LARRY WUNSCH & ASSOC., INC.
LWA
Commercial HVAC & Plbg Equipment Since 1985

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CIRCUIT PROTECTION












LARRY WUNSCH & ASSOC., INC.
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Fax: 512-326-9116

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~SUBMITTALS INDEX~

04/10

"00"® Timers / Aquastat

The Taco Clock Timers and Temperature Aquastat are designed to operate Taco circulators for domestic hot water recirculation during peak demand periods. The 24-hour clock timer can be set in 15 minute on/off intervals. A digital 7-day programmable timer can be set to run at varying times and intervals each day. The timer enclosures feature rugged steel construction. Temperature control is easy with the Aquastat — automatically ON at 95˚F and OFF at 115˚F. Adaptable to any "00" Series Circulator.

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

HYDRONIC COMPONENTS & SYSTEMS

Do it once.
Do it right.® Taco®

Supersedes: 9/15/94

Effective Date: 04/30/06
Printed in USA

Submittal Data Information
"00"® Timers / Aquastat

Submittal Data # 101-036
Supersedes: 09/15/94

Effective: 04/30/06

24 Hour Analog Clock Timer Performance Data – #265-1

Electrical Characteristics: 115/60/1
Timer Switch: 16A @115V
Timer Interval: 15 Minutes
Clock face: Hour and Minute Hands
Manual Switch: I Permanently ON
Automatic Operation
O Permanently OFF

7 Day Digital Timer Performance Data – #265-3

Electrical Characteristics: 115/60/1
Timer Switch: 16A @115V
Timer Interval: 1 Minute (+) Adjustable
Clock face: Digital with Circulator Programming
Max. On/Off Settings: 10
Capacitor Backup: 100 hours

Temperature Aquastat – Snap Action Temperature Switch – #563-2

Electrical Characteristics: 115/60/1
Connections: 1/2" (Snap on circ. body)
3/4" Copper pipe
Temperature Setting: ON @ 95°F
OFF @ 115°F
Contacts: 7 amp SPDT Switch
Wire Leads: 18" – Type 18-2,
Round Premium Cable

Application

The Taco Clock Timers and Temperature Aquastat are designed to control the operation of Taco circulators on Domestic Hot Water Recirculation Systems for maximum comfort and energy efficiency. They are adaptable to any "00"® Series circulator by attaching the enclosure or wiring to the electrical box.

24 Hour Analog Timer

Operates the circulator at the same pre-set times every day. Time intervals are in 15 minute increments. This user friendly clock has a raised minute hand for easy adjustments, quick-set trippers and an operation switch for Manual ON/OFF or Automatic modes.

7 Day Digital Programmable Timer

Digital Timer can be programmed to operate at different times on different days, weekdays or weekends, for maximum comfort and convenience to match family schedules. Easy circular programming clock face and LCD readout screen allows for a maximum of 10 on/off settings. Run time intervals as short as 1 minute provides maximum energy efficiency. A capacitor backup saves settings for 4 days (100 hours) during power outages.

Temperature Aquastat

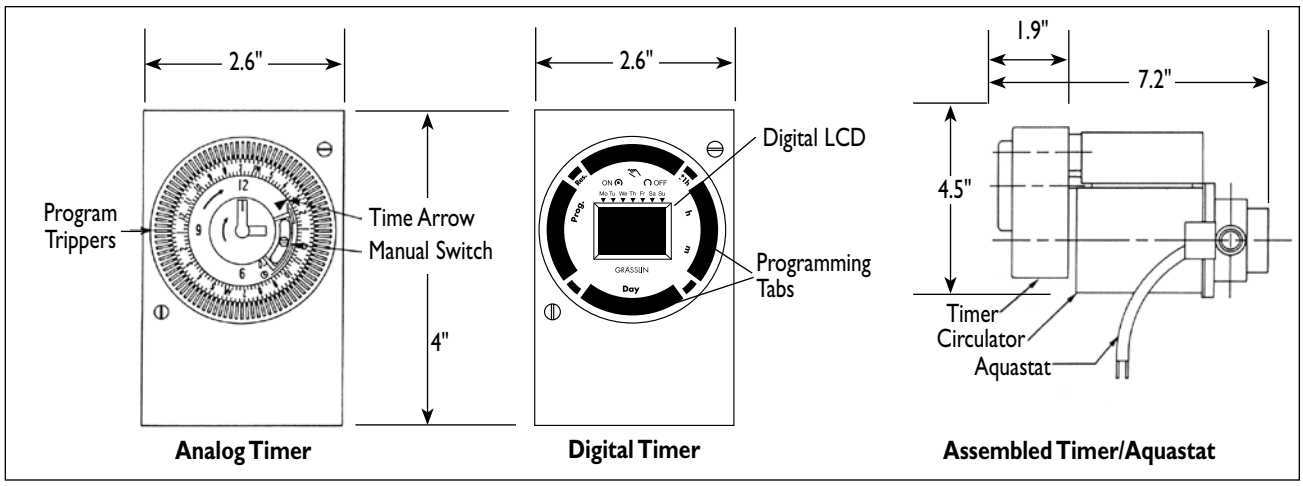
Controls pump operation to maintain system temperature between 95°F and 115°F. Easy clip-on Aquastat attaches directly to 3/4" pipe or a 1/2" sweat pump casing.

Shipping Weight

Model	Item	Lbs.	Kg
265-1	Analog Timer	.75	.35
265-3	Digital Timer	.75	.35
563-2	Aquastat	.25	.11

c UL us LISTED

FOR INDOOR USE ONLY



HYDRONIC COMPONENTS & SYSTEMS

Do it once. Do it right.® Taco®

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210.349.5244 Phone
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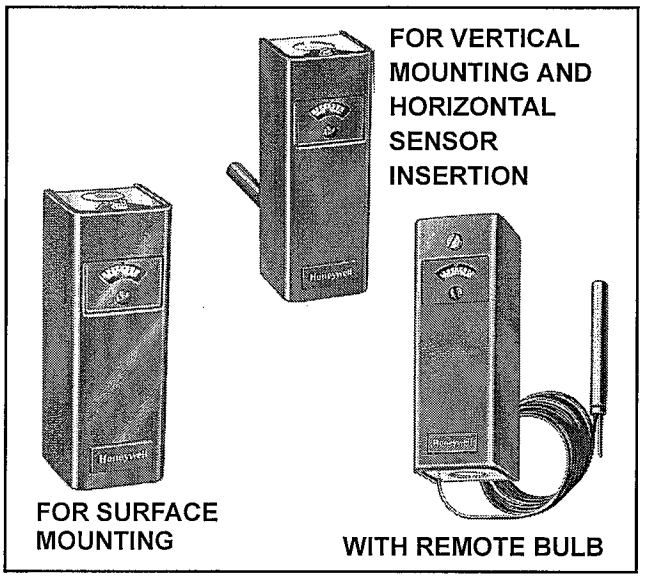
Taco Inc., 1160 Cranston Street, Cranston, RI 02920 / (401) 942-8000 / Fax (401) 942-2360
Taco (Canada) Ltd., 6180 Ordan Drive, Mississauga, Ontario L5T 2B3 / (905) 564-9422 / Fax (905) 564-9436
www.taco-hvac.com

Honeywell

L4006,7,8; L6006,7,8 Aquastat® Controllers

PRODUCT DATA



FEATURES

- L4006,7 and 8 provide spst switching for high or low limit or circulator control.
- L4006G includes two spst switches that provide high limit and circulator control.
- L4006,7; L6006,7 models are available for insertion in vertical or horizontal immersion well, vertical or horizontal direct immersion, and surface mounting.
- L4008, L6008 include remote bulb for mounting controller at a location away from the sensing element.
- Totally enclosed Micro Switch® snap-acting switches operate on temperature rise to set point.
- Models calibrated for high limit use are also suitable for low limit control if a separate high limit controller is used.
- Visible control point scale and external adjustment screw permit easy setting.
- Remote bulb models may be used to sense air temperature in ducts and in outside air sensing applications.

GENERAL

Aquastat® Controllers are immersion type devices for limiting or regulating the temperature of liquids in boilers, storage tanks, and other applications where temperature control is required.

Contents

60-2104-9

SPECIFICATIONS

IMPORTANT

The specifications given in this publication do not include normal manufacturing tolerances. Therefore, this unit may not exactly match the listed specifications. Also, this product is tested and calibrated under closely controlled conditions, and some minor differences in performance can be expected if those conditions are changed.

SUPER TRADELINE®/TRADELINE® MODELS

SUPER TRADELINE controls offer features not available on TRADELINE or standard models, and are designed to replace a wide range of Honeywell and competitive controls.

TRADELINE models are selected and packaged to provide ease of stocking, ease of handling, and maximum replacement value. Specifications of SUPER TRADELINE and TRADELINE controls are the same as those of standard models except as noted below.

SUPER TRADELINE Model: L6006A Aquastat Controller.

SUPER TRADELINE Features:
SUPER TRADELINE package with cross reference label and special instructions.
Factory-set stop at 240°F (116°C).
Vertical or horizontal mount.
Tube of heat-conductive compound.
Insulation: 1-1/2 to 3 in. (38 to 76 mm).

TRADELINE Models: L4006A,B,E; L4008E; L6006C; L6008A Aquastat Controllers.

TRADELINE Features Available:
TRADELINE package with cross reference label and special instructions.
Some Tradeline models include well.
Factory-set stops at 180°F, 240°F, or 250°F (82°C, 116°C, or 121°C).
Vertical or horizontal mount.
Tube of heat-conductive compound.
Insulation depths of 1-1/2 or 3 in. (38 or 76 mm).

NOTE: The following specifications are standard. Variances, available as options, are listed in Tables 1 and 2.

Electrical Ratings (A):
Models with 2°F (1°C) fixed differential:

	120 Vac	240 Vac
Full Load	2.6	1.3
Locked Rotor	15.6	7.8

Models with 5°F (3°C) fixed differential or 5°F to 30°F (3°C to 17°C) adjustable differential:

	110/120 Vac	200/240 Vac	277 Vac[a]
Full Load	8.0	5.1	4.2
Locked Rotor	48.0	30.6	25.2
Millivoltage	0.25 at 0.25 to 12 Vdc		

[a] L6008G only.

Switching:
L4006, L4007, L4008: Spst.
L6006, L6007, L6008: Spdt (breaks R-B and makes R-W on temperature rise at setpoint).

ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number.

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Home and Building Control Sales Office (check white pages of your phone directory).
2. Home and Building Control Customer Relations
   Honeywell, 1885 Douglas Drive North
   Minneapolis, Minnesota 55422-4386

In Canada—Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Scarborough, Ontario M1V 4Z9.
International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

Pressure Rating:
Capillary Bulb (Direct Immersion): 200 psi (1379 kPa).
Immersion Well: 255 psi (1758 kPa).

Sensing Bulb Material: Copper.

Sensing Bulb Fill: Liquid—toluene or silicone oil.

Sensing Bulb Dimensions: 2-7/8 in. (73 mm) long, 3/8 in. (10 mm) diameter.

Wiring: Screw terminals.

Maximum Ambient Temperature: 150°F (66°C).

Approvals:
Underwriters Laboratories Inc:
Remote bulb devices and well-mounted devices shipped without well are component recognized: File No. MP466, Guide No. MBPR2.
L4006A shipped with well, L4006G, L4007A,B; L6006C for surface mounting, L6006B for direct immersion mounting, and L6007A are listed: File No. MP466, Guide No. MBPR.
L6008G is listed: File No. E4436, Guide No. XAPX.
Canadian Standards Association: File No. LR1620, Guide No. 400-E-O.

ANSI Miswiring: Models with 1/4 in. tab terminal meet ANSI Appliance Miswiring Standard.

Mounting:
Horizontal and vertical models mount directly to an immersion well installed in a boiler fitting. L4006H and L6006C contain bracket and clamp for surface mounting on pipe or tank. Remote bulb models have three mounting holes in rear of case for screw mounting to a vertical surface. The L6006B direct immersion model also mounts directly to a boiler fitting.

Finish: Gray.

Dimensions:
Installation: See Fig. 1, 2, and 3.
Immersion Well: See Fig. 4.
Boiler Fitting and Bulb: See Fig. 5.

Accessories and Parts:
137536A Scale Lock Assembly: Includes one 137536-767 Scale Lock and one 80844C-767 Screw, No. 3-48 x 3/16.
Q615A1004 Weatherproof Enclosure (for remote bulb devices only).
107408 Heat-Conductive Compound (4-oz. can).
104488 Spring Clip (stainless steel).
124904 Well Adapter.
Immersion Well Assemblies and Compression Fittings: See form 68-0040, Wells and Fittings for Temperature Controllers, for list and ordering information.

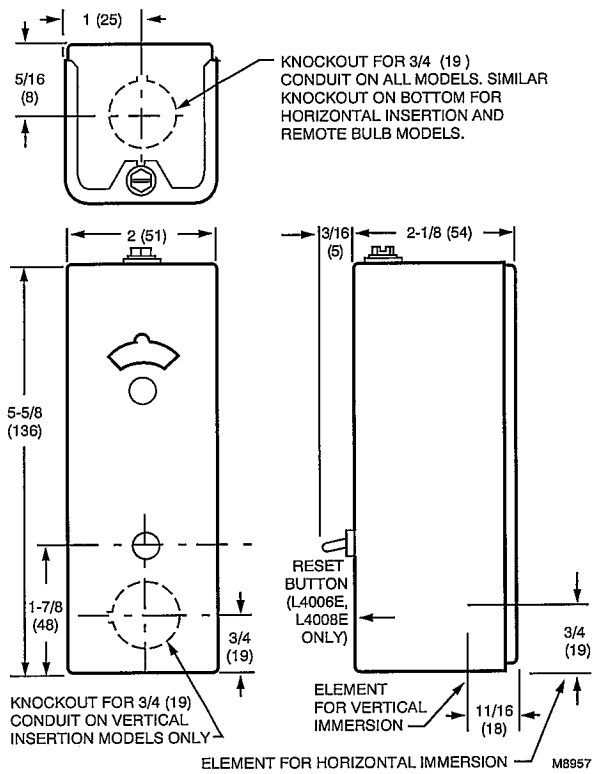


Fig. 1. Approximate case installation dimensions in in. (mm) for direct insertion models.

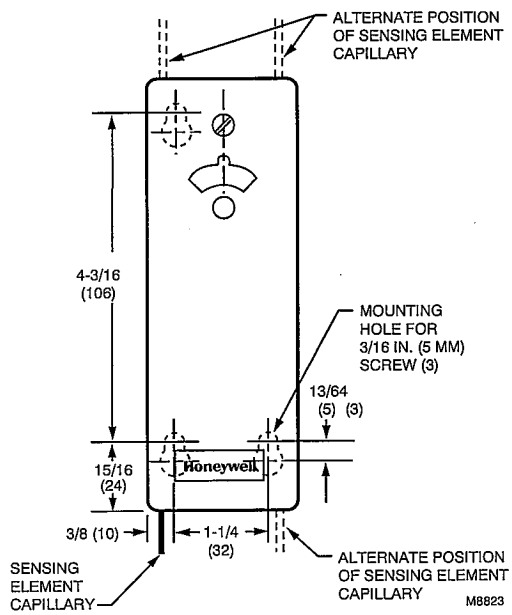


Fig. 2. Approximate installation dimensions in in. (mm) for remote bulb models. Other dimensions are the same as Fig. 1.

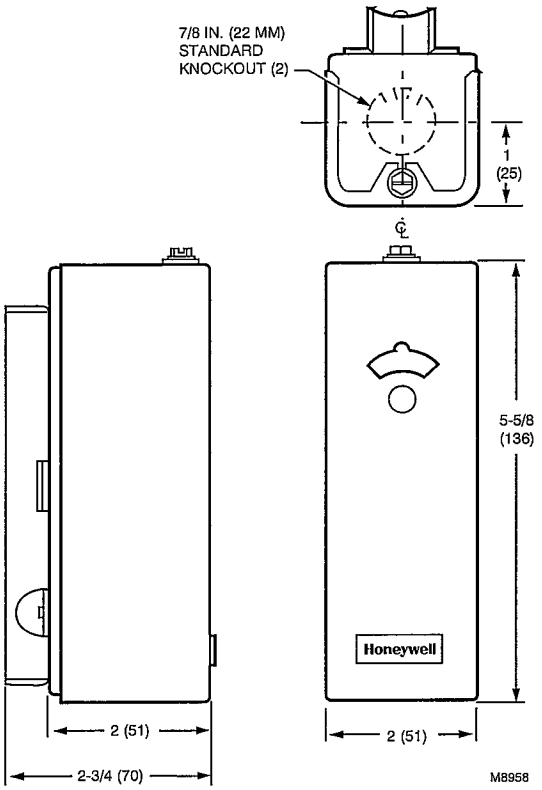


Fig. 3. Approximate installation dimensions in in. (mm) for surface mount models.

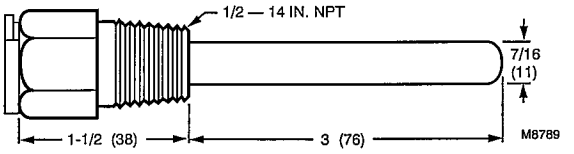


Fig. 4. Approximate immersion well dimensions in in. (mm) for all models except L4006C and L6006B.

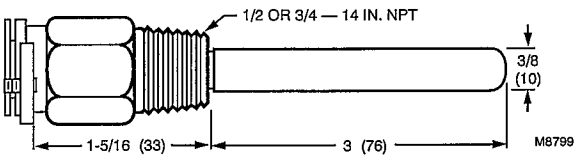


Fig. 5. Approximate boiler fitting and bulb dimensions in in. (mm) for L4006C and L6006B.

Standard Models:
L

Table 1. L4006, L4007, L4008 Controller (Spst Switching) Specifications.

Model	Application	Range °F (°C)	Midscale Differential °F (°C)	Insertion[a]	Switching On Temperature Rise	Available Options
L4006A	High or low limit	40° to 180° (4° to 82°) or 100° to 240° (38° to 116°)	2° or 5° fixed (1° or 3°) or 5° to 30° adjustable (3° to 17°)	Horizontal	Breaks	— TRADELINE models available. — NPT brass spud 1/2 or 3/4 in. — Special capillary assembly. — Insertion 3-3/8 or 5 in. (86 or 127 mm) — Celsius scale markings. — Factory-set stops at 160°, 180°, 185°, 200°, 220°, or 230°F (71°, 82°, 85°, 93°, 104°, or 110°C). — Insulation depths of 1-1/2, 3 or 4 in. (38, 76, or 102 mm). — Screw and mounting brackets. — Plastic tubing over well. — Modified dial with stop. — Special cover and knobs. — With ground screw.
L4006B	Circulator	100° to 240°F (38° to 116°C)L	5°F (3°C) fixed or 5° to 30°F (3° to 17°C) adjustable	Horizontal	Makes	— TRADELINE model available. — Insulation depth 1-1/2 or 3 in. (38 or 76 mm). — NPT brass spud 3/4 in. — Screw in front of case on dial suitable for Powerpile® control. — Factory-set stop at 240°F (116°C).
L4006C	High or low limit	65° to 200°F (18° to 93°C)	3-1/2°F (2°C) fixed	Horizontal direct immersion	Breaks	— TRADELINE model available. — Less cover. — Capillary 10 in. (254 mm). — NPT brass spud 3/4 in.
L4006E[b]	High limit	130° to 290°F (54° to 141°C)	Manual reset	Horizontal or vertical	Breaks	— TRADELINE model availiable. — Insulation depth 1-1/2 or 3 in. (38 or 76 mm). — NPT brass spud 1/2 in. — Factory-set stop at 250°F (121°C). — Capillary 8 in. (203 mm).
L4006G	High limit and circulator control	100° to 200°F (38° to 93°C)	10°F (6°C) fixed	Horizontal	Two switches break simultaneously	— External adjustment knob. — Insulation depth 4 in. (102 mm). — Factory-set stop at 160°F (71°C). — Celsius scale markings. — Without well.

Table 1. L4006, L4007, L4008 Controller (Spst Switching) Specifications.

Model	Application	Range °F (°C)	Midscale Differential °F (°C)	Insertion[a]	Switching On Temperature Rise	Available Options
L4007A	High or low limit	100° to 240°F (38° to 116°C)	2° or 5°F (1° or 3°C) fixed, 5° to 30°F (3° to 17°C) adjustable	Horizontal or vertical	Breaks	— Insulation depth 1-1/2 or 3 in. (38 or 76 mm).
L4007B	Circulator	100° to 240°F (38° to 116°C)	5°F (3°C) fixed or 5° to 30°F (3° to 17°C) adjustable	Vertical	Makes	— Celsius scale markings.
L4008A	High or low limit	100° to 240°F (38° to 116°C) or 130° to 270°F (54° to 132°C)	5°F (3°C) fixed, 5° to 30°F (3° to 17°C) adjustable	Remote bulb direct immersion	Breaks	— Remote capillary 5-1/2 ft (1.7 m), 8-1/2 ft (2.6 m) or 10 ft (3.0 m). — Factory-set scale stops at 120°, 170°, or 200°F (49°, 77°, or 93°C) — Celsius scale markings. — Front cover screw.
L4008B	Circulator	100° to 240°F (38° to 116°C)	5°F (3°C) fixed or 5° to 30°F (3° to 17°C) adjustable	Remote bulb direct immersion	Makes	— Capillary 5-12 ft. (1.7 m).
L4008E[b]	High limit	40° to 80°F (4° to 27°C) or 130° to 270°F (54° to 132°C)	Manual reset	Remote bulb	Breaks	— Factory-set scale stops at 140°, 200°, or 250°F (60°, 93°, or 121°C). — Capillary 5-1/2 ft. or 20 ft. (1.7m or 6.1 m).

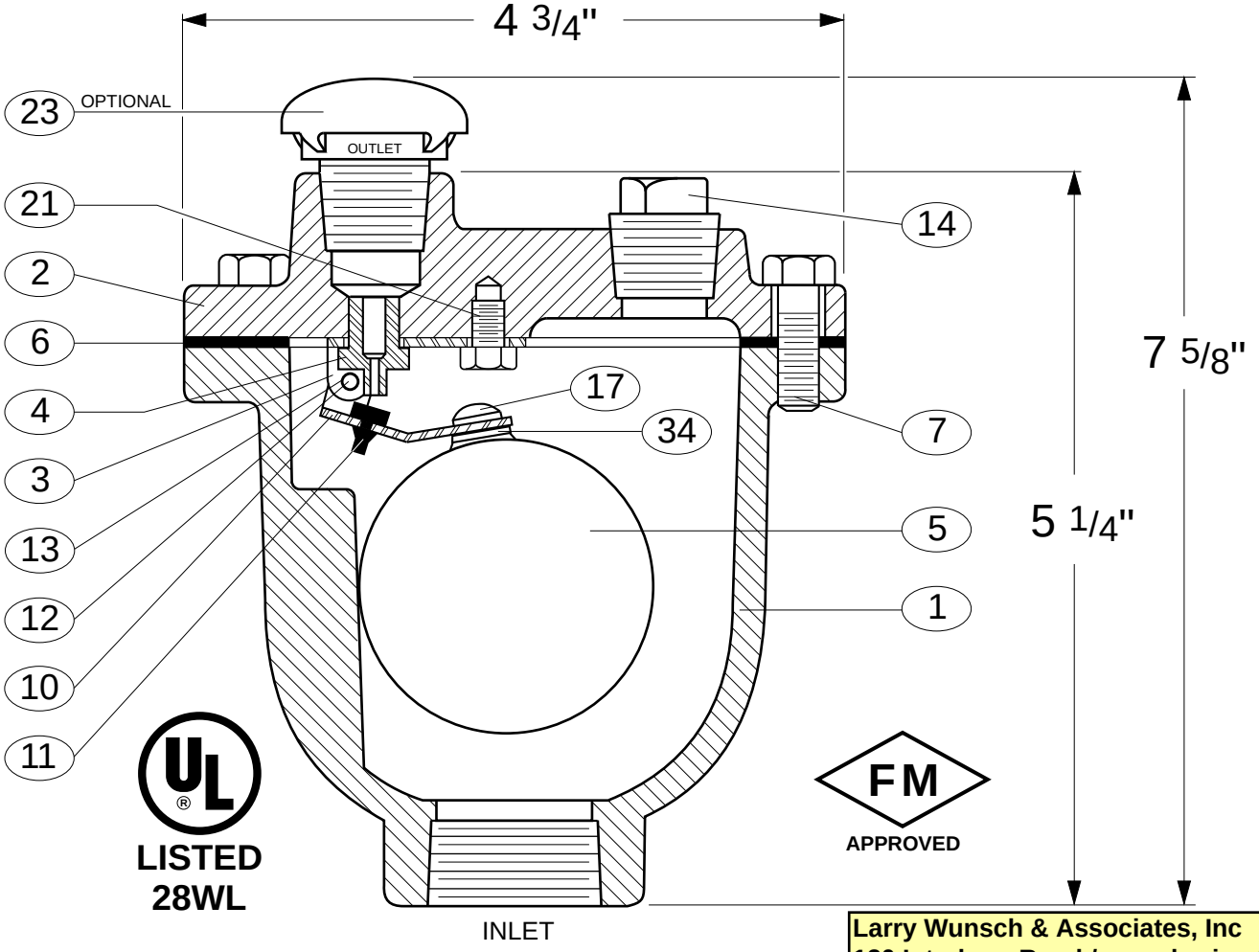
[a] Some models include copper well or fitting; specify when ordering. Also specify boiler tapping size 1/2 or 3/4 in. NPT and insulation depth.

[b] Manual reset (trip-free) switch breaks circuit and locks out when controlled medium reaches setpoint. Controlled temperature must drop 20°F (11°C) below setpoint before contacts can be manually reset.

Table 2. L6006, L6007, L6008 Controller (Spdt Switching) Specifications.

Model	Application	Range °F (°C)	Midscale Differential °F (°C)	Insertion[a]	Availlable Options
L6006A	Circulator and low limit or high limit	100° to 240°F (38° to 116°C) or 100° to 290° (38° to 143°C)	5°F (3°C) fixed or 5° to 30°F (3° to 17°C) adjustable	Horizontal	— SUPER TRADELINE model available. — Modified dial with stop. — NPT brass spud 1/2 in. or 3/4 in. — 3-3/8 in. (86 mm) insertion. — Without well. — Adapater for horizontal or vertical mount. — Insulation depth 1-1/2 or 3 in. (38 or 76 mm).
L6006B	Circulator and low limit or high limit	100° to 240°F (38° to 116°C)	5°F (3°C) fixed or 5° to 30°F (3° to 17°C) adjustable, or 30°F (17°C) fixed.	Horizontal	— Direct immersion. — Insulation depth 1-1/2 in. (38 mm). — 3/4 in. brass compression fitting.
L6006C	Circulator, low limit, and high limit	65° to 200°F (18° to 93°C)	5°F (3°C) fixed or 5° to 30°F (3° to 17°C) adjustable	Horizontal or vertical surface mounted	— TRADELINE model available. — Strap-on, surface mount.
L6007A	Circulator and low limit or high limit	40° to 180°F (4° to 82°C)	Fixed	Horizontal or vertical	— Insulation depth 1-1/2 or 3 in. (38 or 76 mm).
L6008A	Circulator and low limit cooling	100° to 240°F (38° to 116°C) or -30° to +70°F (-35° to +21°C)	5°F (3°C) fixed or 5° to 30°F (3° to 17°C) adjustable	Remote bulb	— TRADELINE models available. — Modified dial with stop. — Capillary 5-1/2 ft. (1.7 m).
L6008G	Two-stage Aquastat® Controller to cycle two-stage gas valve.	130° to 230°F (54° to 110°C) or 60° to 160°F (16° to 71°C)	3-1/2°F (2°C) fixed	Remote bulb	— Capillary 6 ft. (1.8 m). — Adjustable interstage differential; 5° to 10°F (2° to 6°C).
L6008H (maximum temperature of element 405°F [207°C])	Low fire Aquastat® Controller	150° to 200°F (66° to 93°C)	15°F (8°C) fixed	Remote bulb	— Capillary 33 in. (0.8 m).

[a] Some models include copper well or fitting; specify when ordering. Also specify boiler tapping size 1/2 or 3/4 in. NPT and insulation depth.



TEST PRESSURE
1.5 TIMES COLD WORKING PRESSURE-CWP

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

SEE DRAWING NO. VM-15A-M FOR STANDARD MATERIAL OF CONSTRUCTION.

VALVE SIZE	MODEL NO. *	INLET SIZE	OUTLET SIZE	CWP P.S.I.	ORIFICE SIZE
1/2"	1/2"-15A	1/2" N.P.T.	1/2" N.P.T.	175	1/16"
3/4"	3/4"-15A.2	3/4" N.P.T.	1/2" N.P.T.	175	1/16"
1"	1" -15A.3	1" N.P.T.	1/2" N.P.T.	175	1/16"

* ADD "H" TO MODEL NO. FOR OPTIONAL SCREENED HOOD SPK-5H.

1	BODY	11	ORIFICE BUTTON
2	COVER	12	PIVOT PIN
3	LEVER FRAME	13	PIN RETAINER (NOT SHOWN)
4	SEAT	14	PIPE PLUG
5	FLOAT	17	FLOAT RETAINER
6	GASKET	21	LOCATOR
7	COVER BOLT	23	SCREENED HOOD
10	FLOAT ARM	34	LOCK WASHER

Revision 4-13-04

AIR RELEASE VALVE

DATE 2-23-87

VAL-MATIC® VALVE AND MANUFACTURING CORP.

DRWG. NO. VM-15A

AIR RELEASE VALVE

SERIES NO. 15A

STANDARD MATERIALS OF CONSTRUCTION

PART NO.	PART NAME	MATERIAL
1	BODY	CAST IRON ASTM A126, CLASS B
2	COVER	CAST IRON ASTM A126, CLASS B
3	LEVER FRAME	STAINLESS STEEL T316, ASTM A240
4	SEAT	STAINLESS STEEL T316, ASTM A276
5	FLOAT	STAINLESS STEEL T316, ASTM A240
6	GASKET	COMPRESSED NON-ASBESTOS FIBER
7	COVER BOLT	ALLOY STEEL SAE, GRADE 5
10	FLOAT ARM	STAINLESS STEEL T316, ASTM A240
11	ORIFICE BUTTON	VITON
12	PIVOT PIN	STAINLESS STEEL T316, ASTM A479
13	PIN RETAINER	STAINLESS STEEL PH 15-7 MO
14	PIPE PLUG	STEEL
17	FLOAT RETAINER	STAINLESS STEEL T316, ASTM F879
21	LOCATOR	STAINLESS STEEL T316, ASTM F593
34	LOCK WASHER	STAINLESS STEEL T316, ASTM A240

NOTE: ALL SPECIFICATIONS AS LAST REVISED.

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Revised 1-29-03

MATERIALS OF CONSTRUCTION | DATE 2/23/87

VAL-MATIC® VALVE AND MANUFACTURING CORP. | DRWG. NO. VM-15A-M

Telephone 503-635-5560, FAX 503 905-8366
King Solar LLC, West Linn, Oregon, USA

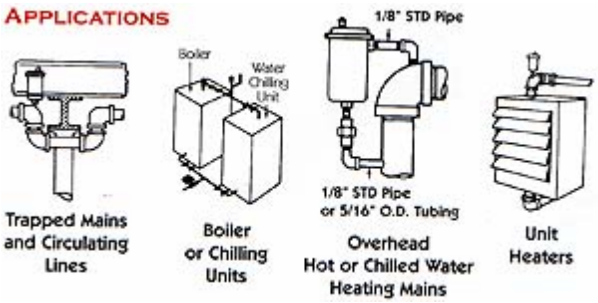
The No.75 Series Auto-Vents® Air eliminators for hot water heating and chilled water cooling systems.

For continuous venting of hot water heating systems and chilled water cooling systems. Install on mains, pipe lines, unit heaters, chillers, convectors, radiant panels and coils

.

The No. 75 Series Auto-Vents are reliable, automatic air eliminating valves for concealed radiators, pipe lines, tanks and other devices where water or liquids are used for heating or cooling. They have proven to be the solution to problems that have confronted engineers and contractors in which air pockets or traps retard the free circulation of the liquids and reduce the efficiency of the system or appliance. The No.75 Series of Auto-Vent air eliminators are made of brass and equipped with a self-closing, float-operated valve. The valve is equipped with a Monel® metal spring and a Neoprene® valve seat which is unaffected by high temperatures, oil and anti-freeze. No air chamber is required. The vent is regularly fitted with a patented cap that may be used as a check in case of a leak caused by core sand or scale.

Combination connection, ½" female, ¾" male
size: 4 3/8inches x 2 1/4inches
Bright brass finish.
150 psi rated.



Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

For Health Hazard Applications

Job Name _____

Job Location _____

Engineer _____

Approval _____

Contractor _____

Approval _____

Contractor's P.O. No. _____

Representative ***LWA***

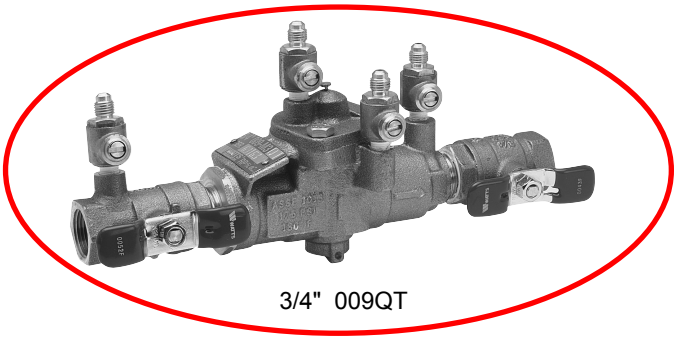
Series 009

Reduced Pressure Zone Assemblies

Sizes: ¼" – 3" (8 – 80mm)

Series 009 Reduced Pressure Zone Assemblies are designed to protect potable water supplies in accordance with national plumbing codes and water authority requirements. This series can be used in a variety of installations, including the prevention of health hazard cross connections in piping systems or for containment at the service line entrance.

This series features two in-line, independent check valves, captured springs and replaceable check seats with an intermediate relief valve. Its compact modular design facilitates easy maintenance and assembly access. Sizes ¼" – 1" (8 – 25mm) shutoffs have tee handles.

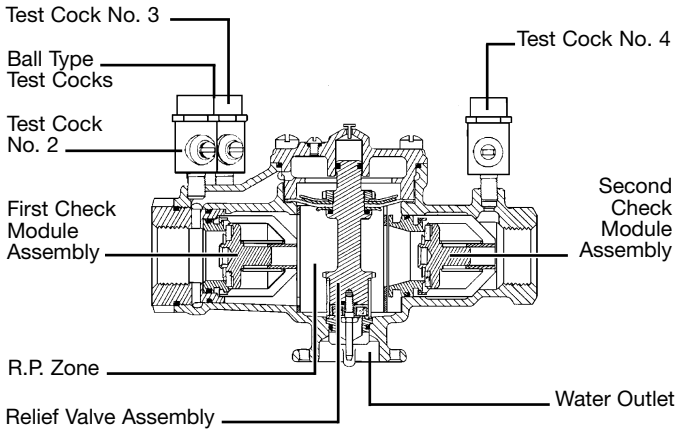


3/4" 009QT

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Features

- Single access cover and modular check construction for ease of maintenance
- Top entry - all internals immediately accessible
- Captured springs for safe maintenance
- Internal relief valve for reduced installation clearances
- Replaceable seats for economical repair
- Bronze body construction for durability ¼" – 2" (8 – 50mm)
- Fused epoxy coated cast iron body 2½" and 3" (65 and 80mm)
- Ball valve test cocks — screwdriver slotted ¼" – 2" (8 – 50mm)
- Large body passages provides low pressure drop
- Compact, space saving design
- No special tools required for servicing



Specifications

A Reduced Pressure Zone Assembly shall be installed at each potential health hazard location to prevent backflow due to backsiphonage and/or backpressure. The assembly shall consist of an internal pressure differential relief valve located in a zone between two positive seating check modules with captured springs and silicone seat discs. Seats and seat discs shall be replaceable in both check modules and the relief valve. There shall be no threads or screws in the waterway exposed to line fluids. Service of all internal components shall be through a single access cover secured with stainless steel bolts. The assembly shall also include two resilient seated isolation valves, four resilient seated test cocks and an air gap drain fitting. The assembly shall meet the requirements of: USC Manual 8th Edition†; ASSE Std. 1013; AWWA Std. C511; CSA B64.4. Shall be a Watts Regulator Co. Series 009.

†Does not indicate approval status. Refer to Page 2 for approved sizes & models.

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IMPORTANT: *INQUIRE WITH GOVERNING AUTHORITIES FOR LOCAL INSTALLATION REQUIREMENTS*

ISO 9001 CERTIFIED

WATTS® REGULATOR

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

Available Models: ¼" – 2" (8 – 50mm)

Suffix:

QT – quarter-turn ball valves
S – bronze strainer
LF – without shutoff valves
AQT – elbow fittings for 360° rotation ¾" – 2" (20 – 50mm) only
PC – internal Polymer Coating
LH – locking handle ball valves (open position)
SH – stainless steel ball valve handles
HC – 2½" inlet/outlet fire hydrant fitting (2" valve)

Prefix:

C – clean and check strainer ¾" – 1" (20 – 25mm) only
U – union connections (see ES-U009)

Available Models: 2½" – 3" (65 – 80mm)

Suffix:

NRS – non-rising stem resilient seated gate valves
OSY – UL/FM outside stem and yoke resilient seated gate valves
S-FDA – FDA epoxy coated strainer
QT-FDA – FDA epoxy coated quarter-turn ball valve shutoffs
LF – without shutoff valves
S – cast iron strainer

Note: The installation of a drain line is recommended. When installing a drain line, an air gap is necessary (see ES-AG).

Materials: ¼" – 2" (8 – 50mm)

Bronze body construction, silicone rubber disc material in the first and second check plus the relief valve. Replaceable polymer check seats for first and second checks. Removable stainless steel relief valve seat. Stainless steel cover bolts.

Standardly furnished with NPT body connections. For optional bronze union inlet and outlet connections, specify prefix U (½" – 2"(15 – 50mm)). Series 009QT furnished with quarter turn, full port, resilient seated, bronze ball valve shutoffs.

Materials: 2½" and 3" (65 – 80mm)

- (FDA approved) Epoxy coated cast iron unibody with bronze seats
- Relief valve with stainless steel seat and trim
- Bronze body ball valve test cocks

Pressure / Temperature

Series 009 ¼" – 2" (8 – 50mm) Suitable for supply pressure up to 175psi (12 bar). Water temperature: 33°F – 180°F (-3°C – 75°C).

Sizes 2½" and 3" (65 and 80mm) are suitable for supply pressures up to 175psi (12 bar) and water temperature at 110°F (43°C) continuous, 140°F (60°C) intermittent.

Standards

USC Manual 8th Edition†
ASSE No. 1013
AWWA C511-92
CSA B64.4
IAPMO File No. 1563.

†Does not indicate approval status. See below for approved models.

Approvals

ASSE, AWWA, CSA, IAPMO

Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.

Approval models QT, AQT, PC, NRS, OSY.

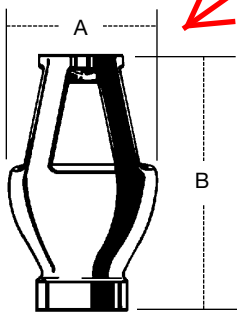
UL Classified ¾" – 2" (20 – 50mm) (LF models only)

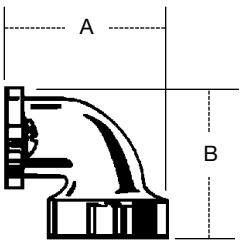
2½" and 3" (65 and 80mm) with OSY gate valves.

