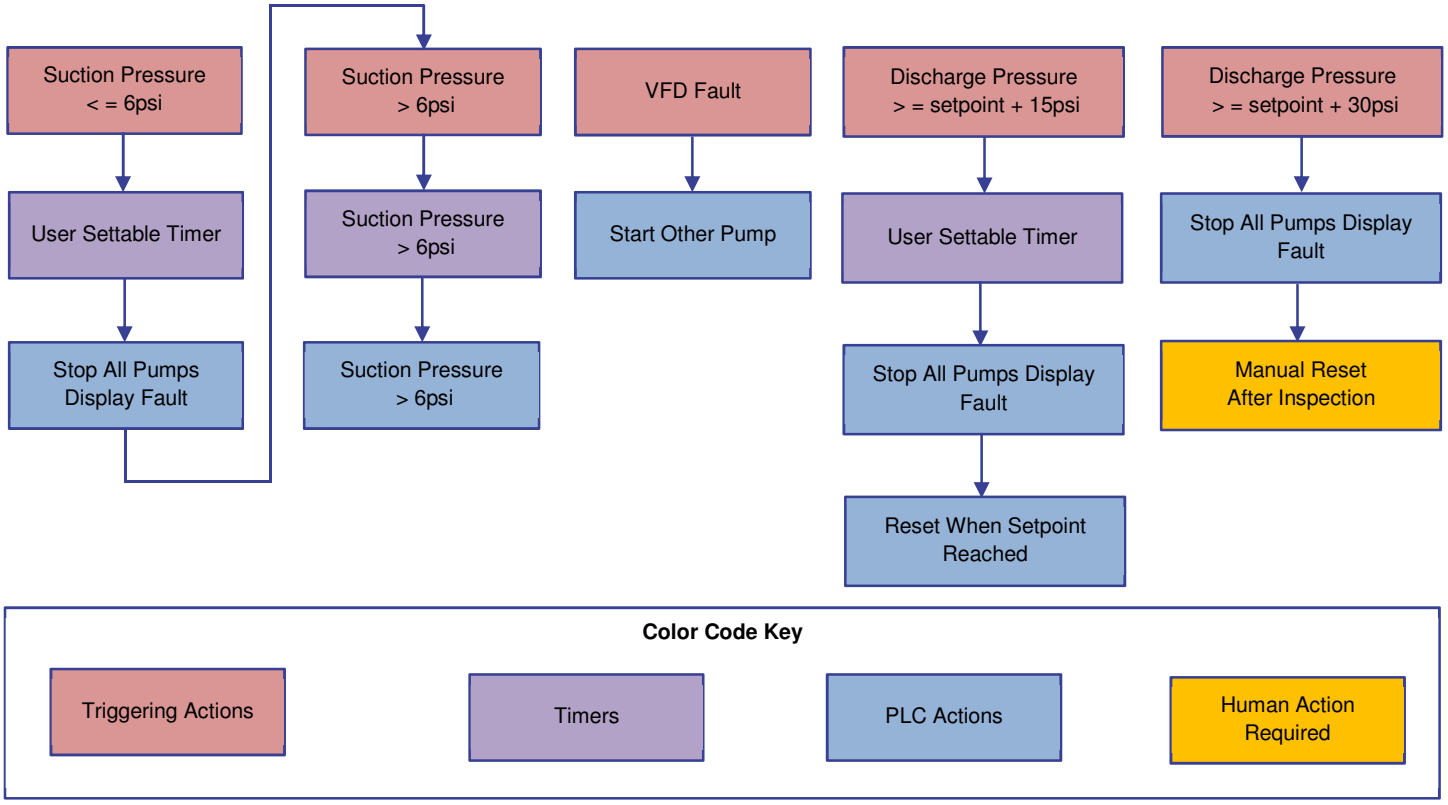
Performance Curve 40-200B-15HP, Synchronous Speed: 3450RPM, Size: 1 1/2 X 2 1/2 X 7 7/8



CONTROL LOGIC CHART



ALARM AND FAULT ACTIONS



PRESSURE SENSOR

Pressure transducer with all stainless steel wetted parts utilizes piezoresistance.

Specifications:

Input	
Voltage	24VDC
PSI Range	X = A = 0-100 B = 0-150 C = 0-200 D = 0-300
Proof Pressure	2 x full scale
Burst Pressure	3 x full scale
Fatigue Life	More than 4 million cycles
Performance @ 25° C (77° F)	
Accuracy	1% full scale, BFSL
Stability	0.2% full scale
Compensated Temperatures	-10 to 75° C (14 to 167° F)
Operating Temperatures	-20 to 80° C (-4 to 176° F)
Zero and Span Offset Tolerance	1.5%
Current Consumption	Approx. 3mA for voltage output, 22mA for current output (4-20mA)
Mechanical Configuration	
Electrical Connection	3 Meter Cable
Signal Type	0-10V
Ingress Rating	IP65 with T-Direct standard 9.4 DIN cable
Pipe Connection	¼ NPT
Housing	316 stainless steel
Diaphragm Material	316 SS, all wetted parts are 316 SS, no internal O-rings
Approvals	CE

PRESSURE SWITCH

PSI Range	Unit Range	Pipe Connection	Electrical Connection
75-500	Adjustable	¼ NPT Male	Spade Terminals

PLC

Key Features

- 3.8” HMI full color embedded PLC
- 8 inputs, 4 relay outputs
- Embedded Ethernet port
- USB Type A port for data logging a and recipe functions
- RS232C/RS485 interface
- IP66f (water and oil tight)

Display Specifications

Display Element	TFT color LCD
Colors/Shades	65,536 colors
Effective Display Area	88.92 W x 37.05 H mm
Display Resolution	240 W x 100 H pixels

Function Specifications

Backup Function	RAM	Backup data: Internal relay, shift register, counter current value, data register, clock data (year, month, and day)
Backup Function	Backup Data	128KB
	Buzzer Output	Single tone (tone length is adjustable)
	Backup Duration	Approx. 30 days (typical) at 25℃ after backup battery fully charged
	Battery	Lithium
	Charging Time	Approx. 15 hours for charging from 0% to 90% of full charge
	Battery Life	5 Years
	Replaceability	Not possible
Timer (1-sec, 110ms, 10ms, 1ms)		200
Input Filter		Without filter, 3 to 15ms (selectable in increments of 1ms)
Catch Input/Interrupt Input	Input Points	4
High-speed Counter	Points	
	Maximum Counter Frequency	Single/two-phase selectable: 1 (5kHz, multiple 2/4, single-phase cannot be used) Single-phase: 4 (x 10kHz)
	Counter Range	0 to 4,294,967,295 (32 bits)
	Operation Mode	Rotary encoder mode and adding counter mode
Analog Voltage Input	Points (terminal No.)	2
	Input Voltage Range	0 to 10V DC
	Digital Resolution	10-bit(0 to 1000)
USB Port	USB Standard	USB 2.0
	Connector	Mini-B type
Ethernet Port		1

SURGE PROTECTOR – OPTIONAL IF ORDERED

Features:

- 50kA 8 x 20 µs
- Type 1 SPD – 20kA I_n & 10kA
- 20kA SCCR (most models)
- All UL-required OCP & Safety Coordination Included Inside
- NEMA 4X Polycarbonate Enclosure – UL746C(f1), UL94-5VA

Performance Specifications

- 50kA 8 x 20µs Per Mode
- UL 1449 tested Inominal: 20kA (highest available) + 10kA
- UL 1449 tested SCCR: 200kA (most models)
- Large-Block, 34mm square, 50kA MOVs
- Individually Fused & Thermally Protected MOVs
- UL 1449 Voltage Protection Ratings (VPRs):

Green = Go Visual Diagnostic Monitoring

- Green LED = A-OK, Out = replace
- LED Visible from Multiple Sides & Angles – Better Viewing
- Every MOV is Monitored as opposed to 'power is present'

Quality, Standards & Validation

- IL1449 Third Edition file: VZCA.E321351 at www.UL.com, cUL
- ANSI/IEEE C62.41.1-2002, V62.41.2-2002, and C62.45-2002
- NEMA LS-1
- IEC 61643, CE
- ISO 17025:2005 Certified Test Lab
- RoHS-compliant

Direction of Rotation Clockwise when viewed from motor end

VFD

Introduction to ABB ACS310 drives for pump and fan applications

ABB general purpose drives, ACS310, are dedicated to variable torque applications such as booster pumps.