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

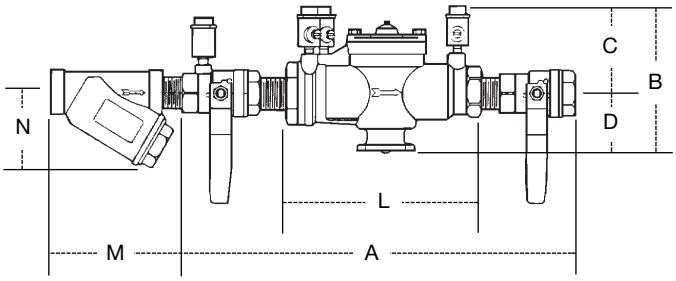
Air Gaps and Elbows

MODEL		DRAIN OUTLET		DIMENSIONS				WEIGHT	
	for 909, 009 and 993 sizes			A		B			
		in.	*mm*	*in.*	*mm*	*in.*	*mm*	*lbs.*	*kgs.*
909AG-A	¼"–½" 009, ¾" 009M2/M3	½	13	2⅜	60	3⅛	79	.625	.28
909AG-C	¾"–1" 009/909, 1"–1½" 009M2	1	25	3¼	83	4⅞	124	1.50	.68
909AG-F	1¼"–2" 009M1, 1¼"–3" 009/909, 2" 009M2, 4"–6" 993	2	51	4⅜	111	6¾	171	3.25	1.47
909AG-K	4"–6" 909, 8"–10" 909M1	3	76	6⅜	162	9⅝	243	6.25	2.83
909AG-M	8"–10" 909	4	102	7⅜	187	11¼	394	15.50	7.03
909EL-A	¼"–½" 009, ¾" 009M2/M3	–	–	–	–	–	–	–	–
909EL-C	¾"–1" 009/909,	–	–	2⅜	60	2⅜	60	.38	.17
* 909EL-F	1¼"-2" 009M1, 1¼"–2" 009/909, 2" 009M2, 4"–6" 993	–	–	3⅝	92	3⅝	92	2	.91
* 909EL-H Vertical	2½"–3" 009/909	–	–	–	–	–	–	–	–





Dimensions and Weight: ¼" – 2" (8 – 50mm) 009



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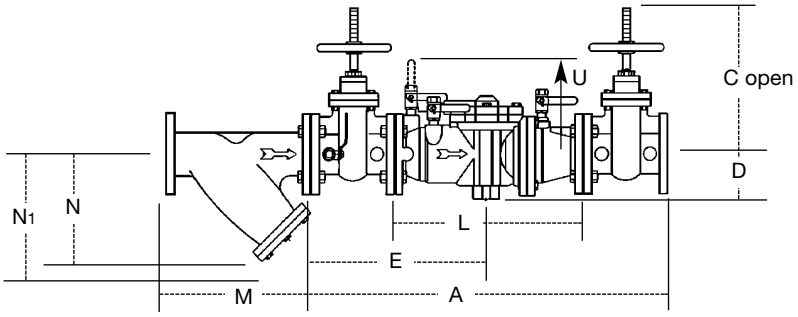
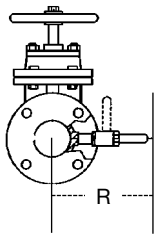
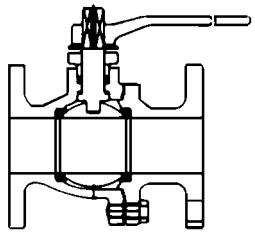
Suffix HC – Fire Hydrant Fittings dimension 'A' = 25" (637mm)
009 ¼" – 2"

SIZE (DN)		DIMENSIONS (APPROX.)										STRAINER DIMENSIONS				WEIGHT	
		A		B		C		D		L		M		N			
in.	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*lbs.*	*kg.*
¼	8	10	250	4⅝	117	3⅜	86	1¼	32	5½	140	2⅜	60	2½	64	5	2
⅜	10	10	250	4⅝	117	3⅜	86	1¼	32	5½	140	2⅜	60	2½	64	5	2
½	15	10	250	4⅝	117	3⅜	86	1¼	32	5½	140	2¾	70	2¼	57	5	2
¾	20	10¾	273	5	127	3½	89	1½	38	6¾	171	3 3/16	81	2¾	70	6	3
1	25	16¾	425	5½	140	3	76	2½	64	9½	241	3¾	95	3	76	12	5
1¼	32	17⅜	441	6	150	3½	89	2½	64	11⅜	289	4 7/16	113	3½	89	15	6
1½	40	17⅞	454	6	150	3½	89	2½	64	11⅛	283	4⅞	124	4	102	16	7
2	50	21⅜	543	7¾	197	4½	114	3¼	83	13½	343	5 15/16	151	5	127	30	13

Dimensions and Weight: 2½" and 3" (65 and 80mm) 009







Watts G-4000 Series
QT – Ball Valves

STRAINER SIZE		DIMENSIONS (approx.)						WEIGHT	
		M		N		N1†			
in.	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*lbs.*	*kgs.*
2½	65	10	254	6½	165	9¾	248	28	12.7
3	80	10⅛	257	7	178	10	254	34	15.4

†Clearance for servicing

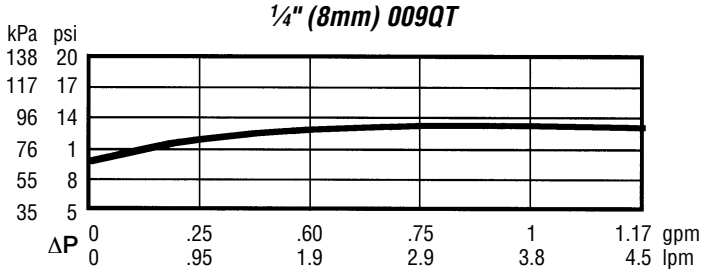
MODEL	SIZE DN		DIMENSIONS (APPROX.)														WEIGHT	
			A		C		D		E		L		R		U			
	in.	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*lbs.*	*kgs.*
009LF	2½	65	—	—	—	—	4½	114	—	—	18⅛	460	—	—	10⅝	270	76	34.5
009OSY	2½	65	33¼	845	15⅞	403	4½	114	16⅜	416	18⅛	460	7¾	197	10⅝	270	166	75.3
009NRS	2½	65	33¼	845	11⅜	289	4½	114	16⅜	416	18⅛	460	7¾	197	10⅝	270	161	73.0
009QT	2½	65	33¼	845	6	152	4½	114	16⅜	416	18⅛	460	7¾	197	10⅝	270	150	68.0
009LF	3	80	—	—	—	—	4½	114	—	—	18⅛	460	—	—	10⅝	270	76	34.5
009OSY	3	80	34¼	870	18½	470	4½	114	16⅝	422	18⅛	460	8¾	222	10⅝	270	198	89.8
009NRS	3	80	34¼	870	12¾	324	4½	114	16⅝	422	18⅛	460	8¾	222	10⅝	270	191	86.6
009QT	3	80	34¼	870	7	178	4½	114	16⅝	422	18⅛	460	8¾	222	10⅝	270	158	71.7

Capacity

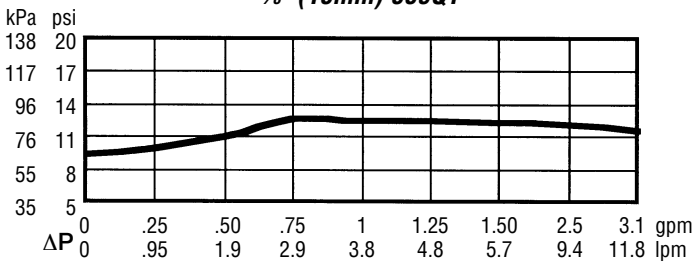
Performance as established by an independent testing laboratory.

*Typical maximum system flow rate (7.5 feet/sec., 2.3 meters/sec.)

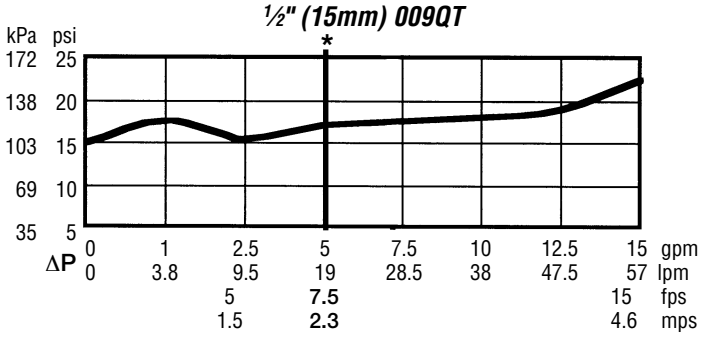
¼" (8mm) 009QT



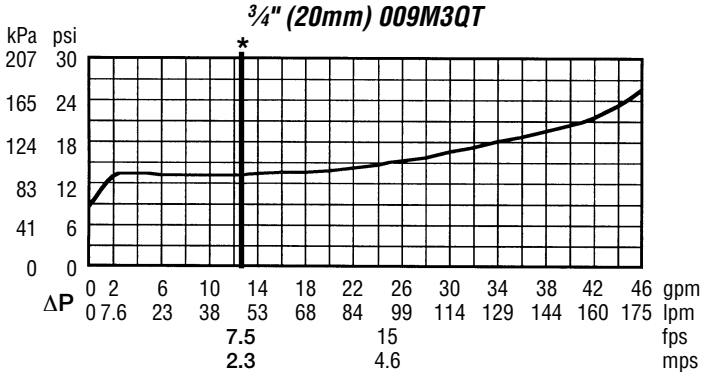
⅜" (10mm) 009QT



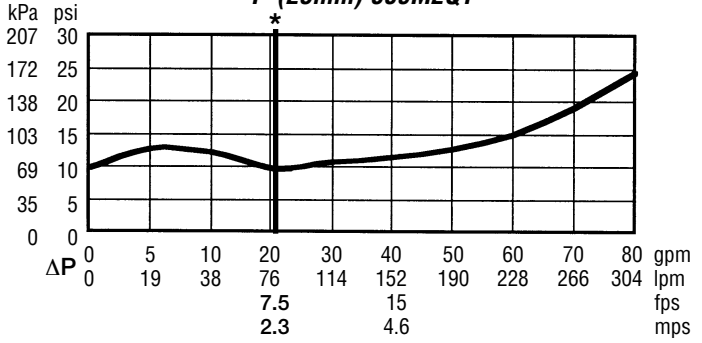
½" (15mm) 009QT



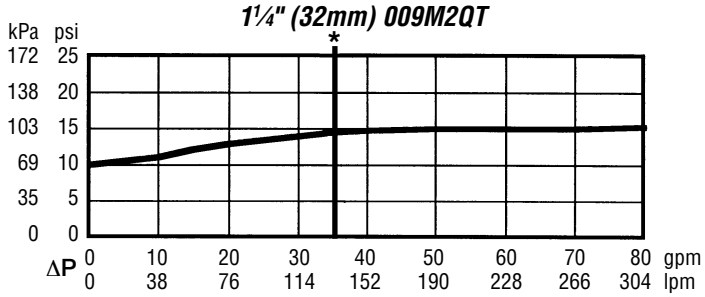
¾" (20mm) 009M3QT



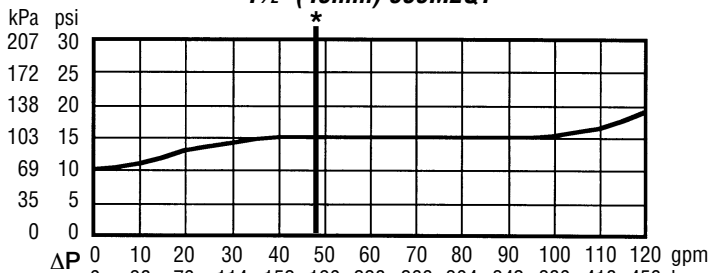
1" (25mm) 009M2QT



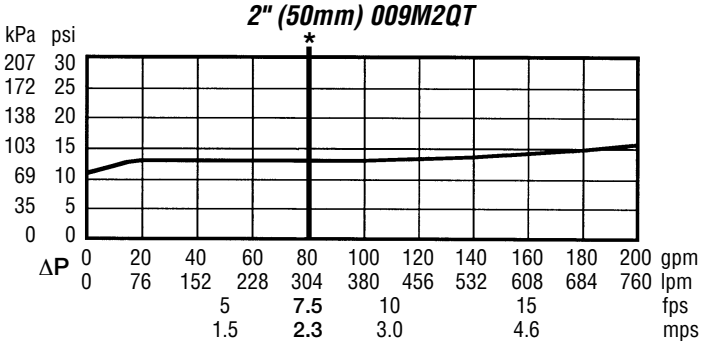
1¼" (32mm) 009M2QT



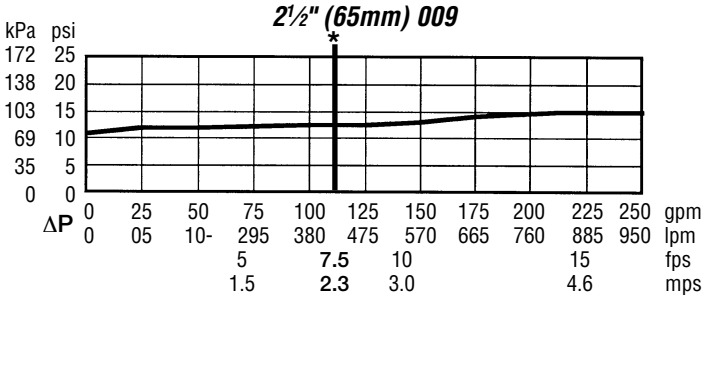
1½" (40mm) 009M2QT



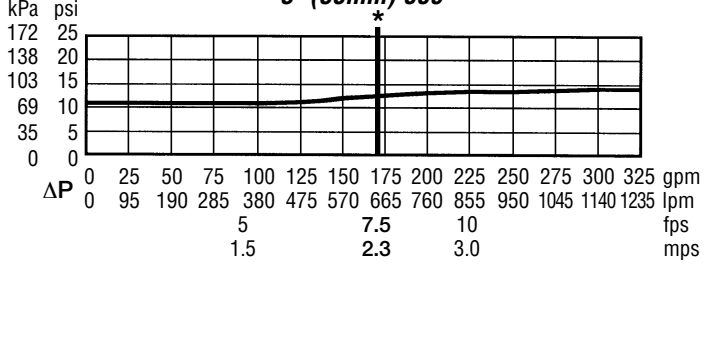
2" (50mm) 009M2QT



2½" (65mm) 009



3" (80mm) 009



For Health Hazard Applications

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

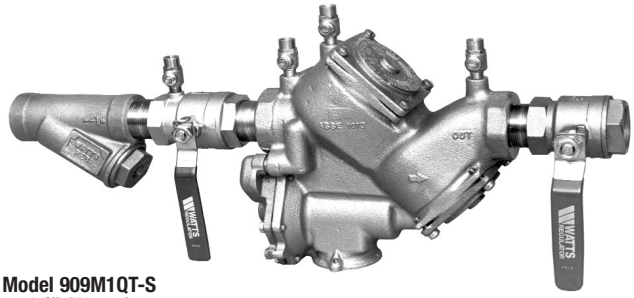
Approval _____ Representative *LWA*

Series 909

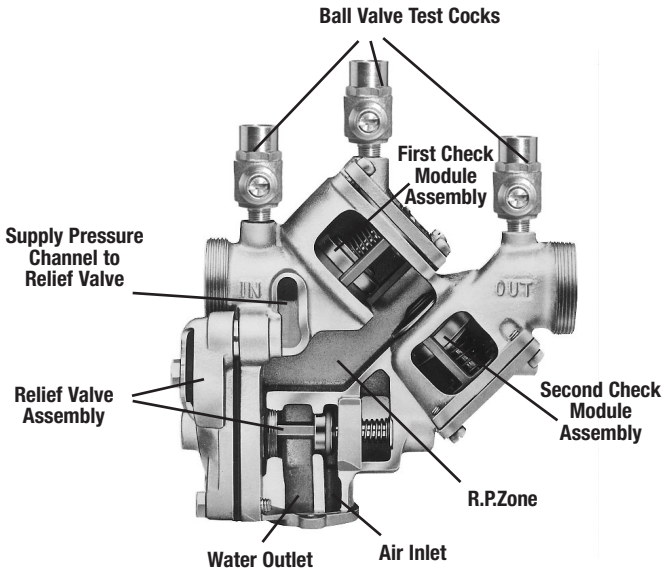
Reduced Pressure Zone Assemblies

909 Sizes: ¾", 1" (20, 25mm)
909M1 Sizes: 1¼", 1½", 2" (32, 40, 50mm)

Series 909 Reduced Pressure Zone Assemblies are designed to provide superior cross-connection control protection of the potable water supply in accordance with national plumbing codes and containment control for water authority requirements. This series can be utilized in a variety of installations, including health hazard cross-connections in plumbing systems or for containment at the service line entrance. With its exclusive, design incorporating the patented "air-in/water-out" principle it provides maximum relief valve discharge during the emergency conditions of combined backsiphonage and backpressure with both checks fouled. Model 909QT, standardly furnished with full port, resilient seated and bronze ball valve shutoffs. Sizes ¾" and 1" (20 and 25mm) shutoffs have tee handles.



Model 909M1QT-S
1½" (40mm)



Features

- Modular design
- Replaceable seats
- Compact for installation ease
- Horizontal or vertical (up or down) installation
- No special tools required for servicing

Specifications

A Reduced Pressure Zone Assembly shall be installed at each cross-connection to prevent backsiphonage and backpressure of hazardous materials into the potable water supply. The assembly shall consist of a pressure differential relief valve located in a zone between two positive seating check valves. Backsiphonage protection shall include provision to admit air directly into the reduced pressure zone via a separate channel from the water discharge channel, or directly into the supply pipe via a separate vent. The assembly shall include two tightly closing shutoff valves before and after the assembly, test cocks and a protective strainer upstream of the No. 1 shutoff valve. The assembly (specify Model 909 for temperatures up to 140°F (60°C) or Model 909HW for temperatures up to 210°F (99°C)) shall meet the requirements of ASSE Std. 1013; AWWA Std. C-511-92 CSA B64.4; FCCCHR of USC Manual Section 10. Listed by IAPMO (UPC). SBCCI (Standard Plumbing code). The assembly shall be a Watts Regulator Company Series 909QTS or 909QTSHW.

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

WATTS®

Models

Suffix

AQT	Elbow fittings for 360˚ rotation ¾" – 2" only
C&T	Cap and tether test cocks
PC	Internal polymer coating
QT	Quarter-turn ball valves
S	Bronze strainer
HW	Stainless steel check modules for hot and harsh water conditions
LF	Without shutoff valves
LH	Locking ball valve handles (open position)
HC	Inlet/outlet fire hydrant fitting (2" only)

Prefix

C	Clean and check strainer - ¾" and 1" (20 and 25mm) only
U	Union - ¾" and 1" (20 and 25mm) only
FAE	Flanged adapter ends - 1¼", 1½", 2" (32, 40, 50mm) only

NOTE: The installation of a drain line is recommended. When installing a drain line, an air gap is necessary.

Materials

Body:	Bronze
Check Seats:	909 Celcon®
Relief Valve Seats:	Stainless steel 909HW
Test Cocks:	Bronze

Celcon® is a registered trademark of Celanese, Limited

Connections

¾", 1" (19, 25mm) 909-NPT Female threaded body connection.

1¼" – 2" (32 – 50mm) 909-M1-NPT Male threaded body connection.

Standards

AWWA C-511-92

FCCCHR of USC Manual Section 10

IAPMO (UPC), SBCCI (Standard Plumbing code)

Approvals

Listed by IAPMO

Listed by SBCCI

1013 B64.4

*Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.

Horizontal and vertical "flow-up" approval on ¾" and 1" sizes (models 909QT, 909PCQT, and U909QT).

Pressure — Temperature

Temperature Range: 33°F – 140°F (5°C – 60°C) continuos, 180°F (82°C) intermittent

Maximum Working Pressure: 175psi (12.06 bar)

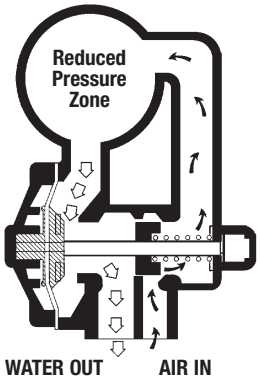
Series 909HW:

Temperature Range: 33°F – 210°F (5°C – 99°C)

Maximum Working Pressure: 175psi (12.06 bar)

How it Operates

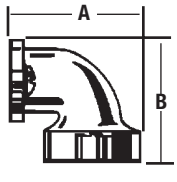
The unique relief valve construction incorporates two channels: one for air, one for water. When the relief valve opens, as in the accompanying air-in/water-out diagram, the right-hand channel admits air to the top of the reduced pressure zone, relieving the zone vacuum. The channel on the left then drains the zone to atmosphere. Therefore, if both check valves foul, and simultaneous negative supply and positive backpressure develop, the relief valve uses the air-in/water-out principle to stop potential backflow.

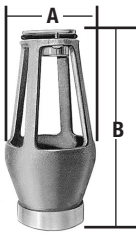


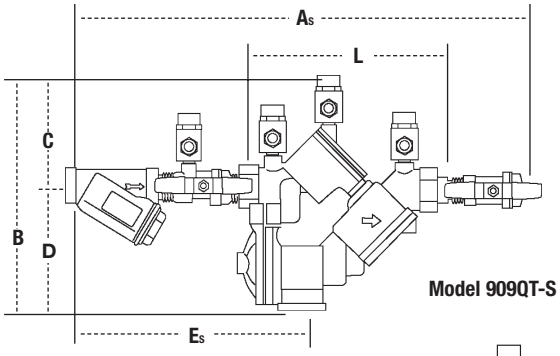
Patent# 4,241,752

Dimensions — Weights

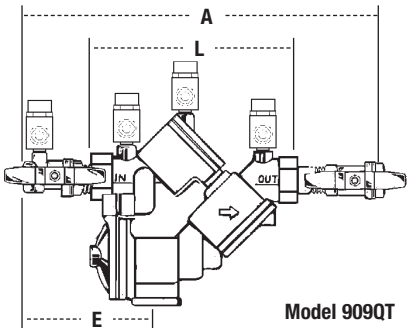
When installing a drain line use 909AG series Air Gaps on Series 909 backflow preventers. *909EL series elbows are for air gaps on backflow preventers in vertical installations.



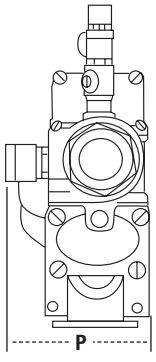




Model 909QT-S



Model 909QT



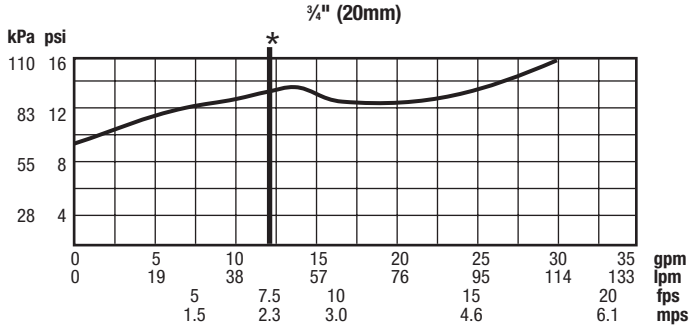
Series 909AG Air Gaps

		909 DRAIN		OUTLET		DIMENSIONS				WEIGHTS	
Iron Body		Sizes		Sizes		A		B			
No.	*Desc.*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*lbs.*	*kg.*
909-AG-C	Air Gap	¾,1	19,25	1	25	3¼	83	4⅞	124	1½	.7
909-EL-C	Elbow*	¾,1	19,25	–	–	2⅜	60	2⅜	60	⅜	.2
909-AG-F	Air Gap	1¼-2	32-50	2	50	4⅜	111	6¾	171	3¼	1.5
909-EL-F	Elbow*	1¼-2	32-50	–	–	3⅝	92	3⅝	92	2	.9

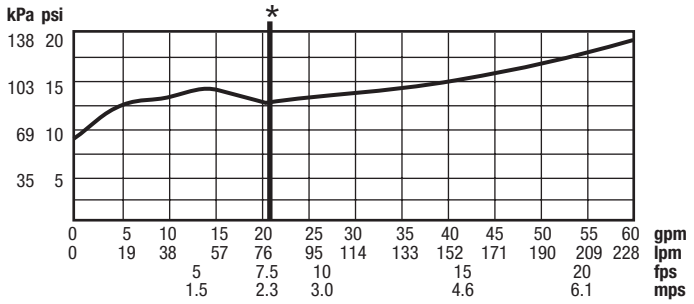
Capacity

As compiled from documented Foundation for Cross-Connection Control and Hydraulic Research of the University of Southern California lab tests.
*Typical maximum system flow rate (7.5 feet/sec.)

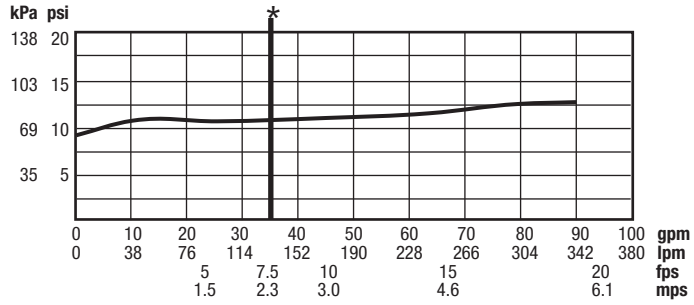
¾" (20mm)



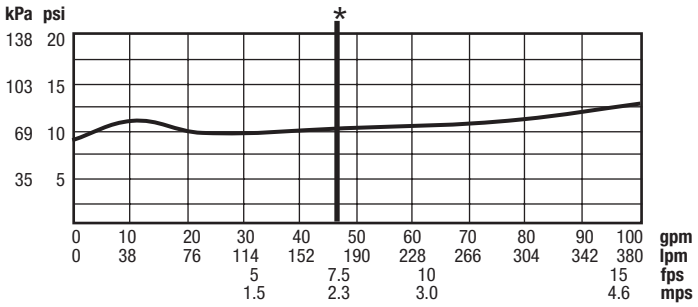
1" (25mm)



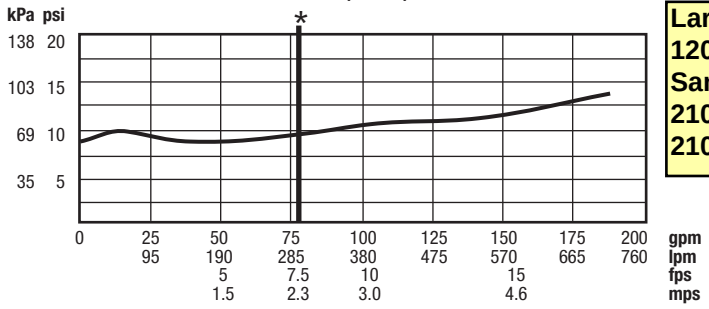
1¼" (32mm)



1½" (40mm)



2" (50mm)



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San Antonio, Texas 78216-7042
210.349.5244 Phone
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Suffix HC - Fire Hydrant Fittings dimension "A" = 23¾" (603mm)

SIZE (DN)	DIMENSIONS																		WEIGHT			
	A		As		B		C		D		E		Es		L		P		QT		QT-S	
	In.	*mm*	*In.*	*mm*	*In.*	*mm*	*In.*	*mm*	*In.*	*mm*	*In.*	*mm*	*In.*	*mm*	*In.*	*mm*	*In.*	*mm*	*lbs.*	*kg.*	*lbs.*	*kg.*
***909QT, 909QT-S Dimensions**																						
¾"	14⅜	365	18 1/16	459	8¾	222	4	102	4¾	121	6¾	171	10 3/16	259	7 5/16	186	3⅜	98	14	6.4	15.6	7.1
1"	15⅝	391	19⅝	498	8¾	222	4	102	4¾	121	7	178	11	279	7 5/16	186	3⅜	98	15	6.8	17.5	7.9
1¼"M1	18½	470	23 7/16	595	11⅝	295	5½	140	6½	165	7½	191	12 3/16	310	10⅜	264	5¼	133	40	18.1	42.8	19.4
1½"M1	19	483	24⅜	619	11⅝	295	5½	140	6½	165	7½	191	12⅝	321	10⅜	264	5¼	133	40	18.1	44.0	20.0
2"M1	19½	495	25 15/16	659	11⅝	295	5½	140	6½	165	7¾	197	13 15/16	354	10⅜	264	5¼	133	40	18.1	47.4	21.5
***U909QT Dimensions - with integral body unions (Prefix "U")**																						
¾"	14⅜	371	19 1/16	484	8¾	222	4	102	4¾	121	6¾	171	10 3/16	259	7 5/16	186	3⅜	98	14	6.4	15.6	7.1
1"	15⅝	397	20 15/16	532	8¾	222	4	102	4¾	121	7	178	11	279	7 5/16	186	3⅜	98	15	6.8	17.5	7.9
***FAE909QT - Dimensions with flanged adapter ends (Prefix "FAE")**																						
1¼"	19	483	24½	622	11⅝	295	5½	140	6½	165	7½	191	12 3/16	310	10⅜	264	5¼	133	40	18.1	42.8	19.4
1½	19¾	502	26⅛	664	11⅝	295	5½	140	6½	165	7½	191	12⅝	321	10⅜	264	5¼	133	40	18.1	44.0	20.0
2"	21	533	28⅜	721	11⅝	295	5½	140	6½	165	7¾	197	13 15/16	354	10⅜	264	5¼	133	40	18.1	47.4	21.5

Subscript 'S' = strainer model

753 BRASS BALL VALVE

MATCO-NORCA™

❖ FULL PORT ❖ FORGED BRASS ❖ CHROME PLATED BALL

❖ TWO PIECE BODY ❖ TEFLON SEATS ❖ BLOW OUT PROOF STEM

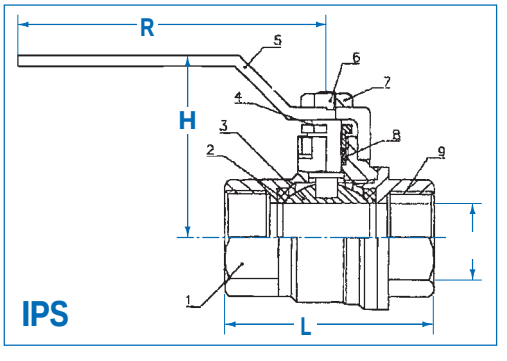
600 PSI NON SHOCK WOG 150 PSI SWP

Applications: Residential, Commercial, Light Industrial for Water, Oil, Gas

Conforms to specifications of MSS-SP-110
Threaded Ends Comply with ANSI B2.1
Solder Ends comply with ANSI B16.18

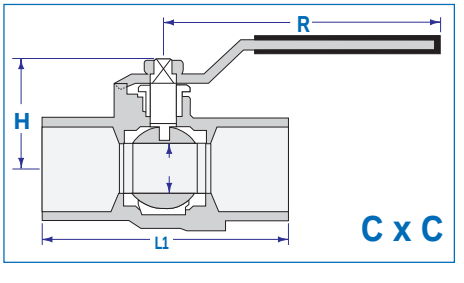
MATERIAL SPECIFICATIONS

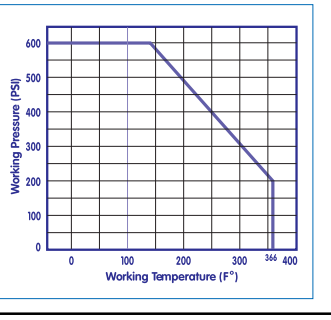
NO.	PART	MATERIAL	ASTM SPEC
1	Body	Forged Brass	B124 C37700
2	Seat	Teflon	PTFE
3	Ball	Forged Brass Chrome Plated	B124 C37700
4	Packing Nut	Brass	B16
5	Handle	Cast Iron	Commercial
6	Stem	Brass	B16
7	Nut	Brass	B16
8	Packing	Teflon	PTFE
9	Body Ends	Forged Brass	B124 C37700



DIMENSIONS & WEIGHTS

SIZE (inch)	DN	L	L1	H	R	WT. (lb)	
						IPS	C-C
1/4"	.39	1.77	-	1.24	3.50	.37	.37
3/8"	.39	1.77	-	1.24	3.50	.34	.34
1/2"	.57	2.02	2.06	1.99	3.50	.44	.44
3/4"	.75	2.22	2.75	2.09	4.09	.69	.74
1"	.97	2.66	3.48	2.68	4.63	1.06	1.16
1-1/4"	1.25	3.21	4.24	3.03	4.63	1.62	1.74
1-1/2"	1.58	3.62	4.62	3.29	5.71	2.52	2.68
2"	1.97	4.19	5.50	3.62	5.71	3.37	3.59
2-1/2"	2.52	5.35	-	4.49	9.13	7.89	8.24
3"	3.11	6.32	-	4.84	9.13	11.26	11.61
4"	3.90	7.28	-	5.49	9.13	18.54	19.67





Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

MATCO-NORCA™

Larry Wunsch & Associates, Inc
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70-100 Series
Bronze Ball Valve

Threaded, 600 psig WOG, Cold Non-Shock, 150 psig Saturated Steam. (See referenced P/T charts)
Vacuum Service to 29 inches Hg.
Federal Specification: WW-V-35C, Type: II, Composition: BZ, Style: 3.
MSS SP-110; Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

FEATURES

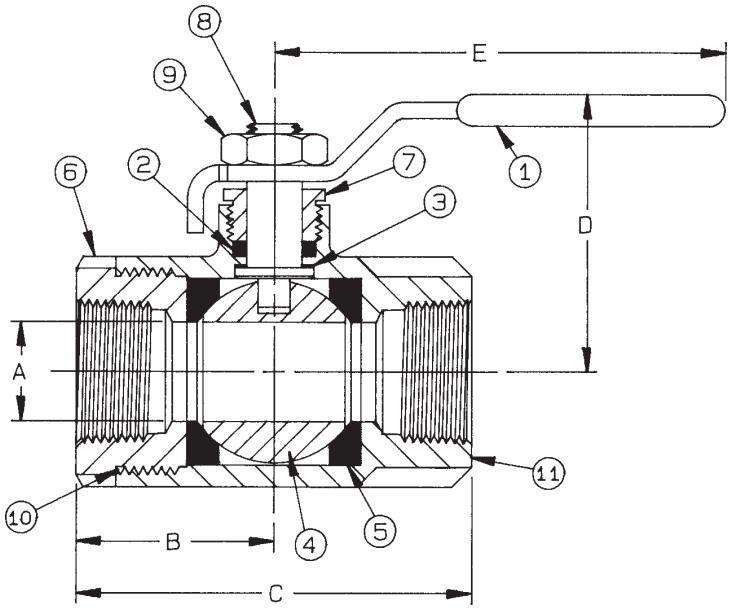
- Chromium plated ball
- RPTFE seats and stuffing box ring
- Blow-out-proof stem design
- Adjustable packing gland

STANDARD MATERIAL LIST

1. Lever and grip	Steel, zinc plated w/vinyl	7. Gland nut	B16
2. Stem packing	RPTFE	8. Stem	B16
3. Stem bearing	RPTFE	9. Lever nut	Steel, zinc plated
4. Ball	B16, chrome plated	10. Body seal (1-1/4" to 3")	PTFE
5. Seat (2)	RPTFE		
6. Retainer	B16 (1/4" to 1") B584-C84400 (1-1/4" to 3")	11. Body	B584-C84400

VARIATIONS AVAILABLE:

70-120 Series (Adjustable Stop Lever)
70-140 Series (316 SS Ball & Stem)
70-150 Series (Balancing Stop)
70-190 Series (Locked Retainer)



BRONZE BALL VALVE

NUMBER	SIZE	A	B	C	D	E	Wt.
70-101-01	1/4"	.37	1.03	2.06	1.75	3.87	.60
70-102-01	3/8"	.37	1.03	2.06	1.75	3.87	.56
70-103-01	1/2"	.50	1.12	2.25	1.75	3.87	.63
70-104-01	3/4"	.68	1.50	3.00	2.12	4.87	1.39
70-105-01	1"	.87	1.68	3.37	2.25	4.87	1.72
70-106-01	1-1/4"	1.00	2.00	4.00	2.62	5.50	3.26
70-107-01	1-1/2"	1.25	2.18	4.37	3.06	8.00	4.61
70-108-01	2"	1.50	2.34	4.68	3.25	8.00	6.06
70-109-01A	2-1/2"	2.00	3.12	6.25	3.72	8.00	17.25
70-100-01	3"	2.50	3.37	6.75	4.12	8.00	18.60
70-10A-01	4"	3.12	3.68	7.37	5.25	10.00	25.50

OPTIONS AVAILABLE:

(SUFFIX)	OPTION	SIZES
-02-	Stem Grounded	1/4" to 3"
-03-	1-1/4" CS Stem Extension	1/4" to 3"
-04-	2-1/4" CS Stem Extension	1/4" to 3"
-05-	Plain Ball	1/4" to 3"
-07-	Steel Tee Handle	1/4" to 2"
-08-	90° Reversed Stem	1/4" to 3"
-10-	SS Lever & Nut	1/4" to 3"
-14-	Side Vented Ball (Uni-Directional)	1/4" to 3"
-15-	Wheel Handle, Steel	1/4" to 2"
-16-	Chain Lever - Vertical	3/4" to 2"
-17-	Rough Chrome Plated - Bronze Valves	1/4" to 3"
-21-	UHMWPE Trim (Non-PTFE)	1/4" to 3"
-24-	Graphite Packing	1/4" to 3"
-27-	SS Latch-Lock Lever & Nut	1/4" to 3"
-30-	Cam-Lock and Grounded	1/4" to 2"
-32-	SS Tee Handle & Nut	1/4" to 2"
-35-	VTFE Trim	1/4" to 3"
-36-	SS Hi-Rise Round Handle, SS Nut	1/4" to 2"
-39-	SS Hi-Rise Locking Wheel Handle, SS Nut	1/4" to 2"
-40-	Cyl-Loc and Grounded	1/4" to 2"
-41-	Automatic Drain (Bronze Valves Only) see page J-8	1/4" to 2"
-45-	Less Lever & Nut	1/4" to 3"
-46-	Latch Lock Lever - Lock in Closed Position Only	1/4" to 3"
-47-	SS Oval Latch-Lock Handle & Nut	1/4" to 1"
-48-	SS Oval Handle (No Latch) & Nut	1/4" to 2"
-49-	Assembled Dry	1/4" to 3"
-50-	2-1/4" CS Locking Stem Extension	1/4" to 3"
-56-	Multifill Seats & Packing	1/4" to 3"
-57-	Oxygen Cleaned	1/4" to 3"
-58-	Chain Lever - Horizontal	3/4" to 2"
-60-	Static Grounded Ball & Stem	1/4" to 3"
-63-	NPT x Solder/Socket Weld	3/8" to 3"
-64-	250# Steam Trim	1/4" to 3"
-P01-	BSPP (Parallel) Thread Connection	1/4" to 3"
-T01-	BSPT (Tapered) Thread Connection	1/4" to 3"

For Pressure/Temperature Ratings, Refer to Page M-8, Graph No. 4

Apollo Ball Valves Temperature Curves

Model Number; 70-100-01 (1/4" to 3")

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210.349.5244 Phone
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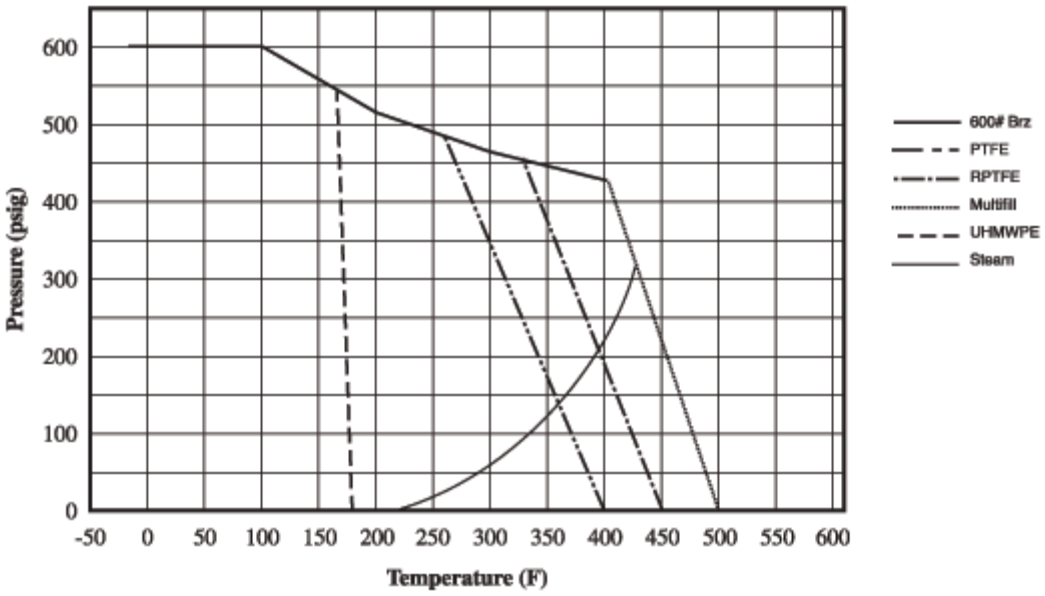
600# Bronze P-T Rating (Graph 4)



Mueller Steam Specialty

Model: 65M, 66M

Cast Iron ~~Wafer and~~ Full Lug Butterfly Valve

Pressure-Temperature Rating					
IN ACCORDANCE WITH ANSI B16.1 or B16.5					
Cast Iron	65M 66M 2" - 12"	200 PSI - WOG	Cast Iron	66M 14" - 36"	150 PSI - WOG

Model 66M (lug)

SERVICE RECOMMENDATIONS

Soft seated butterfly valves are designed for general applications such as on-off, throttling and isolation in residential, commercial and industrial piping systems. They are well suited for control of water, steam, air, oil and gases. The seat design is especially well suited for vacuum service to 28" Hg and high velocity service.

FEATURES

The dual durometer seat is made of a highly wear resistant elastomer with a phenolic backup ring. This combination provides a soft, elastic seat which will not collapse under vacuum or high velocity service and eliminates the need for flange gaskets. The stem seals consist of a primary seal between the spherical disc hub and the spherical seat hub. The secondary seals are O-rings at the top and bottom of the stem to retain lubrication and prevent atmospheric corrosion. The one piece stem is blowoff proof. These valves can be furnished in a variety of trim materials. Ten position handles are available for manual operation as well as a gear operator with handwheel. Pneumatic, hydraulic or electric actuators with solenoids, positioners and limit swiches can be specified for automated operation .