The dive's dedicated pump and fan features lower operating costs boost energy efficiency and reduce CO2 emissions. Included among these features are built-in PID controllers and PFC (pump and fan control) that varies the drive's performance in response to changes in pressure, flow or other external data.

Among the pre-programed protection functions is pump cleaning. This prevents pumps and pipes clogging by initiating a sequence of forward and reverse runs of the pump to clean the impeller.

Within pumping applications, energy savings up to 50 percent can be achieved compared to direct-on-line motor-driven systems that use mechanical flow control methods. The ABB general purpose drives provide built-in features for efficient energy management. Energy savings can be easily monitored using the built-in counters that display energy savings in kilowatt hours and saved carbon dioxide emissions. The savings can also be displayed in local currencies.

The compact design and uniform dimensions make cabinet mounting of the drive straightforward, thereby providing a speedy and space saving installation. The ACS310 drives have an embedded Modbus interface for system monitoring that saves the cost of external fieldbus devices and enables to integrate the drives easily with PLC. When combined with preprogrammed application macros, an intuitive user interface and several assistant screens, installation time is further reduced while speeding up parameter setting and drive commissioning.

The ACS310 drives meet the needs of logistical and technical distributors as well as the requirements of end users with pumping and ventilation applications.

Highlights

- Powerful set of pump and fan features
- Boosted energy efficiency
- Tailored for cabinet installations
- Clever drive commissioning assistants and convenient user interface
- Worldwide availability and service

The ACS310 drive is specifically designed to meet the variable torque loads demanded by centrifugal fans and pumps. The result is maximum application uptime, reduced maintenance cost and higher energy savings.

A booster pump system is designed to boost supplied water pressure to a predetermined level in water and wastewater pressure to a predetermined level in water and wastewater plants. The ACS310 drive features pump and fan control (PFC) for use where several parallel pumps are operated together and the required flow rate is variable.

PID control is available to allow the process to accurately maintain a pressure setpoint by adjusting the control outputs, thus allowing for precise control within difficult processes. A sleep & boost function detects prior shutdown. The pressure is continuously monitored and pumping restarts when the pressure falls below the minimum level.

VFD - Continued

Main Features

Feature	Advantage	Benefit
Pump and fan control (PFC) feature to control pumps and fans in parallel	One drive controls several pumps or fans and eliminates the need for an external programmable logic controller. Reduces motor stress and increases lifetime when auxiliary motors are driven according to the needed pump/fan capacity. Interlock function enables one motor to be disengaged from the mains supply while others continue operating in parallel.	Saves cost of additional drives and external PLC. Longer life for pump or fan systems while reducing maintenance time and costs. Maintenance can be carried out safely without stopping the process.
Soft pump and fan control features (SPFC)	Reduces unwanted pressure peaks in pumps and pipelines when an auxiliary motor is started. Reduces inrush current to the power network while connecting new auxiliary motors.	Reduces maintenance costs. Longer life for pump or fan systems. Smoother processes.
Pump protection functions	Integrated protection and control with preprogrammed features like pipe cleaning, pipe fill, inlet/outlet pressure supervision and detection of under or over load for preventive maintenance. Improves process control and system reliability. Integrates system protection. Smoother processes: improved and optimized system. Longer life for pump and fan systems, reduced maintenance costs.	Reduces maintenance costs. Longer life and reliable operation of pump systems.
PID controllers	Varies the drive's performance according to the need of the application.	Enhances production output, stability and accuracy.
Embedded Modbus EIA-485 fieldbus interface	No need for external fieldbus options. Integrated and compact design.	Saves costs of external fieldbus devices. Increases reliability.
On/off cooling control		
Software controlled phase inversion	Fast and easy way to change the phase order of the motor rotation.	Time savings as there is no need to change the output cable order manually.
Short parameter menu view	Only the most needed drive parameters are shown on the drive's parameter view. Complete parameter view can be changed by setting one parameter.	Time savings as the user quickly sees the most important parameters. Fast commissioning of the drive.
Energy optimizer	Improve motor efficiency with intelligent drive control method, especially while operating on partial centrifugal loads.	Boosts energy efficiency due to lower motor currents. Reduces audible noise from the motor.
Energy efficiency counters	Several counters to illustrate saved energy (kWh), carbon-dioxide emissions (CO_2) and cost in local currency.	Shows direct impact on energy bill and helps control operational expenditure (OPEX).
Full output current at 50° C ambient	The drive can be operated in ambient temperatures up to 50° C without derating the output current.	Optimizes drive dimensioning for wide temperature ranges.
Load analyzer	Load analyzer saves process data, such as current and torque values, which can be used to analyze the process and dimensioning of the drive and motor.	Optimized dimensioning of the drive, motor and process.
Compact size and flexible mounting option	The high power-to-size ratio of the drive facilitates efficient cabinet space usage. Optimum installation layout. Flexible installation with screw or DIN rail mounting. Drive can be installed sideways or side-by-side.	Space savings.
User interface	Assistant control panel with clear alphanumerical dynamic menus, real time clock and 14 languages. Basic panel with numerical display.	Different control panels available according to functionality needs.
Maintenance assistant	Monitors consumed energy (kWh), running hours or motor rotation.	Assists in preventive maintenance of the drive, motor or run application.
Commissioning Assistants	Easy setup of parameters for PID controllers, real-time clock, serial communication, drive optimizer and drive startup.	Time savings with reduces need to set the parameters manually. Ensures all required parameters are set.
Drive protection	Motor output and I/O protected against wiring faults. Protection against unstable supply networks. Coated boards as standard.	Latest solution to protect the drive and offer trouble free us and the highest quality.

VFD - Continued

Technical Data

Mains Connection	
Voltage and power range	1-phase, 200 to 240 V ± 10% 0.37 to 2.2 kW (0.5 to 3 hp) 3-phase, 200 to 240 V ± 10% 0.37 to 11 kW (0.5 to 15 hp) 3-phase, 380 to 480 V ± 10% 0.37 to 22 kW (0.5 to 30 hp)
Frequency	48 to 63 Hz
Motor Connection	
Voltage	3-phase, from 0 to U_{supply}
Frequency	0 to 500 Hz
Continuous loading capability	I_{2N} maximum continuous output current at ambient temperature of +40 °C. No overloadability, derating 1% for every additional 1 °C up to 50 °C. I_{LD} continuous output current at max ambient temperatures of +50 °C. 10% overloadability for one minute every ten minutes. At start 1.8 x I_{2N} for 2 s
Switching frequency Default Selectable	 4 kHz 4 to 16 kHz with 4 kHz steps
Acceleration time	0.1 to 1800 s
Deceleration time	0.1 to 1800 s
Motor Control method	Scalar U/F
Environmental limits	
Ambient temperature	-10 to 50 °C (14 to 122 °F), no frost allowed
Altitude Output current	 Rated current available at 0 to 1000 m (0 to 3281 ft) reduced by 1% per 100 m (328 ft) over 1000 to 2000 m (3281 to 6562 ft)
Relative humidity	Lower than 95% (without condensation)
Degree of protection	IP20/optional NEMA 1 enclosure
Enclosure color	NCS 1502-Y, RAL 9002, PMS 420 C
Contamination levels Transportation Storage Operation	IEC721-3-3 No conductive dust allowed Class 1C2 (chemical gases) Class 1S2 (solid particles) Class 2C2 (chemical gases) Class 2S2 (solid particles) Class 3C2 (chemical gases) Class 3S2 (solid particles)

Product compliance
Low Voltage Directive 2006/95/EC Machinery Directive 2006/42/EC EMC Directive 2004/108/EC Quality assurance system ISO 9001 Environmental system ISO 14001 UL, cUL, CE, C-Tick and GOST R approvals RoHS compliant

Programmable control connections	
Two analog inputs Voltage signal Unipolar Bipolar Current signal Unipolar Bipolar Resolution Accuracy	 0 (2) to 10V, R_{in} > 312 kΩ -10 to 10 V, R_{in}>312 kΩ 0 (4) to 20 mA, R_{in} = 100 Ω -20 to 20 mA, R_{in} = 100 Ω 0.1% ± 1%
One analog output	0 (4) to 20 mA, load < 500 Ω
Auxiliary voltage	24 V DC ± 10%, max. 200 mA
Five digital inputs Input impedance	12 to 24 V DC with internal or external supply, PNP and NPN, pulse train 0 to 16 kHz 2.4 kΩ
One relay output Type Maximum switching voltage Maximum switching current Maximum continuous current	 NO + NC 250 V AC/30 V DC 0.5 A/30 V DC; 5 A/230 V AC 2 A rms
One digital output Type Maximum switching voltage Maximum switching current Frequency Resolution Accuracy	 Transistor output 30 V DC 100 mA/30 V DC, short circuit 10Hz to 16 kHZ 1 Hz 0.2%
Serial communication	
Fieldbus Cable Termination Isolation Transfer rate Communication type Protocol	Modbus EIA-485, embedded Shielded twisted pair, impedance 100 to 150 ohms Daisy-chained bus, without dropout lines Bus interface isolated from drive 1.2 to 76.8 kbit/s Serial, asynchronous, half duplex **Modbus**
Chokes	
AC input chokes	External option For reducing THD in partial loads and to comply with EN/IEC 61000-3-12
AC output chokes	External option To achieve longer motor cables

VFD - Continued

Cooling

ACS310 is fitted with cooling fans as standard. The cooling air must be free from corrosive substances and must not be above the maximum ambient temperature of 50° C. For more specific limits see the Technical data – Environmental limits.

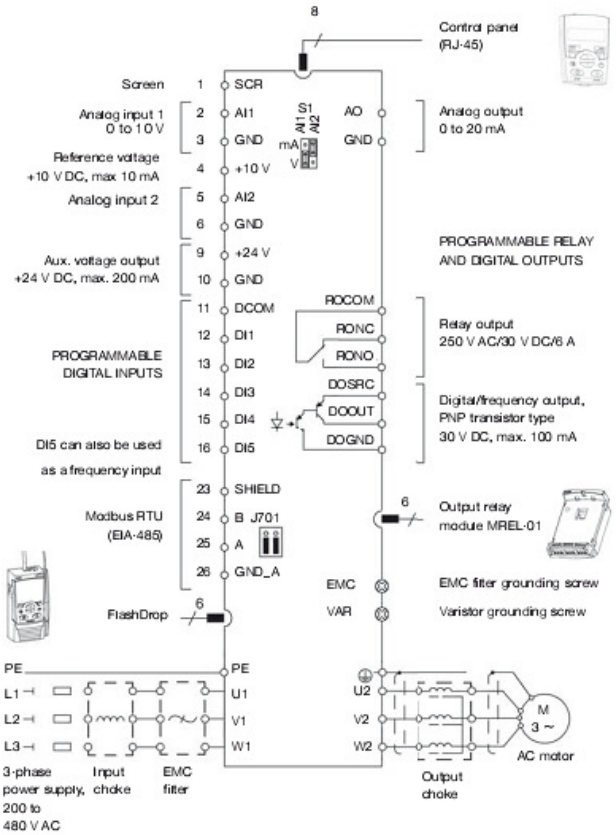
Control Connections

Application macros

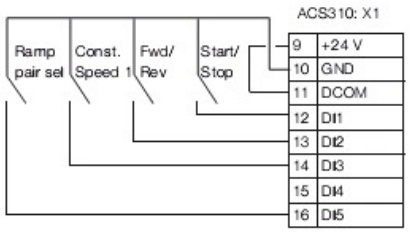
Applications macros are preprogramed parameter sets. While starting up the drive, the user typically selects one of the macros that are best suited for the application. The diagram below gives an over view of ACS310 control connections and shows the default I/O connections for the ABB standard macro.

- ABB standard macro
- 3-wire macro
- Alternative macro
- Motor Potentiometer
- Hand/auto macro
- PID control macro
- PFC control macro
- SPFC control macro

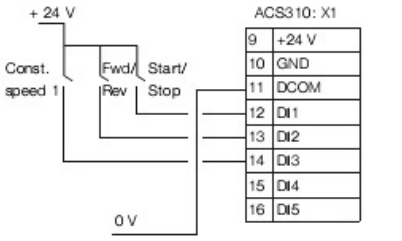
In addition to the standard macros the user can create



Typical I/O connections



DI configuration NPN connected (sink)



DI configuration PNP connected (source) with external power supply

VFD - Continued

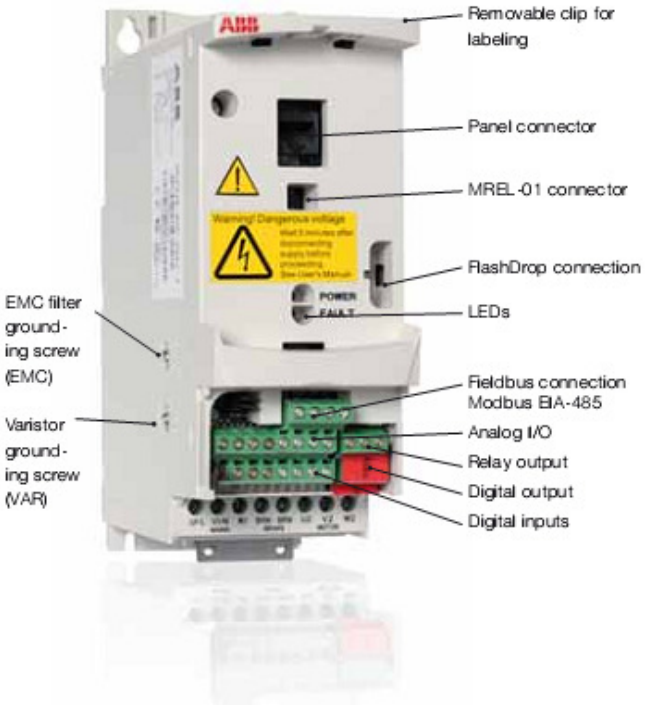
User Interfaces

Serial communication

The embedded Modbus EIA-485 fieldbus brings connectivity to major automation systems. A single twisted pair cable avoids large amounts of conventional cabling, thereby reducing costs and increasing system reliability.