ISO mount on 2"-36". Double D shaft on 2"-8". Keyed shaft on 10"-36".

PERFORMANCE PARAMETERS

Temperature limitations are dependent on seat and body materials and service conditions. For throttling service, line velocity should not exceed 20 ft/sec (6m/sec) for liquid and 15,000 ft/min (4,500 m/min) for gases. Corrosive media applications depend on trim materials selected.

TESTING

Individually Hydrostatically Tested

STANDARD MATERIALS

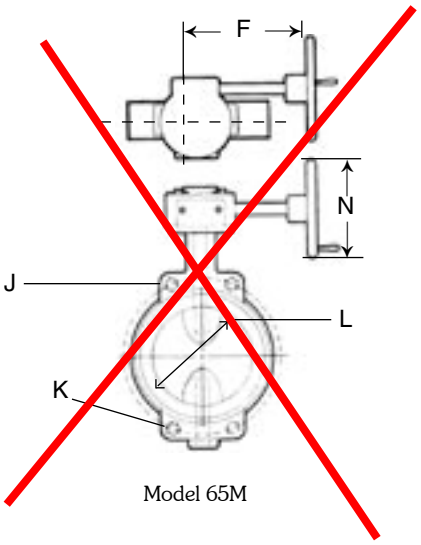
Body:	Cast Iron
Stems:	416 SS
Seat:	EPDM, Buna-N
Disc:	Aluminum Bronze, Stainless Steel

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

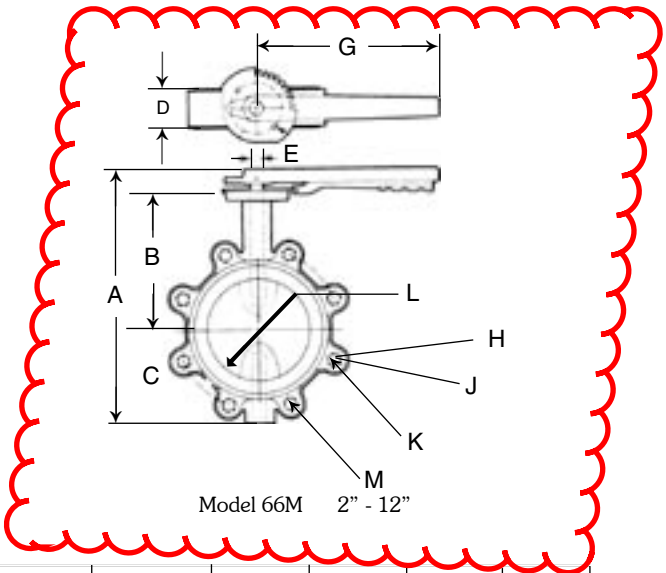
Mueller Steam Specialty
An SPX Process Equipment Operation
1491 N.C. Hwy 20 West, St. Pauls, NC 28384

Mueller Steam Specialty

Dimensions and Weights - 2" - 12"



Model 65M



Model 66M 2" - 12"

SIZE	in / mm	2 / 50	2-1/2 / 65	3 / 80	4 / 100	5 / 125	6 / 150	8 / 200	10 / 250	12 / 300
A	in	10 5/8	11 5/8	12 1/8	13 5/8	14 5/8	15 5/8	19 3/8	21 1/4	24 1/2
	mm	270	295	308	346	371	397	492	540	622
B	in	6 3/8	6 7/8	7 1/8	7 7/8	8 3/8	8 7/8	10 1/4	11 1/2	13 1/14
	mm	162	175	181	200	213	225	260	292	332
C	in	3	3 1/2	3 3/4	4 1/2	5	5 1/2	7 3/4	8	9 1/2
	mm	76	89	95	114	127	140	197	203	241
D	in	1-3/4	1-7/8	1-7/8	2-1/8	2-1/4	2-1/4	2-1/2	2-13/16	3-1/8
	mm	45	48	49	55	58	59	63	70	80
E	in	1/2	1/2	1/2	5/8	3/4	3/4	7/8	1 1/8	1 1/4
	mm	13	13	13	16	19	19	22	29	32
F	in	7	7	7	7	7	7	10	10	10
	mm	178	178	178	178	178	178	254	254	254
G	in	11	11	11	11	11	11	14	14	-
	mm	279	279	279	279	279	279	356	356	-
H(65M)	# holes	4	4	4	4	4	4	4	4	4
H(66M)	# holes	4	4	4	8	8	8	8	12	12
J	in	11/16	11/16	11/16	11/16	13/16	13/16	13/16	15/16	15/16
	mm	17	17	17	17	21	21	21	24	24
K	in	4 3/4	5 1/2	6	7 1/2	8 1/2	9 1/2	11 3/4	14 1/4	17
	mm	121	140	152	191	216	241	289	362	432
L	in	2	2 1/2	3	4	5	6	8	10	12
	mm	51	64	76	102	127	152	203	254	305
M	in	5/8 11	5/8 11	5/8 11	5/8 11	3/4 10	3/4 10	3/4 10	7/8 9	7/8 9
	mm	16	16	16	16	19	19	19	22	22
N	in	6	6	6	6	6	6	10	10	10
	mm	152	152	152	152	152	152	254	254	254
O	in	-	-	-	-	-	-	-	-	-
	mm	-	-	-	-	-	-	-		
P	in	-	-	-	-	-	-	-	-	-
	mm	-	-	-	-	-	-	-	-	-
WEIGHTS										
65M	lb	5	7	8	11	15	19	34	59	94
	kg	2.2	3.1	3.6	4.9	6.8	8.6	15.3	26.7	42.6
66M	lb	7	8	9	17	21	25	42	73	112
	kg	3.1	3.6	4	7.7	9.5	11.33	19	33.1	50.7

Dimensions and Weights (Approximate "Apply for Certified Drawings")

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120 Interloop Road / www.lwai.net
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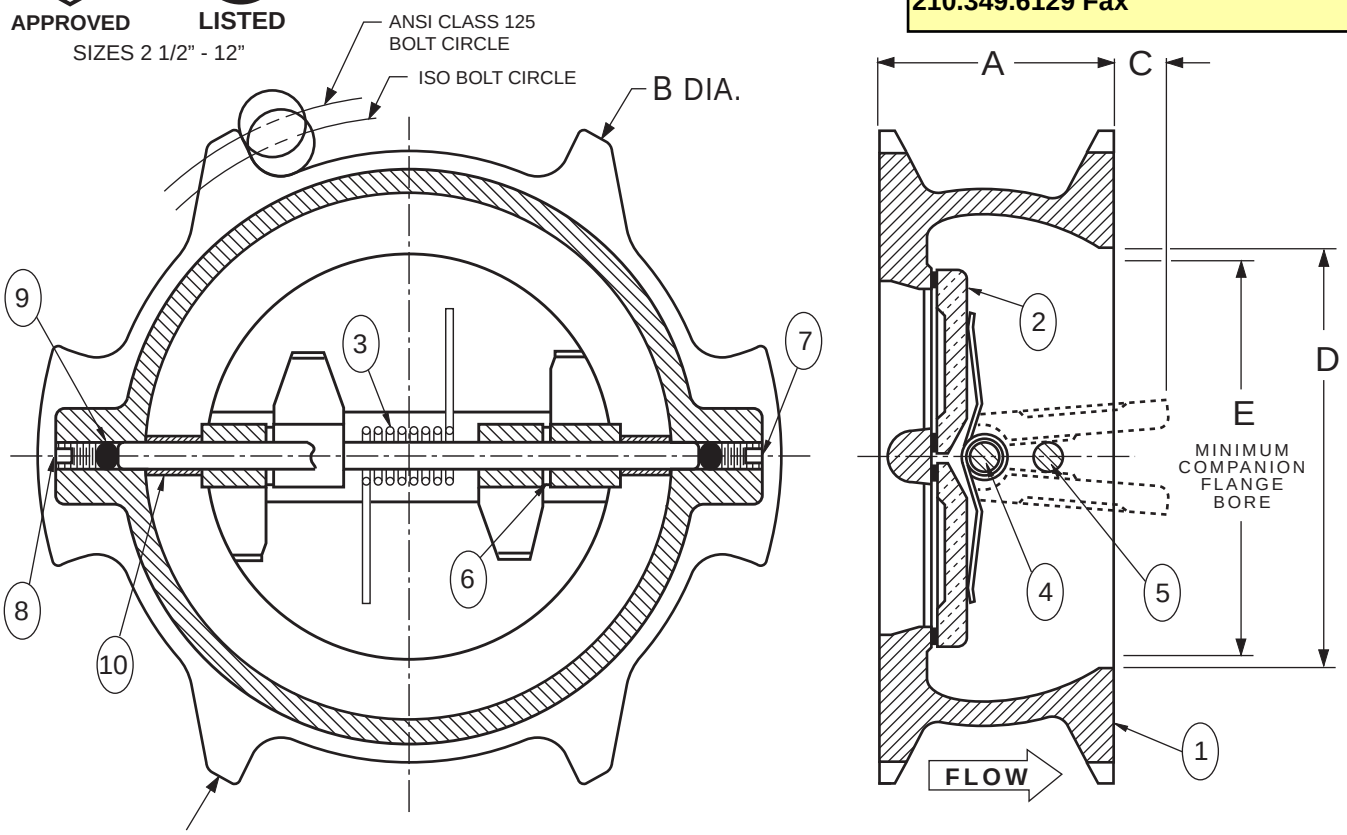
FM APPROVED c UL us LISTED

SIZES 2 1/2" - 12"



PART NO.	PART NAME	PART NO.	PART NAME
1	BODY	6	DISC THRUST BEARING
2	DISC	7	HINGE PIN RETAINER
3	TORSION SPRING	8	STOP PIN RETAINER
4	DISC HINGE PIN	9	STABILIZATION SPHERE
5	DISC STOP PIN	10	SPACER

ANSI CLASS 125 - ISO PN10/PN16

VALVE SIZE	MODEL NO.	A	B	C	D	E
2	8802W	2.12	5.12	0.00	2.88	0.00
2 1/2	8825W	2.38	6.00	0.12	3.50	1.31
3	8803W	2.62	5.62	0.18	3.88	1.69
4	8804W	2.62	7.75	0.62	4.75	3.06
5	8805W	3.25	7.56	0.81	5.50	3.62
6	8806W	3.75	8.62	0.81	6.25	4.25
8	8808W	5.00	12.25	1.00	8.00	5.50
10	8810W	5.50	14.75	2.06	10.25	8.50
12	8812W	7.12	17.38	1.94	12.00	9.25

PRESSURE-TEMPERATURE RATING

TEMP. °F.	MAXIMUM NON-SHOCK PRESSURE PSI
	DUCTILE IRON CONSTRUCTION
150°	250
200°	235
250°	220
HYDROSTATIC TEST PRESSURE	500

VAL-MATIC® DUAL DISC® CHECK VALVES CAN BE USED FOR HORIZONTAL FLOW OR VERTICAL FLOW-UP APPLICATIONS ONLY.

CAUTION: FOR HORIZONTAL FLOW APPLICATIONS, VALVE MUST BE INSTALLED WITH THE DISC HINGE PIN IN THE VERTICAL POSITION.

SEE DRAWING NO. VM-8802W-M FOR 2"-12" STANDARD MATERIAL OF CONSTRUCTION.

FOR AIR SERVICE APPLICATIONS, SEE DRAWING NO.VM-8902W.

SIZES 10 & 12 FURNISHED WITH LIFTING EYEBOLT.

Revision 9-25-06

WAFER STYLE DUAL DISC® CHECK VALVE

DATE 11-22-00

VAL-MATIC® VALVE AND MANUFACTURING CORP.

DRWG. NO. VM-8802W

DUAL DISC® CHECK VALVE

2”-12” STANDARD MATERIALS OF CONSTRUCTION

PART NO.	PART NAME	MATERIAL
1	BODY	DUCTILE IRON ASTM A536, GRADE 65-45-12 W/ BUNA-N RESILENT SEAT MOLDED TO BODY
2	DISC	BRONZE ASTM B584, ALLOY C83600
3	TORSION SPRING	STAINLESS STEEL T316, ASTM A313
4	HINGE PIN	STAINLESS STEEL T316, ASTM A276
5	STOP PIN	STAINLESS STEEL T316, ASTM A276
6	THRUST BEARING	STAINLESS STEEL T316, ASTM A240
7	HINGE PIN RETAINER	STEEL
8	STOP PIN RETAINER	STEEL
9	STABILIZATION SPHERE	BUNA-N
10	SPACER	STAINLESS STEEL T316, ASTM A276

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

NOTE: ALL SPECIFICATIONS AS LAST REVISED.

Revised 9-25-06

MATERIALS OF CONSTRUCTION	DATE 1/21/03
VAL-MATIC® VALVE AND MANUFACTURING CORP.	DRWG. NO. VM-8802W-M

Style DD

Wafer Double Disc Check Valve

Cast Iron (ASTM A 126, Class B)
125 lb.

Carbon Steel (ASTM A 216, Grade WCB)
150 lb. Thru 1500 lb.

Stainless Steel (ASTM A 351, Grade CF8M)
150 lb. Thru 1500 lb.

APPLICATIONS
Liquid or gas where protection from flow reversal in a pipeline is required.

CONSTRUCTION
The Keckley Style DD Wafer Double Disc Check Valves are constructed from rugged castings that are machined to exacting specifications. Reference individual technical data pages for standard disc, shaft, spring, and elastomer seat.

FEATURES
- A short face-to-face dimension.
- Lighter weight, by 80-90% than non-conventional full-body check valves.
- Spring-loaded, double disc design has a low cracking pressure.
- The tension spring performs a lifting motion on the disc to prevent excessive wear on the "heel" area of the elastomer seat.
- The independent, dual shaft design allows interchangeability of shafts. The stop shaft stabilizes the discs during high flow rates.
- Epoxy coating is standard.
- Field serviceable without the need for special tools.

INSTALLATION
The Style DD is used in both vertical and horizontal applications. For horizontal flow applications the shaft should be vertically oriented. Contact Keckley for downward vertical flow installations.

ORDERING
Reference page C2 for Keckley Check Valve Product Numbers.

WORKING PRESSURES – NON SHOCK

NOM. RATING	BODY MATERIAL	MEDIA	2" to 12"	14" to 24"
125#	CAST IRON (ASTM A 126, CLASS B)	W.O.G.	200 PSI @ 150°F	150 PSI @ 150°F
NOM. RATING	**BODY MATERIAL**	**MEDIA**	**2" to 24"**	
150#	CARBON STEEL (ASTM A 216, GRADE WCB)	W.O.G.	285 PSI @ 100°F	
	STAINLESS STEEL (ASTM A 351, GRADE CF8M)	W.O.G.	275 PSI @ 100°F	
NOM. RATING	**BODY MATERIAL**	**MEDIA**	**2" to 24"**	
300#	CARBON STEEL (ASTM A 216, GRADE WCB)	W.O.G.	740 PSI @ 100°F	
	STAINLESS STEEL (ASTM A 351, GRADE CF8M)	W.O.G.	720 PSI @ 100°F	

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

KECKLEY

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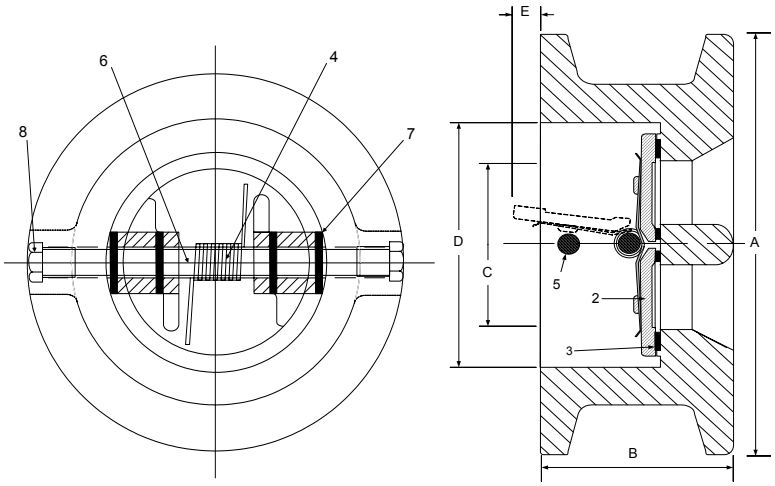
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Style DD

Wafer Double Disc Check Valve, 125 lb. Cast Iron (ASTM A 126, Class B)



PARTS LIST		
ITEM	DESCRIPTION	MATERIAL
1	BODY	Cast Iron (ASTM A 126, Class B)
2	DISC	Cast Stainless Steel (ASTM A 351, Grade CF8)
3	SEAT	Buna-N
4	SPRING	Stainless Steel (ASTM A 182, 316)
5	STOP PIN	Stainless Steel (ASTM A 182, 304)
6	HINGE PIN	Stainless Steel (ASTM A 182, 304)
7	THRUST WASHER	Teflon
8	PLUG	Carbon Steel (ASTM A 307, B)

Above "Standard" Product Number - **DD1F-CI-34136**
Other Options - Reference C2 for available materials.

SIZE		DIMENSIONS										WEIGHTS	
		A		B		C*		D		E			
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kgs
2	50	4-1/8	105	2-1/8	54	1-1/2	38	2-3/8	60	3/16	5	6	3
2-1/2	65	4-7/8	124	2-1/8	54	2-7/32	56	2-7/8	73	5/16	8	7	3
3	80	5-3/8	137	2-1/4	57	2-25/32	71	3-1/2	89	1/2	13	7	3
4	100	6-7/8	175	2-1/2	64	3-23/32	94	4-1/2	114	1	25	14	6
5	125	7-3/4	197	2-3/4	70	4-5/8	117	5-1/2	140	1-1/8	29	20	9
6	150	8-3/4	222	3	76	5-9/16	141	6-5/8	168	1-1/4	32	27	12
8	200	11	279	3-3/4	95	7-1/2	191	8-5/8	219	1-5/16	33	51	23
10	250	13-3/8	340	4-1/4	108	9-7/16	240	10-3/4	273	2-1/2	64	80	36
12	300	16-1/8	410	5-5/8	143	11-1/4	286	12-3/4	324	2-3/8	60	145	66
14	350	17-3/4	451	7-1/4	184	12-5/8	321	14	356	3-1/4	83	180	82
16	400	20-1/4	514	7-1/2	191	14-11/16	373	16	406	4-1/2	114	215	98
18	450	21-5/8	549	8	203	16-9/16	421	18	457	5-3/8	137	300	136
20	500	23-7/8	606	8-3/8	213	18-9/16	471	20	508	6-3/8	162	340	154
24	600	28-1/4	718	8-3/4	222	21-5/8	549	24	610	8-/12	216	518	235
30	750	34-3/4	883	12	305	28-7/16	722	30-3/8	772	9-1/2	241	1100	499
36	900	41-1/4	1048	15-1/4	387	34-3/8	873	36	914	12	305	1500	680
42	1050	48	1219	17	432	40-9/16	1030	42	1067	13-3/4	349	2800	1270
48	1200	54-1/2	1384	20-5/8	524	44-3/16	1122	48	1219	17	432	4000	1814

†This table reflects only the nearest metric equivalents.
*Minimum companion flange bore.

APPLICABLE STANDARDS

- Design ASME B16.1
- Conform to API 594 & 6D
- Testing API 598
- MSS SP – 6
- MSS SP – 25
- MSS SP -- 55

Seat Material	Operating Temperature**	
	°F	°C
Buna – N	-20 to 250	-29 to 121
Viton	-20 to 400	-29 to 204
EPDM	-40 to 300	-40 to 149

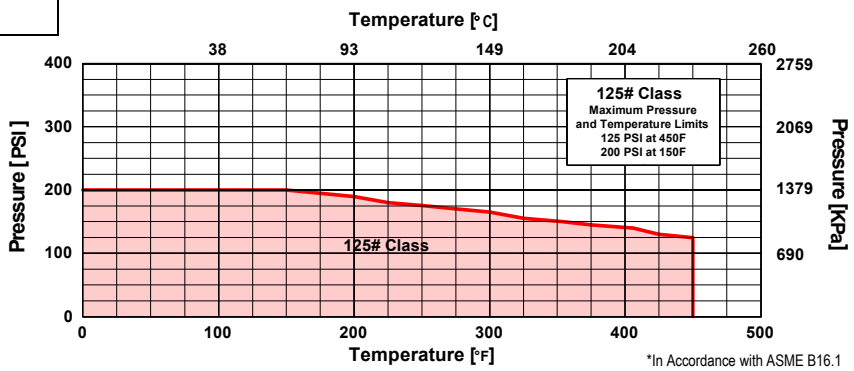
**Subject to limitations of body material.

FLOW COEFFICIENTS

Size	2"	2½"	3"	4"	5"	6"
C_v	48	98	170	290	495	720
Size	**8"**	**10"**	**12"**	**14"**	**16"**	**18"**
C_v	1800	2600	4300	5500	7200	9400
Size	**20"**	**24"**	**30"**	**36"**	**42"**	**48"**
C_v	12600	19000	37500	60000	89000	124000

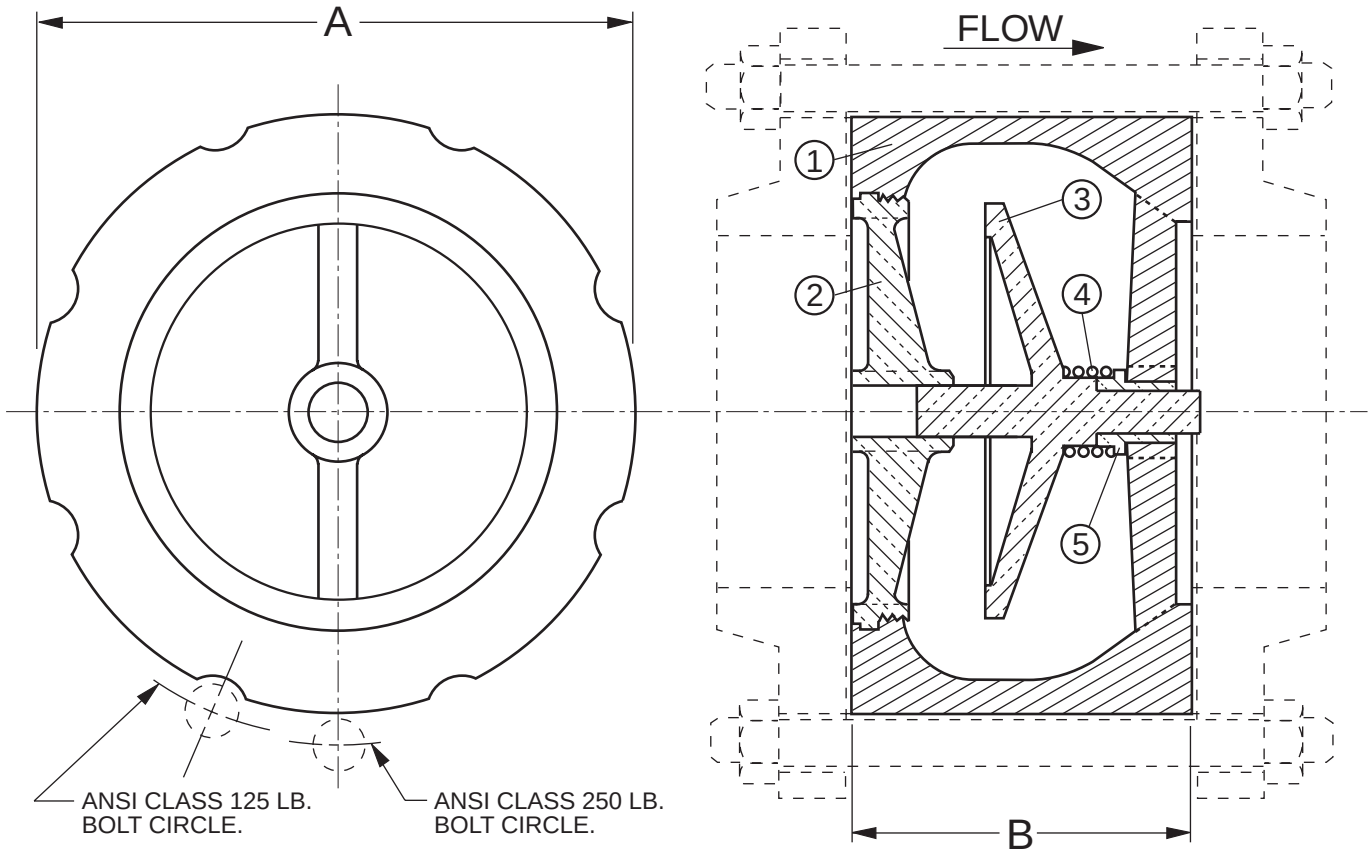
PRESSURE vs. TEMPERATURE CHART

125# Cast Iron (ASTM A 126, Class B)



*In Accordance with ASME B16.1

FLANGES, BOLTS, NUTS AND GASKETS ARE SUPPLIED BY OTHERS.



PART NO.	NAME	PART NO.	NAME
1	BODY	4	SPRING
2	SEAT	5	BUSHING
3	DISC		

SEE DRAWING NO. VM-1402-M FOR STANDARD MATERIALS OF CONSTRUCTION.

ANSI 125 / 250 LB. CLASS				
VALVE SIZE	MODEL* NO.	CWP (P.S.I.)	A	B
2	1402	400	4 1/4	2 5/8
2 1/2	1425	400	5	2 7/8

* MODEL NUMBERS REFLECT BRONZE TRIM.

Installation Requirements

Refer to drawing SS-974 entitled Silent Check Valve Flange Installation Requirements for mating flanges.

Larry Wunsch & Associates, Inc
210.349.5244 Phone
210.349.6129 Fax

Revised 2-4-99

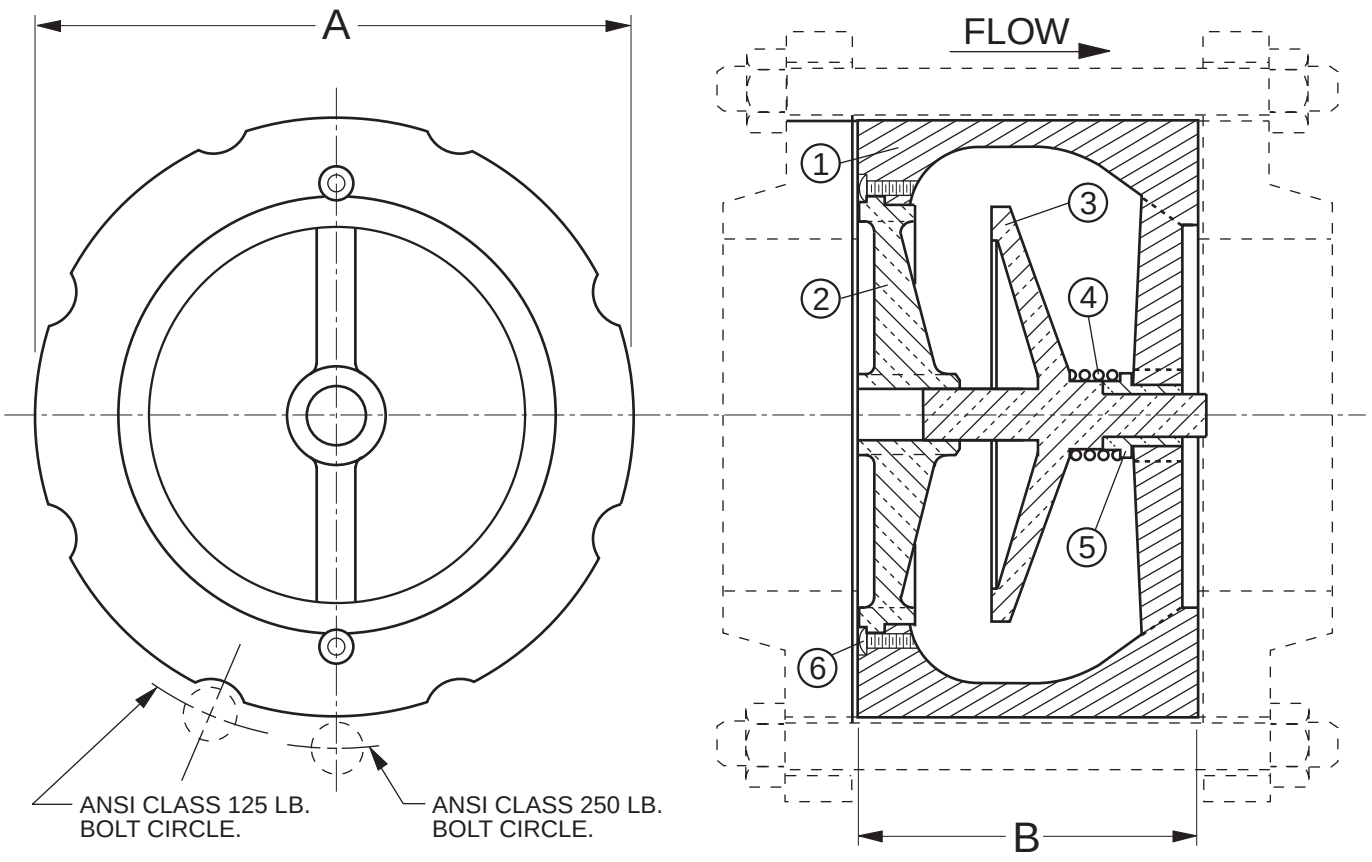
WAFER STYLE SILENT CHECK VALVE

DATE 4-1-67

VAL-MATIC® VALVE AND MANUFACTURING CORP.

DRWG. NO. VM-1402

FLANGES, BOLTS, NUTS AND GASKETS ARE SUPPLIED BY OTHERS.



PART NO.	NAME	PART NO.	NAME
1	BODY	4	SPRING
2	SEAT	5	BUSHING
3	DISC	6	RETAINING SCREWS

SEE DRAWING NO. VM-1402-M FOR STANDARD MATERIALS OF CONSTRUCTION.

ANSI 125 / 250 LB. CLASS				
VALVE SIZE	MODEL NO.*	CWP (P.S.I.)	A	B
3	1403	400	5 3/4	3 1/8
4	1404	400	7	4
5	1405	400	8 3/4	4 3/4
6	1406	400	9 3/4	5 1/2

* MODEL NUMBERS REFLECT BRONZE TRIM.

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210.349.5244 Phone
210.349.6129 Fax

Installation Requirements

Refer to drawing SS-974 entitled Silent Check Valve Flange Installation Requirements for mating flanges.

Revised 4-17-98

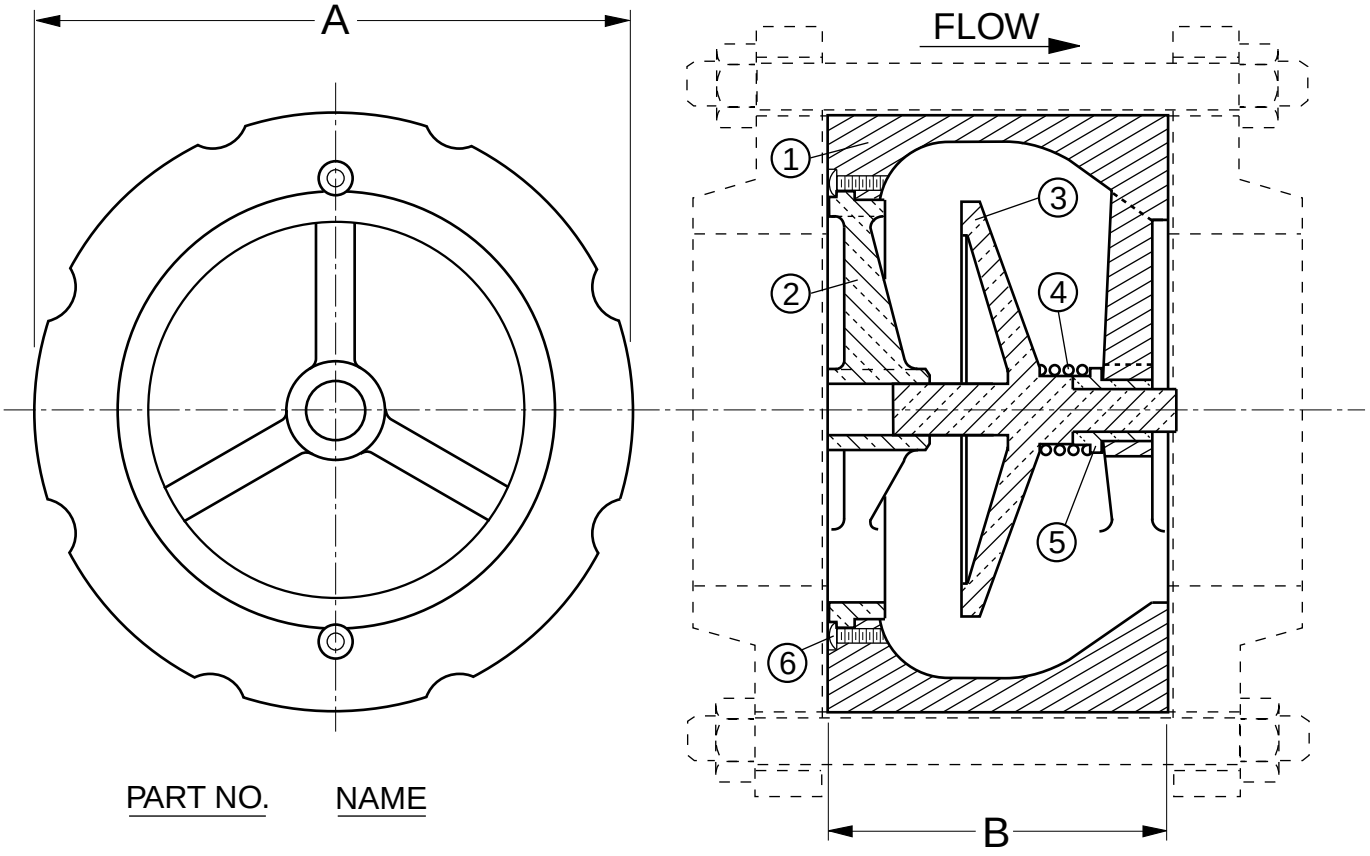
WAFER STYLE SILENT CHECK VALVE

DATE 4-1-67

VAL-MATIC® VALVE AND MANUFACTURING CORP.

DRWG. NO. VM-1403

FLANGES, BOLTS, NUTS AND GASKETS ARE SUPPLIED BY OTHERS.



PART NO.	NAME
1	BODY
2	SEAT
3	DISC
4	SPRING
5	BUSHING
6	RETAINING SCREWS

Installation Requirements

Refer to drawing SS- 974 entitled Silent Check Valve Flange Installation Requirements for mating flanges.

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210.349.5244 Phone
210.349.6129 Fax

SEE DRAWING NO. VM-1402-M FOR STANDARD MATERIALS OF CONSTRUCTION.

125 LB. CLASS				
VALVE SIZE	MODEL NO.*	CWP (P.S.I.)	A	B
8	1408	200	13 3/8	6 1/2
10	1410	200	16	8 1/4
250 LB. CLASS				
8	1458	400	13 3/8	6 1/2
10	1460	400	16	8 1/4

* MODEL NUMBERS REFLECT BRONZE TRIM.

Revised 4-15-03

WAFER STYLE SILENT CHECK VALVE

DATE 4-1-67

VAL-MATIC® VALVE AND MANUFACTURING CORP.

DRWG. NO. VM-1408

WAFER STYLE SILENT CHECK VALVE

SERIES NO. 1400 ANSI CLASS 125 & 250

STANDARD MATERIALS OF CONSTRUCTION

PART NO.	PART NAME	MATERIAL
1	BODY	CAST IRON ASTM A126, CLASS B
2	SEAT	BRONZE ASTM B584, ALLOY C83600
3	DISC	BRONZE ASTM B584, ALLOY C83600
4	SPRING	STAINLESS STEEL T316, ASTM A313
5	BUSHING	BRONZE ASTM B16, ALLOY C36000
6 *	RETAINING SCREWS	STAINLESS STEEL T316, ASTM F879

* SEAT RETAINING SCREWS NOT FURNISHED ON VALVE SIZES 2" & 2 $^{1}/_{2}$".

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

NOTE: ALL SPECIFICATIONS AS LAST REVISED.

Revised 3-17-06

MATERIALS OF CONSTRUCTION	DATE 7/14/82
VAL-MATIC® VALVE AND MANUFACTURING CORP.	DRWG. NO. VM-14XX-M

CIRCUIT SETTER

Submittal Data Information

ACCU-FLO ½" – 2"

401-047

SUPERSEDES: September 1, 2001 EFFECTIVE: December 1, 2006

JOB _____ ENGINEER _____ CONTRACTOR _____ REP. *LWA*

QUANTITY	MODEL NO.	SIZE	LOCATION

FEATURES

- Fixed port venturi orifice balancing valve.
- Flow measurement function independent of stem and ball position.
- Dual Schrader style pressure ports allow for easy differential pressure gauge attachment.
- Ball valve construction: Allows Accu-Flo to function reliably both as a balancing valve and suitable for shut-off service in closed hot or cold water systems.
- Valve can be installed in any position.
- All-brass wetted parts resist corrosion for reliable operation.
- Blow-out proof stem.
- Built-in drain port.
- Fully-Assembled: Shipped ready for installation. Note: Sweat models can be installed while assembled.
- Internal seats: Teflon® seats prevent leakage and assure smooth, quiet, dependable operation.
- Calibrated nameplate: Easy to read. Memory stop is tamper resistant and has a fast and accurate resetting if shut-off feature is used. Calibrated to aid in pre-balancing flow loop.