Modbus TCP to Modbus RTU gateway

Additionally SREA-01 Ethernet adapter offers Modbus TCP to Modbus RTU gateway functionality which enables Modbus TCP connectivity to ACS310. Please refer to SREA-01 user's guide for more detailed information.



Option Used

The ACS310's internal EMC filter is designed to meet category C3 requirements of EN/IEC 61800-3 standard. External EMC filters maybe used to enhance the drives electromagnetic performance in conjunction with its internal filtering.

MMP

These MS4 series devices are mainly used to switch motors manually on/off and protect them against short-circuit, overload and phase failures. Fuseless protection with a manual motor starter saves costs, space and ensures a quick reaction under short-circuit condition, by switching off the motor within miliseconds.

Manual Motor Protector General Information

- Suitable for 3-phase motors up to 75 HP @ 480V
- AMP range from 11-100A
- UL listed & CSA certified for Group Motor Installation
- High short circuit capacity
- Adjustable overload protection
- Short circuit protection
- Phase failure detection
- UL508 (type) listing available
- Rated Operating Voltage: max. 600V
- Tripping Class: 10/20
- Max. kA IC @ 600V 100kA
- Mechanical Life Time: 100,000 switches

BUTTERFLY VALVES

Material Specifications

Butterfly valves are designed for bubble-tight shut-off to 200psi/1400kPa. Two piece stem permits narrow disc design for low pressure drop performance and is self-centering for positive shut-off.

Housing: Ductile iron conforming to ASTM A-536, grade 65-45-12, painted black

Body: Carbon steel

Seat/Liner: EPDM

Stem-Upper/Lower: 416 stainless steel

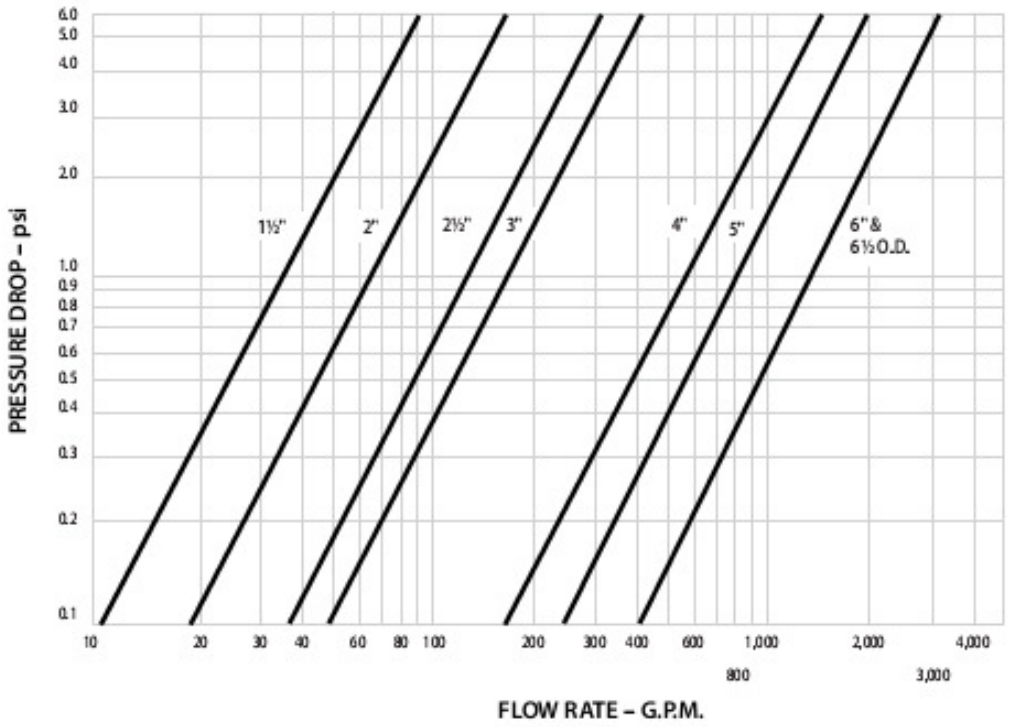
Disc: 316 stainless steel

O-ring: EPDM

Hardware: Steel, Electroplated

Flow Characteristics

The chart below expresses the flow of water at 65°F/18°C through a full open valve.



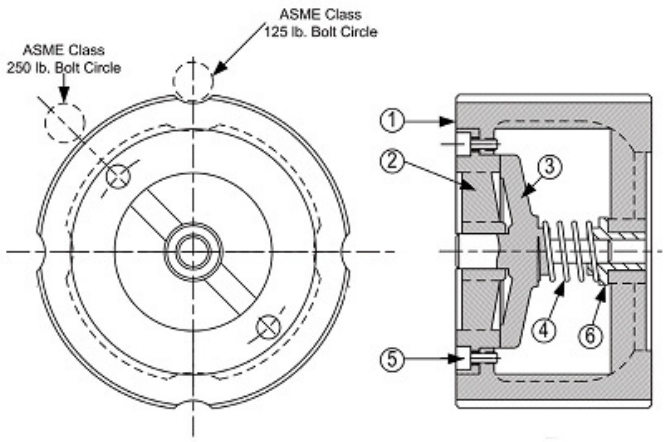
CHECK VALVES

Features

- Non-Slam
- A short face-to face dimension
- A spring automatically closes the disc at zero flow, which prevents flow reversal and water hammer.
- The disc is fully guided at the top and bottom to prevent binding and cocking.
- Designed for a minimum open area equal to 110% of the pipe size.
- Discs lift 1/3 of an inch from their seats for every 1" of pipe size.
- NSF epoxy coating is standard.
- Optional soft seat provides bubble tight shut off.

Working Pressures – Non Shock

NOM. RATING	BODY MATERIAL	MEDIA	2" to 12"
125#	CAST IRON (ASTM A 126, CLASS B)	W.O.G.	200 PSI @ 150°F
NOM. RATING	**BODY MATERIAL**	**MEDIA**	**2" to 6"**
250#	CAST IRON (ASTM A 126, CLASS B)	W.O.G.	500 PSI @ 150°F
NOM. RATING	**BODY MATERIAL**	**MEDIA**	**2" to 12"**
150#	CARBON STEEL (ASTM A 216, GRADE WCB)	W.O.G.	285 PSI @ 150°F
	STAINLESS STEEL (ASTM A 351, GRADE CF8M)	W.O.G.	275 PSI @ 150°F
NOM. RATING	**BODY MATERIAL**	**MEDIA**	**2" to 6"**
300#	CARBON STEEL (ASTM A 216, GRADE WCB)	W.O.G.	740 PSI @ 150°F
	STAINLESS STEEL (ASTM A 351, GRADE CF8M)	W.O.G.	720 PSI @ 150°F



Wafer Silent Check Valve, 125 lb. / 250 lb.
Sizes 2" - 6" 125/250 lb. dual rated,
Sizes 8" - 12" 125 lb. rated.
Cast Iron (ASTM A 126, Class B)