ACCESSORIES

- Readout Meter
- Slide Rule

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

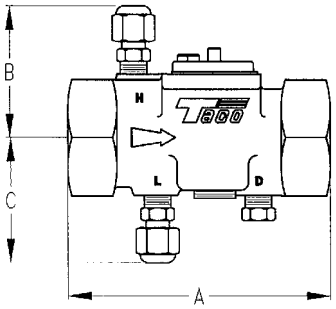
SPECIFICATIONS

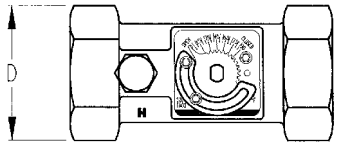
SIZES	½", ¾", 1", 1¼", 1½", 2"
BODY	BRONZE
INTERNAL COMPONENTS	BRASS, TEFLON ®, EPDM
SEATS	TEFLON ®
CONNECTIONS	NPT AND SWEAT
SCHRADER VALVE CONNECTIONS	BRASS ¼"
INDICATOR PLATE	STAINLESS STEEL
POINTER	DIE CAST ZINC
PRESSURE/TEMPERATURE RATING	300 PSI, 250°F

ACCU-FLO DIMENSIONS

SIZE	PRODUCT NO.	CONNECTION	DIMENSIONS								MATERIAL		WEIGHTS		C_V - FULL OPEN POSITION
			A		B		C		D		BODY	VENTURI	LBS.	KG.	
			INCHES	MM	INCHES	MM	INCHES	MM	INCHES	MM					
½"	ACUF-050-AC	SWEAT	3¼	82	2	51	2	51	1½	38	BRONZE	BRASS	1¼	0.5	2.12
	ACUF-050-AT	NPT	3¼	82	2	51	2	51	1½	38	BRONZE	BRASS	1¼	0.5	
¾"	ACUF-075-AC	SWEAT	3¼	82	2⅛	54	2⅛	54	1½	38	BRONZE	BRASS	1¼	0.5	3.9
	ACUF-075-AT	NPT	3¼	82	2⅛	54	2⅛	54	1½	38	BRONZE	BRASS	1½	0.7	
1"	ACUF-100-AC	SWEAT	4	101	2⅛	54	2⅛	54	1⅝	41	BRONZE	BRASS	1½	0.7	8.4
	ACUF-100-AT	NPT	4	101	2⅛	54	2⅛	54	1⅝	41	BRONZE	BRASS	2	0.9	
1¼"	ACUF-125-AC	SWEAT	5⅛	130	2½	63	2⅜	60	2	51	BRONZE	BRASS	3½	1.6	17.3
	ACUF-125-AT	NPT	5⅛	130	2½	63	2⅜	60	2¼	57	BRONZE	BRASS	3¾	1.7	
1½"	ACUF-150-AC	SWEAT	5⅞	149	2⅝	67	2½	64	2 3/16	56	BRONZE	BRASS	4½	2.1	28.3
	ACUF-150-AT	NPT	5⅞	149	2⅝	67	2½	64	2¾	70	BRONZE	BRASS	5¼	2.4	
2"	ACUF-200-AC	SWEAT	6¾	171	2¾	70	2¾	70	2¾	70	BRONZE	BRASS	6¾	3.1	62.3
	ACUF-200-AT	NPT	6¾	171	2¾	70	2¾	70	3⅜	86	BRONZE	BRASS	8	3.6	

½"-2" SWEAT & THREAD DIMENSION DIAGRAMS





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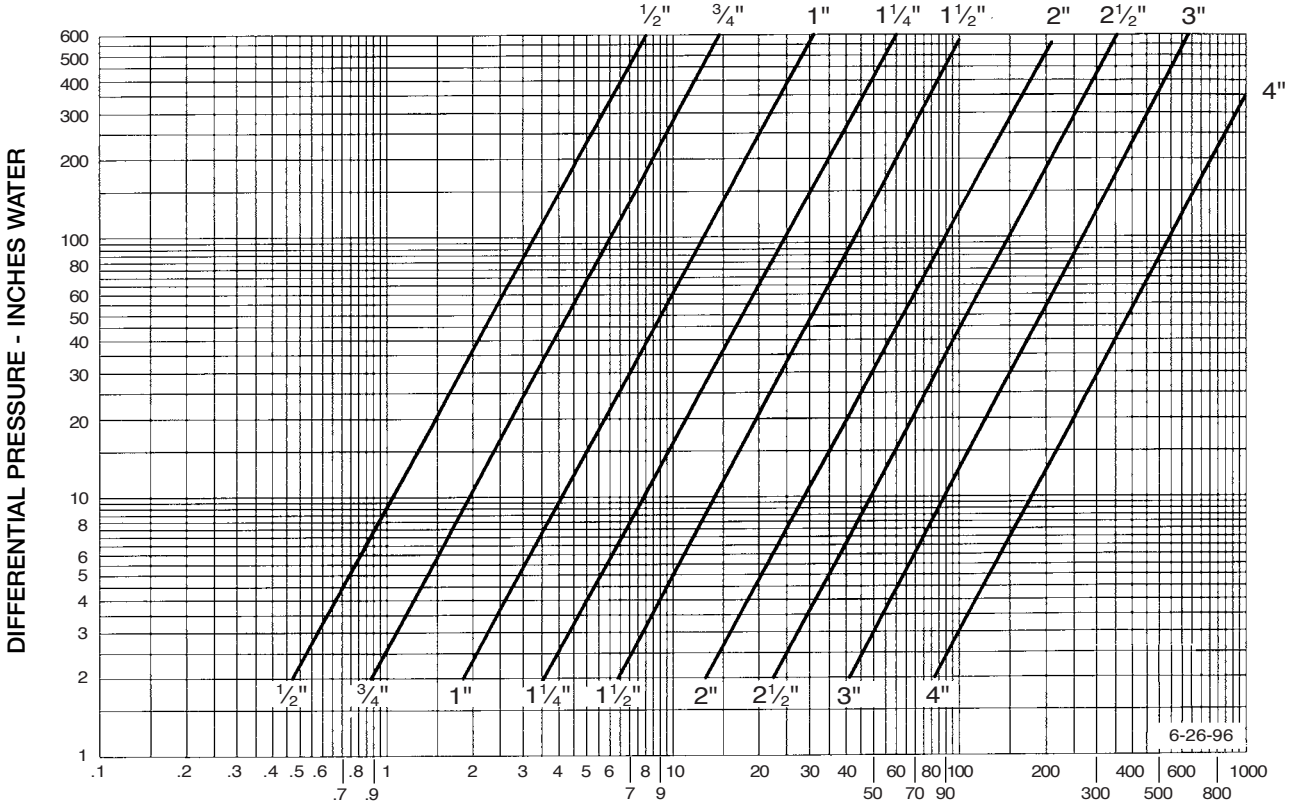
210.349.6129 Fax

FLOW MEASUREMENT CHART



FLOW - GALLONS/MINUTE

Do it Once. Do it Right.®

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TACO (Canada), Ltd., 6180 Ordan Drive, Mississauga, Ontario L5T 2B3. Telephone: 905/564-9422. FAX: 905/564-9436.
Visit our web site at: http://www.taco-hvac.com

CIRCUIT SETTER

Submittal Data Information

ACCU-FLO 2½", 3", 4"

401-048

SUPERSEDES: April 1, 2006 EFFECTIVE: December 1, 2006

JOB _____ ENGINEER _____ CONTRACTOR _____ REP. *LWA*

QUANTITY	MODEL NO.	SIZE	LOCATION

FEATURES

- Fixed port venturi orifice balancing valve.
- Flow measurement function independent of stem and ball position.
- Ball valve construction: Allows Accu-Flo to function reliably both as a balancing valve and suitable for shut-off service in closed hot or cold water systems.
- Valve can be installed in any position.
- Blow-out proof stem.
- Fully-Assembled: Shipped ready for installation.
- Internal seats: Teflon® seats prevent leakage and assure smooth, quiet, dependable operation.
- Calibrated nameplate: Easy to read. Memory stop is tamper resistant and has a fast and accurate resetting if shut-off feature is used. Calibrated to aid in pre-balancing flow loop.

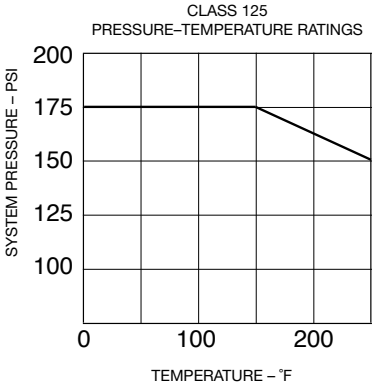
ACCESSORIES

- Readout Meter
- Slide Rule

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

SPECIFICATIONS

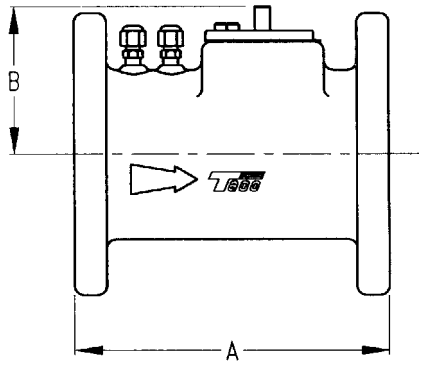
SIZES	2½", 3", 4"
BODY	CAST IRON
INTERNAL COMPONENTS	BRASS, TEFLON ®, EPDM, NORYL ®
SEATS	TEFLON ®
CONNECTIONS	FLANGED
SCHRADER VALVE CONNECTIONS	BRASS ¼"
INDICATOR PLATE	STAINLESS STEEL
POINTER	DIE CAST ZINC
PRESSURE/TEMPERATURE RATING	CLASS 125 (See Chart)

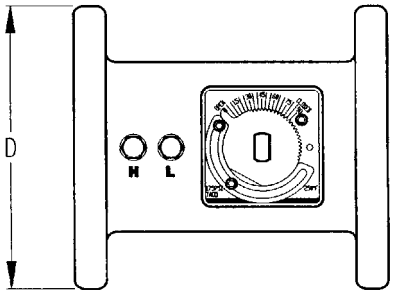


ACCU-FLO DIMENSIONS

SIZE	PRODUCT NO.	CONNECTION	DIMENSIONS								MATERIAL		WEIGHTS		C_V - FULL OPEN POSITION
			A		B		C		D		BODY	VENTURI	LBS.	KG.	
			INCHES	MM	INCHES	MM	INCHES	MM	INCHES	MM					
2½"	ACUF-250-F	FLANGED	8	200	3⅝	92	–	–	7	178	CAST IRON	BRASS	26	11.8	122.0
3"	ACUF-300-F	FLANGED	8 3/16	208	4	102	–	–	7½	191	CAST IRON	TFE	32	14.3	212.0
4"	ACUF-400-F	FLANGED	10	250	4¾	121	–	–	9	229	CAST IRON	TFE	60	26.9	444.0

2½", 3", 4" FLANGED





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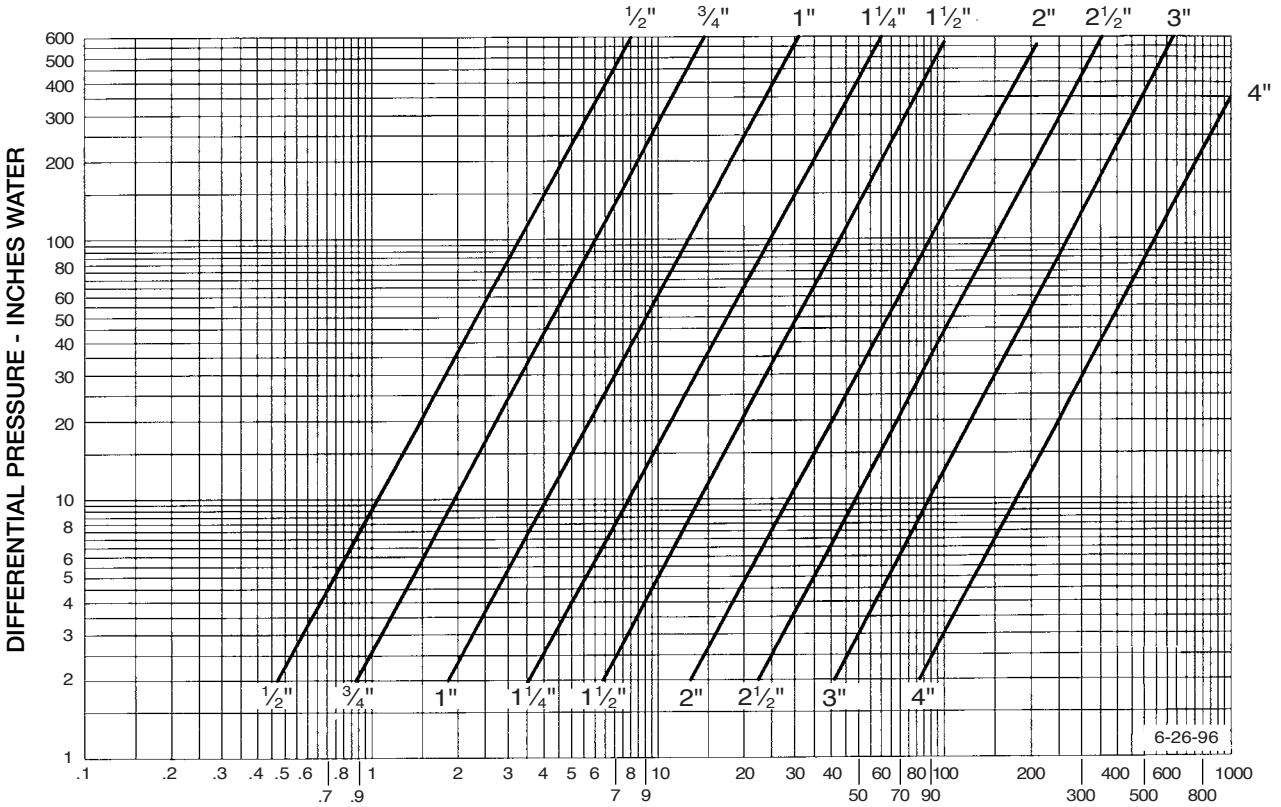
FLOW MEASUREMENT CHART



FLOW - GALLONS/MINUTE

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Visit our web site at: http://www.taco-hvac.com

DOME TOP

FILTER FEEDER

DESIGN FEATURES

- FILTER VESSELS – ALL 304 STAINLESS STEEL CONSTRUCTION, 150 PSI @ 250° F.
- CLAMP COVER – EASES COVER REMOVAL AND PREVENTS MISPLACEMENT OF BOLTS.
- O-RING COVER GASKET – ELIMINATES SPECIAL BOLT TORQUING PROCEDURES REQUIRED WITH FLAT TOP UNITS, AND PROVIDES A SUPERIOR SEAL.
- CONVENIENT SIDE DRAINS ALLOW BOTH THE CLEAN SIDE AND DIRTY SIDE TO BE EASILY DRAINED.
- FILTER ELEMENTS – WOUND 25 MICRON IS STANDARD. OTHER MICRON RATINGS AVAILABLE.

FCI

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

FCI MANUFACTURING 1090 RAINBOW DR SPRING BRANCH, TX 78070
1-866-4FCIMFG (1-866-432-4634) FAX 210-767-1979
info@fcimfg.com

DOME TOP FILTER FEEDER **SPECIFICATION**

Contractor shall furnish Dome Top 60 GPM filter feeder for the chilled water and hot water systems as shown on drawings. Filter feeder shall be rated at 150 psi @ 250^0 F with 2" NPT inlet and outlet, 3/4" vent, 3/4" drains. Unit to be constructed entirely of 304 stainless steel and be complete with accessories as shown on the drawings. Replaceable cartridges shall be 25 micron. Closure to be quick-access type with o-ring gasket. Filter Feeder shall be as manufactured by FCI Manufacturing or approved equal.

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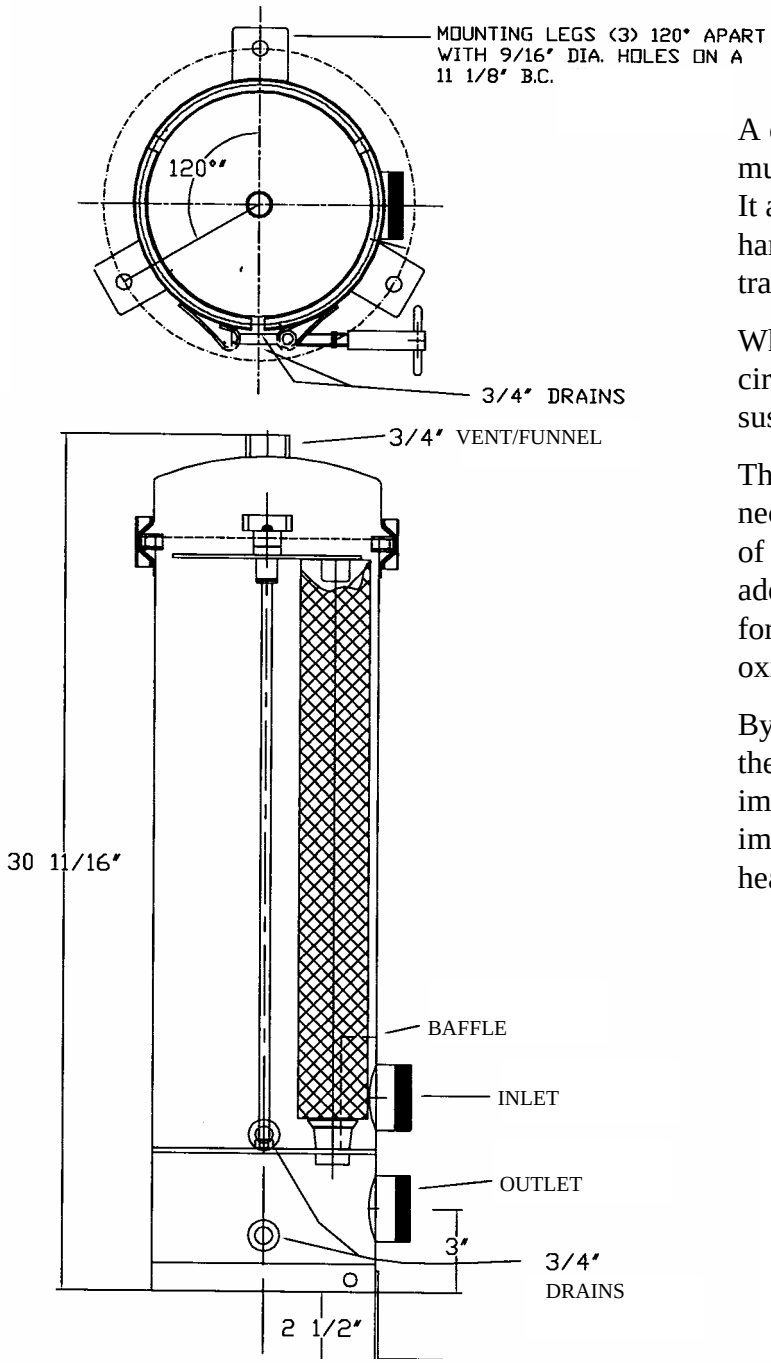
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

FCI

FCI MANUFACTURING 1090 RAINBOW DR SPRING BRANCH, TX 78070
1-866-4FCIMFG (1-866-432-4634) FAX 210-767-1979
info@fcimfg.com

DOME TOP FILTER FEEDER



A closed chilled water or hot water system must have the correct balance of chemicals. It also needs to be free of contaminates that harm system components and impair heat transfer.

When chelate solution is added to a circulating system, the turbidity is held in suspension which can be filtered out.

The FCI Filter Feeder combines the necessity of a Shot Feeder with advantages of Side Stream Filter. It not only allows the adding of chemicals, but also filters out foreign materials such as mill scale, iron oxide, slag, sand, dirt, etc.

By removing particulates from the system the life of the pump seals, wear rings, and impellers are extended. And most importantly, a cleaner system means better heat transfer efficiency.

FEATURES

- •All 304 Stainless Steel Construction
- •150 PSI @ 250° F
- •2" Inlet/Outlet
- •Legs with drilled pads
- •Threaded funnel
- •Quick removal cover
- •Both clean side and dirty side drains
- •Optional site flow indicator
- •Optional auto flow control valve

Project:	Date:
Mechanical Engineer:	Rep: *LWA*
Mechanical Contractor:	Tag:

FCI Manufacturing
1090 Rainbow Dr
Spring Branch, TX 78070
Phone: 866.4FCIMFG (866.432.4634)
Fax: 210.767.1979

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

SHOT FEEDER

DESIGN FEATURES

- ALL 304 STAINLESS STEEL CONSTRUCTION
- 150 PSI AT 250^0 F.
- 5 GALLON SIZE.
- CORROSION RESISTANT FUNNEL.
- VALVE PACKAGES AVAILABLE.
- SITE FLOW INDICATOR OPTION.

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

FCI

FCI MANUFACTURING 1090 RAINBOW DR SPRING BRANCH, TX 78070
1-866-4FCIMFG (1-866-432-4634) FAX 210-767-1979
info@fcimfg.com

SHOT FEEDER

SPECIFICATION

Contractor shall furnish and install chemical shot feeders for the chilled water and hot water systems, as shown on the drawings. Shot feeder shall be rated at 150 psi @ 250^0 F. Unit to be all stainless steel construction, complete with corrosion resistant funnel and accessories as shown on the drawings. Shot feeder shall be as manufactured by FCI Manufacturing or approved equal.

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

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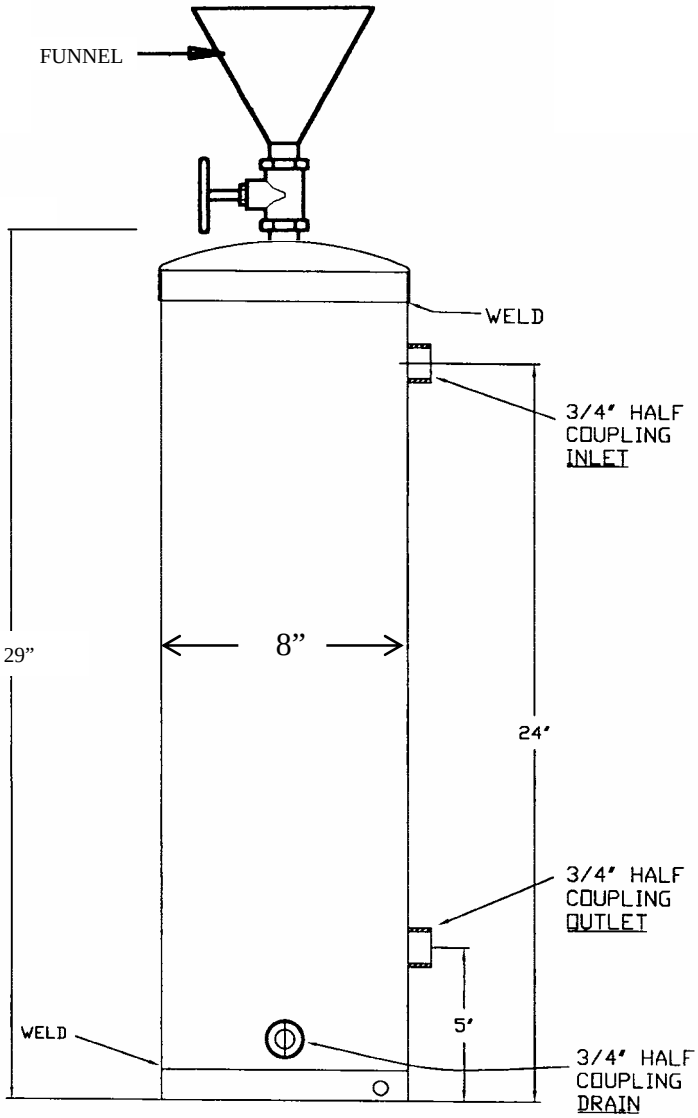
1-866-4FCIMFG (1-866-432-4634) FAX 210-767-1979
info@fcimfg.com

SHOT FEEDER



The FCI Shot Feeder is designed to provide a rugged and dependable chemical feeder for chilled and hot water systems. Units are constructed entirely of 304 stainless steel and are rated at 150 psi @ 250° F.

FEATURES

- ¾" threaded funnel (Standard)
- ¾" Griswald auto flow control valve (Optional)
- ¾" site flow indicator (Optional)

Project:	Date:
Mechanical Engineer:	Rep: LWA
Mechanical Contractor:	Tag:

FCI Manufacturing
1090 Rainbow Dr
Spring Branch, TX 78070
Phone: 866.4FCIMFG (866.432.4634)
Fax: 210.767.1979

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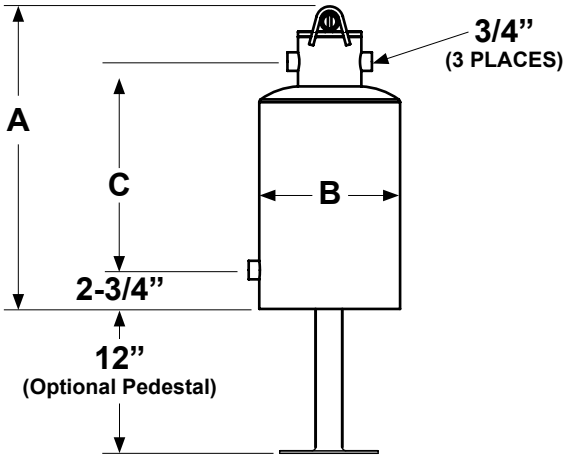
GRISWOLD FILTRATION

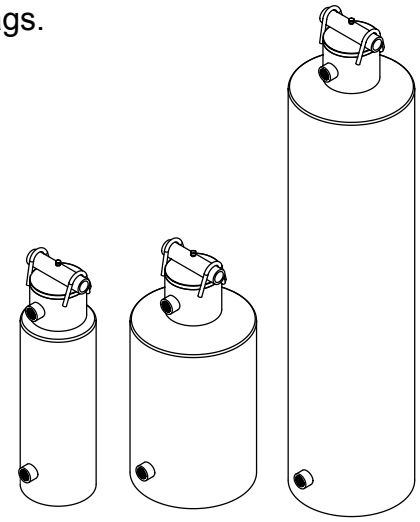
POT FEEDER SPECIFICATION SHEETS

FB SERIES

The FB Series Pot Feeder comes in three standard sizes, 2 Gal., 5 Gal., and 12 Gal. capacity. The standard equipment on the Pot Feeders consist of a carbon steel, powder coated Feeder Tank (optional stainless steel is available) with three 3/4" FNPT connections.

Optional equipment includes the Funnel Package, Valve Package, Pedestal, stainless steel strainer basket, and 25 micron Filter Bags.

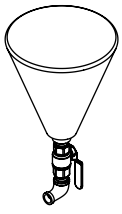




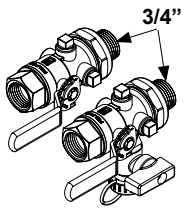
MAX. PRESSURE: 200 PSI @ 200°F

MODEL	CAPACITY GAL. (LTR.)	CONNECTIONS	BASIC WEIGHT LBS (kg)	DIMENSIONS INCHES (cm)		
				DIM "A"	DIM "B"	DIM "C"
FB-2	2 (7.8)	3/4" NPT	18 (8.2)	22 (55.8)	6 (15.2)	16 (40.6)
FB-5	5 (18.9)		28 (12.7)	21 (53.3)	10 (25.4)	14 (35.6)
FB-12	12 (45.4)		54 (24.5)	44 (111.8)	10 (25.4)	37.7 (95.7)

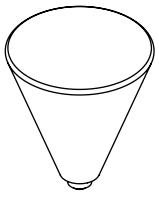
OPTIONS



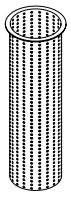
FUNNEL PACKAGE



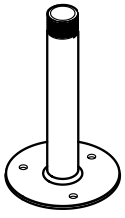
VALVE PACKAGE



FUNNEL ONLY



BASKET



PEDESTAL

PART NO.	DESCRIPTION
FP-75	FUNNEL PACKAGE
VP-75	VALVE PACKAGE
F-75	FUNNEL ONLY
P-12	PEDISTAL

PART NO.	DESCRIPTION
SB-SS	BASKET, STAINLESS STEEL
SB-25	FILTER BAG, 25 MICRONS
SB-2525	FILTER BAG, 25 MICRONS (QTY. 25)

1525 E. Sixth Street, Corona, CA. 92879 Phone: (951) 270-1776 Fax: (951) 735-0798
www.griswoldfiltration.com

ASME

GRISWOLD FILTRATION

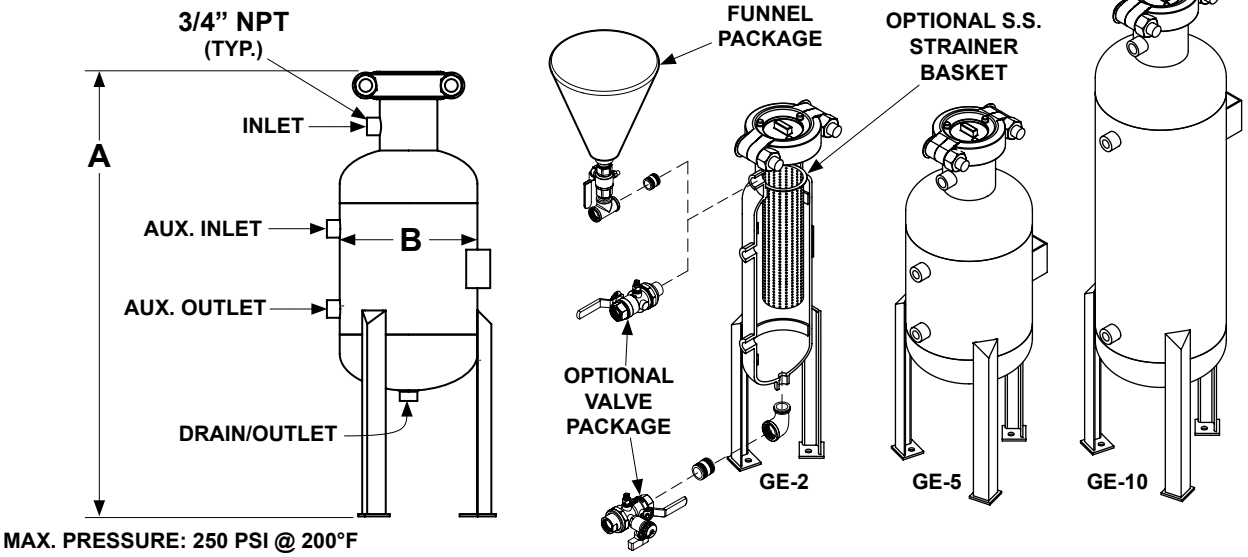
Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

POT FEEDER SPECIFICATION SHEETS

CBF-GE SERIES

The GE Series Pot Feeder is ASME rated, and comes in three standard sizes, 2 Gal., 5 Gal., and 10 Gal. capacity. The standard equipment on the Pot Feeders consist of the Feeder Tank with four 3/4" FNPT connections.

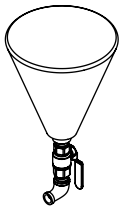
Optional equipment includes the Funnel Package, Valve Package, stainless steel strainer basket, and 25 micron Filter Bags.



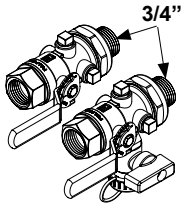
MAX. PRESSURE: 250 PSI @ 200°F

MODEL	CAPACITY GAL. (LTR.)	CONNECTIONS	BASIC WEIGHT LBS (kg)	DIMENSIONS INCHES (cm)	
				DIM "A"	DIM "B"
CBF-2GE	2 (7.8)	3/4" NPT	55.22 (25.1)	33 (83.8)	6-3/4 (17.2)
CBF-5GE	5 (18.9)		54.4 (24.7)	33 (83.8)	10-3/4 (27.3)
CBF-10GE	10 (37.9)		65 (29.48)	45-1/2 (115.6)	10-3/4 (27.3)

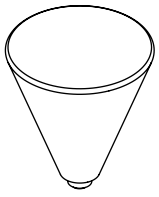
OPTIONS



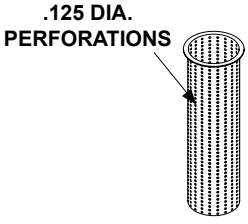
FUNNEL PACKAGE



VALVE PACKAGE



FUNNEL ONLY



BASKET

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
FP-75A	FUNNEL PACKAGE	SB-SS	BASKET, STAINLESS STEEL
VP-75A	VALVE PACKAGE	SB-25	FILTER BAG, 25 MICRONS
F-75	FUNNEL ONLY	SB-2525	FILTER BAG, 25 MICRONS (QTY. 25)

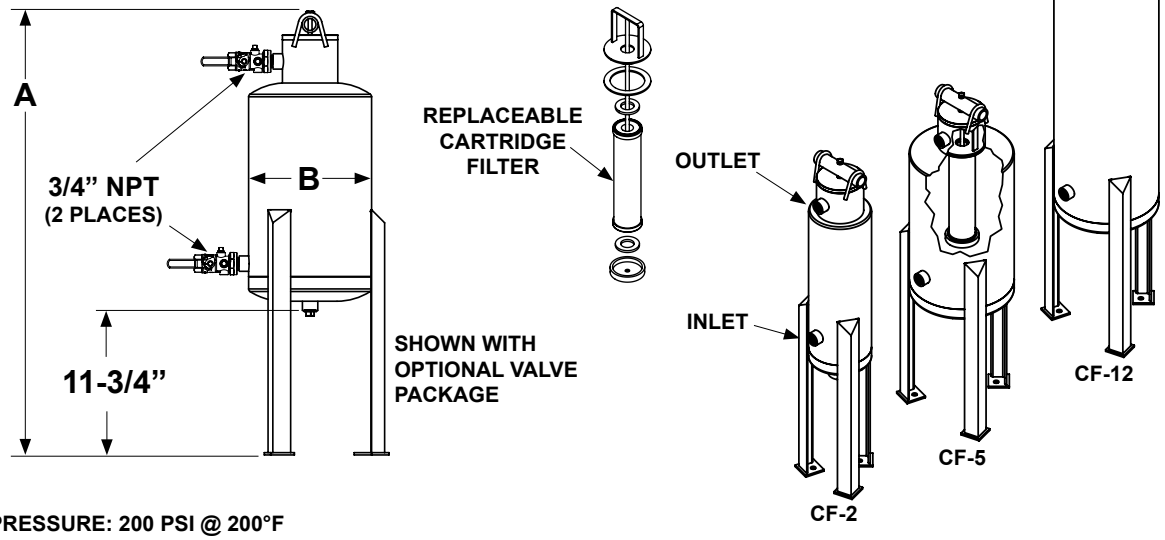
1525 E. Sixth Street, Corona, CA. 92879 Phone: (951) 270-1776 Fax: (951) 735-0798
www.griswoldfiltration.com

POT FEEDER SPECIFICATION SHEETS

CF-SERIES

The CF Series Pot Feeder comes in three standard sizes, 2 Gal., 5 Gal., and 12 Gal. capacity. The standard equipment on the Pot Feeders consist of the Feeder Tank with two 3/4" FNPT connections.

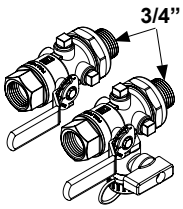
Optional equipment includes the Valve Package.



MAX. PRESSURE: 200 PSI @ 200°F

MODEL	CAPACITY GAL. (LTR.)	CONNECTIONS	BASIC WEIGHT LBS (kg)	DIMENSIONS INCHES (cm)	
				DIM "A"	DIM "B"
CF-2	2 (7.8)	3/4" NPT	42 (19)	36-1/2 (93)	6 (15.25)
CF-5	5 (18.9)		52 (23.5)	36-1/2 (93)	10 (25.4)
CF-12	12 (45.4)		78 (35.38)	59 (150)	10 (25.4)

OPTIONS



VALVE PACKAGE

PART NO.	DESCRIPTION
VP-75	VALVE PACKAGE

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

UNITED BRASS WORKS, INC.

714 S. Main St., Randleman, NC 27317

Tel: 800-334-3035 Fax: 800-498-4696 www.ubw.com

ISO9001 REGISTERED COMPANY

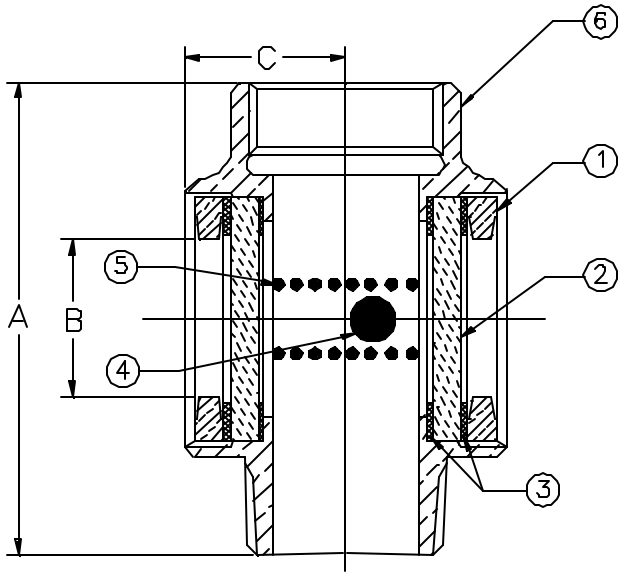
Larry Wunsch & Assoc., Inc.
210-349-5244 p
210-349-6129 f

Model 70TTSLB
High Pressure Flow Indicator
With PTFE Seals, Tempered Soda Lime Glass, & Activity Signal

100% Pressure Tested
Male X Female Configuration

MATERIAL LIST

NO.	DESCRIPTION	MATERIAL
1	Ring	Brass
2	Glass	Tempered Soda Lime
3	Gasket	PTFE
4	Ball	Nylon
5	Spring	Stainless Steel
6	Body	Bronze



Size	¾”	1”	1 ¼”	1 ½”	2”	2 ½”	3”**
Operating Pressure (PSI) ***	125	125	125	85	85	85	40
A	4.00	4.00	4.00	6.19	6.19	6.38	3.88
B	1.63	1.63	1.63	2.43	2.43	2.43	2.91
C	1.69	1.69	1.75	2.25	2.25	2.25	2.52
Ship Wgt. (lbs)	1.37	1.50	1.50	4.69	4.56	5.25	8.25
Qty. Unit Pack	4	4	4	2	2	1	1
Where Used	Shot Feeder		Filter Feeder				

***** 3” Double Female Only*** ****** Higher Pressure Glass Available As Special***

Tri Flo Tech LLC

Los Angeles, California

3410 E 14th St. • LA, CA 90023 • (323) 269-7700 • www.triflotech.com

TRI AUTO FLO ; MECHANICAL SPECIFICATION AND ORDERING FORM; Tri Auto Flo is a combination isolation Valve, Union, Pressure and Temperature port which is equipped with a Tri Auto Flo cartridge, which is capable of maintaning the flow within +/- 5% of actual flow rate between 2-50 PSID differential pressure across the cartridge. The Tri Flo forged brass body insures multiple taps, reliable leak free performance and additional accesories to accomodates variable piping configurations. Tri Flo Tech is capable of manufacturing the cartridges to maintain the flow to decimal increments such as 1.1 G.P.M., 1.2 G.P.M. thru 1.9 in all flow rates.

TRI AUTO FLO

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Pressure/ Temperature Ratings:

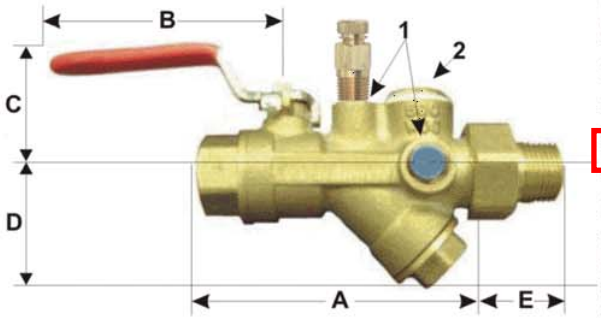
1/2" - 2": 600 PSI WOG Non - Shock

All Sizes: 325 Deg. F. Maximum

Optional Accessories:

- Air Vent
- PT/Port Accessory/Extension - Flex Hoses

Dimensional Information & Material Specifications:



Model #	Size	A	B	C	D	E	Cv*
TA-AF_	1/2"	3.80	3.40	1.70	1.60	1.00	5.50
TA-BF_	3/4"	5.20	3.40	1.80	2.40	1.00	9.00
TA-CF	1"	5.30	3.40	1.80	2.40	1.20	9.00
TA-DF_	1-1/4"	6.60	4.40	2.50	3.50	1.70	28.00
TA-EF_	1-1/2"	6.60	4.40	2.50	3.50	1.90	28.00
TA-FF_	2"	11.30	5.50	3.50	4.50	1.90	32.00

Note: Cv's are based on valve body without cartridge.

Model shown is FxM consult factory for dimension per configuration.

Valve Body & Union Nut:	Forged Brass
Ball:	Chrome Plated/Forged Brass
Stem & Gland Nut:	Forged Brass
Tailpiece:	Forged Brass
Readout Port Body & Cap:	Extruded Brass
Readout Port Seal:	Nordel
Lever Handle:	Zinc Plated Steel w/Vinyl Grip
Lever Nut:	Extruded Brass
Seats & Packing:	PTFE
Stem O-Rings:	Viton

Connection Availability:

Body End:	Female NPT	1/2" thru 2"
	Copper SWT	1/2" thru 2"
Tailpiece End:	Female NPT	1/2" thru 2"
	Male NPT	1/2" thru 2"
	Copper SWT	1/2" thru 2"
Tailpiece End W/One Size Reduction:	Female NPT	3/4" thru 2"
	Male NPT	3/4" thru 2"
	Copper SWT	1/2" thru 2"

Option Ports:

#1 FNPT Option Port: (1) on top and (1) on each side:	1/2" thru 2"	1/4" port
	1/2" thru 1"	1/2" port
	1-1/4" thru 2"	

Cartridge Sizes	Flow Rate in GPM and GPM Increments
1/2" Low	0.5, 1.0, 1.5, 2.0, 2.5, 3.0
1/2" High	3.5, 4.0, 5.0, 6.0, 7.0, 8.0
3/4" & 1" Low	0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 5.0, 6.0, 7.0, 8.0
1" High, 1-1/4" & 1-1/2"	9.0, 10.0, 11.0, 12.0, 13.0, 14.0, 15.0, 16.0, 17.0
	18.0, 19.0, 20.0, 21.0, 22.0, 23.0, 24.0, 25.0, 26.0
1.50"	0.5 - 80 (in 0.1 GPM increments)
2.00"	26 - 126 (in 0.1 GPM increments)

Automatic flow control cartridges can also be batch manufactured and custom crafted from a variety of different materials such as Monel, Hastteloy "C", Tantalum, Titanium, PVC, Kynar and others to enhance corrosive sensitive applications. Consult the factory today for more information about special materials required for your project.