PARTS LIST		
ITEM	DESCRIPTION	MATERIAL
1	Body	Cast Iron (ASTM A 126, Class B)
2	Seat	Cast Bronze (ASTM B 62, C83600)
3	Disc	Cast Bronze (ASTM B 62, C83600)
4	Spring	Stainless Steel (ASTM A 182, Grade F-304)
5	Screw	Stainless Steel (ASTM A 182, Grade F-304)
6	Bushing	Stainless Steel (ASTM A 182, Grade F-304)

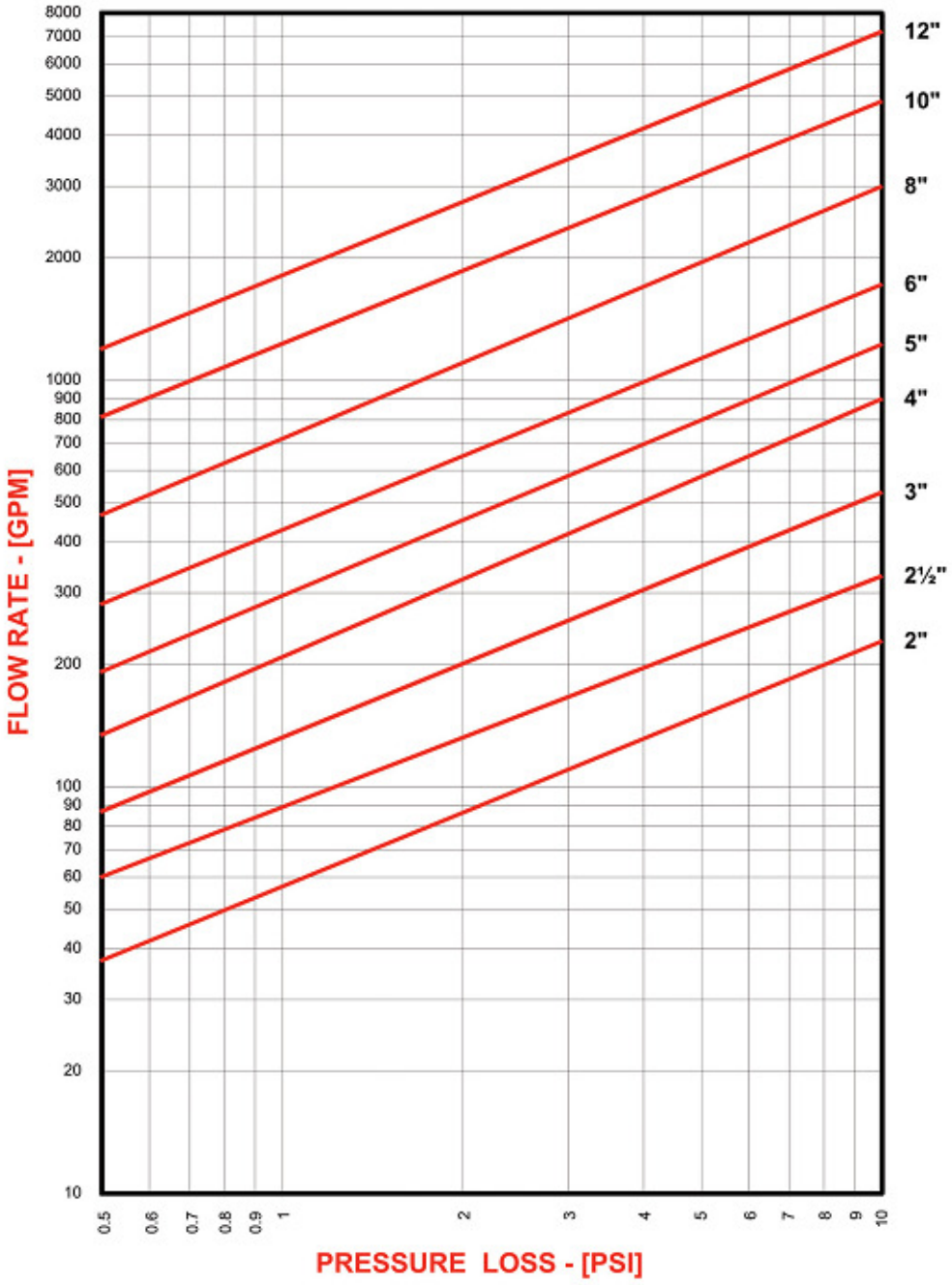
CHECK VALVES - Continued

Pressure Drop Chart

The check valve has a cracking pressure equal to or less than 0.5 PSI when mounted horizontally.

To Use Charts:

Find your desired rate of flow (GPM) on the left side of the chart. Follow its corresponding horizontal line to the point where it intersects the diagonal line indicating the check valve pipe size. From this point of intersection, follow the vertical line down to the bottom of the chart to determine the approximate pressure drop.



PUMP

EBARA Model 3U/CDU or EVMU Features:

- Close coupled design
- Stainless steel liquid end components
- Back pullout design
- Top centerline discharge and foot support under casing
- Self-venting
- High operating efficiency

Specifications:

Suction 150 lb. ANSI R.F. equivalent

Discharge 150 lb. ANSI R.F. equivalent

Liquid Handled

Type of liquid Clean Water

Temperature 212°F (100°C)

Max. Working pressure 230 PSI (15 Bar)

Materials

Casing 304L Stainless Steel

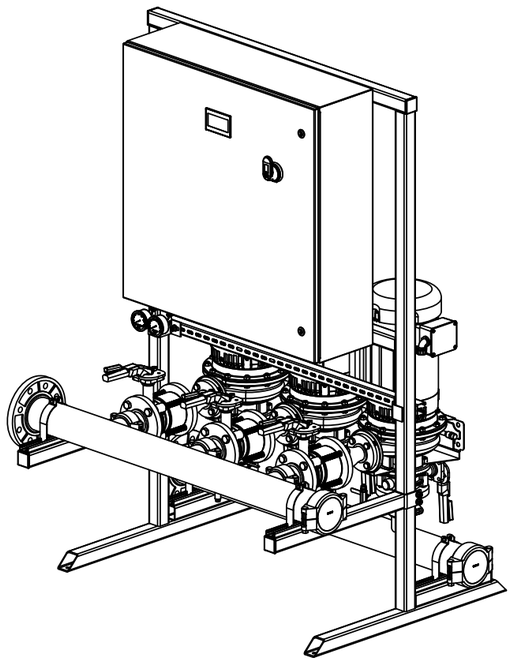
Impeller (closed type) 304L Stainless Steel

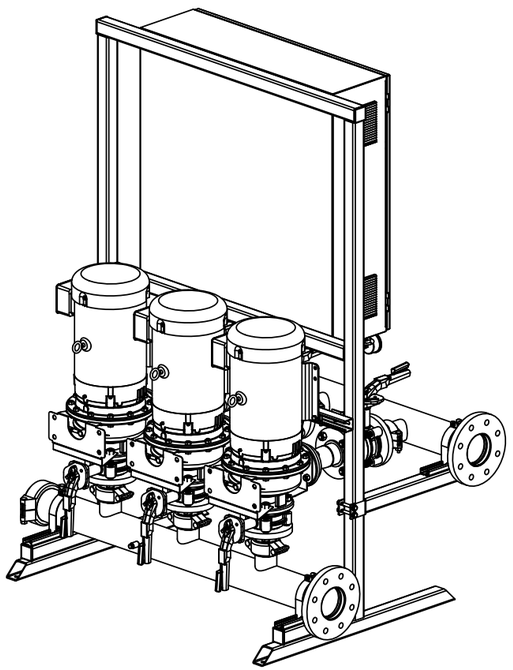
Shaft Sleeve 304L Stainless Steel

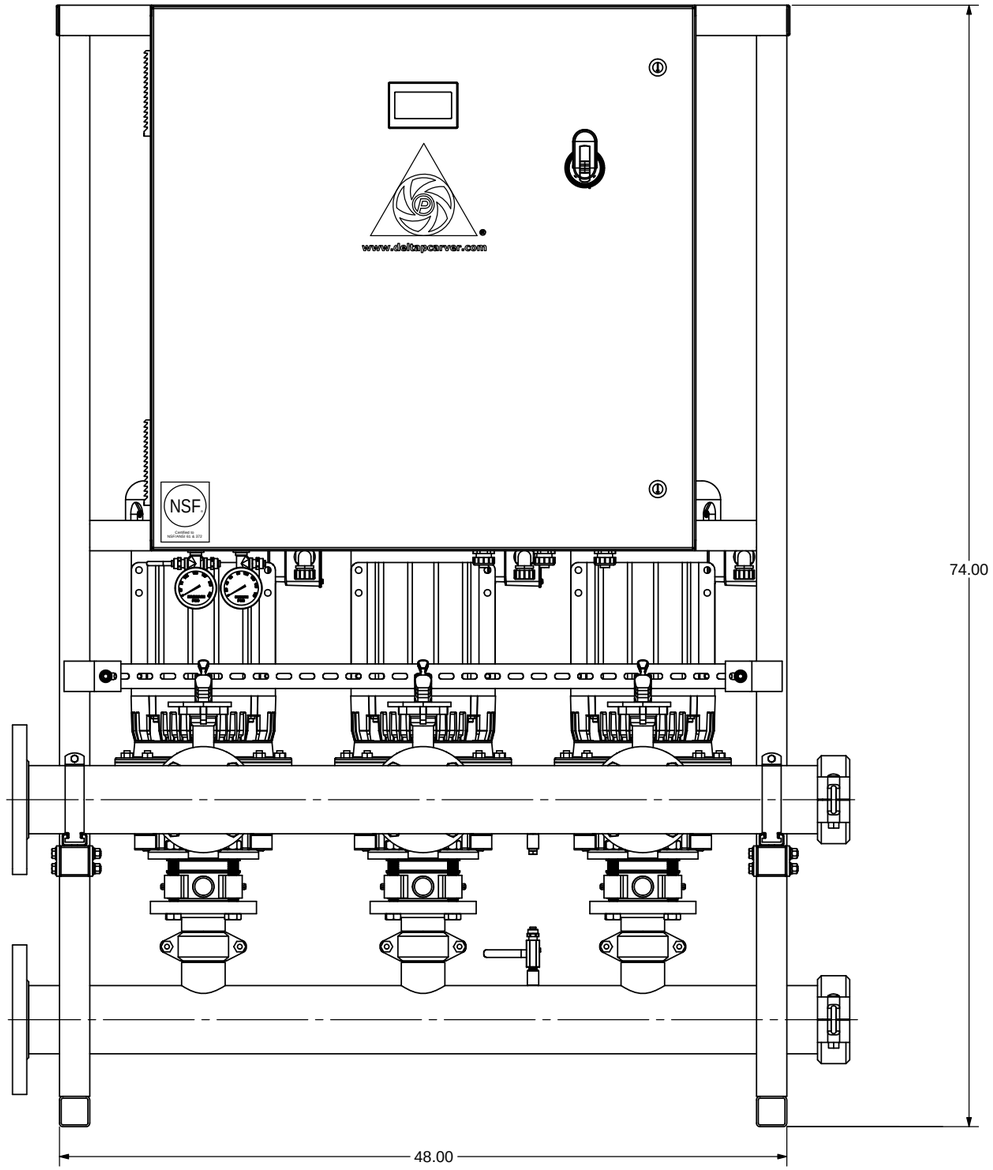
Bracket Cast Iron

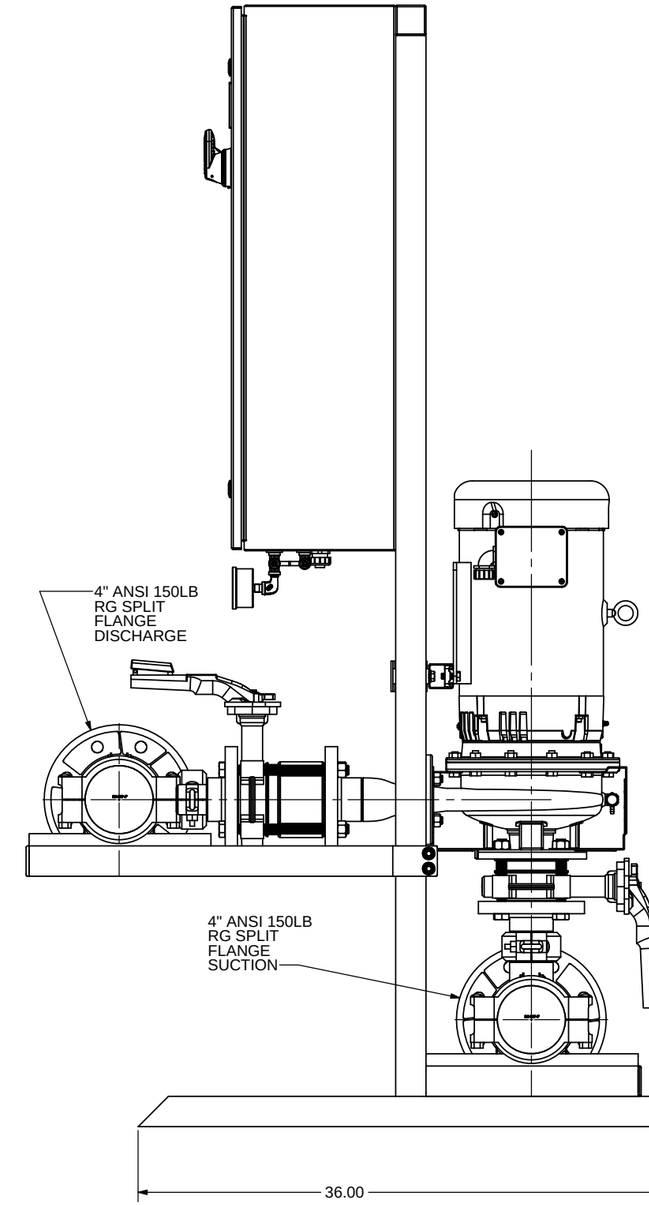
Shaft Seal Mechanical seal – Type 21 Carbon/Ceramic/ Viton

See following pages for drawing(s).