Ordering Instructions

TAF - 075 S - 050 M - XX - XX - XX

- **Model**
- **Ball End** — 1/2"= 050, 3/4"= 075, 1"=100, 1 1/4"= 125, 1 1/2"= 150; F = Female & S = Sweet
- **Union End** — 1/2"= 050, 3/4"= 075, 1"=100, 1 1/4"= 125, 1 1/2"= 150; F = Female, M = Male & S = Sweet
- **Port Accesories** — PT, BD, SH, MV
- **Flow Rate in G.P.M.** — See Accesories

Project Information:

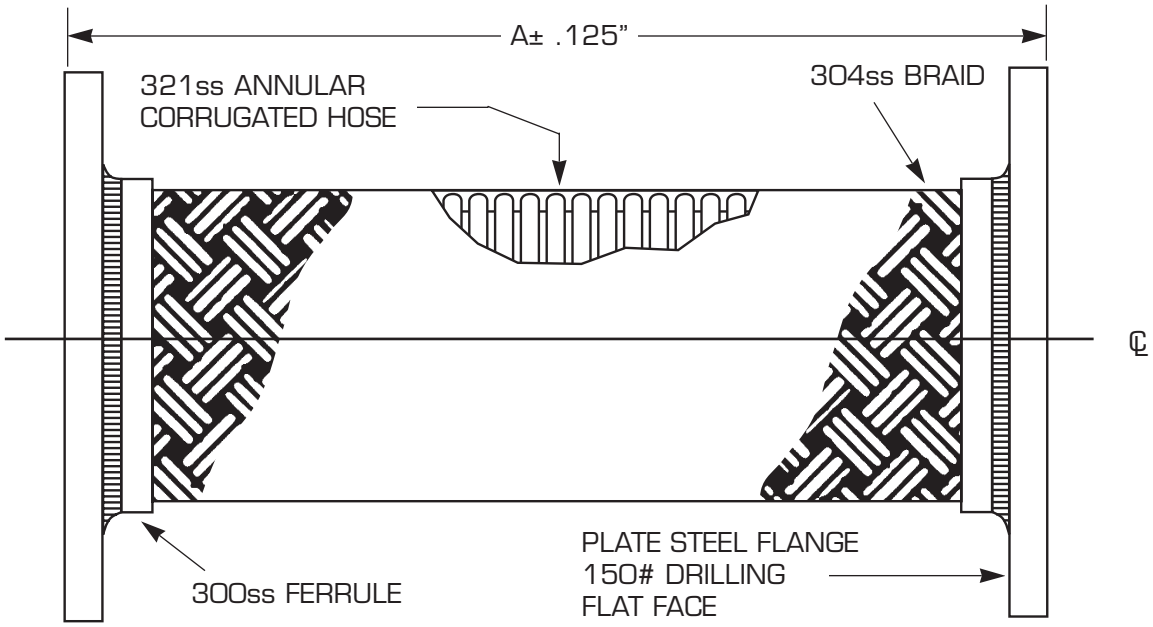
Contractor _____ Representative LWA

Engineer _____ Job # _____

P.O.# _____ Date _____

Delivery _____ F.O.B. _____

Pumpsaver® Braided Pump Connectors



FOR TEMP ABOVE 70°F	
TEMP °F	FACTOR S.S.
70	1.00
200	.94
300	.88
400	.83
500	.78
600	.74

Qty	I.D. (In.)	A (In.)	Pressure (PSI) 70°F	Parallel Offset (In.) Permanent	Parallel Offset (In.) Intermittent	Weight (lb)	Notes
	2.00	9.00	450	1⅛	⅜	10.00	
	2.50	9.00	300	1	⅜	12.00	
	3.00	9.00	275	⅝	¼	14.00	
	4.00	9.00	270	½	¼	19.00	
	5.00	11.00	225	¾	⅜	25.00	
	6.00	11.00	165	⅝	¼	30.00	
	8.00	12.00	155	½	¼	54.00	
	10.00	13.00	150	½	¼	75.00	
	12.00	14.00	145	½	¼	105.00	
	14.00	14.00	130	⅜	⅛	135.00	

**For safe working pressure above 70°F, multiply pressure shown at 70°F times correction factor of required temp.*

**Working pressures shown for the hose and braid are based on an operating temperature of 70°F (21°C) with a 4:1 safety factor.*

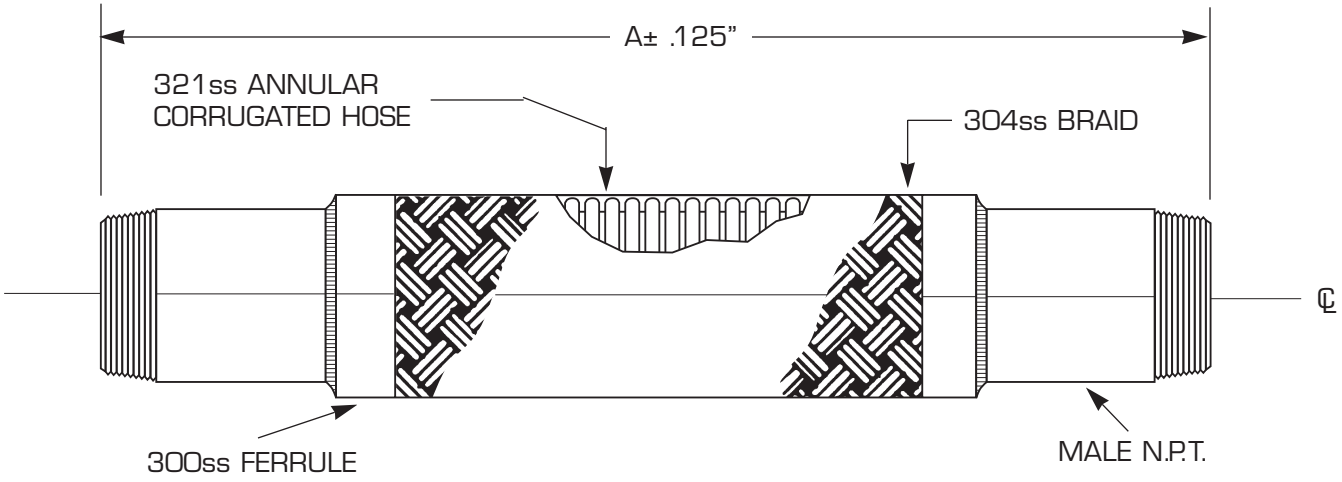
PROJECT	
CUSTOMER	
ENGINEER	
REPRESENTATIVE	*LARRY WUNSCH & ASSOC*
DRAWING #	

REV. 1/02

FLEX-HOSE CO., INC.

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Pumpsaver® Braided Pump Connectors



FOR TEMP ABOVE 70°F	
TEMP °F	FACTOR S.S.
70	1.00
200	.94
300	.88
400	.83
500	.78
600	.74

Qty	I.D. (In.)	A (In.)	Pressure (PSI) 70°F	Parallel Offset (In.) Permanent	Parallel Offset (In.) Intermittent	Weight (lb)	Notes
	.50	8.50	1325	1	¼	.56	
	.75	10.00	1100	1⅝	⅜	.87	
	1.00	10.00	700	1	¼	1.10	
	1.25	11.00	550	1½	½	1.43	
	1.50	12.00	450	1¾	⅝	1.80	
	2.00	14.00	450	1⅜	½	2.92	
	2.50	16.00	300	2	¾	4.64	
	3.00	18.00	275	2	1	6.84	
	4.00	20.00	270	2¼	1⅛	9.20	

**For safe working pressure above 70°F, multiply pressure shown at 70°F times correction factor of required temp.*

**Working pressures shown for the hose and braid are based on an operating temperature of 70°F (21°C) with a 4:1 safety factor.*

END FITTING MATERIAL SPECIFICATIONS

CARBON STEEL		**SCH'D 40 IPS**	
STAINLESS STEEL		**SCH'D 80 IPS**	

PROJECT	
CUSTOMER	
ENGINEER	
REPRESENTATIVE	***LARRY WUNSCH & ASSOC***
DRAWING #	

REV. 1/02

FLEX-HOSE CO., INC.

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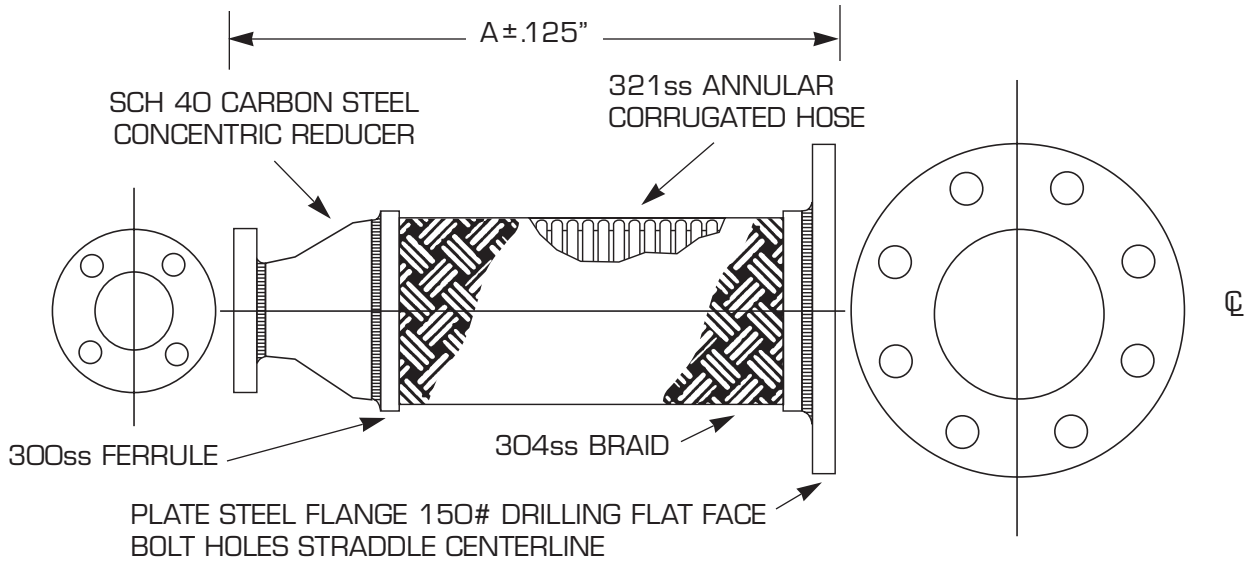
210.349.6129 Fax

Pumpsaver® Braided Pump Connectors



FOR TEMP ABOVE 70°F	
TEMP °F	FACTOR S.S.
70	1.00
200	.94
300	.88
400	.83
500	.78
600	.74

**For safe working pressure above 70°F, multiply pressure shown at 70°F times correction factor of required temp.*

Qty	I.D. (In.) Small Flange	I.D. (In.) Large Flange & Hose	A (In.)	Pressure (PSI) 70°F	Parallel Offset (In.) Permanent	Parallel Offset (In.) Intermittent	Weight (lb)	Notes
	1.50	2.00	13.00	450	1¾	⅝	10.00	
	1.50	2.50	13.00	300	1⅜	½	11.20	
	2.00	2.50	13.00	300	1⅜	½	12.40	
	2.00	3.00	13.00	275	⅞	⅜	14.90	
	2.00	4.00	13.00	270	½	¼	18.70	
	2.50	3.00	13.00	275	⅞	⅜	16.00	
	2.50	4.00	13.00	270	½	¼	20.00	
	2.50	5.00	16.00	225	⅞	⅜	25.70	
	2.50	6.00	16.00	165	½	¼	32.00	
	3.00	4.00	13.00	270	½	¼	20.80	
	3.00	5.00	16.00	225	⅞	⅜	26.50	
	3.00	6.00	16.00	165	½	¼	32.80	
	4.00	5.00	16.00	225	⅞	⅜	28.40	
	4.00	6.00	16.00	165	½	¼	34.70	
	4.00	8.00	18.00	155	⅝	¼	53.40	
	5.00	6.00	16.00	165	½	¼	37.70	
	5.00	8.00	18.00	155	⅝	¼	55.70	
	6.00	8.00	18.00	155	⅝	¼	56.90	LARRY WUNSC
	6.00	10.00	20.00	150	⅝	¼	83.10	
	8.00	10.00	20.00	150	⅝	¼	95.00	
	10.00	12.00	22.00	145	½	¼	125.90	

**Working pressures shown for the hose and braid are based on an operating temperature of 70°F (21°C) with a 4:1 safety factor.*

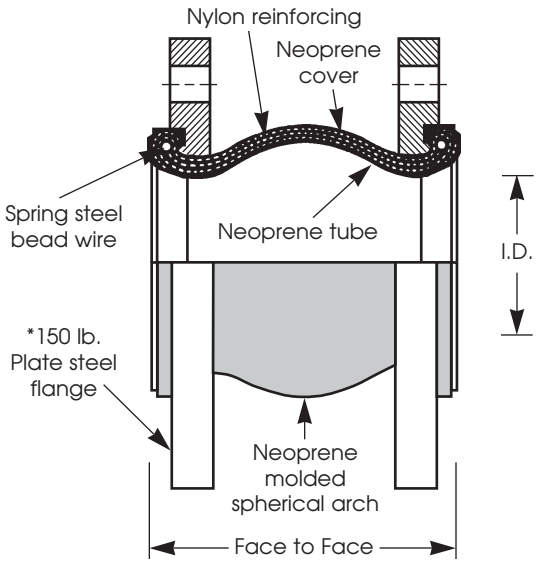
PROJECT	
CUSTOMER	
ENGINEER	
REPRESENTATIVE	*LARRY WUNSCH & ASSOC*
DRAWING #	

REV. 1/02

FLEX-HOSE CO., INC.®

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

FLEXZORBER® NNS Single Sphere Flanged

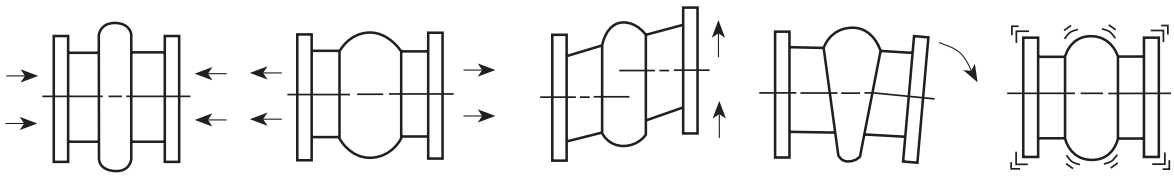


I.D. (IN)	LENGTH (IN)	PRESSURE (PSI) 170°F	PRESSURE (PSI) 220°F	VAC RATING (in Hg.)	MOVEMENT CAPABILITY COMPRESSION (IN)	MOVEMENT CAPABILITY EXTENSION (IN)	MOVEMENT CAPABILITY PARALLEL (IN)	MOVEMENT CAPABILITY ANGULAR (Deg)	FLANGE DIMS NO. BOLT HOLES	FLANGE DIMS HOLE SIZE	(LBS)
1.5	6	225	150	26	½	⅜	½	15°	4	⅝	7
2.0	6	225	150	26	½	⅜	½	15°	4	¾	9
2.5	6	225	150	26	½	⅜	½	15°	4	¾	13
3.0	6	225	150	26	½	⅜	½	15°	4	¾	14
4.0	6	225	150	26	⅝	⅜	½	15°	8	¾	18
5.0	6	225	150	26	⅝	⅜	½	15°	8	⅞	23
6.0	6	225	150	26	⅝	⅜	½	15°	8	⅞	27
8.0	6	225	150	26	⅝	⅜	½	15°	8	⅞	38
10.0	8	225	150	26	¾	½	¾	15°	12	1	56
12.0	8	225	150	26	¾	½	¾	15°	12	1	83
14.0	8	125	105	26	¾	½	¾	15°	12	1⅛	115
16.0	8	125	105	26	¾	½	¾	15°	16	1⅛	165
18.0	8	125	105	26	¾	½	¾	15°	16	1¼	168
20.0	8	125	105	26	¾	½	¾	15°	20	1¼	170

*ANSI Class 150 lb. Steel Floating Flanges

FLEXZORBER® MOVEMENTS

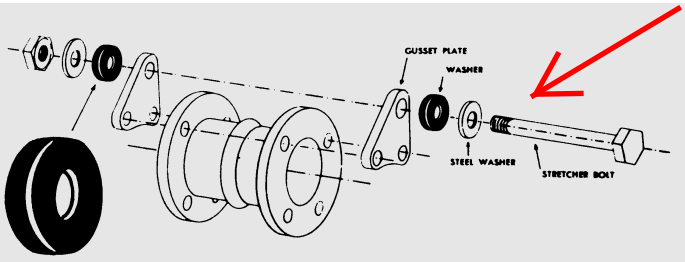
Flex-Hose Co.'s FLEXZORBER® rubber connectors & expansion joints are capable of handling the following movements:



Axial Compression | Axial Extension | Parallel Offset | Angular Deflection | Vibration

With Control Units for Rubber Connectors & Expansion Joints

Unrestrained, most rubber expansion joints and connectors will extend when pressurized. Therefore, it is recommended the system be anchored. When anchoring is not practical, control units must be used.



Control Units Required: ☐ YES ☐ NO

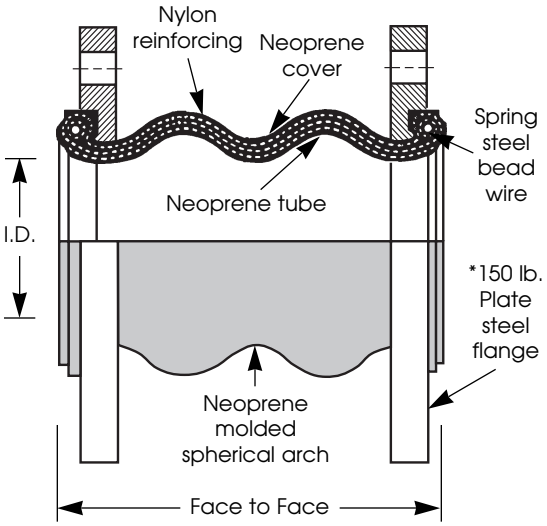
PROJECT	
CUSTOMER	
ENGINEER	
REPRESENTATIVE	*LARRY WUNSCH & ASSOC*
DRAWING #	

REV. 1/02

FLEX-HOSE CO., INC.

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

FLEXZORBER® NND Double Sphere Flanged

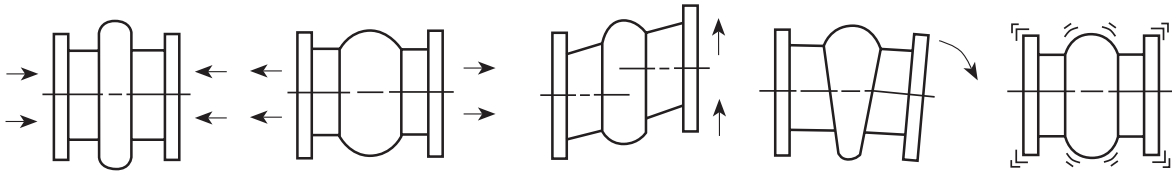


I.D. (IN)	LENGTH (IN)	PRESSURE (PSI) 170°F	PRESSURE (PSI) 220°F	VAC RATING (in Hg.)	MOVEMENT CAPABILITY COMPRESSION (IN)	MOVEMENT CAPABILITY EXTENSION (IN)	MOVEMENT CAPABILITY PARALLEL (IN)	MOVEMENT CAPABILITY ANGULAR (Deg)	FLANGE DIMS NO. BOLT HOLES	FLANGE DIMS HOLE SIZE	(LBS)
2.0	7	225	150	26	1	¾	1	30°	4	¾	9
2.5	7	225	150	26	1	¾	1	30°	4	¾	13
3.0	7	225	150	26	1	¾	1	30°	4	¾	15
4.0	9	225	150	26	1¼	1	1¼	30°	8	¾	20
5.0	9	225	150	26	1¼	1	1¼	30°	8	⅞	26
6.0	9	225	150	26	1¼	1	1¼	30°	8	⅞	29
8.0	13	225	150	26	1½	1	1⅜	30°	8	⅞	45
10.0	13	225	150	26	1½	1	1⅜	30°	12	1	63
12.0	13	225	150	26	1½	1	1⅜	30°	12	1	95

*ANSI Class 150 lb. Steel Floating Flanges

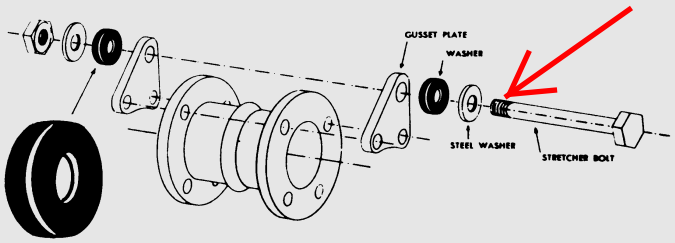
FLEXZORBER® MOVEMENTS

Flex-Hose Co.'s FLEXZORBER® rubber connectors & expansion joints are capable of handling the following movements:



With Control Units for Rubber Connectors & Expansion Joints

Unrestrained, most rubber expansion joints and connectors will extend when pressurized. Therefore, it is recommended the system be anchored. When anchoring is not practical, control units must be used.



Control Units Required: ☐ YES ☐ NO

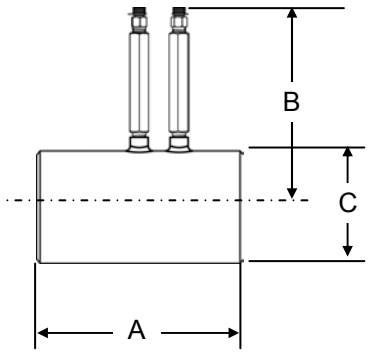
PROJECT	
CUSTOMER	
ENGINEER	
REPRESENTATIVE	*LARRY WUNSCH & ASSOC*
DRAWING #	

REV. 1/02

FLEX-HOSE CO., INC.

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Weld End Metering Station (2-1/2" – 18")



SPECIFICATIONS:

PSI/Temperature Rating	
Metering Station:	400 PSI/250º F
QuickSet:	175 PSI (14"-18": 150 PSI)[1]/250º F
Low Loss Venturi:	Carbon Steel with Piezo-Ring to average low signal pickup.
Body Material:	Carbon Steel SA-53 Grade B.
Butterfly Valve[2]:	Bronze disk, 400 series S.S. stem.
End Connections:	Beveled for welding
Body Tappings:	1/4" NPT with Brass P/T test valves
Assembly:	Valve comes fully assembled.
Installation:	No straight-run is necessary for normal operation. Consult chart (F-4439) for exact Flow Constant and Permanent Pressure Drop calculations.

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San Antonio, Texas 78216-7042
210.349.5244 Phone
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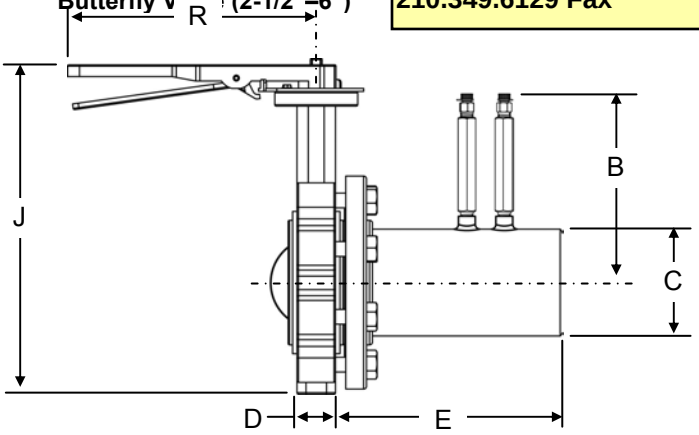
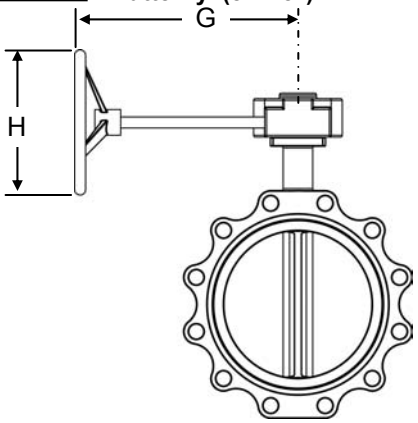
Weld End QuickSet with Handle Butterfly V (2-1/2"–6")



Gear/Hand Wheel Butterfly (8"–18")



FLOW RATES (+/-1%[3])

LINE SIZE	MODEL NO.	Cv Metering Station[4]	Cv Quickset[4]	GPM RANGE FOR 20"-100" W.C. ΔP (SET W/100" GAUGE)	GPM RANGE FOR 20"-300" W.C. ΔP (SET W/300" GAUGE)
2-1/2"	3QWM_	171	135	39 – 87	39 – 151
3"	3QWN_	269	201	66 - 147	66 – 255
4"	3QWP_	580	417	116 – 260	116 – 451
5"	3QWQ_	800	630	165 – 372	165 – 645
6"	3QWR_	1250	980	272 – 624	272 – 1075
8"	3QWS_	2100	1745	525 – 1180	525 – 2045
10"	3QWT_	4000	3201	725 – 1610	725 – 2790
12"	3QWU_	5700	4690	1249 – 2790	1249 – 4820
14"	3QWV_	7300	6225	1548 – 3420	1548 – 5940
16"	3QWW_	9600	8283	2490 – 5525	2490 – 9575
18"	3QWX_	14500	12057	3305 – 7405	3305 - 12830

NOTES

[1] Higher PSI ratings are available. Contact factory.
[2] Butterfly Valve is standard on QuickSet only.
[3] Accuracy is based on Griswold's manufacturing tolerances. Accuracy for determining flowrate will be affected by the accuracy of the meter used to set the valve.
[4] Cv's are used to calculate permanent pressure drop. PSID=(Flow/Cv)^2. Consult chart F-4439 for flow measurement.

Replaces form F-4406C 12/05

 F-4406D

DIMENSIONS & WEIGHTS FOR METERING STATION (NOMINAL)

LINE SIZE	A	B	C	WEIGHT (LBS.)
2-1/2"	5.8	7.3	2.9	3.1
3"	6.3	7.6	3.5	4.4
4"	7.9	8.0	4.5	8.0
5"	9.8	8.6	5.6	13.4
6"	10.3	9.1	6.6	18.2
8"	12.3	10.1	8.6	32.7
10"	15.5	11.2	10.8	58.0
12"	16.3	12.2	12.8	79.7
14"	16.5	12.8	14.0	95.1
16"	17.5	13.8	16.0	111.7
18"	16.8	14.8	18.0	121.0

DIMENSIONS & WEIGHTS FOR QUICKSET (NOMINAL)

LINE SIZE	B	C	D	E	G	H	J	R HANDLE	WEIGHT (LBS.)	
									W/ HANDLE	W/GEAR WHEEL
2-1/2"	7.3	2.9	1.8	6.0	N/A	N/A	11.6	10.5	17.5	N/A
3"	7.6	3.5	1.8	6.5	N/A	N/A	12.1	10.5	20.7	N/A
4"	8.0	4.5	2.0	8.1	N/A	N/A	13.6	10.5	31.3	N/A
5"	8.6	5.6	2.1	10.0	N/A	N/A	14.6	10.5	40.7	N/A
6"	9.1	6.6	2.3	11.5	N/A	N/A	15.6	10.5	53.6	N/A
8"	10.1	8.6	2.4	15.0	9.5	12.0	18.9	N/A	N/A	99.6
10"	11.2	10.8	2.6	18.0	9.5	12.0	21.3	N/A	N/A	151.0
12"	12.2	12.8	3.0	21.5	9.5	12.0	24.6	N/A	N/A	224.9
14"	12.8	14.0	3.0	24.0	9.5	12.0	26.8	N/A	N/A	303.5
16"	13.8	16.0	4.0	27.5	15.0	16.0	30.0	N/A	N/A	392.3
18"	14.8	18.0	4.5	31.8	15.0	16.0	31.6	N/A	N/A	511.5

MODEL NUMBER SELECTION[5]

3 Q W _ _ _

Select a Size: M=2.5", N=3", P=4", Q=5" R=6", S=8", T=10", U=12", V=14", W=16", X=18"

"0" for Metering Station "Y" for QuickSet with Butterfly Valve

Tag: 0=Standard, T=Hanging Tag

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

NOTES

[5] Model no. and flow rate are indicated on label affixed to body.

Replaces form F-4406C 12/05

F-4406D

SUBMITTAL DATA

MODEL "R" METERS

6" DIAL DIFFERENTIAL METER
LIGHT WEIGHT, FLOW TEST KIT
FOR CONVENIENT FIELD USE.

TO MONITOR ORIFICE, VENTURI,
PITOT FLOW DEVICES.

MODEL R-50FS	0-50 FT. H_2O FOR USE WITH CIRCUIT SETTERS. SCREW-ON FITTINGS.
MODEL R-50IS	0-50 IN. H_2O FOR USE WITH SENTINEL PITOT FLOW DEVICES. SCREW-ON FITTINGS.
MODEL R-50IQ	0-50 IN. H_2O FOR USE WITH VENTURI FLOW DEVICES. QUICK DISCONNECT FITTINGS.
MODEL R-100IS	0-100 IN. H_2O FOR USE WITH SENTINEL PITOT FLOW DEVICES. SCREW-ON FITTINGS.
MODEL R-100IQ	0-100 IN. H_2O FOR USE WITH VENTURI FLOW DEVICES. QUICK DISCONNECT FITTINGS.

SPECIFICATIONS:

WORKING PRESSURE – 125 PSI
ACCURACY ± 2%
HOSE LENGTH – (2) 10 FEET
BLEED VALVES WITH FLEXIBLE BLEED HOSE
DRAINABLE

FLUID MEDIA – GASES OR LIQUIDS COMPATIBLE WITH THE FOLLOWING WETTED MATERIALS:

NYLON
BUNA-N RUBBER
316 STAINLESS STEEL
POLYSULFONE
BRASS
ACETAL

IN GENERAL, WATER - OIL - MOST GASES UP TO 200^{B} F ARE COMPATIBLE.
(Special ranges on request)

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Industrial Flow Switch

Better materials lead to better performance. Originally developed for the fire protection industry, the materials of construction, operation and dependability of the Taco Industrial Flow Switch is superior to any other product on the market. It is overwhelmingly preferred by boiler manufacturers and comes with the industry's only 3 year warranty.

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
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HYDRONIC COMPONENTS & SYSTEMS

Do it once. Do it right.™ Taco®

Supersedes: 100-8.2 Dated 04/1/02

Effective Date: 12/31/03
Printed in USA

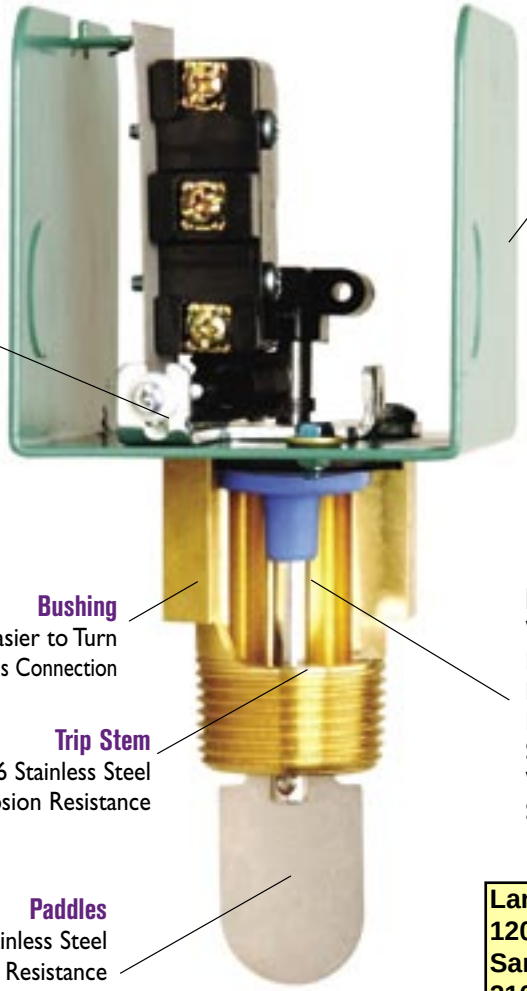
Application

The Taco Industrial Flow Switch (IFS) starts or stops electronically operated equipment when a flow or no flow condition occurs. The IFS can be used in 1" to 8" liquid flow lines, carrying water or any nonhazardous fluid not harmful to brass, stainless steel or fluorosilicone. It is used in a wide variety of applications including heating systems, domestic water boosters, process work, water systems, chillers and on low mass boilers.

Features

- 3 Year Warranty
- Fluorosilicone Seal Superior to Competitor's Mechanical Bellows
- Little Mechanical Wear or Fatigue
- Greater Flow Sensitivity and Wider Adjustment Range
- Higher Pressures, 250 PSI Standard
- 250°F Temperature Rating
- Stainless Steel Paddles & Trip Rods
- NEMA 1 and NEMA 4 Models
- Single or Double Switch Models
- High Current Models Available
- For Use on 1" to 8" Diameter Pipe
- UL, CSA, CE Approved

Better Materials Lead to Better Performance



Enclosures
Sturdier 20 Gauge Steel Covers
16 Gauge Steel Bases Ensures Robustness

Flow Sensitivity Adjustment
Wide Adjustment Range

Bushing
Larger Wrench Flats – Easier to Turn
1" NPT Brass or Stainless Steel Process Connection

Trip Stem
316 Stainless Steel
Corrosion Resistance

Fluorosilicone Seal
Will Not Harden, Crack and Subsequently Develop a Leak as is the Case with a Bellows Design
Improves Performance in High Pressure Systems
Withstands 100 PSI More Than Any Other Standard Flow Switch

Paddles
316 Stainless Steel
Corrosion Resistance
Rigid Paddles Available
Paddles For 1" to 8" Pipes Included with Every IFS

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Listings/Approvals
- UL Guide (NKPZ) for industrial control equipment per UL Standard 508 Industrial Control Equipment
- UL Guide (MFHX) for heating/cooling appliance switch per UL Standard 353 Limit Controls
- CSA Class (321106) for industrial control equipment per CSA Standard C22.2 No. 14-M Industrial Control Equipment
- CE (Except IFSH1/H2)

Maximum Service Pressure
- 250 PSI

Enclosure
- Model IFS01/02/H1/H2: NEMA Type 1 (For indoor use only). Formed sheet metal with powdercoat finish.
- Model IFSWS/W2: NEMA Type 4 (For indoor or outdoor use). Die-cast housing and high impact resistant polycarbonate cover.

Switch Contacts
- IFS01/H1/WS: One SPDT (Form C) switch
- IFS02/H2/W2: Two sets of SPDT (Form C) switches to provide versatility in wiring two separate circuits
- IFS01/02/W2: 15 Amps at 125/250VAC, .5 Amps at 125VDC, .25 Amps at 250VDC
- IFSH1/H2: 22 Amps at 125/250VAC
- IFSWS: 10 Amps at 125/250VAC, .5 Amps at 125VDC, .25 Amps at 250VDC
- IFS01/02/W2 Motor Ratings : 120VAC, 1/8 HP, 3.8 AC F.L.A. 22.8 AC L.R.A; 240VAC, 1/4 HP, 2.9 AC F.L.A., 17.4 AC L.R.A
- IFSH1/H2 Motor Ratings : 120VAC, 1/2 HP, 9.8 AC F.L.A. 58.8 AC L.R.A; 240VAC, 1 HP, 8.0 AC F.L.A., 48.0 AC L.R.A
- IFSWS Motor Ratings : 120VAC, 1/3 HP, 7.2 AC F.L.A. 43.2 AC L.R.A; 230VAC, 1/3 HP, 3.6 AC F.L.A., 21.6 AC L.R.A

Pilot Duty Rating
- IFS01/02/H1/H2/W2: 125 VA, 120/240 VAC
- IFSWS: 332 VA, 120/240 VAC

Ambient Temperature Range
- IFS01/02/H1/H2/W2: 32°F - 176°F (0°C - 80°C)
- IFSWS: 32°F - 151°F (0°C - 66°C)

Media Temperature Range
- IFS01/02/H1/H2/W2: 32°F - 250°F (0°C - 121°C)
- IFSWS: -20°F - 250°F (-29°C - 121°C)

Pipe Connections
- 1" NPT Brass on models IFSxxB
- 1" NPT 316 Stainless Steel on models IFSxxS

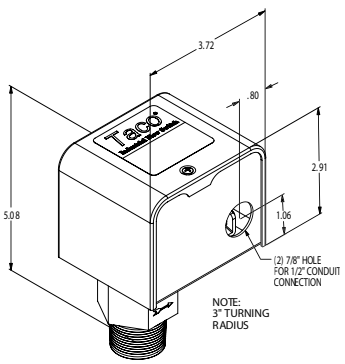
Conduit Entrance
- IFS01/02/H1/H2: Two openings for 1/2" conduit
- IFSWS/W2: One opening for 1/2" conduit

Usage
- For pipe sizes 1" - 8"

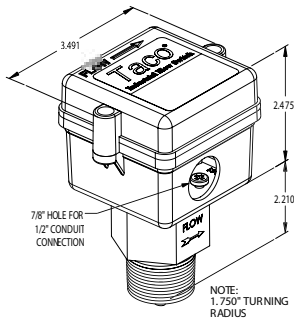
Caution
- This device is not intended for applications in explosive environments or hazardous locations

Dimensions

IFS01/02/H1/H2 Models



IFSWS Models



GPM Required to Actuate Switch

Specifications Typical Flow Rates-GPM Required to Actuate Switch (For vertical pipe installations)											
Pipe Size (inches)		1	1-1/4	1-1/2	2	2-1/2	3	4	5*	6	8*
Minimum Adjustment	Flow Increase	4.5	4.5	6.0	7.5	13.5	18	35	50	70	210
	Flow Decrease	3.5	3.5	5.0	5.5	9.5	13	25	40	60	190
Maximum Adjustment	Flow Increase	9.5	10	13.5	20.0	29	50	70	120	180	410
	Flow Decrease	7.0	8.5	10.5	18.5	26	45	65	105	160	380

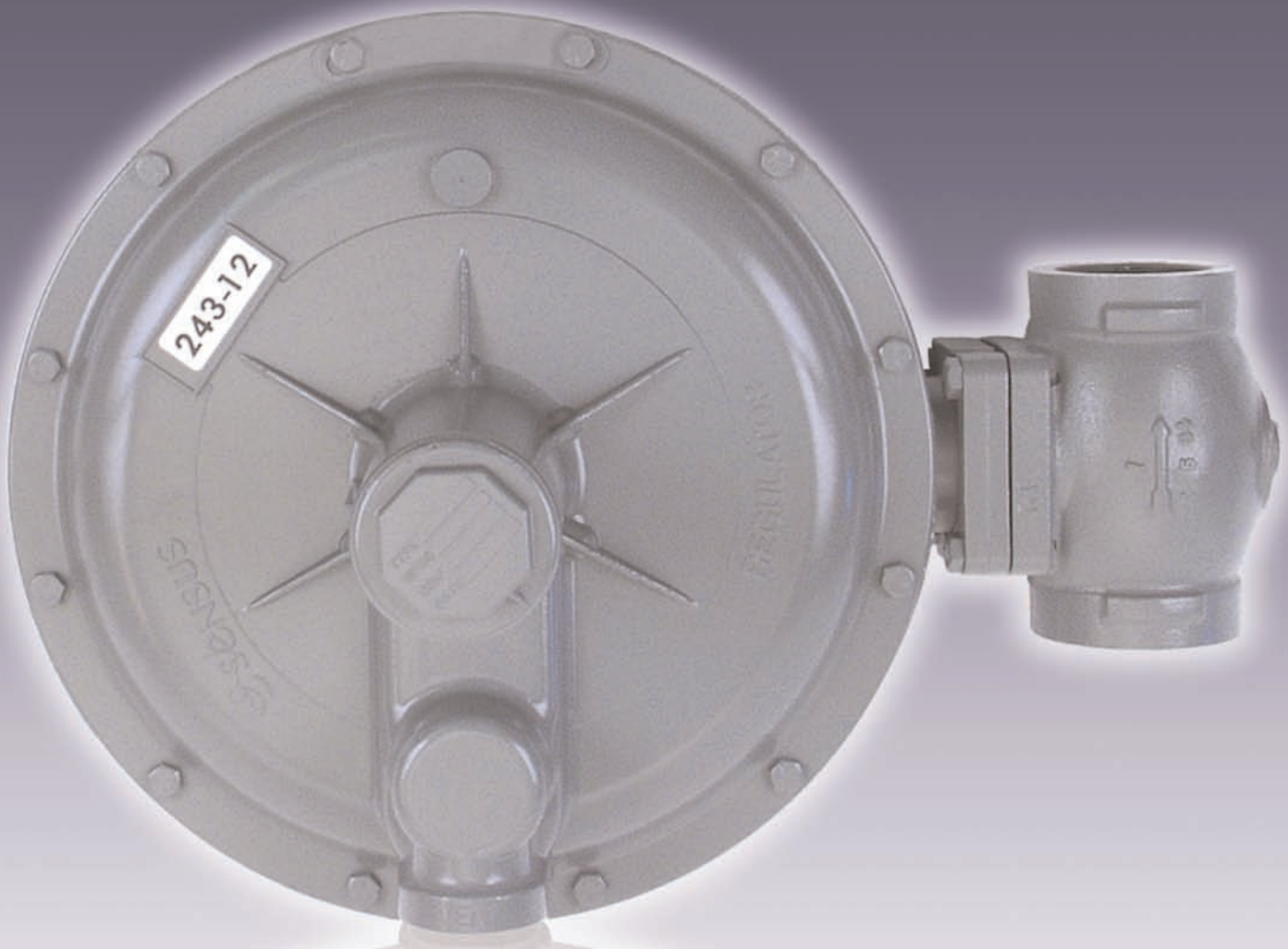
Notes:
1. Typical flow rates for 1" to 1-1/2" pipe sizes are averages which may vary approximately ±1 GPM with the use of a bronze reducing tee.
2. Typical flow rates for 2" to 8" pipe sizes are averages which may vary approximately ±10% GPM with the use of a 1" weldolet.

(*) Flow rates for these sizes are calculated.