NOTE - PRELIMINARY LAYOUT, FOR REFERENCE ONLY

NOTE - ROLL GROOVE FLANGE AND COUPLING ARE REVERSIBLE

UNLESS OTHERWISE NOTED:		NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	DJB	5-25-17
INTERPRET GEOMETRIC DIMENSIONING & TOLERANCING PER ASME Y14.5M -1994	ENG APPR	-	-
	MFG APPR	-	-
LINEAR TOLERANCE ±.06"	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF DELTA P CARVER. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF DELTA P CARVER IS PROHIBITED.		
ANGULAR TOLERANCE ±5°			
BREAK CORNERS .06" MIN			
MACHINED FINISHES 250 RMS	THIRD ANGLE PROJECTION		
	DO NOT SCALE DRAWING	SCALE: 1:5	VOL.: 9217.37 IN^3

Delta P Carver
We Put The PSI In Water Systems

Ormond Beach
Florida, USA
386-236-0950

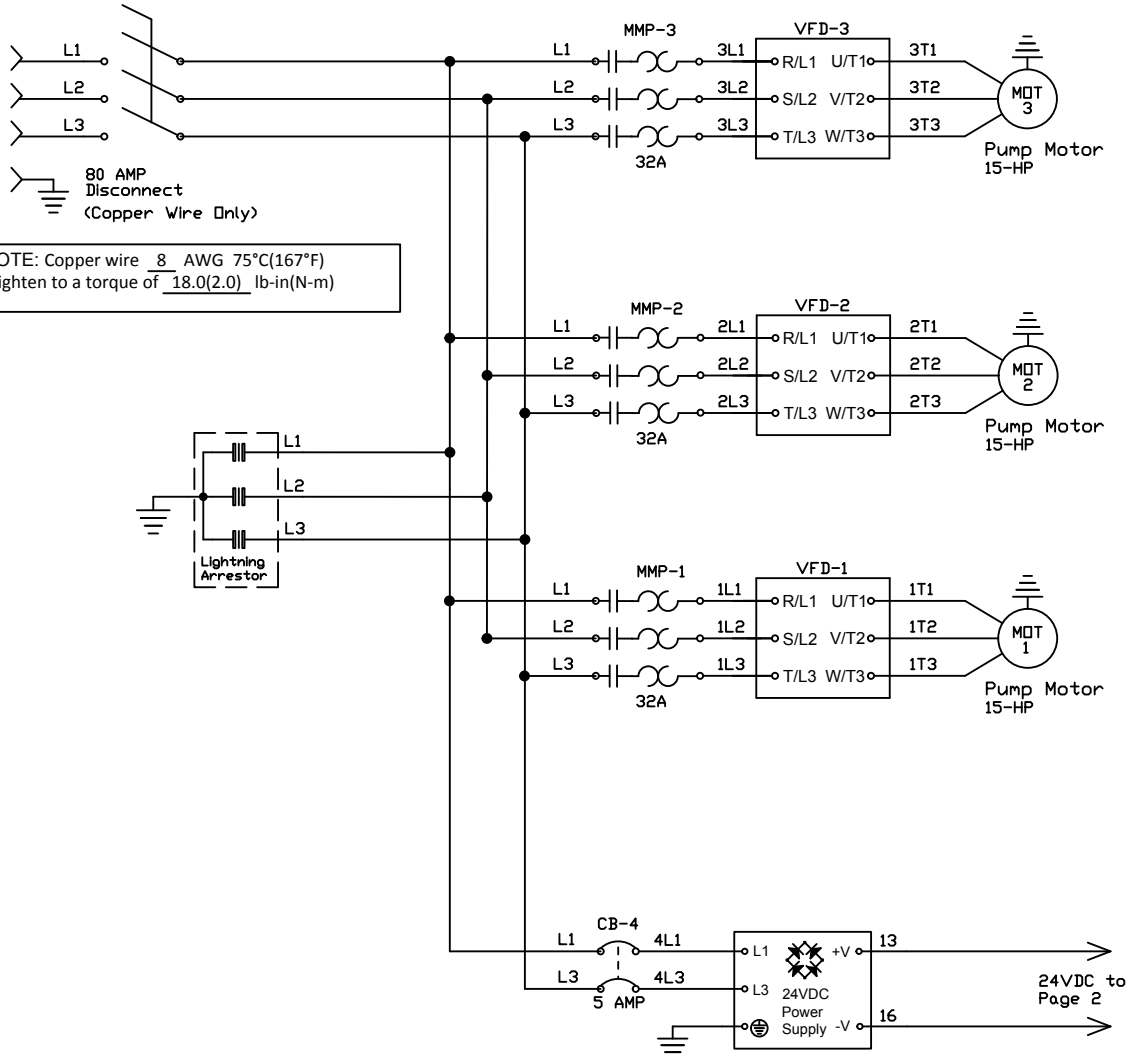
DELTA PAK TRIPLEX 3U-40-200-B 15HP, 215JM, 460VAC, RG WELDMENT, LUG BUTTERFLY, 4" MANIFOLDS, MMP

D		REV. 0

SHEET: 1 OF 2

NOTE: Customer to supply and install branch circuit overcurrent protection with an inverse time circuit breaker for:

460 VOLT **80 AMP MAX**
3 PHASE
60 HERTZ

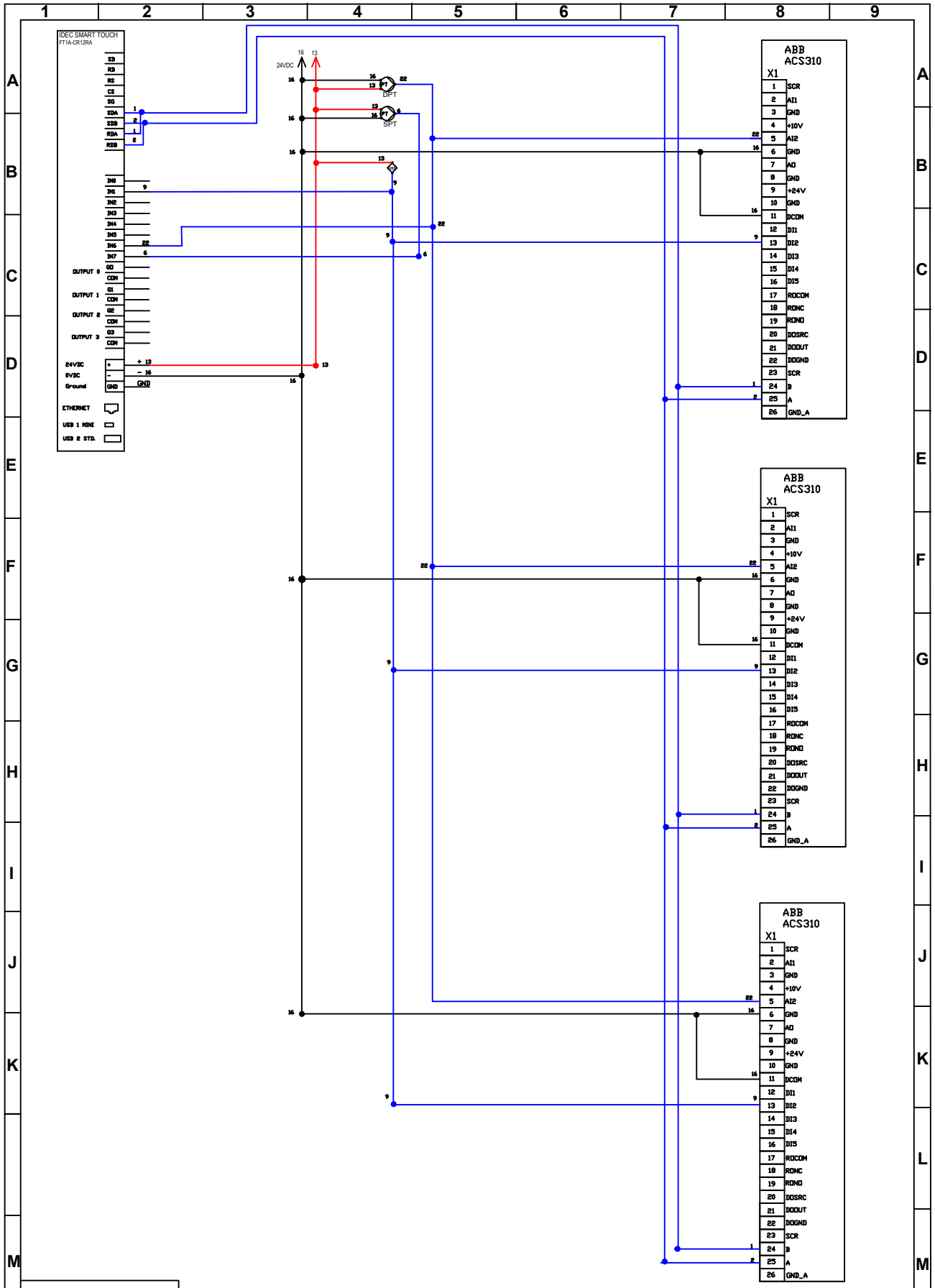


NOTE: Copper wire 8 AWG 75°C(167°F)
Tighten to a torque of 18.0(2.0) lb-in(N-m)

Delta P Carver, Inc.
14 Sunshine Blvd.
Ormond Beach
Florida 32174
Ph: 1-386-236-0950
Fax: 1-386-236-0955

DELTA P CARVER, INC.

DATE: 01/02/2017	SHEET NO: 1 OF 2
DRAWN BY: MRM	JOB NO: TBD
DWG NO: E12-DA3A-080-032-002	
JOB NAME: 15HP 460V TRIPLEX (LIGHTNING ARRESTOR)	



DeltaPCarver, Inc.
14 Sunshine Blvd.
Ormond Beach,
Florida 32174
Ph: 1-386-236-0950
Fax: 1-386-236-0955

DELTA P CARVER, INC.

DATE: 11/21/2016	SHEET NO: 2 of 2
DRAWN BY: KWB	REV: 1
MODEL: TRIPLEX CONTROL	JOB NO: TBD
JOB NAME: TRIPLEX WITH AXIS RUN PIN	

WARRANTY

1. DELIVERY TITLE AND RISK: Unless otherwise specified in Manufacturer's order acknowledgement: (a) the Products shall be deemed to be delivered to the Customer when delivered to the carrier at Manufacturer's facilities; and (b) the Customer shall assume all risk of loss with respect to such Products from and after the time of such delivery including, without limitation, all risk of loss while the Products are in transit. The Customer is deemed to have accepted the Products unless written notice of rejection is given within seven days of discovery of any defect or reason for rejection, and the Customer waives any right to revoke acceptance thereafter. Such loss is not covered under warranty.

2. FORCE MAJEURE: If Manufacturer's performance of its obligations under the order is delayed or made impossible or commercially impracticable due to any cause beyond Manufacturer's reasonable control (including, without limitation, acts of God, labor disputes, compliance with government regulations, equipment failure, shortages or difficulties in transportation, inability to obtain necessary labor or raw materials, or defects or delays in the performance of Manufacturer's suppliers or subcontractors), Manufacturer shall have such additional time within which to fulfill the order as may be reasonably necessary under the circumstances. Furthermore, if Manufacturer is unable to produce sufficient Products to meet all demands of its customers, Manufacturer shall have the right to allocate production among its customers and plants in any manner which Manufacturer may, in its sole discretion, deem equitable.

3. PAYMENT: Unless otherwise expressly provided on the Manufacturer's order acknowledgement, the Customer shall make payment of the purchase price for the Products in full to Manufacturer within 30 days from the date of Manufacturer's invoice for the Products. Failure to make timely payment will relieve Manufacturer of any Warranty responsibilities.

4. WARRANTY AND DISCLAIMER: Subject to all of the provisions set forth in this paragraph, Manufacturer warrants that their Products will be free from defects in materials and workmanship for a period of 36 months from the date of startup or 42 months after date of shipment from Manufacturer, whichever occurs first. If any payment is not made by Customer when due, Manufacturer warrants that it has good title to the Products and the Products are otherwise sold "as is" with all faults. **The express warranties set forth in this paragraph are exclusive and in lieu of all other warranties, conditions and terms as to quality or fitness of the Products, written, oral or implied, statutory or otherwise, including, without limitation, any warranties or conditions of merchantability or fitness for a particular purpose, and all such other warranties, conditions and terms are hereby disclaimed and excluded by Manufacturer.** The express warranties contained in this paragraph do not apply to any Products: (a) that have not been properly installed, operated or maintained in conformity with specifications furnished by Manufacturer or with any instructions for the installation, operation and maintenance of the Products; (b) which have been misused or modified, altered, repaired or replaced without the prior express written consent of Manufacturer; or (c) which are damaged by dry operation, explosion, erosion or corrosion. The term of any express warranty set forth herein shall not be extended because of the replacement or repair of defective Products hereunder.

5. EXCLUSIVE REMEDIES: If any Products furnished under the Agreement are defective or otherwise fail to conform to the Agreement, Manufacturer shall, at its option, either: (a) repair, replace such defective or non-conforming Products FOB Manufacturer's facilities, or any other facility designated by Manufacturer; or (b) repay or credit the purchase price paid for such Product to the Customer. The Customer shall not return any such non-conforming or defective Products to Manufacturer or incur any shipping or other charges in respect of such Products without Manufacturer's prior written consent. Repair, replacement of or repayment or credit for such non-conforming or defective Products shall be the Customer's exclusive remedy for and shall constitute satisfaction of any and all liabilities of Manufacturer with respect to any non-conformance of or defect whatsoever in the Products (including any liability for direct, indirect, special, incidental or consequential damages), whether in warranty, contract, tort, negligence, strict liability or otherwise.

WARRANTY - Continued

6. **LIMITATION OF LIABILITY:** In no event shall Manufacturer be liable for any special, direct, indirect, incidental or consequential damages (including, without limitation, personal injury, property damage, loss of profits or loss of anticipated business, cost of substitute products, downtime costs, delays, or claims of customers of the Representative or other third parties for such or other damages) whether based in warranty, contract, tort, negligence, strict liability or otherwise. In no event shall Manufacturer's liability exceed the purchase price allocable to the Products giving rise to the Purchaser's claim.

7. **LIMITATION OF ACTIONS:** No suit or claim based on any cause of action, regardless of form, arising out of, or in any way connected with the Agreement or the Products furnished to the Customer, may be brought by the Customer or any party claiming through the Purchaser more than one year after the date that such cause of action accrued.

8. **ACCEPTANCE OF ORDERS:** Salespersons or other representatives of Manufacturer are only authorized to solicit orders from prospective buyers and have no authority to accept orders on behalf of Manufacturer. Orders may only be accepted by an authorized representative at Manufacturer's facilities.

9. **TECHNICAL ADVICE:** Unless otherwise expressly provided in an agreement signed by both Manufacturer and Purchaser, any technical advice offered or given by Manufacturer in connection with the installation, maintenance or use of any Products will be as an accommodation to Customer and without charge without any warranties, express or implied; Manufacturer shall have no responsibilities or liabilities whatsoever for the content or use of such advice.

SUBMITTAL PACKAGE

Delta P Carver

Creating Value.

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Phone: 386-236-0950 **Fax:** 386-236-0955

Website: DeltaPCarver.com

Email: sales@deltapcarver.com