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Model 243
Service Regulators

R-1306
Rev. 10



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SENSUS
METERING SYSTEMS

These large capacity service regulators are designed and built for commercial, industrial and gas distribution work. They are right at home in such places as factories and foundries, district regulator stations, commercial laundries and laundromats, motels-hotels and apartments, bakeries, restaurants, schools, churches and hospitals.

The versatile 243 is used for all kinds of gas fueled equipment . . .boilers, burners, furnaces, ovens, heaters, kilns, engines, air conditioners, etc.

Remarkable field versatility results from the union connection between the fully interchangeable bodies and diaphragm-case assemblies. They are easy to install, adjust, inspect and service in all kinds of piping arrangements.

While used primarily for natural gas services, Model 243 regulators perform equally well on LPG vapor, air, dry CO_2, nitrogen and other inert gas applications. Contact your representative for special construction which may be available for certain corrosive gases.

Basic Models

243-12 Model Numbers	Variation	243-8 Model Numbers
243-12-1	Standard* Regulator	**243-8-1**
243-12-2	Regulator with Internal Relief Valve (IRV)	**243-8-2**
243-12-4	Regulator with Low Pressure Cut-Off (LPCO)	**243-8-4**
243-12-6	Regulator with both IRV and LPCO	**243-8-6**
	High Pressure Regulator	**243-8HP**
	Pressure Loaded Regulator	**243-8PL**

For additional information on IRV refer to page 5. For LPCO refer to page 6

*The term standard refers to non-IRV configurations.

Outlet Pressure Ranges and Springs

Spring Color	Outlet Pressure Range		Spring Part Number
	243-12	243-8	
Red-Black	---	3½" to 6½" w.c.	143-82-021-00
Blue-Black	---	5" to 8½" w.c.	143-82-021-01
Green-Black	---	6" to 14" w.c.	143-16-021-02
Red	3½" to 6½" w.c.	---	143-16-021-03
Blue	5" to 8½" w.c.	---	143-16-021-04
Green	6" to 14" w.c.	12" to 28" w.c.	143-16-021-05
Orange-Black	10" to 18" w.c.	---	143-16-021-11
Orange	12" to 28" w.c.	1 to 2 psi	143-16-021-06
Black	1 to 2 psi	2 to 4½ psi	143-16-021-07
Cadmium	1½ to 3 psi	3 to 5 psi◆	143-16-021-08
Cadmium	1½ to 3 psi	3 to 6½ psi*	143-16-021-08
Cadmium	---	6 to 10 psi*	143-16-021-08
White †	---		143-16-021-13

†White is nested inside Cadmium *Model 243-8HP only ◆Model 243-8-2 (IRV) only.

Pipe Sizes

Model	Pipe Size
243-12-1 and 243-12-2	1¼",½" and 2"
243-8-1 and 243-8-2	1¼",1½" and 2"
243-8HP	1¼",1½" and 2"

Temperature Limits

The Model 243 Regulator may be used for flowing gas temperatures from -20ºF to 150ºF.

Buried Service

The Model 243 Regulator is <u>not</u> recommended for buried service.

Maximum Inlet Pressure, psig

Regulator Model and Size	1¼" 30°	*1¼" 10°	1" 30°	*1" 10°	¾" 30°	¾" 10°	½" 10°	⅜" 10°	¼" 10°	.207" 10°
1¼", 243-12	15	25	25	40	-	60	100	125	125	-
1½", 243-12	15	25	25	40	-	60	100	125	125	-
2", 243-12	15	25	25	40	40	60	100	125	125	-
1¼", 243-8	-	-	-	-	-	40	80	100	125	125
1½", 243-8	-	-	25	-	-	40	80	100	125	125
2", 243-8	-	-	25	-	40	40	80	100	125	-
1¼", 243-8HP	-	-	-	-	-	40	80	100	125	-
1½", 243-8HP	-	-	25	-	-	40	80	100	125	-
2", 243-8HP	-	-	25	-	-	40	80	100	125	-

*External Control Regulator Only

Fixed Factor billing

Regulator accuracy is essential to measurement accuracy, and because the 243 is so precise, it is ideal for Pressure-Factor Measurement, Pressure Compensated Metering, Fixed Factor Billing, etc.

The table below gives the pressure accuracies obtainable with 243-12 and 243-8 regulators at the capacities in the tables on pages 8 to 19.

The 243 will hold outlet pressure within the indicated percentage limits from set flow (250 scfh) to the flows given in the capacity tables. Percentages are all based on absolute pressure using 14.4 psia as atmospheric.

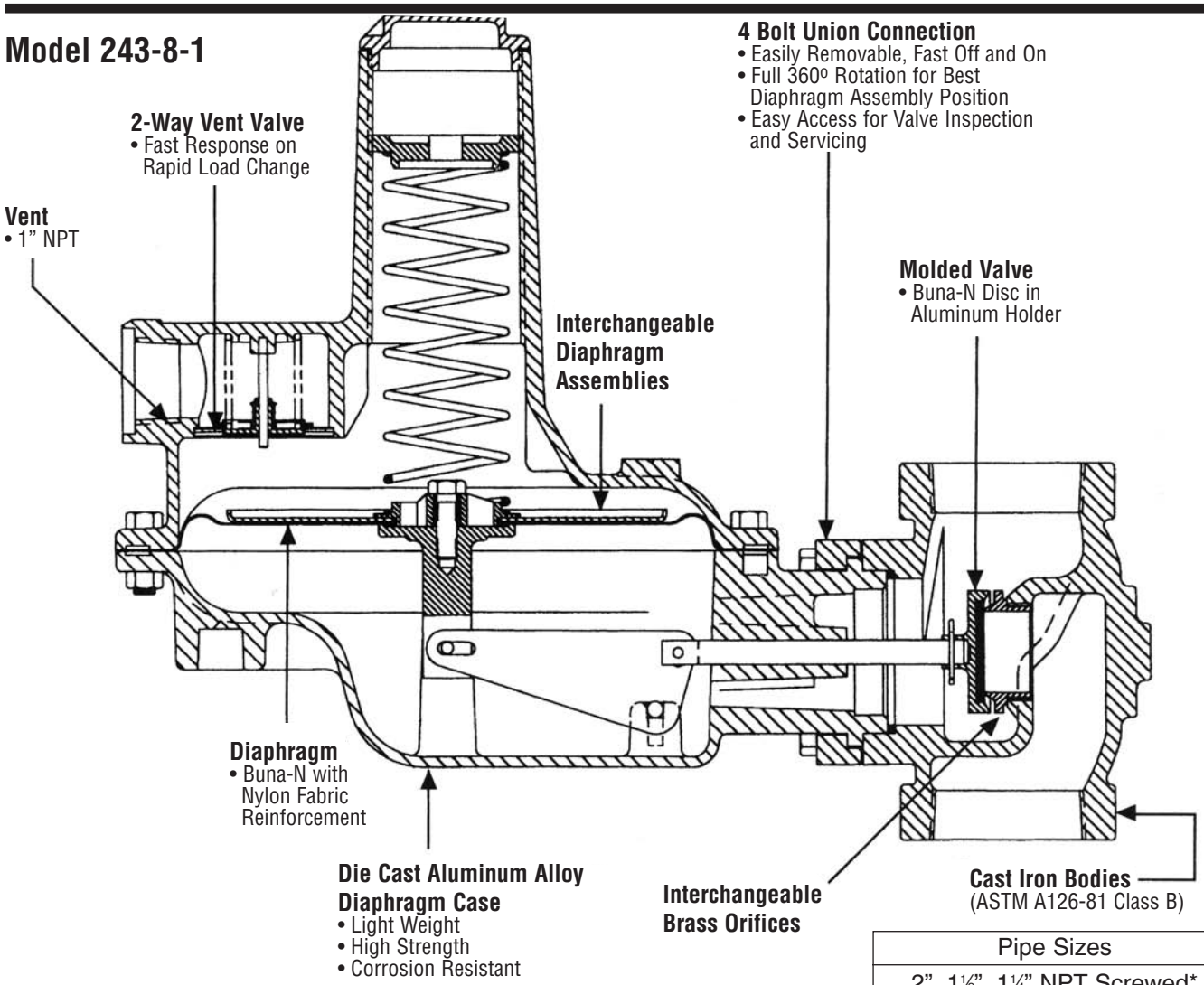
As an example, referring to page 10, a 1½" Model 243-12-2 with 1" orifice, 30°, valve, 15 psig inlet and 11" w.c. setpoint (green spring) at 2" w.c. droop has a gas capacity of 9800 scfh. Per the below table, this regulator at these conditions will hold outlet pressure at 11" w.c. ± ½% (2" w.c.) from 250 to 9800 scfh (based on absolute pressure).

For higher outlet pressures, greater capacities, increased accuracies, and excessive inlet pressure variations, use the 243-RPC pilot operated regulator (see page 7).

Set Point	Droop	Accuracy
6" w.c.	1" w.c.	+ ½% and -½%
7" w.c.	1" w.c.	+ ½% and -½%
11" w.c.	2" w.c.	+ ½% and -½%
18" w.c.	3" w.c.	+ 1% and -1%
1psi	0.3 psi	+ 1% and -2%
1psi	0.2 psi	+ 1% and -1½%
2psi	0.6 psi	+ 1% and -4%
3psi	0.3 psi	+ 1% and -2%
3psi	0.6 psi	+ 1% and -3½%

Construction and Design Features

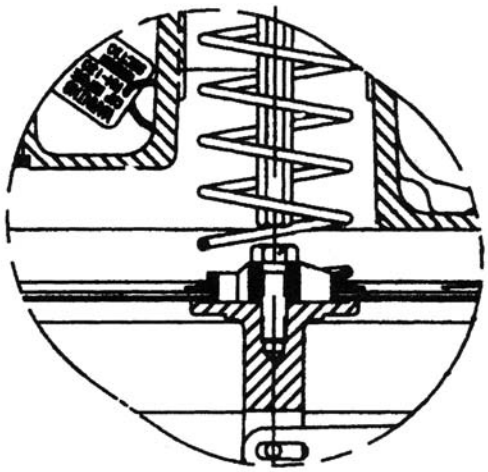
Model 243-8-1



Pipe Sizes
2", 1½", 1¼" NPT Screwed*
2" Flanged ANSI 125

*Can also be furnished with British Standard Threads (BST)

Model 243-12-1 Travel Stop



A travel stop is located in the 243-12-1 and the 243-12-4 to provide overpressurization protection.

Caution: Turn gas on slowly. If an outlet stop valve is used, it should be opened first. Do not overload the diaphragm with a sudden surge of inlet pressure. Monitor the outlet pressure during start-up to prevent an outlet pressure overload. **Refer to RM-1306 for more detailed start-up procedures.**

Operation of the Internal Relief Valve

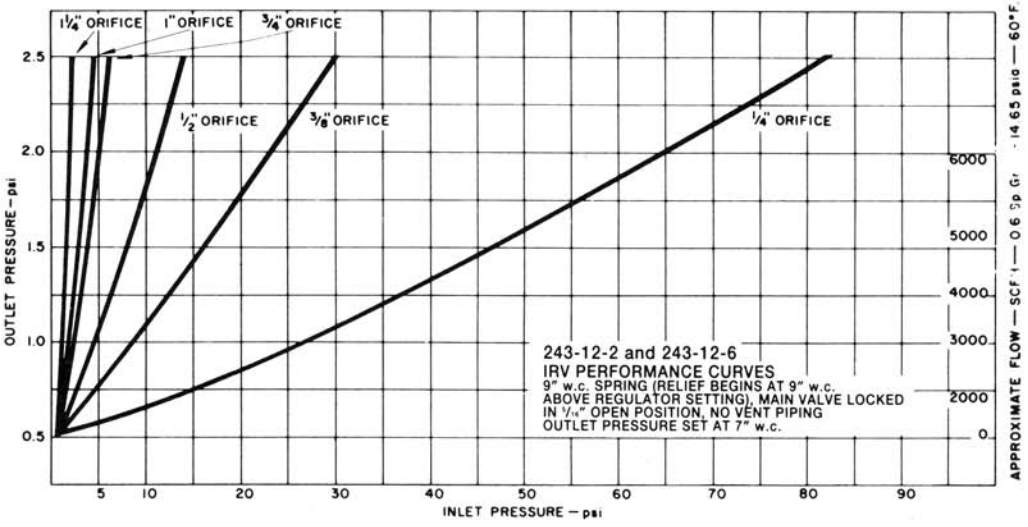
The internal relief valve is optional (refer to Basic Models Table, page 2).

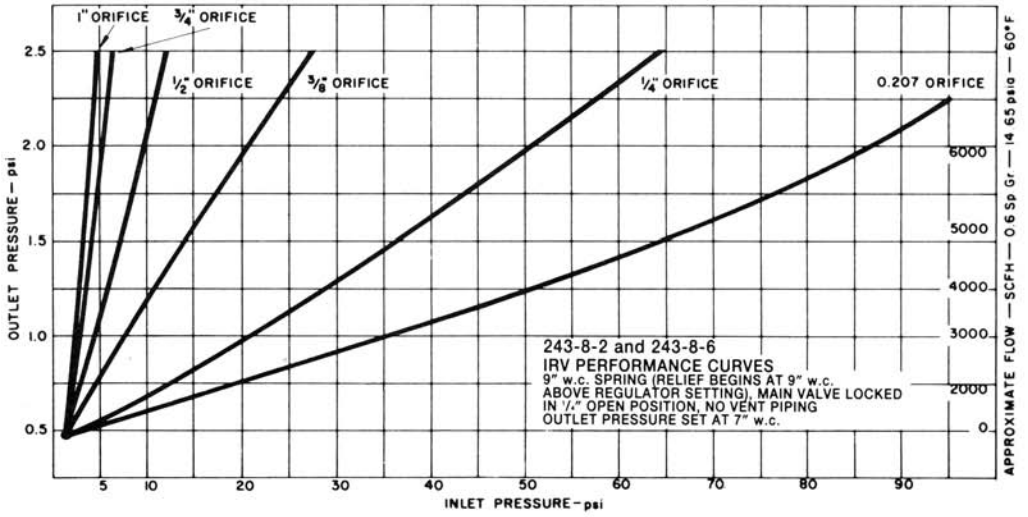
Often called an “IRV”, it is built into the center of the diaphragm assembly as shown in the adjoining sketch and works in essentially the same way as standard relief valves.

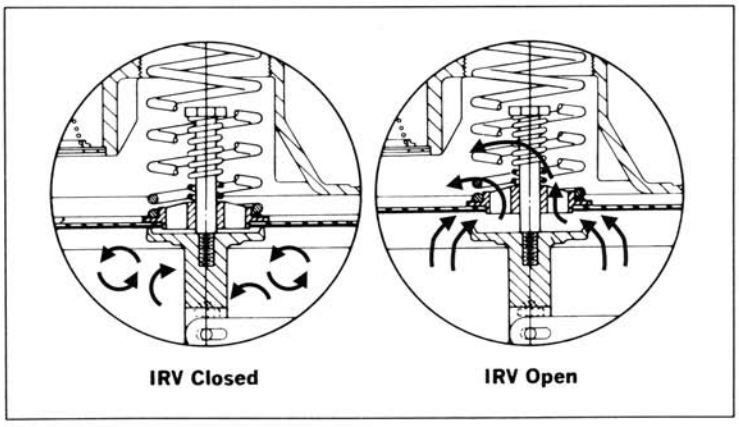
It opens when outlet pressure exceeds the setpoint by approximately 9” w.c. thereby allowing excess gas to escape through the vent to atmosphere. An optional spring is available on the 243-8-2 for relieving at approximately 20” w.c. above set point. A cross-section of a complete 243 with IRV is shown on page 6.

Performance is given on the curves at the right. The IRV will prevent the outlet pressure from exceeding the value shown by the curves upon regulator failure at the conditions specified.

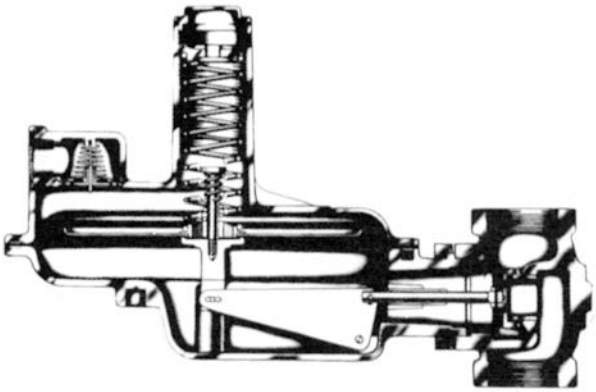
The IRV is a proven design of quality construction. Within its capacity limits it adds a measure of safety protection to the outstanding and dependable performance of the 243.







Caution: Note that an IRV, like any other relief valve, must be sized carefully. If the curves indicate that outlet pressure can exceed the maximum safe limit it is essential to provide an additional relief valve carefully sized to handle the difference.



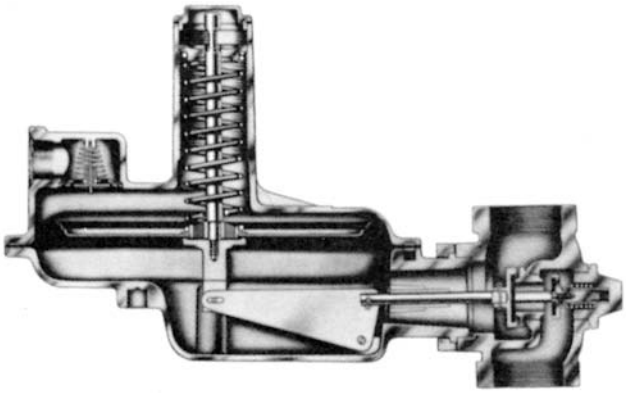
Internal Relief Valve

The 243 is available with an internal relief valve (IRV). It's a built-in safety device for providing a limited level of overpressurization protection.

Like any relief valve, an IRV must be carefully sized.

More complete description plus performance data is given on page 5. For Basic Models refer to the table on page 2.

Internal Relief valves are not available in the high pressure Model 243-8HP

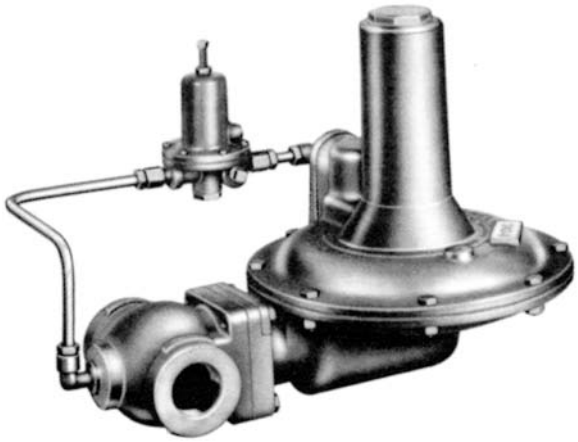


Low Pressure Cut-Off

The low pressure cut-off (LPCO) is used for automatic gas shut-off when inlet pressure is too low for the required gas flow. Once closed, it must be manually reopened and reset.

Basic Models are given in the table at the bottom on page 2. Note: There is an LPCO version that also includes the internal relief valve.

Outlet pressures range from 4" w.c. to 30" w.c. and available orifices are ½", ¾" and 1". For more complete information and capacities please refer to data bulletin RDS 1306-1.



Pressure Loading

While pressure loading (self-operation) falls short of the remarkable accuracy inherent in the pilot operated regulator (relay-operation) it still does a good job. And the pressure loaded 243-8PL has a performance background of many years of dependable, accurate pressure control.

Its outlet range is 3 to 35 psig. Pipe sizes are 1¼", 1½" and 2". It is available arranged either bleed to atmosphere or bleed to line. Capacities range to over 50,000 scfh.

2” Models 243-12-1 and 243-12-2 in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psia - 60°F)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle						
		1¼”	1”	¾”	¾”	½”	⅜”	¼”
		30°	30°	30°	10°	10°	10°	10°
Set Point 6” w.c. 1” w.c. Droop Red Spring 3½” to 6½” w.c. **143-16-021-03**	½	2400	2200	1500	1250	800	500	
	1	4000	3600	2700	2100	1300	850	400
	2	6400	6000	4500	3800	2200	1400	600
	5	11000	11000	8200	6500	3800	2300	1000
	10	13000	15000	12500	9000	5700	3300	1500
	15	14000	15000	15000	10300	7100	4000	1750
	25		15000	20000	11500	9500	5300	2400
	40			20000	13000	13000	7500	3300
	60				15000	13000	10000	4500
	80					13000	12000	5700
	100					13000	12000	7000
	125						12000	8000
Set Point 7” w.c. 1” w.c. Droop Blue Spring 5” to 8½” w.c. **143-16-021-04**	½	2000	1800	1400	1100	700	500	
	1	3400	3000	2200	2000	1200	750	400
	2	6000	5600	4000	3200	2000	1250	600
	5	11000	11000	8000	6000	3700	2100	1000
	10	12500	14000	12000	8400	5600	3300	1400
	15	14000	15000	15000	10000	7100	4000	1750
	25		15000	20000	11500	9500	5300	2400
	40			20000	13500	12000	7500	3200
	60				15000	13000	10000	4400
	80					13000	12000	5600
	100					13000	12000	7000
	125						12000	8000
Set Point 11” w.c. 2” w.c. Droop Green Spring 6” to 14” w.c. **143-16-021-05**	1	3400	3000	2100	1950	1150	750	400
	2	5600	4700	3700	3400	2000	1200	600
	5	10500	9000	7800	6900	3500	2100	1000
	10	13000	13000	12000	9200	5500	3200	1600
	15	14000	14000	15000	10500	7000	4000	1800
	25		15000	20000	12000	9500	5300	2400
	40			20000	14500	12500	7500	3200
	60				15500	13000	10000	4400
	80					14000	12000	5600
	100					14000	12000	7000
	125						12000	8000

Last capacity figure in each group indicates maximum allowable inlet pressure (except for emergency conditions). Heavy stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the *optimum performance* range.

Note: The performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

2" Models 243-12-1 and 243-12-2 in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psia - 60°F) (continued)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle						
		1¼"	1"	¾"	¾"	½"	⅜"	¼"
		30°	30°	30°	10°	10°	10°	10°
Set Point 18" w.c. 3" w.c. Droop Orange Spring 12" to 28" w.c. **143-16-021-06**	1	2500	2000	1400	1200	950	650	
	2	4200	3400	2700	2400	1500	1000	500
	5	8000	7100	5600	4700	2800	1800	950
	10	12000	12000	10500	7500	4800	2900	1400
	15	13500	14500	15000	9500	6500	3900	1700
	25		16500	20000	11500	9200	5300	2300
	40			20000	13500	12000	7500	3200
	60				15000	13000	10000	4400
	80					14000	12000	5600
	100					14000	12000	7000
	125						12000	8000
Set Point 1 psi 0.31 psi Droop Orange Spring 12" to 28" w.c. **143-16-021-06**	2	6500	5000	4000	4000	2000	1300	500
	5	8000	7500	6000	6000	4000	2200	1000
	10	9000	8500	8000	8000	5500	3000	1400
	15	12000	11000	10000	10000	7000	4000	1800
	25		13500	12500	11500	9500	5500	2400
	40			14000	13000	11000	7400	3300
	60				15000	13500	10000	4500
	80					15000	13000	6000
	100					16000	14000	7000
	125						14000	8500
Set Point 1 psi 0.2 psi Droop Black Spring 1 to 2 psi **143-16-021-07**	2	3350	3000	2000	1900	1200	1000	500
	5	6600	5900	4200	3900	2400	1600	1000
	10	11000	10000	7600	6500	4100	2800	1450
	15	13000	12000	9300	8300	5600	3800	1700
	25		15000	16500	11000	8500	5300	2400
	40			20000	14000	12500	7500	3400
	60				15500	13000	10000	4400
	80					14000	12000	5600
	100					14000	12000	7000
	125						12000	8000
Set Point 2 psi 0.6 psi Droop Cadmium Spring 1½ to 3 psi **143-16-021-08**	5	8200	7400	5200	4800	2900	1900	900
	10	12500	11300	8700	7800	4800	3000	1400
	15	15500	14500	11500	10000	6500	3800	1700
	25		18000	16500	13500	9000	5300	2400
	40			20000	16500	12500	7600	3400
	60				16500	15500	10000	4600
	80					16000	12000	5600
	100					16000	12000	7000
	125						12000	8000
Set Point 3 psi 0.35 psi Droop Cadmium Spring 1½ to 3 psi **143-16-021-08**	5	3500	3000	2000	1800	1400	1100	750
	10	8000	7000	5500	5000	3000	2000	1100
	15	10500	10000	8000	7000	4000	3000	1600
	25		11500	9800	9000	5600	4500	2000
	40			21500	20000	10500	7500	3500
	60				21000	14500	10500	4500
	80					18000	13500	6000
	100					20500	16400	7500
	125						19000	9000

Last capacity figure in each group indicates maximum allowable inlet pressure (except for emergency conditions). Heavy stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the *optimum performance* range.

Note: The performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

1½" Models 243-12-1 and 243-12-2 in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psia - 60ºF)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle					
		1¼"	1"	¾"	½"	⅜"	¼"
		30°	30°	10°	10°	10°	10°
Set Point 6" w.c. 1" w.c. Droop Red Spring 3½" to 6½" w.c. **143-16-021-03**	½	2000	1600	1300	700	500	
	1	2800	2500	2100	1200	800	400
	2	4000	3500	3200	2100	1300	600
	5	6100	5600	4800	3700	2200	1000
	10	8200	7700	6500	5600	3100	1400
	15	9300	9300	7400	6800	3900	1750
	25		11000	9100	8100	5100	2400
	40			10500	9800	7100	3200
	60			12000	11000	9300	4400
	80				12000	10500	5600
	100				12000	11000	7000
	125					11000	8000
Set Point 7" w.c. 1" w.c. Droop Blue Spring 5" to 8½" w.c. **143-16-021-04**	½	1800	1550	1100	600	500	
	1	2600	2300	1850	1100	750	400
	2	3800	3300	2600	1900	1250	600
	5	5700	5100	4200	3300	2100	1000
	10	8200	7600	6000	5400	3100	1400
	15	9300	9100	7000	6600	3900	1750
	25		11000	8400	7800	5100	2400
	40			10000	9500	7100	3200
	60			10500	10500	9300	4400
	80				11500	10500	5600
	100				12000	11000	7000
	125					11000	8000
Set Point 11" w.c. 2" w.c. Droop Green Spring 6" to 14" w.c. **143-16-021-05**	1	2700	2300	1900	1100	750	400
	2	4000	3500	2700	1900	1200	600
	5	6000	5600	4500	3500	2100	1000
	10	8800	8200	6500	5500	2900	1400
	15	10000	9800	7700	6800	3800	1750
	25		11500	9700	8100	5100	2400
	40			11500	9700	7100	3200
	60			12500	11500	9300	4400
	80				12000	10500	5600
	100				12500	11000	7000
	125					11000	8000
Set Point 18" w.c. 3" w.c. Droop Orange Spring 12" to 28" w.c. **143-16-021-06**	1	1800	1300	1100	800	500	
	2	3000	2800	2200	1500	1000	500
	5	5600	5200	4200	2600	1800	950
	10	8600	7700	6000	4300	2900	1400
	15	10000	9300	7400	5800	3800	1750
	25		11500	9100	7800	5100	2400
	40			11000	9500	7100	3200
	60			12500	11000	9300	4400
	80				12500	10500	5600
	100				13000	11000	7000
	125					11000	8000

Last capacity figure in each group indicates maximum allowable inlet pressure (except for emergency conditions). Heavy stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the *optimum performance* range.

Note: The performance data is based on normal testing at 70ºF flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

1½" Models 243-12-1 and 243-12-2 in SCFH of Natural Gas (0.6 Specific Gravity - 14.65 psia - 60ºF) (cont'd.)

Outlet Pressure and Spring	Inlet Pressure psi	Orifice Size and Valve Angle					
		1¼"	1"	¾"	½"	⅜"	¼"
		30°	30°	10°	10°	10°	10°
Set Point 1 psi 0.31 psi Droop Orange Spring 12" to 28" w.c. **143-16-021-06**	2	6500	5000	4000	2000	1300	500
	5	8000	7500	6000	4000	2200	1000
	10	9000	8500	8000	5500	3000	1400
	15	12000	11500	10000	7000	4000	1800
	25		13500	11500	9500	5500	2400
	40			13000	11000	7400	3300
	60			15000	13500	10000	4500
	80				15000	13000	6000
	100				16000	14000	7000
	125					14000	8500
Set Point 1 psi 0.2 psi Droop Black Spring 1 to 2 psi **143-16-021-07**	2	2800	2450	1500	1200	850	500
	5	5500	5100	3700	2400	1600	950
	10	8000	7500	5700	4000	2700	1400
	15	10000	9100	7100	5300	3700	1750
	25		11000	9300	7300	5100	2400
	40			11000	9300	7100	3200
	60			12500	11000	9300	4600
	80				12500	10500	5600
	100				13000	11000	7000
	125					11000	8000
Set Point 3 psi 0.35 psi Droop Cadmium Spring 1½ to 3 psi **143-16-021-08**	5	3500	3000	2000	1400	1100	500
	10	7000	6000	5000	2500	2000	1000
	15	9000	8000	7000	3500	2500	1500
	25		10000	8000	4800	4500	1900
	40			11500	6500	6000	3500
	60			14000	8000	7500	4500
	80				9000	8000	6000
	100				12000	11000	7000
	125					12000	8500
Set Point 2 psi 0.6 psi Droop Cadmium Spring 1½ to 3 psi **143-16-021-08**	5	6000	5300	4100	2700	1700	900
	10	10000	9300	7100	4700	2900	1400
	15	13000	12000	8800	6200	3800	1700
	25		14500	11000	8600	5200	2400
	40			13500	11000	7100	3200
	60			15000	13500	10000	4600
	80				15000	12000	5600
	100				16000	12000	7000
	125					12000	8000

Last capacity figure in each group indicates maximum allowable inlet pressure (except for emergency conditions). Heavy stepped line indicates the recommended maximum capacity and inlet pressure for each orifice for operation within the *optimum performance* range.

Note: The performance data is based on normal testing at 70°F flowing temperature.
Changes in performance can occur at extreme low flowing temperatures.

Maximum Emergency Pressures

NOTE: The use of an internal or external relief valve is recommended for installations subjected to no flow for extended periods of time, such as pilotless ignition systems. A travel stop stem is located in the 243-12-1 and 243-12-4 to provide over-pressurization protection to internal components during overpressurization.

The maximum pressure the regulator inlet may be subjected to under abnormal conditions without causing damage to the regulator is the maximum allowable inlet pressure (from the capacity tables, pages 8 through 19) plus 50 psi.

The maximum pressure the diaphragm may be subjected to without causing damage to the internal parts of the regulator is:

243-12-1..... set point + 3 psi
243-12-2, 243-8-1 and
243-8-2..... set point + 5 psi
243-8HP..... set point + 5 psi

Set point is defined as the outlet pressure a regulator is adjusted to deliver.

If any of the pressure limits are exceeded, the regulator must be taken out of service and inspected. All damaged or otherwise unsatisfactory parts must be repaired or replaced.

The maximum pressure that can be safely contained by the diaphragm case is:
243-12-1 and
243-12-2..... 15 psi
243-8-1 and 243-8-2..... 15 psi
243-8HP..... 25 psi

Safely contained means no leakage as well as no bursting

Before using any of the above data, make sure this entire section is clearly understood.

Overpressurization Protection

Protect the downstream piping system and the regulator's low pressure chambers against overpressurization due to possible regulator malfunction or failure to achieve positive lockup. The allowable outlet pressure is the lowest of the maximum pressures permitted by federal codes, state codes, Bulletin RDS-1498 or other applicable standards. The method of protection can be a relief valve, monitor regulator, shut-off device or similar mechanism.

Monitoring

A monitor set consists of two regulators in series as shown. The monitor is the standby. It takes control if a failure in the operating regulator causes outlet pressure to exceed normal.

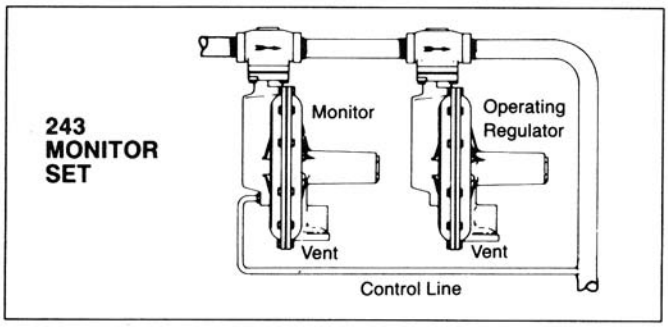
Either regulator may be used as the monitor. In both cases the upstream regulator must have a blocked throat and external control line as shown for the 243 on page 7. Also, the control line for the upstream regulator connects into the outlet piping all the way downstream. . . that is, downstream of the downstream regulator.

The illustration shows a typical 243 monitor set. While the downstream regulator is shown as operating and the upstream regulator is shown as the monitor, the two can be reversed. There are reasons for doing it one way or the other depending on user's practice. Stop and bypass valves, not shown, likewise would depend on user's preference and practice.

Either way, the operating regulator is adjusted for the normal outlet pressure. The monitor is adjusted somewhat higher so it is normally full open. If a failure in the operating regulator causes excessive increase in outlet pressure, the monitor will go into operation to hold outlet pressure at its set point.

Monitoring is an effective and dependable method of providing overpressure protection. A significant advantage is that it provides the protection without wasting gas to atmosphere. Refer to Bulletin RDS-1306-2 (Package monitor sets 243-DOT) for more information.

When a 243 is used to monitor another 243 with an identical orifice size, the total maximum capacity through both can be figured at 70% of the rated capacity for one regulator. This applies with the monitor located upstream or downstream.



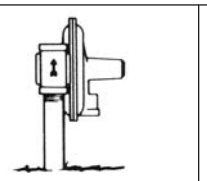
Periodic Inspection: Regulators are pressure control devices with numerous moving parts subject to wear that is dependent upon particular operating conditions. To assure continuous satisfactory operation, a periodic inspection schedule must be adhered to with the frequency of inspection determined by the severity of service and applicable laws and regulations.
See Bulletin RM-1306 field service instructions.

Mounting Positions

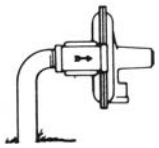
The 243 Service Regulator can be provided in any of the positions shown. Specify by position number when ordering.

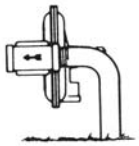
CAUTION

The diaphragm case vent must be positioned to protect against flooding, drain water, ice formation, traffic, tampering, etc. The vent must be protected against nest building, animals, bees, insects, etc. to prevent vent blockage and minimize the chances of foreign materials from collecting in the vent side.

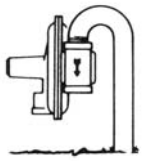

POSITION 101


POSITION 102


POSITION 103


POSITION 104


POSITION 105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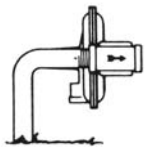
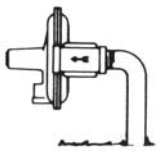
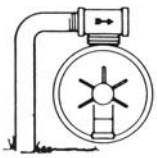

POSITION 107


POSITION 108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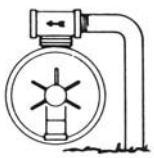
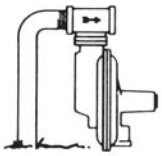
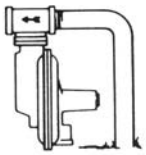
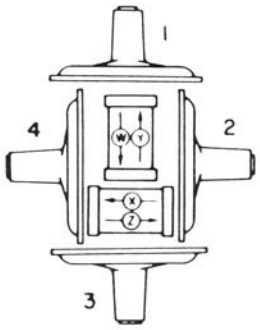
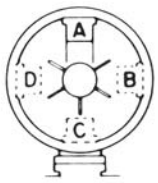

POSITION 110


POSITION 111


POSITION 112

NOTE: If desired position is not shown use diagrams at right as guides to specify vent, diaphragm case, and body arrangement. Example: Position 105 would be D-4-Y.



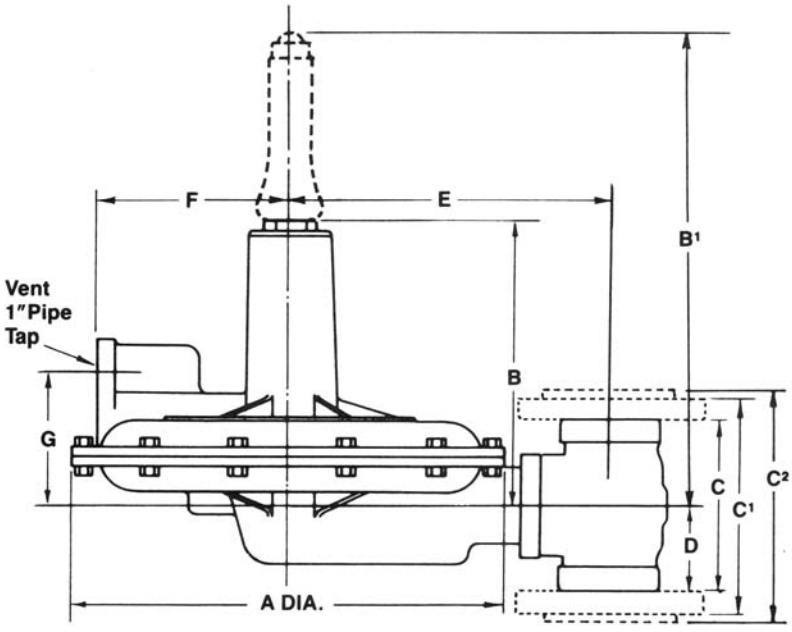


CAUTION: It is the user's responsibility to assure that all service regulator vents and/or vent lines exhaust to a non-hazardous location away from **any potential** sources of ignition. **Refer to Bulletin RM-1306 for more detailed information.**

Dimensions

Model	243-12	243-8	243-8HP
A	14"	10 3/16"	10 3/16"
**B	9 3/4"	9 3/4"	-
B1	-	-	12 3/4"
C	5 3/4"	5 3/4"	5 3/4"
***C1	7 1/2"	7 1/2"	7 1/2"
****C2	7 7/8"	7 7/8"	7 7/8"
D	2 7/8"	2 7/8"	2 7/8"
E	10 13/32"	8 19/32"	8 19/32"
F	6 1/32"	4 27/32"	4 27/32"
G	4 11/32"	4 5/32"	4 5/32"
Shipping* Weight	27 lbs.	25 lbs.	29 lbs.

* Add 9 lbs. for flanges on 2" body
** 10" for 243-12-1 and 243-12-4, which include travel stop
*** ANSI Flanges
**** ND-10 Flanges



Materials of Construction

Body . . . . . Cast Iron
Diaphragm Case . . . . . Die Cast Aluminum Alloy
Diaphragm . . . . . Buna-N with Nylon Fabric Insert
Diaphragm Pans. . . . . Zinc Plated Steel
Diaphragm Coupling . . . . . Zinc Die Casting
Orifice . . . . . Brass
Valve . . . . . Buna-N Soft Seat in Aluminum Holder
Stem . . . . . Brass
Lever . . . . . Zinc Plated Steel
O-Rings and Tetra Seals . . . . . Buna-N
Adjustment Spring Button & Seal Cap, Std. . . . . Zinc Die Casting
Adjustment Screw, 243-8HP . . . . . Zinc Plated Steel
Cover, 243-8HP . . . . . Cast Iron
Seal Cap, 243-8HP . . . . . Cast Iron

Full Open Capacity

Use the following formula for the full open capacity of 243 regulators.

1. $Q = K\sqrt{Po(P_1-P_0)}$ . . . . . (for $\frac{P_1}{P_0}$ less than 1.894

2. $Q = \frac{KP_1}{2}$ . . . . . (for $\frac{P_1}{P_0}$ greater than 1.894

Q = maximum capacity of the regulator (in SCFH of 0.6 specific gravity natural gas).
K = the **"K" factor**, the regulator constant (from the table)
P_1 = **absolute** inlet pressure (psia).
P_0 = **absolute** outlet pressure (psia).

Orifice Size-in.	.207"	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"
K	90	132	292	520	1100	1800	2480

When sizing relief valves for use with 243 regulators, use *full open capacity*. Do not use capacity from capacity tables pages 8 through 19.

Other Cases

243 Regulators are mainly used on natural gas. However, they perform equally as well on LP gas, nitrogen, dry CO_2 , air and others. For capacities, multiply the table values on pages 8 thru 19 by the following correction factors:

OTHER GASES	CORRECTION FACTOR
Air (Specific Gravity 1.0)	0.77
Propane (Specific Gravity 1.53)	0.63
1350 BTU Propane-Air Mix (1.20)	0.71
Nitrogen (Specific Gravity 0.97)	0.79
Dry Carbon Dioxide (Specific Gravity 1.52)	0.63
For other noncorrosive gases: CORRECTION FACTOR =	$\sqrt{\frac{0.6}{\text{Specific Gravity of the Gas}}}$

While used primarily on natural gas services, Model 243 regulators perform equally as well on LPG vapor, air, CO_2 , nitrogen and other inert gas applications. Please contact your Sensus Metering Systems representative for special construction which may be available for certain corrosive gases.

How to Order

Specify:
1. Pipe size and model number (page 2).
2. Screwed or flanged connections
3. Mounting position
4. Orifice size and valve angle.
5. Inlet pressure (also maximum and minimum if available)
6. Outlet pressure setting
7. Capacity required (scfh)
8. Type of gas (natural gas, propane, etc.)
9. Spring part number

Other Sensus Metering Systems Gas Pressure Regulators

Sensus Metering Systems produces a broad product line of Gas Pressure Regulators which are widely used throughout the natural gas industry. These regulators are also suitable for non-corrosive industrial gas applications such as propane, butane, air, nitrogen, dry CO_2 etc. For additional information on a particular model, please request the indicated bulletin from the local Sensus Metering Systems sales office, or visit our website at www.sensus.com

Multi-Purpose Service Regulators

Model 043-C
Bulletin: TD-1309
½", ¾", 1", 1¼" pipe sizes
Inlet pressures . . . . . .to 125 psi
Outlet pressures . . . . . 5" w.c. to 5 psi
Capacity to 3500 CFH
Available with 90º angle or straight-through body.
Standard with internal relief valve.

Model 143-80
Bulletin: R-1301
¾", 1", 1¼" pipe size
Inlet pressures . . . . . .to 125 psi
Outlet pressures . . . . . 3½" w.c. to 6 psi
Capacity to 2000 CFH
Optional internal relief valve and low pressure cut off.

Industrial Field Regulators

For intermediate to high pressure applications. Ideal on pipeline taps servicing plants and buildings. Appropriate for double stage reduction ahead of service regulators, and for high pressure burners and compressed air systems.

046
Bulletin: R-1312
¾", 1", 1¼" pipe sizes
Inlet pressures . . . . . .to 1000 psi
Outlet pressures . . . . . .3 to 200 psi
Capacity to 40,000 SCFH
Optional monitor and internal relief valve.

141A
Bulletin: R-1311
2" pipe size
Inlet pressures . . . . . .to 1500 psi
Outlet pressures . . . . . .5 to 400 psi
Capacity to 55,000 SCFH

Pilot Loaded Regulators

For intermediate and high pressure applications requiring precise pressure reduction with minimal droop. Ideal for standard and high capacity flows on burners, driers, dehydrators and compressor line. Appropriate for fixed factor billing.

243-RPC
Bulletin: R-1343
1¼", 1½" and 2" pipe size
Inlet pressures.....to 150 psi
Outlet pressures.....3½" w.c. to 35 psi
Capacity to 76,000 SCFH

1100
Bulletin: R-1341
Pipe Size: 2"
(screwed or flanged)
Inlet pressures.....to 400 psi
Outlet pressures.....3" w.c. to 100 psi
Capacity to 414,000 SCFH

1200
Bulletin: R-1342
Pipe Size: 2" (flanged)
Inlet pressures....to 1200 psi
Outlet pressures....20 to 600 psi
Capacity to 789,000 SCFH

Sensus Metering Systems also produces Industrial and Combustion Regulators; High Pressure, High Capacity Regulators: and Safety Relief Valves. Detailed information available upon request.

Intermediate and Large Capacity Diaphragm Type Gas Meters

M-1021
Rev. 9

SENSUS
METERING SYSTEMS

10,000 Meter

The rugged 10,000 meter, with "O" ring seal, is the largest among the Sensus line of single joint aluminum gas meters.

This lightweight, large capacity meter, made of aluminum alloy, has a maximum working pressure of 100 psig, yet weighs only 428 pounds—about one-third the weight of comparable cast iron meters.

Its rigid construction and light weight make it the perfect meter for commercial and industrial operations requiring large volume loads at high pressure.

10,000 Meter

3000 Meter

The sturdy design, internally and externally, of the Sensus 3000 meter makes it ideal for commercial and industrial operations where large volume loads at high pressure (up to 100 psig) are necessary.

Single joint construction and "O" ring type gasket insure a positive seal against leakage.

Aluminum alloy construction of the cover, body, and valve plate accounts for its lightweight durability and economy in shipping costs.

Compact, 28 ¼" x 16" wide, and weighing approximately 100 pounds, the 3000 meter eliminates many of the service and installation problems encountered with the heavier cast iron meters.

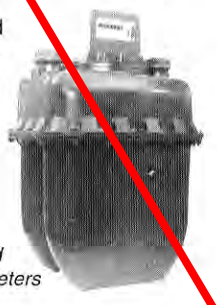
3000 Meter

750 and 1600 Meters

The 750 and 1600 meters, like all Sensus single joint lightweight meters, are extremely versatile because repair and space problems are reduced to a minimum. Due to advanced design and engineering features, both of these meters have all of the inherent simplicity and accuracy of the reputable Sensus single joint meters.

The 1600 is constructed of sturdy aluminum alloy castings. It has an "O" ring seal and is especially suited to small industrial and commercial operations where large capacities at high pressure are needed.

Guide wires are utilized in the 750 and 1600 to provide the smoothest possible diaphragm motion and to assure proof stability and long meter life.



750 and 1600 Meters

5000 Meter

The great weight reduction over previous cast iron models, made possible by the use of aluminum alloy for the cover, body, and valve plate, results in substantial savings in shipping costs as well as greater ease in handling.

To prevent leakage between the body and cover, the 5000 meter has an "O" ring seal.

Its compact design and light weight make this meter an ideal replacement for large tin meters still in service, and for downtown basement installations where a large capacity, yet easy-to-handle, meter is required.

5000 Meter

1000 Meter

The 1000 meter, newest member of the single joint line of meters, was engineered for intermediate size loads on commercial and industrial services. It was designed and built specifically for 1000 cfh loads—not an alteration or redesign of an existing meter.

The low speed (1.6 REV/CF) of the 1000 meter ensures proof stability and long service life with minimum maintenance.

This meter, as well as all others described on this page, incorporates such recognized Equimeter features as single joint and low friction valves.

The 1000 meter, as well as all the other members of the single joint family, makes use of modern engineering plastic (UV stabilized clear polycarbonate) for its index box as standard equipment.

1000 Meter

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

SENSUS
METERING SYSTEMS

Intermediate and Large Capacity Diaphragm Gas Meters

Sensus Gas Meter Capacity Tables

Some care must be taken in establishing diaphragm meter capacities, and the tables on this and the following page are designed to simplify meter sizing. The first table lists the natural gas capacities of Sensus diaphragm meters at base pressure conditions and at meter differentials of both ½" w.c. and 2" w.c., which is the most common method of presenting such information. The other tables give meter capacities at elevated operating pressures and for several commonly metered gases in addition to natural gas. Diaphragm capacities under pressure must be suppressed from the normal Boyle's law multipliers somewhat to protect the meter diaphragms from damage. These tables do just that and indicate the maximum allowable capacity for each meter under various pressure and gas conditions for safe, reliable operation. Also listed are capacities limiting the meter differential to 2" w.c. because a number of utilities place that restriction on their use to extend ultimate meter life. For meter capacities at other pressures and for gases other than those listed, please contact your local Sensus representative.

NOTE: Recommended meter operating temperature range is -30°F to +150°F. The typical temperature compensation performance is within an accuracy band of ±2% over a flowing gas temperature range of -20°F to +120°F.

NATURAL GAS CAPACITIES

Meter Model	Capacity Rating @ ½" w.c. Differential	Capacity Rating @ 2" w.c. Differential
750	750 CFH	1600 CFH
1600	800	1600
1000	1000	2200
3000	1450	3000
5000	2500	5000
10000	5000	10000

Note: Capacities based on 0.6 sp. gr. gas metered at 4 oz. base pressure.

The table below can be used to estimate capacities at other elevated pressures. Multiply the maximum allowable factor, or the 2" w.c. factor corresponding to the operating pressure, times the 2" w.c. rating at 0.25 psig.

Example: A 3000 meter operating at 100 psig has a maximum allowance capacity of:
(4.50) x (3000) = 13,500 SCFH.
The same meter at 50 psig has a 2" w.c. capacity of:
(2.10) x (3000) = 6,300 SCFH.
Please see the Sensus Gas Meter Capacity Tables section for additional details.

CAPACITIES AT OTHER ELEVATED PRESSURES

Gauge Pressure (psig)	Maximum Allowance Factor	2" w.c. Factor
0	1.00	1.00
5	1.29	1.15
10	1.55	1.30
15	1.78	1.45
20	2.00	1.55
25	2.23	1.65
30	2.40	1.75
40	2.78	1.95
50	3.10	2.10
60	3.50	2.30
70	3.73	2.40
75	3.80	2.50
80	4.00	2.60
90	4.30	2.70
100	4.50	2.80

NATURAL GAS CAPACITIES SCFH OF 0.6 SP. GR. GAS AT ELEVATED PRESSURES

Gauge Pressure (psig)	Diff.	750	1600	1000	3000	5000	10,000
0.25	2" w.c.	1,600	1,600	2,200	3,000	5,000	10,000
	Max. Allow	1,600	1,600	2,200	3,000	5,000	10,000
5	2" w.c.	1,840	1,840	2,530	3,450	5,750	11,500
	Max. Allow	2,070	2,070	2,840	3,880	6,450	12,900
10	2" w.c.	2,080	2,080	2,860	3,900	6,500	13,000
	Max. Allow	2,480	2,480	3,420	4,660	7,760	15,550
15	2" w.c.	2,320	2,320	3,190	4,350	7,250	14,500
	Max. Allow	2,840	2,840	3,960	5,400	9,000	18,000
20	2" w.c.	2,480	2,480	3,410	4,650	7,750	15,500
	Max. Allow	3,230	3,230	4,440	5,820	10,100	20,200
25	2" w.c.		2,640	3,630	4,950	8,250	16,500
	Max. Allow		3,570	4,900	6,700	11,100	22,300
40	2" w.c.		3,120		5,850	9,750	19,500
	Max. Allow		4,450		8,700	13,900	27,800
50	2" w.c.		3,360		6,300	10,500	21,000
	Max. Allow		5,000		9,370	15,600	31,200
70	2" w.c.		3,840		7,200	12,000	24,000
	Max. Allow		5,980		11,200	18,700	37,400
100	2" w.c.		4,480		8,400	14,000	28,000
	Max. Allow		7,170		13,400	22,400	44,800

All capacities listed are standard cubic feet per hour, standard conditions being an atmospheric pressure of 14.4 psia and 60°F with a 4 oz. base pressure. Tables do not take into account supercompressibility. Last capacity figure in each group indicates maximum allowable operating pressure. See specification table on page 10.

METRICATION Use the following for metric conversions:

std. metres³/hr. x 35.31 = std. ft³/hr. (SCFH)
std. ft.³/hr. (SCFH) x 0.0283 = std. metres³/hr.

kilograms/centimeter² (kg/cm²) x 14.22 = psi
psi x 0.0703 = kilograms/centimeters² (kg/cm²)

kilopascals (kPa) x 0.145 = psi
psi x 6.90 = kilopascals (kPa)

bars x 14.50 = psi
psi x 0.069 = bars

millimeters water (mm H_2O) x 0.0394 = in. w.c.
in. w.c. x 25.4 = millimeters water (mm H_2O)

millimeters mercury (mm Hg) x 0.535 = in. w.c.
in. w.c. x 1.868 = millimeters mercury (mm Hg)

SENSUS
METERING SYSTEMS

Intermediate and Large Capacity Diaphragm Gas Meters

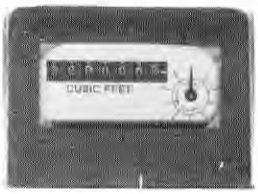
Meter Mounted Instruments

All Sensus meters are volumetric devices which totalize volume at line conditions. Meter accessories are available to provide read-outs in desired units at line conditions or corrected for pressure, temperature or both. These accessories fit directly on the index plate without special adapters and are provided with weather-proof cases. Read-out units can be in either cubic feet or cubic meters.

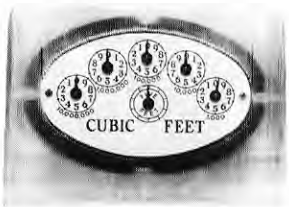
Sensus Meter Mounted Vertical Direct Reading indexes in aluminum boxes and all electronic correcting instruments can be equipped to provide intrinsically safe pulse outputs for remote reading. Electronic correctors can provide remote reading of either or both uncorrected and corrected volumes. Remote readouts can be obtained in either cubic feet or metric units.

Indexes

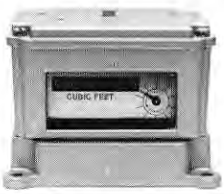
Circular Reading (VCR) and Direct Reading (VDR) indexes are housed in Lexan covers. The VDR index is also available in an aluminum box with a switch output to transmit totalized volume to a remote counter or instrument.



Direct Reading (VDR) Index



Circular Reading (VCR) Index



Aluminum Box Direct Reading (VDR) Index

Industrial Gas Measurement

Industry today is placing a tremendous amount of emphasis on fuel conservation and fuel allocation within its facilities. Plant accountants are making efforts to keep increasingly accurate records of fuel gas consumption as well as consumption of various special process gases within their facilities. Sensus' complete line of single joint large capacity diaphragm meters provides industry with the metering equipment they need to do the job and to do it accurately. Listed below are some of the gases used by industry that Sensus meters are capable of handling. See pages 6 and 7 of this bulletin for capacity information and see your local Sensus representative or distributor for further information regarding in-plant metering and special gas services. Sensus diaphragm meters offered for these services are of standard construction. These meters will provide accurate measurement and normal meter life. They will not create any hazards when used with the listed gases. The materials of construction in these standard meters are compatible with the listed gases and no material breakdown will occur when contacting these gases.

Some contamination of metered gases may occur due to petroleum base lubricants used in the meters.

Gas
Air
Argon (A_2)
Butane (C_4H_{10})
Carbon Dioxide (CO_2)*
Carbon Monoxide (CO)*
Ethane (C_2H_6)
Ethylene (C_2H_4)
Helium (He_2)†
Hydrogen (H_2)†
Krypton (Kr_2)
Methane (CH_4)
Nitrogen (N_2)
Neon (Ne)
Pentane (C_5H_{12})
Propane (C_3H_8)
Propylene (C_3H_6)
Xenon (Xe_2)

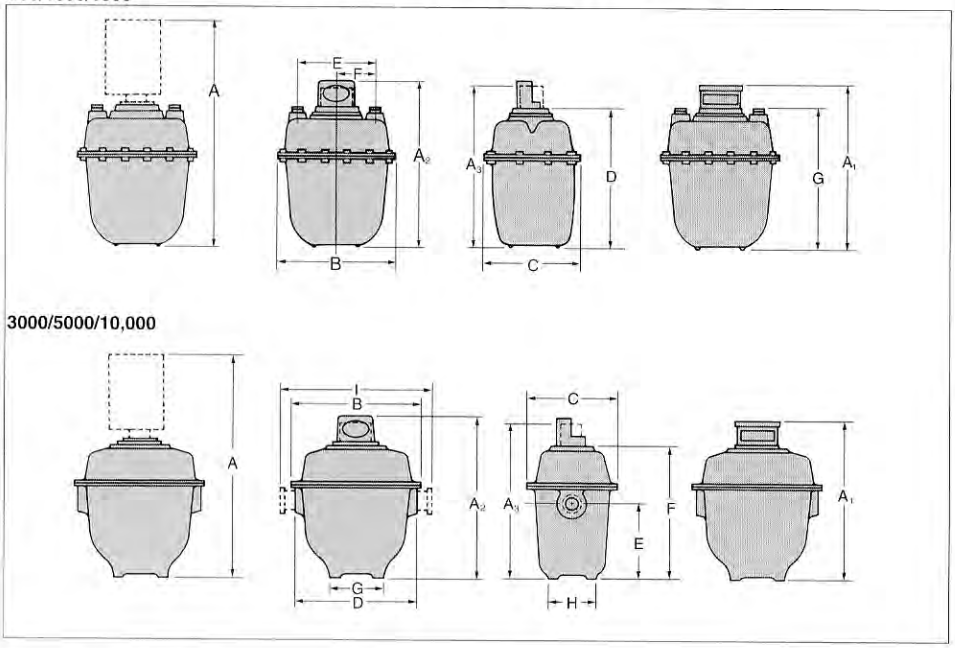
* Gas must be 100% dry.

† Because of the low density of these gases, meters for this service may not be used in excess of 50% of their pressure rating.

Intermediate and Large Capacity Diaphragm Gas Meters

Comparative Dimensions of Sensus Large Capacity Meters. . .

750/1600/1000



3000/5000/10,000

Specifications

Meter	Maximum Working Pressure (psig)	Capacity @ ½" w.c. diff. of 0.6 Sp. Gr. Gas CFH	Capacity @ 2" w.c. diff. of 0.6 Sp. Gr. Gas CFH	ft³/REV of Output Shaft Standard*	m³/REV of Output Shaft	REV/ cu. ft.	Actual Weight Lbs.	Shipping Weight Lbs.	Standard Connections	Other Available Connections
750	20	750	1600	10	0.1	2.6	51	55	45 Lt.	30, 60 Lt., No. 3 Spg., 1½" FTP, 2" NPT
1600	100	800	1600	10	0.1	2.6	70	75	45 Lt.	30, 60 Lt., No. 3 Spg., 1½" FTP
1000	25	1000	2200	10	0.1	1.6	55	60	45 Lt.	60, 100 Lt., No. 3 Spg., 1½" or 2" FTP No. 5 Spg. on 1000 only
3000 w/o flanges	100	1450	3000	10	0.1	1.3	107	135	3"-8 NPT	2"-11½ NPT
w/ flanges	100	1450	3000	10	0.1	1.3	120	154	3" Flange	2" Flange
5000 w/o flanges	100	2500	5000	10	1 or 0.1	0.5	198	238	4"-8 NPT	3"-8 NPT
w/ flanges	100	2500	5000	10	1 or 0.1	0.5	233	270	4" Flange	3" Flange
10,000 w/o flanges	100	5000	10000	100	1	0.32	323	389	4"-8 NPT	3"-8 NPT
w/ flanges	100	5000	10000	100	1	0.32	360	420	4" Flange	3" Flange

* Other outputs available upon request on some models.

750/1600/1000 Meters

Dimensions (Inches)	Model 750	Model 1600	Model 1000
A	32¾	32¾	35⅜
A1	23⅜	23⅜	26
A2	24 3/16	24 3/16	26⅞
A3	22⅞	22⅞	25½
B	17¼	17¼	19 11/16
C	14⅝	14⅝	16⅞
D	20 3/16	20 3/16	22⅞
E	11	11	11 / 13⅛
F	5½	5½	5½ / 6 9/16
G	20	20	22⅝

3000/5000/10,000 Meters

Dimensions (Inches)	Model 3000	Model 5000	Model 10,000
A	36¾	43 7/16	49 9/16
A1	27½	34⅛	40¼
A2	28¼	34 15/16	41 1/16
A3	26 15/16	33 9/16	39¾
B	21½	27 3/16	31¾
C	16	19 11/16	26⅜
D	21½	26	31¾
E	13	17¼	21¼
F	24¼	30 15/16	37 1/16
G	9½	10	16¼
H	7½	8	13¼
I	27½	32	37¾

A — Type I Mechanical Instruments and all Electrocorector Models*

A1 — Vertical Direct Reading (VDR) Index in Aluminum Box

A2 — Vertical Circular Reading (VCR) and Vertical Direct Reading (VDR) Indexes in Lexan Covers

A3 — Horizontal Circular Reading (HCR) Index

* Contact your Sensus representative for dimensions of NexCorr.

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

SENSUS
METERING SYSTEMS

Sensus Diaphragm Meter Installation Instructions

The badge end of the meter designates the inlet and is so indicated (on the badge). The maximum working pressure and rated capacity of the meter at 1/2" and 2" water column differential are also marked on the badge. This rated working pressure is not to be exceeded.

It is recommended that large capacity meters be installed with a bypass line to facilitate future repairs without interruption of service.

The inlet pipe of the meter should be blown clean before installing the meter. Pipe turnings, weld spatters, scale, dirt and other foreign materials can cause serious damage to valves, valve seats, and bearings resulting in excessive wear on these parts and loss of meter accuracy. Where condensation is a problem, the line on the upstream side of the meter should have drip traps to prevent the condensation from collecting in the meter. Standard drains are available on all sizes with the exception of the 1000 meter. The threads of the Inlet and Outlet piping should be inspected for dirt and damage. Dirt, damaged threads, or weld spatters and other materials in the threads can be a cause of leakage or damage to meter connection threads.

Caution is necessary when placing the meter into service after installation as any excessive build-up of differential across the diaphragms, valves and channels may cause rupturing of the diaphragm, distortion of the diaphragm pans, bowing or cracking body partitions, and other possible serious damage.

The following procedure should be followed to place a meter into service on an installation with a bypass line:

1. Slowly crack the meter outlet valve.
2. Slowly crack the meter inlet valve until the proving hand has started to move.
3. Very slowly open the outlet valve until completely opened.
4. Very slowly open the inlet valve until completely opened.
5. Slowly close the bypass line valve.

To put the meter into service on an installation without a bypass line, the valve on the outlet of the meter, if there is one, should be opened first. The meter inlet valve should then be very slowly cracked to insure no excessive build-up of differential. After the proving hand of the meter has started to move, continue to very slowly open the valve until completely opened.

Excessively high differentials across the chambers and channels of the meter can also be caused by a sudden reduction in pressure due to blowing drips or removing a meter from service. There is no substitute for extreme caution and care in placing any meter into service or removing any meter from service.

How to Order

When ordering SensusDiaphragm Meters, the following information must be defined. This will insure the greatest possible speed and accuracy in filling orders.

- Meter Model
- Standard (NTC) or temperature compensated (TC)
- Maximum flow rate (cubic feet or M^3 per hour)
- Specific gravity of gas
- Maximum rated working pressure, psig
- Type readout desired (specify cubic feet or metric):
  HCR—Horizontal Circular Reading Index
  VCR—Vertical Circular Reading Index
  VDR—Vertical Direct Reading Index
- Volume Corrector (specify model)
- Size of piping connections
- Type of piping connections (flanged or screwed)
- Diaphragm drains, if desired. (Not available on Model 1000.)

IMAC PULSIMATIC TRANSMITTER

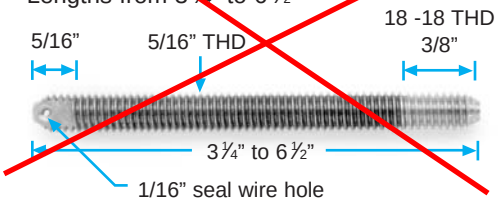
Features

- VIRTUALLY indestructible low profile does not interfere with existing piping arrangement.
- ONE-PIECE cast aluminum housing, precision machined. Provides the **optimum protection** for the pulsing mechanism along with precise mechanical action.
- SINGLE or DOUBLE independent outputs available on all models.
- FITS all types of industrial size meters with a vertical mechanical index: Diaphragm — Rotary — Turbine. (See DMP literature for front mounted indexes)
- OPERATES at extremely low torque.
- MOUNTS between meter and index or instrument.
- IDEAL for Data Acquisition Systems.
- Also available: Bottom seal plate (301-0070) to eliminate overhang (recommended for certain applications).
- Special adapter kit (DMK217) for Actaris Meters 675A, 800A, 1000A.
- CSA Approved LR11378 Underwriters Recognition #E186234.

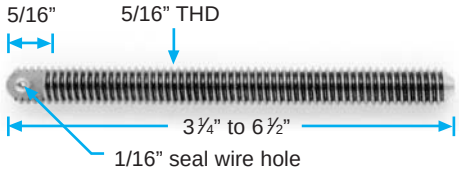
- AVAILABLE in the following pulses per revolution of the drive shaft: 100 cu ft
  1/2 / 1 / 2 / 5 / 10 / 20 / 50 / 100 / 500 / 1000

Mounting Hardware

Special studs with 18 - 18 threads available and necessary for American Meter. Lengths from 3 ¼" to 6 ½"



Standard kits include 3 ¼" brass mounting studs with sealing wire holes and SST nuts and washer.



Electrical Output Connections:

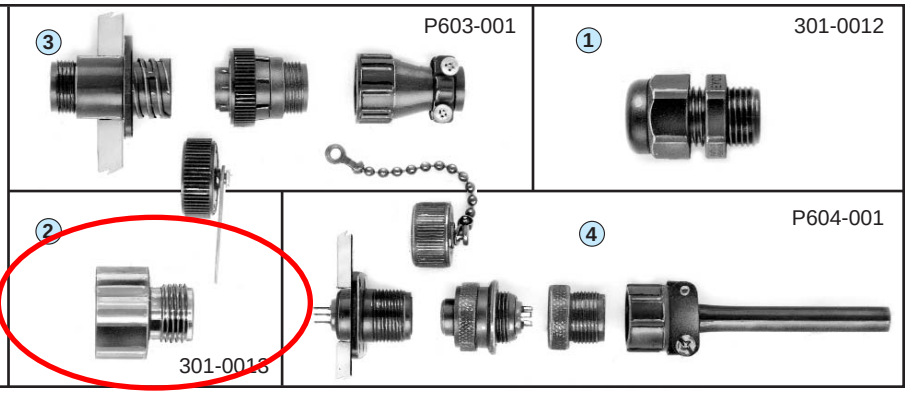
① STANDARD: Compression Fitting

Optional:

② ½" N.P.T. conduit adapter - aluminum

③ Plastic weatherproof receptacle with external quick disconnect

④ Metallic weatherproof receptacle with external quick disconnect



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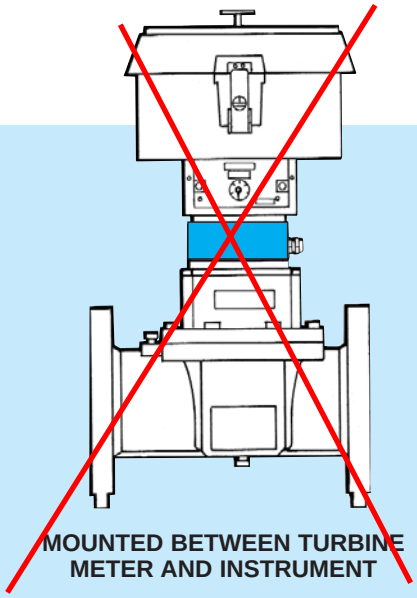
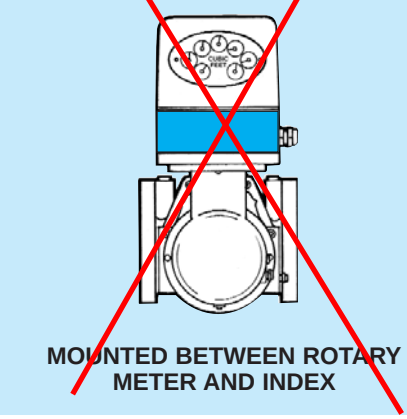
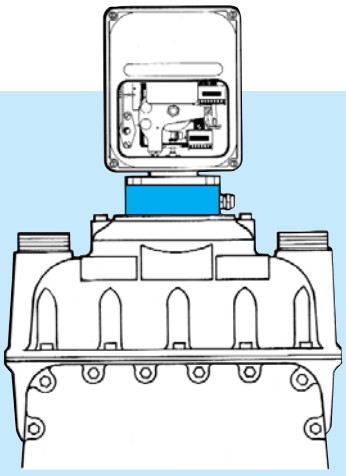
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax



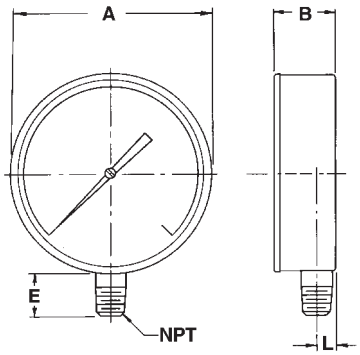
MOUNTED BETWEEN TURBINE METER AND INSTRUMENT



MOUNTED BETWEEN ROTARY METER AND INDEX



MOUNTED BETWEEN DIAPHRAGM METER AND INSTRUMENT



CASE - Drawn stainless steel, with push-in Lexan window.
TUBE & SOCKET - Phosphor bronze. Brass socket and 1/4" male NPT lower connection. Soft soldered connection.
DIAL - White coated metal lithographed with black graduations lines and numerals.
MOVEMENT - All brass construction, precision gear and pinion.
POINTER - Slotted adjustable.
ACCURACY - 1% ANSI-ASME B40.1 Grade 1A.

SERIES		A	B	E	L	NPT
4CTS	INCH	4.62	1.12	1.062	.437	1/4"
	MM	117.3	28.4	26.9	11.09	

QTY.	CAT. NO.	DIAL DIA.	RANGE	TAG
	4CTS	41/2"		
	4CTS	41/2"		
	4CTS	41/2"		
	4CTS	41/2"		
	4CTS	41/2"		

PRESSURE (psi) - Series 4CTS

DUAL SCALE - PSI & FT H_2O

AS REQ'D

Range [1]	Figure interval	Minor graduation
0-15 / 0-35'	1	0.2
0-30 / 0-70'	5	0.5
0-60 / 0-140'	5	1.0
0-100 / 0-231'	10	1.0
0-160 / 0-345'	20	2.0
0-200 / 0-460'	20	2.0
0-300	50	5.0
0-400	50	5.0
0-600	50	10.0

COMPOUND

Range	Figure interval in Hg	Figure interval psi	Minor graduation in Hg	Minor graduation psi
30"Hg-15psi	10	5	1	0.5
30"Hg-30psi	10	5	1	1
30"Hg-60psi	10	10	2	2
30"Hg-100psi	15	10	5	2
30"Hg-150psi	30	20	2	2

VACUUM

Range	Figure interval	Minor graduation
0-30"Hg	5"Hg	0.5"Hg

1 All dial ranges available in dual scale - psi & Kpa, psi & Kg/cm2. Ranges 15 psi thru 200 psi available dual scale - psi & Ft H_2O.

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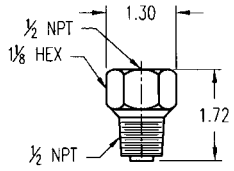
210.349.5244 Phone
210.349.6129 Fax

WEISS INSTRUMENTS

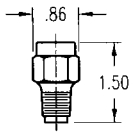
WEISS INSTRUMENTS, INC.
HOLTSVILLE, NEW YORK 11742

DESCRIPTION:
4 1/2" HVAC Pressure Gauge
Series 4CTS

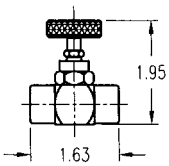
DRAWN BY: DATE: DRAWING:



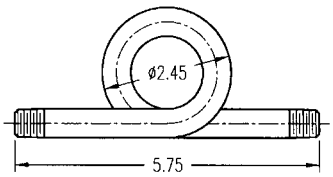
PSN-B-50



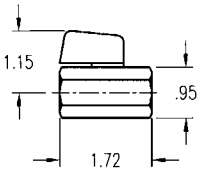
PSN-B-25



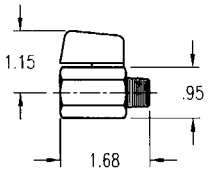
25NVBR
25NVSS



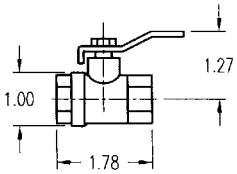
SY-14B
SY-14S



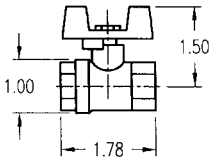
BV25
BV50



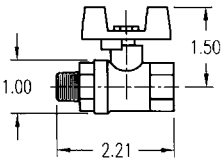
MBV25



LC-14



TC-14
TC-12



MTC-14

Quanity	CAT. NO.	SIZE	MATERIAL	RATING
	PRESSURE SNUBBERS			
	PSN-B-25	1/4" MNPT x 1/4" FNPT	Brass	1,500psi & 70°F
	PSN-B-50	1/2" MNPT x 1/2" FNPT	Brass	1,500psi & 70°F
	NEEDLE VALVE			
	25NVBR	1/4" FNPT x 1/4" FNPT	Brass	600 psi & 300°F
	25NVSS	1/4" FNPT x 1/4" FNPT	304 SS	7000 psi & 550°F
	SYPHONS			
	SY-14S	1/4" MNPT x 1/4" MNPT	Iron	500 psi & 400°F
	SY-14B	1/4" MNPT x 1/4" MNPT	Brass	250 psi & 400°F
	GAUGE COCKS			
	TC-14	1/4" FNPT x 1/4" FNPT	Brass	150 lb. Steam
	LC-14	1/4" FNPT x 1/4" FNPT	Brass	150 lb. Steam
	MTC-14	1/4" FNPT x 1/4" MNPT	Brass	150 lb. Steam
	TC-12	1/2" FNPT x 1/2" FNPT	Brass	150 lb. Steam
	BALL VALVES			
	BV25	1/4" FNPT x 1/4" FNPT	Nickel Plated Brass	450 psi & 250°F
	MBV25	1/4" FNPT x 1/4" MNPT	Nickel Plated Brass	450 psi & 250°F
	BV50	1/2" FNPT x 1/2" FNPT	Nickel Plated Brass	450 psi & 250°F

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120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

WEISS INSTRUMENTS

WEISS INSTRUMENTS, INC.
HOLTSVILLE, NEW YORK 11742

DESCRIPTION:

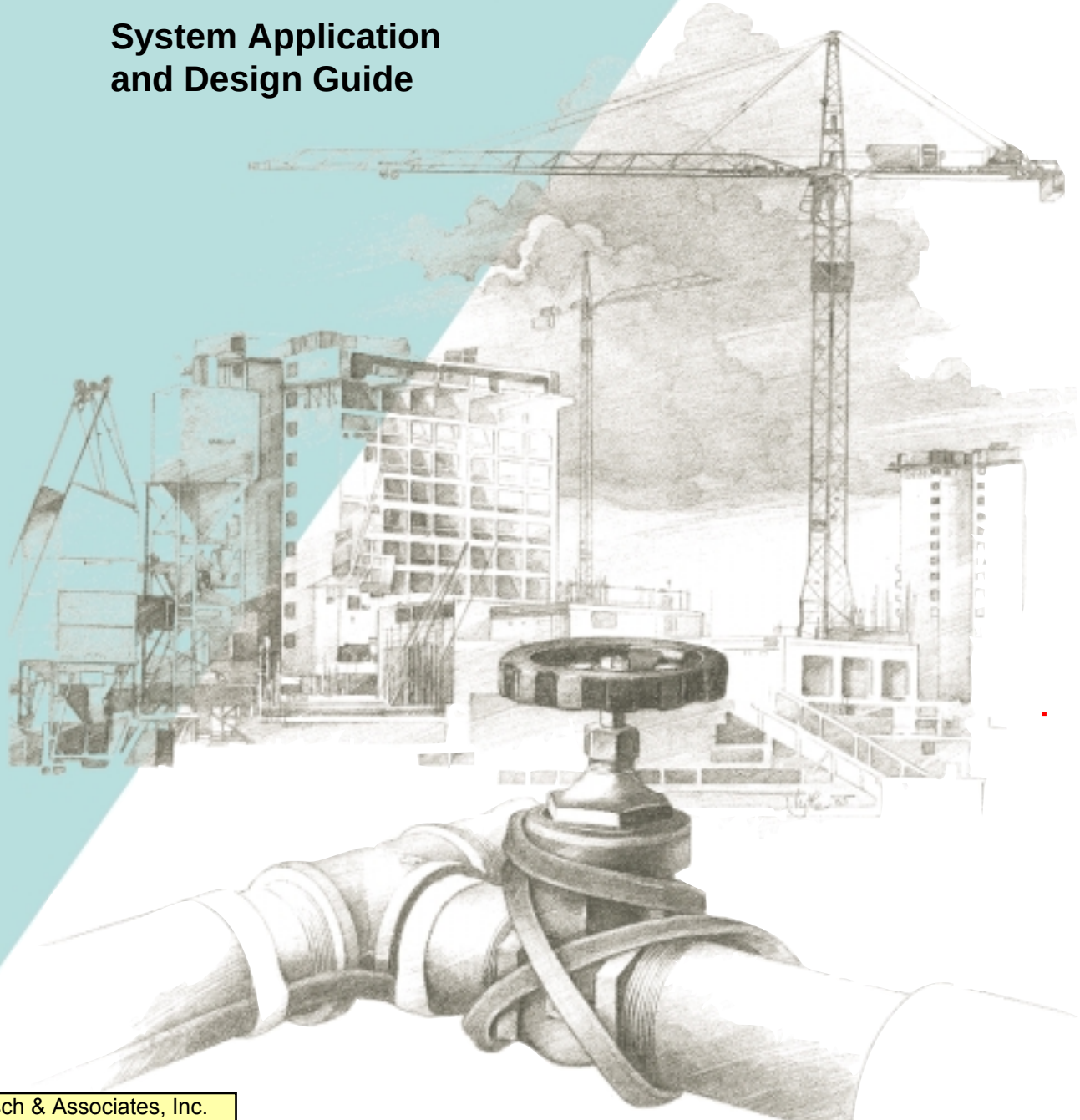
GAUGE ACCESSORIES

DRAWN BY: DATE: DRAWING:

Raychem

XL-Trace

System Application and Design Guide

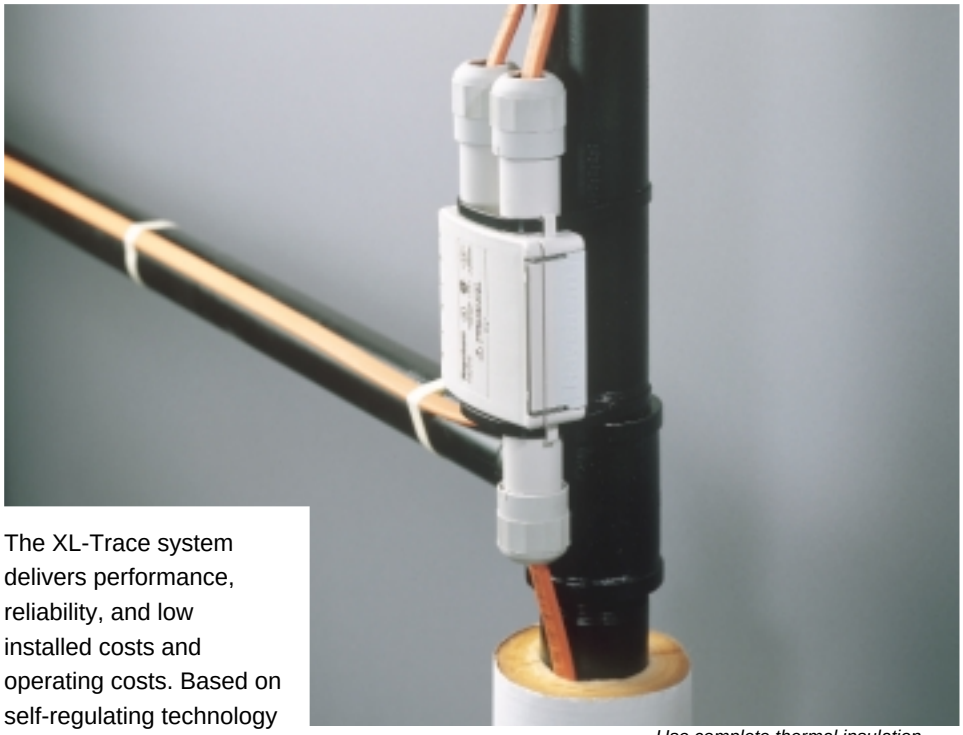


Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Pipe Freeze Protection and Flow Maintenance for Commercial Construction Applications

XL-Trace Systems for Freeze Protection and Flow Maintenance

Raychem takes the next step in self-regulating heating cable systems: Exciting new applications and simple components make XL-Trace installation a snap.



Use complete thermal insulation

The XL-Trace system delivers performance, reliability, and low installed costs and operating costs. Based on self-regulating technology developed by Raychem in 1971, XL-Trace heating cables provide solutions to the widest range of applications in the industry. And Raychem's revolutionary RayClic quick-connect components make installing an XL-Trace system as easy as 1-2-3.

See How XL-Trace Heating Cables Perform

Self-Regulation

The conductive polymer heating core regulates its power output in response to pipe temperature.

Benefits

Simple and reliable:
- Can be overlapped.
- No overheating or burnouts.
- No thermostats required.
- Saves energy over constant wattage.

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120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
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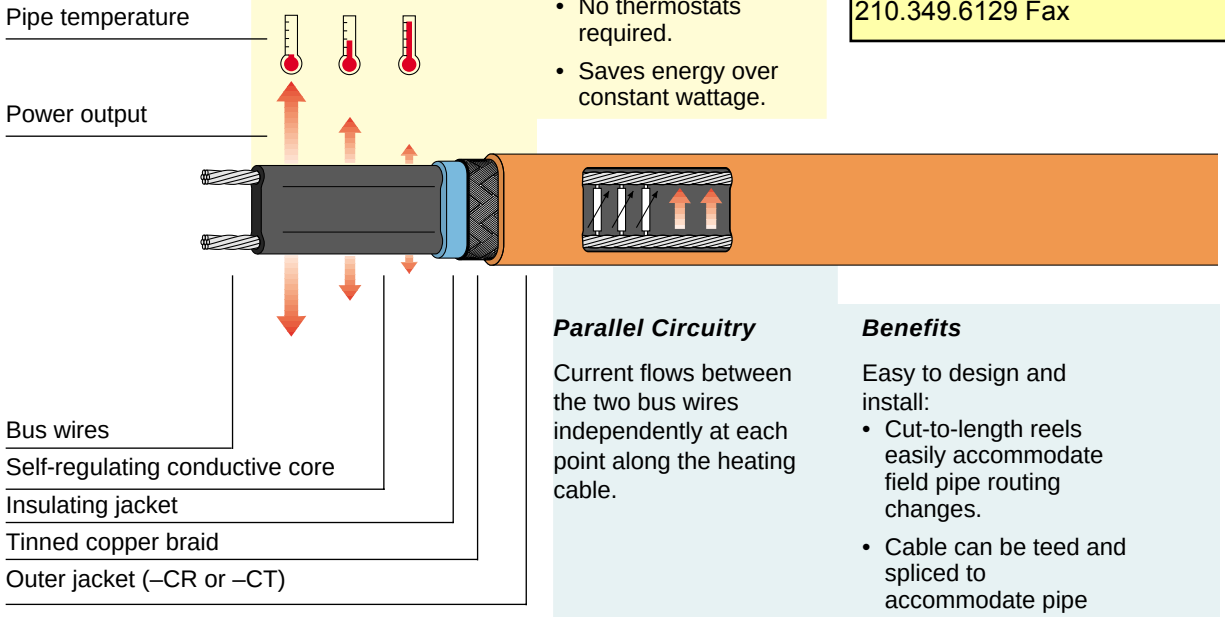

Parallel Circuitry

Current flows between the two bus wires independently at each point along the heating cable.

Benefits

Easy to design and install:
- Cut-to-length reels easily accommodate field pipe routing changes.
- Cable can be teed and spliced to accommodate pipe branches.

XL-Trace Systems for Freeze Protection and Flow Maintenance

Components that make installing the XL-Trace system as easy as 1-2-3

Raychem's RayClic system is the simplest, fastest, most reliable set of connections ever developed for electric heating cable.
No wire stripping is needed because the insulation displacement connector makes the electrical connection. The RayClic system reduces installation time, eliminates callbacks, and lowers the total installed cost of a heating cable system.

Simple

- No special tools
- Three-step installation

Reliable

- Intuitive installation
- Rugged, waterproof, UV-resistant enclosure

Cost effective

- Quick installation
- No callbacks

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120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

The XL-Trace system is UL Listed, FM Approved, and CSA Certified for all of these applications:

Freeze Protection

- Metal and plastic pipe
- Piping in parking garages
- Pipes in coolers and freezers
- Sprinkler piping*
- Cooling-tower piping
- Piping in unheated warehouses
- Plumbing lines
- Temporary construction piping

**Sprinkler piping is UL and ULC Listed only.*

Flow Maintenance

- Grease disposal lines
- Fuel lines

Specification Guide

1 General

Furnish and install a complete UL Listed, CSA Certified, or FM Approved system of heating cables, components, and controls to (choose one: prevent pipes from freezing, provide freeze protection of sprinkler system piping, provide flow maintenance of grease lines, provide flow maintenance for fuel oil).

2 Products

2.1 The self-regulating heating cable shall consist of two (2) 16 AWG nickel-copper bus wires embedded in parallel in a self-regulating polymer core that varies its power output to respond to temperature all along its length, allowing the heating cable to be cut to length in the field. The heating cable shall be covered by a radiation-crosslinked, modified polyolefin dielectric jacket. To provide a ground path and to enhance the heating cable's ruggedness, the heating cable shall have a braid of tinned copper and an outer jacket of (select: modified polyolefin [-CR] or fluoropolymer [-CT]), as required per section 427-23 of the NEC-1996.

For installation on plastic piping, the heating cable shall be applied using aluminum tape (AT-180).

2.2 In order to conserve energy and to prevent overheating, the heating cable shall have a self-regulating factor of at least 90 percent. The self-regulating factor is defined as the percentage reduction, without thermostatic control, of the heating cable output going from 40°F pipe temperature operation to 150°F pipe temperature operation.

2.3 The heating cable shall operate on line voltages of (select: 120, 208, 220, 240, or 277) volts without the use of transformers.

2.4 The heating cable for metal-pipe freeze protection shall be sized according to the table below. The required heating cable output rating is in watts per foot at 50°F. (Heating cable selection based on 1" fiberglass insulation on metal piping.)

	Minimum Ambient Temperature	
Pipe size (inches)	**0°F**	**–20°F**
3 or less	5 watts	5 watts
4	5 watts	8 watts
6	8 watts	8 watts
8	8 watts	2 strips—5 watts
10	2 strips—5 watts	2 strips—8 watts

2.5 The heating cable shall be XL-Trace cable as manufactured by Raychem Corporation.

2.6 Power connection, end seal, splice, and tee kit components shall be applied in the field.

2.7 Heating-cable circuit shall be protected by a ground-fault device for equipment protection. This requirement is in accordance with section 427-22 of the NEC-1996.

3. Components

All heating-cable components shall be UL Listed, CSA Certified, or FM Approved for use as part of the system to provide (choose one: pipe freeze protection, flow maintenance). Component enclosures shall be rated NEMA 4X to prevent water ingress and corrosion. Installation shall not require the installing contractor to cut into the heating-cable core to expose the bus wires. Connection systems that require the installing contractor to strip the bus wires, or that use crimps or terminal blocks, shall not be acceptable. All components that make an electrical connection shall be re-enterable for servicing. No component shall use silicone to seal the electrical connections. An exception will be made in areas where a conduit transition is required.

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

4 System Control

Option 1: Manual Control
The system shall be controlled by a switch, either directly or through an appropriate contactor.

Option 2: Thermostatic Control—Ambient Sensing
The system shall be controlled by an ambient sensing thermostat (choose: AMC-1A or AMC-F5) set at 40°F either directly or through an appropriate contactor.

Option 3: Thermostatic Control—Line Sensing
The system shall be controlled by a line sensing thermostat (choose: AMC-F5 fixed at 40°F or AMC-1B variable set point) set at 40°F either directly or through an appropriate contactor.

5 Execution

5.1 Installation

A. System must be installed per manufacturer's recommendations.

B. Apply the heating cable linearly on the pipe after piping has been successfully pressure-tested. Secure the heating cable to piping with cable ties or fiberglass tape.

C. Apply "Electric Traced" labels to the outside of the thermal insulation.

5.2 Tests

After installation and before and after installing the thermal insulation, subject heating cable to testing using a 2500-Vdc Megger. Minimum insulation resistance shall be 20 megohms or greater.

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Warranty

Warranty; Suitability

(a) Raychem warrants products delivered hereunder against faulty workmanship and use of defective materials for a period of 18 months from the date of installation or 24 months from the date of shipment, whichever is sooner. When the contract calls for systems design, drawings, technical advice, services, or instructions (collectively "Services") by Raychem, in connection with the products, Raychem further warrants for the above stated warranty period solely that such Services will be undertaken in accordance with Raychem's reasonable technical judgment based on Raychem's understanding of the pertinent technical data as of the date of performance of such Services. The foregoing warranty with respect to products shall not be enlarged or affected by, and (except as expressly provided herein) no obligation or liability shall arise or grow out of, Raychem's rendering Services in connection with the products. Such warranty is the only warranty made by Raychem and it can be amended only by a written instrument signed by a duly authorized officer of Raychem. If the products furnished by Raychem hereunder are determined to contain a deficiency, Buyer's exclusive remedy shall be to have Raychem repair such products or supply replacement products or credit Buyer's account for such products and accept their return, whichever Raychem may elect in its sole discretion. Notwithstanding the foregoing sentence, in no circumstances shall Raychem have any liability or obligation with respect to expenses, liabilities, or losses associated with the installation or removal of any products or the installation of replacement products or for any inspection, testing, or redesign occasioned by any deficiency or by the repair or replacement of products. Raychem's obligations are subject to the further condition that Raychem shall have no liability whatsoever for any deficiency unless (i) Raychem is notified in writing promptly (and in no event later than 30 days) after discovery by Buyer of the alleged deficiency, which notice shall include a detailed explanation of the alleged deficiency, (ii) the products containing the alleged deficiency are promptly returned to Raychem, F.O.B. Raychem's plant, and (iii) Raychem's examination of such products discloses to Raychem's satisfaction that such alleged deficiency actually exists and occurred in the course of proper and normal use and was not caused by accident, misuse, neglect, alteration, or improper installation, repair, or testing. If any products so prove to contain a deficiency and Raychem elects to repair or replace them, Raychem shall have a reasonable time to make such repair or replacement.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NONINFRINGEMENT, AND OF ANY OTHER OBLIGATION ON THE PART OF RAYCHEM.

(b) It shall be the responsibility of the Buyer to determine, on the basis of the most current written technical data, the suitability of the products and of any systems design or drawings for the intended use and their compliance with applicable laws, regulations, codes, and standards and the Buyer assumes all risks pertaining thereto.

Raychem®

XL-Trace

Self-regulating pipe freeze protection and flow maintenance system

The Raychem® XL-Trace system provides freeze protection and flow maintenance of pipes in commercial applications.

Typical applications include:
- Buried pipes
- Cooling tower lines
- Sprinkler systems
- Fire standpipe and drain pipes
- Exposed plumbing systems
- Metal and plastic pipes

The heating element in the XL-Trace heating cable consists of a continuous core of conductive polymer extruded between two copper bus wires. As current flows through the core, the XL-Trace heating cable regulates its own heat output in response to pipe temperature changes.

Low total installed cost

The XL-Trace heating cable's parallel circuitry allows it to be cut to the exact length required, with no wasted cable. Its flexibility allows it to be wrapped around complex fittings and valves and overlapped without overheating plastic pipes. All of these characteristics simplify and streamline the design of a heat-tracing system. Installation is quick and simple.

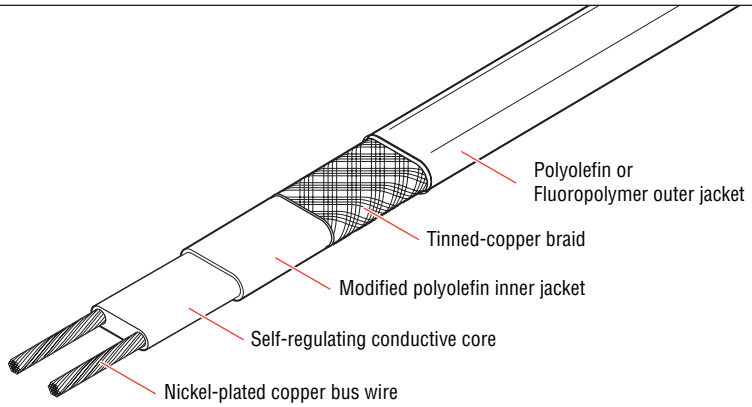
Low total operating cost

Building operators are assured of optimal energy efficiency and low maintenance costs when an XL-Trace system is specified.

The same features that make an XL-Trace system easy to install the first time also simplify additions or changes to the system during building renovations.

For additional information, contact your Tyco Thermal Controls representative or call Tyco Thermal Controls at (800) 545-6258.

Heating cable construction



Catalog number	5XL-1-CR/CT	5XL-2-CR/CT	8XL-1-CR/CT	8XL-2-CR/CT
Voltage	120 V	208–277 V	120 V	208–277 V
Maximum exposure temperature	150°F (65°C)	150°F (65°C)	150°F (65°C)	150°F (65°C)
Minimum installation temperature	0°F (–18°C)	0°F (–18°C)	0°F (–18°C)	0°F (–18°C)
Minimum bend radius	5/8 in (16 mm)	5/8 in (16 mm)	5/8 in (16 mm)	5/8 in (16 mm)

Maximum circuit length in feet (meters)

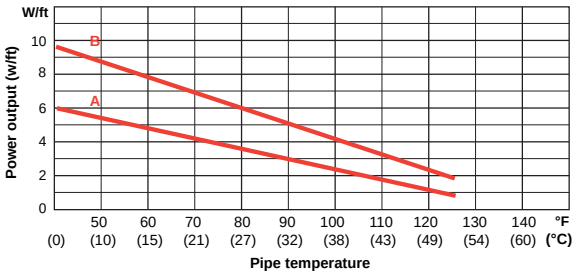
	Start-up temperature	Circuit breaker size 15 A	20 A	30 A
5XL-1-CR or -CT at 120 volts	40°F (0°C)	165 (50)	220 (67)	250 (76)
	0°F (–18°C)	110 (34)	145 (44)	220 (67)
8XL-1-CR or -CT at 120 volts	40°F (0°C)	120 (37)	160 (49)	190 (58)
	0°F (–18°C)	85 (26)	115 (35)	170 (52)
5XL-2-CR or -CT at 208–277 volts	40°F (0°C)	285 (87)	380 (116)	450 (137)
	0°F (–18°C)	190 (58)	255 (78)	385 (117)
8XL-2-CR or -CT at 208–277 volts	40°F (0°C)	205 (62)	275 (84)	350 (107)
	0°F (–18°C)	150 (46)	200 (61)	300 (91)

* Use 40°F start-up for ambient control.

Nominal Power Output on Metal Pipes at 120V/208V

A 5XL1-CR and 5XL1-CT
5XL2-CR and 5XL2-CT

B 8XL1-CR and 8XL1-CT
8XL2-CR and 8XL2-CT



Components

Raychem RayClic or FTC components must be used to terminate XL-Trace heating cables. Refer to the *XL-Trace Application and Design Guide* (H55838) for proper component selection.

Bus wires

16 AWG nickel-plated copper

Braid/outer jacket

Tinned-copper braid with modified polyolefin jacket-CR or optional fluoropolymer jacket-CT

Dimensions

Maximum width	0.75 in (19 mm)
Maximum thickness	0.38 in (10 mm)

Nominal weight

92 lb/1000 ft

Approvals

718K Pipe Heating Cable

DESIG. 3A, 3B, 3C

Ground-fault protection

To minimize the danger of fire from sustained electrical arcing if the heating cable is damaged or improperly installed, and to comply with the requirements of Tyco Thermal Controls and national electrical codes, ground-fault equipment protection must be used on each heating cable branch circuit. Arcing may not be stopped by conventional circuit protection.

World Wide Headquarters
Tyco Thermal Controls
300 Constitution Drive
Menlo Park, CA 94025-1164
USA
Tel (800) 545-6258
Fax (800) 527-5703
info@tycothermal.com
www.tycothermal.com

EXPERIENCE COUNTS

ENGINEERING MANUAL

Link-Seal® Modular Seals
Century-Line® Sleeves
Cell-Cast® Disks

Use the original engineered fit...
there are no equals!

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San Antonio, Texas 78216-7042
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Made in U.S.A.

Link-Seal® Modular Seal Features

Saves time and money...
Link-Seal® modular seals install in up to 75% less time when compared to lead-oakum joints, hand fitted flashings, mastics or casing boots.

Positive hydrostatic seal...
Link-Seal® modular seals are rated at 20 psig (40 feet of head), which exceeds the performance requirements of most applications.

Long seal life...
Link-Seal® modular seals are designed for use as a permanent seal. Seal elements are specially compounded to resist aging and attack from ozone, sunlight, water and a wide range of chemicals.

Maximum protection against corrosion...
Standard fasteners employ the use of a proprietary coating process on carbon steel. For extremely corrosive environments, corrosion resistant 316 stainless steel hardware is offered as a standard.

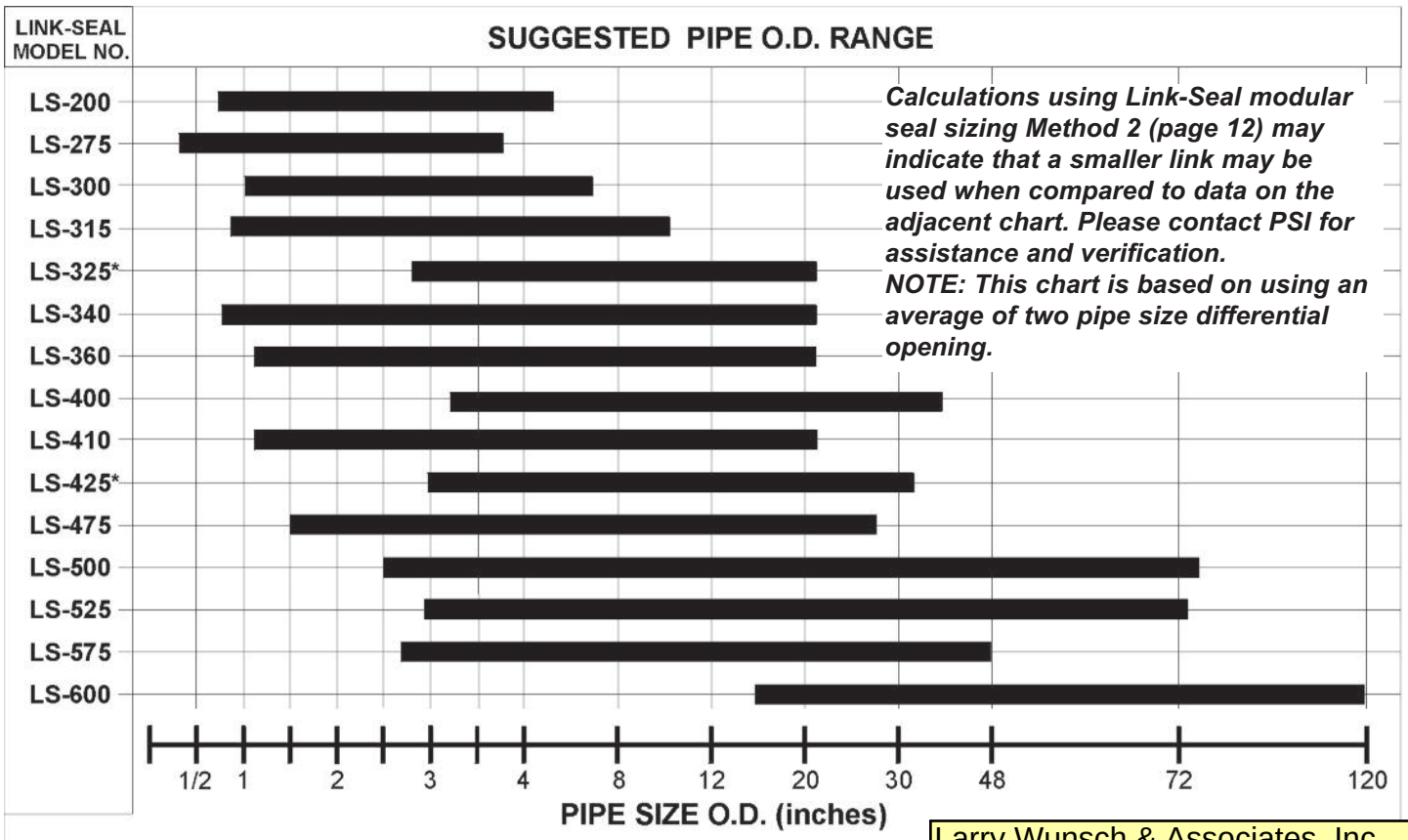
ISO Quality Assurance...
Link-Seal® modular seals are manufactured in an ISO 9001:2000 certified facility. In addition, they are completely manufactured and assembled in the U.S.A.

Certification/Approvals...
Factory Mutual Fire Approvals.
Det Norske Veritas Marine Deak/Bulkhead Penetration Certification.
Also a wide variety of approvals from various Federal agencies, associations, code groups, laboratories and organizations.

Configure a Link-Seal® modular seal to match your application...
Color coded EPDM, Nitrile, & Silicone elastomers may be used with various hardware options to match performance characteristics with service conditions.

Choose a Link-Seal® modular seal to match your pipe size and wall opening...
Link-Seal® modular seals are now available in 16 sizes to provide a solution for most all applications.

Suggested Pipe O.D. Range



Calculations using Link-Seal modular seal sizing Method 2 (page 12) may indicate that a smaller link may be used when compared to data on the adjacent chart. Please contact PSI for assistance and verification.
NOTE: This chart is based on using an average of two pipe size differential opening.

*= Whenever possible use thicker links, such as the LS-400, LS-475 or LS-500 series to provide more leeway.

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Sizing Charts for Standard Pipe

SDR-35 Gravity Sewer Pipe

PIPE SIZE (Nom.)	ACTUAL O.D. (Inches)	CS MODEL NON-METALLIC SLEEVE MODEL NUMBER	CS LINK-SEAL® SIZE	CS LINKS PER SEAL	WS MODEL STEEL SLEEVE MODEL NUMBER	WS LINK-SEAL® SIZE	WS LINKS PER SEAL	CAST OR CORE BIT DRILLED HOLE I.D.	CAST LINK-SEAL® SIZE	CAST LINKS PER SEAL
4	4.22	CS-6-*	LS-315-***	11	WS-6-28-S-*	LS-315-***	10	6.000	LS-315-***	10
6	6.28	CS-8-*	LS-315-***	15	WS-8-32-S-*	LS-315-***	15	8.000	LS-315-***	15
8	8.40	CS-10-*	LS-325-***	9	WS-10-36-S-*	LS-315-***	19	12.000	LS-475-***	12
10	10.50	CS-14-*	LS-475-***	14	WS-14-37-S-*	LS-360-***	17	14.000	LS-475-***	14
12	12.50	CS-18-*	LS-500-***	12	WS-16-37-S-*	LS-360-***	20	16.000	LS-475-***	17
15	15.30	CS-20-*	LS-575-***	17	WS-20-37-S-*	LS-575-***	17	18.000	LS-360-***	24
18	18.70	CS-24-*	LS-575-***	21	WS-22-37-S-*	LS-360-***	29	22.000	LS-475-***	24
21	22.05	CC-30-**	LS-600-***	13	WS-26-37-S-*	LS-475-***	28	26.000	LS-575-***	24
24	24.80	CC-30-**	LS-525-***	21	WS-28-37-S-*	LS-425-***	22	28.000	LS-475-***	31
27	27.95	CC-32-**	LS-400-***	25	WS-32-37-S-*	LS-400-***	25	32.000	LS-575-***	30
30	32.00	CC-38-**	LS-500-***	28	WS-36-37-S-*	LS-400-***	29	36.000	LS-575-***	34

* = Specify sleeve length in inches ** = See Cell-Cast® Page 16 *** = Specify LS Model C, S-316, L...etc when ordering (Example LS-475-C-17) Technically there is no limit to the pipe size that can be sealed using Link-Seal® modular seals. Please contact factory for sizes not listed and for CS model plastic sleeves for walls less than 8" thick.

Steel and Plastic Pipe with Same Outside Diameter

PIPE SIZE (Nom.)	ACTUAL O.D. (Inches)	CS MODEL NON-METALLIC SLEEVE MODEL NUMBER	CS LINK-SEAL® SIZE	CS LINKS PER SEAL	WS MODEL STEEL SLEEVE MODEL NUMBER	WS LINK-SEAL® SIZE	WS LINKS PER SEAL	CAST OR CORE BIT DRILLED HOLE I.D.	CAST LINK-SEAL® SIZE	CAST LINKS PER SEAL
1/2	0.840	CS-3-*	LS-315-***	4	WS-2-15-S-*	LS-275-***	5	2.000	LS-200-***	4
3/4	1.050	CS-3-*	LS-315-***	4	WS-2-1/2-20-S-*	LS-275-***	6	3.000	LS-315-***	4
1	1.315	CS-3-*	LS-300-***	4	WS-2-1/2-20-S-*	LS-200-***	5	3.000	LS-300-***	4
1-1/4	1.660	CS-3-*	LS-275-***	7	WS-3-21-S-*	LS-275-***	8	3.000	LS-275-***	8
1-1/2	1.900	CS-3-1/2-*	LS-300-***	5	WS-3-21-S-*	LS-200-***	7	4.000	LS-315-***	6
2	2.375	CS-4-*	LS-300-***	6	WS-3-1/2-22-S-*	LS-200-***	8	4.000	LS-300-***	6
2-1/2	2.875	CS-4-*	LS-200-***	9	WS-4-23-S-*	LS-200-***	9	4.000	LS-200-***	9
3	3.500	CS-5-*	LS-315-***	9	WS-6-28-S-*	LS-360-***	7	5.000	LS-300-***	8
3-1/2	4.000	CS-6-*	LS-340-***	10	ws-6-18-S-*	LS-340-***	10	6.000	LS-315-***	10
4	4.500	CS-6-*	LS-300-***	10	ws-6-18-S-*	LS-315-***	11	6.000	LS-300-***	10
5	5.563	CS-8-*	LS-360-***	10	ws-8-18-S-*	LS-360-***	10	8.000	LS-340-***	13
6	6.625	CS-10-*	LS-475-***	10	ws-8-18-S-*	LS-315-***	15	10.000	LS-475-***	10
8	8.625	CS-12-*	LS-475-***	12	ws-10-25-S-*	LS-315-***	20	12.000	LS-475-***	12
10	10.750	CS-14-*	LS-410-***	15	WS-14-37-S-*	LS-360-***	17	14.000	LS-475-***	14
12	12.750	CS-16-*	LS-475-***	17	WS-16-37-S-*	LS-360-***	20	16.000	LS-475-***	17
14	14.000	CS-16-*	LS-340-***	30	WS-18-37-S-*	LS-475-***	18	18.000	LS-575-***	16
16	16.000	CS-20-*	LS-410-***	21	WS-20-37-S-*	LS-475-***	21	20.000	LS-575-***	18
18	18.000	CS-22-*	LS-340-***	38	WS-22-37-S-*	LS-475-***	23	22.000	LS-575-***	20
20	20.000	CS-25-*	LS-500-***	18	WS-24-37-S-*	LS-475-***	25	24.000	LS-575-***	22
22	22.000	CS-25-*	LS-360-***	34	WS-26-37-S-*	LS-475-***	28	26.000	LS-575-***	24
24	24.000	CC-30-**	LS-500-***	21	WS-28-37-S-*	LS-475-***	30	28.000	LS-575-***	26
26	26.000	CC-30-**	LS-400-***	23	WS-30-37-S-*	LS-400-***	23	30.000	LS-575-***	28
28	28.000	CC-32-**	LS-400-***	25	WS-32-37-S-*	LS-400-***	25	32.000	LS-575-***	30
30	30.000	CC-36-**	LS-500-***	26	WS-34-37-S-*	LS-400-***	27	34.000	LS-575-***	32
32	32.000	CC-38-**	LS-500-***	28	WS-36-37-S-*	LS-400-***	29	36.000	LS-575-***	34
34	34.000	CC-38-**	LS-400-***	30	WS-40-37-S-*	LS-500-***	29	38.000	LS-575-***	36
36	36.000	CC-42-**	LS-500-***	31	WS-42-37-S-*	LS-500-***	31	40.000	LS-575-***	38
42	42.000	CC-48-**	LS-500-***	36	WS-48-37-S-*	LS-500-***	36	46.000	LS-575-***	44
48	48.000	CC-54-**	LS-500-***	40	WS-54-37-S-*	LS-500-***	41	52.000	LS-575-***	50

* = Specify sleeve length in inches ** = See Cell-Cast® Page 16 *** = Specify LS Model C, S-316, L...etc when ordering (Example LS-475-C-17) Technically there is no limit to the pipe size that can be sealed using Link-Seal® modular seals. Please contact factory for sizes not listed and for CS model plastic sleeves for walls less than 8" thick. **Note:** ws rolled sleeves (6" & 8") = .1875" wall thickness; (10") = .25" wall thickness.

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Sizing Charts for Standard Pipe

Ductile Iron Pipe (AWWA-C900, AWWA-C905, PVC Water Pipe)

PIPE SIZE (Nom.)	ACTUAL O.D. (Inches)	CS MODEL NON-METALLIC SLEEVE			WS MODEL STEEL SLEEVE			CAST OR CORE BIT DRILLED HOLE		
		MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	HOLE I.D.	LINK-SEAL® SIZE	LINKS PER SEAL
2	2.500	CS-4-*	LS-300-***	6	WS-3-1/2-22-S-*	LS-200-***	8	4.000	LS-300-***	6
2-1/4	2.750	CS-4-*	LS-275-***	10	WS-4-23-S-*	LS-200-***	9	4.000	LS-200-***	9
3	3.960	CS-6-*	LS-340-***	10	ws-6-18-S-*	LS-340-***	10	6.000	LS-315-***	10
4	4.800	CS-8-*	LS-475-***	8	ws-8-18-S-*	LS-475-***	8	8.000	LS-410-***	7
6	6.900	CS-10-*	LS-475-***	10	WS-10-36-S-*	LS-410-***	10	10.000	LS-410-***	10
8	9.050	CS-12-*	LS-400-***	9	WS-12-37-S-*	LS-400-***	9	12.000	LS-400-***	9
10	11.100	CS-14-*	LS-410-***	15	WS-14-37-S-*	LS-340-***	24	14.000	LS-410-***	15
12	13.200	CS-18-*	LS-575-***	15	WS-16-37-S-*	LS-340-***	28	16.000	LS-400-***	12
14	15.300	CS-20-*	LS-575-***	17	WS-20-37-S-*	LS-575-***	17	18.000	LS-360-***	24
16	17.400	CS-22-*	LS-360-***	28	WS-22-37-S-*	LS-575-***	19	20.000	LS-360-***	27
18	19.500	CS-24-*	LS-410-***	25	WS-24-37-S-*	LS-575-***	21	22.000	LS-360-***	30
20	21.600	CS-25-*	LS-400-***	20	WS-26-37-S-*	LS-575-***	23	26.000	LS-525-***	19
24	25.800	CC-30-**	LS-400-***	23	WS-30-37-S-*	LS-400-***	23	28.000	LS-425-***	23
30	32.000	CC-38-**	LS-500-***	28	WS-36-37-S-*	LS-400-***	29	36.000	LS-575-***	34
36	38.300	CC-44-**	LS-500-***	33	WS-44-1/2-37-S-*	LS-500-***	33	43.000	LS-500-***	33
42	44.500	CC-50-**	LS-500-***	38	WS-50-37-S-*	LS-500-***	38	49.000	LS-525-***	38
48	50.800	CC-56-**	LS-500-***	43	WS-57-37-S-*	LS-500-***	43	56.000	LS-500-***	43

* = Specify sleeve length in inches ** = See Cell-Cast® Page 16 *** = Specify LS Model C, S-316, L...etc when ordering (Example LS-475-C-17)
Technically there is no limit to the pipe size that can be sealed using Link-Seal® modular seals. Please contact factory for sizes not listed and for CS model plastic sleeves for walls less than 8" thick. **Note:** ws rolled sleeves (6" & 8") = .1875" wall thickness; (10") = .25" wall thickness.

Copper Tubing

PIPE SIZE) (Nom.)	ACTUAL O.D. (Inches)	CS MODEL NON-METALLIC SLEEVE			WS MODEL STEEL SLEEVE			CAST OR CORE BIT DRILLED HOLE		
		MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	HOLE I.D.	LINK-SEAL® SIZE	LINKS PER SEAL
1/2	0.625	CS-2-*	LS-275-***	4	WS-2-15-S-*	LS-275-***	5	2.000	LS-275-***	4
3/4	0.875	CS-3-*	LS-315-***	4	WS-2-1/2-20-S-*	LS-275-***	6	2.000	LS-200-***	4
1	1.125	CS-3-*	LS-315-***	4	WS-2-1/2-20-S-*	LS-275-***	6	3.000	LS-315-***	4
1-1/4	1.375	CS-3-*	LS-275-***	8	WS-2-1/2-20-S-*	LS-200-***	5	3.000	LS-300-***	4
1-1/2	1.625	CS-3-*	LS-275-***	8	WS-3-21-S-*	LS-275-***	8	3.000	LS-275-***	8
2	2.125	CS-4-*	LS-315-***	6	WS-3-1/2-22-S-*	LS-275-***	10	4.000	LS-315-***	6
2-1/2	2.625	CS-4-*	LS-275-***	12	WS-4-23-S-*	LS-275-***	11	4.000	LS-275-***	11
3	3.125	CS-5-*	LS-340-***	8	WS-5-25-S-*	LS-315-***	8	5.000	LS-315-***	8
4	4.125	CS-5-*	LS-200-***	12	ws-6-18-S-*	LS-340-***	10	6.000	LS-315-***	10
6	6.125	CS-8-*	LS-340-***	14	ws-8-18-S-*	LS-340-***	14	8.000	LS-315-***	15
8	8.125	CS-12-*	LS-575-***	10	ws-10-25-S-*	LS-340-***	18	12.000	LS-575-***	10
10	10.125	CS-12-*	LS-340-***	22	WS-14-37-S-*	LS-410-***	14	14.000	LS-575-***	12
12	12.125	CS-16-*	LS-575-***	14	WS-16-37-S-*	LS-410-***	16	16.000	LS-575-***	14

* = Specify sleeve length in inches *** = Specify LS Model C, S-316, L...etc when ordering (Example LS-475-C-17)
Note: ws rolled sleeves (6" & 8") = .1875" wall thickness; (10") = .25" wall thickness.

Cast Iron Soil Pipe (Extra Heavy)

PIPE SIZE (Nom.)	ACTUAL O.D. (Inches)	CS MODEL NON-METALLIC SLEEVE			WS MODEL STEEL SLEEVE			CAST OR CORE BIT DRILLED HOLE		
		MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	MODEL NUMBER	LINK-SEAL® SIZE	LINKS PER SEAL	HOLE I.D.	LINK-SEAL® SIZE	LINKS PER SEAL
2	2.380	CS-4-*	LS-300-***	6	WS-3-1/2-22-S-*	LS-200-***	8	4.000	LS-300-***	6
3	3.500	CS-5-*	LS-315-***	9	WS-6-28-S-*	LS-360-***	7	5.000	LS-300-***	8
4	4.500	CS-6-*	LS-300-***	10	ws-6-18-S-*	LS-315-***	11	6.000	LS-300-***	10
5	5.500	CS-8-*	LS-360-***	10	ws-8-18-S-*	LS-360-***	10	8.000	LS-340-***	13
6	6.500	CS-8-*	LS-315-***	15	ws-8-18-S-*	LS-315-***	15	10.000	LS-475-***	10
8	8.620	CS-12-*	LS-475-***	12	ws-10-25-S-*	LS-315-***	20	12.000	LS-475-***	12
10	10.750	CS-14-*	LS-410-***	15	WS-14-37-S-*	LS-360-***	17	14.000	LS-475-***	14
12	12.750	CS-16-*	LS-475-***	17	WS-16-37-S-*	LS-360-***	20	16.000	LS-475-***	17
15	15.880	CS-20-*	LS-410-***	21	WS-20-37-S-*	LS-475-***	20	18.000	LS-340-***	33

* = Specify sleeve length in inches *** = Specify LS Model C, S-316, L...etc when ordering (Example LS-475-C-17)
Technically there is no limit to the pipe size that can be sealed using Link-Seal® modular seals. Please contact factory for sizes not listed and for CS model plastic sleeves for walls less than 8" thick. **Note:** ws rolled sleeves (6" & 8") = .1875" wall thickness; (10") = .25" wall thickness.

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Century-Line® Engineered Sleeves

Century-Line® Sleeves

are used to create circular holes in concrete poured barriers of all types including; walls, floors and ceilings. Molded from non-conductive, high impact resistant HDPE, Century-Line® sleeves are lightweight and easily installed by one construction worker without use of cranes or hoists. They are available in 16 diameters ranging from 2” to 25” (51mm - 635mm) and shipped, from stock, in any desired length.

Weights and Dimensional Data
Model CS (16” length)

MODEL	I.D. (In.)	I.D. (mm)	lbs.	Kg.
CS-2	1.98	50.3	0.70	0.32
CS-3	2.94	74.7	1.30	0.59
CS-3-1/2	3.38	85.9	1.50	0.68
CS-4	4.03	102.4	2.00	0.90
CS-5	5.14	130.6	2.80	1.27
CS-6	6.14	156.0	3.60	1.63
CS-8	8.21	208.5	4.80	2.18
CS-10	10.19	258.8	6.40	2.90
CS-12	12.26	311.4	7.20	3.27
CS-14	14.14	359.2	11.20	5.08
CS-16	16.18	411.0	12.00	5.44
CS-18	17.45	443.2	15.50	7.03
CS-20	19.12	485.6	17.50	7.94
CS-22	20.32	516.1	21.00	9.53
CS-24	22.76	578.1	22.00	9.98
CS-25	24.81	630.2	23.00	10.43

Features

16 sizes - 2” to 25” in diameter

In the event of a field or engineering change, sleeves may be cut shorter at the job site using ordinary hand tools. Standard sleeves are 16” (40.6mm) in length. Longer length models may also be quickly fabricated as a custom ordered item.

1/8 the weight of steel

Century-Line® sleeves are light enough for one worker to install without a crane, hoist or helper which reduces installation time and costs. Century-Line® sleeves are easy to stock and far less expensive to ship, when compared to steel sleeves.

Resists water migration.

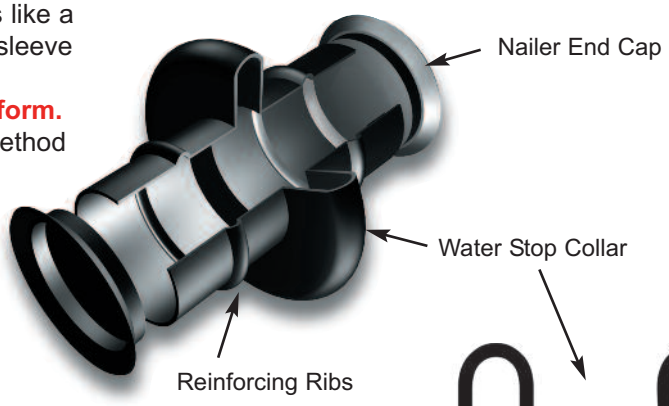
The 2” (50.8mm) water stop collar not only anchors the sleeve in position but creates a path against the migration of water around the outside of the sleeve.

Adjusts to wall thickness.

Century-Line sleeves’ unique hollow water stop collar acts like an expansion joint, adjusting (up to 1/2” - 12.7mm) to the thickness of the wall. This compressive force reacts against the forms like a spring, creating pressure and maintains proper sleeve location within the form.

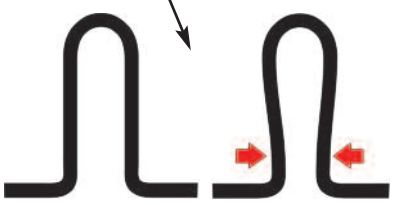
Nailer end caps position sleeve precisely in form.

Specially designed end caps provide an ideal method for attaching Century-Line® sleeves to the concrete forms. The end caps assure that the sleeve holds its circular configuration during the pour. In addition to keeping out wet concrete, they also prevent dirt from entering the sleeve during backfill operations or the interim construction period.



Tough high density polyethylene (HDPE) construction.

High impact resistant HDPE also provides excellent resistance to acids, alkalis and other organic solvents. Ideal for cathodic protection systems, these non-conductive sleeves will neither rust, corrode or degrade. Low-temperature properties are such that they may be installed under any weather conditions suitable for pouring concrete. High temperature application limit is 150º F. (66º C.). The sleeve is molded with a texture on the outside surface to assure a better bond than most plastic to concrete interfaces.



Adjusts To Wall Tickness

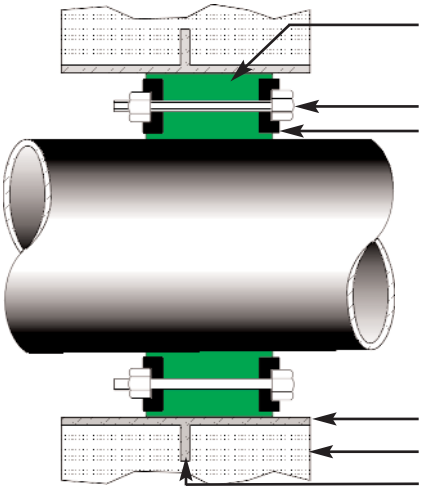
Century-Line sleeves unique hollow water stop collar works like an expansion joint, adjusting (up to 1/2”) to the thickness of wall. This design creates a dynamic force against the form.

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

PSI-Thunderline/Link-Seal®
6525 Goforth Street, Houston TX 77021 U.S.A.
Tel: 713-747-6948, Fax: 713-747-6029
Toll Free: 800-423-2410, www.linkseal.com

LOCAL LINK-SEAL® MODULAR SEAL REPRESENTATIVE

Larry Wunsch & Associates, Inc
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax



STEEL WALL SLEEVE SUBMITTAL SHEET

JOB _____

CUSTOMER _____

P.O. # _____

DATE _____

SUBMITTED BY_____DATE_____

APPROVED BY_____DATE_____

LINK-SEAL® MODEL NO. EXAMPLE

LS - 400 - C - 10

- LINK-SEAL®
- SIZE
- MODEL
- NO. OF LINKS

STEEL WS SLEEVE MODEL NO. EXAMPLE

WS - 14 - 25 - S - 12

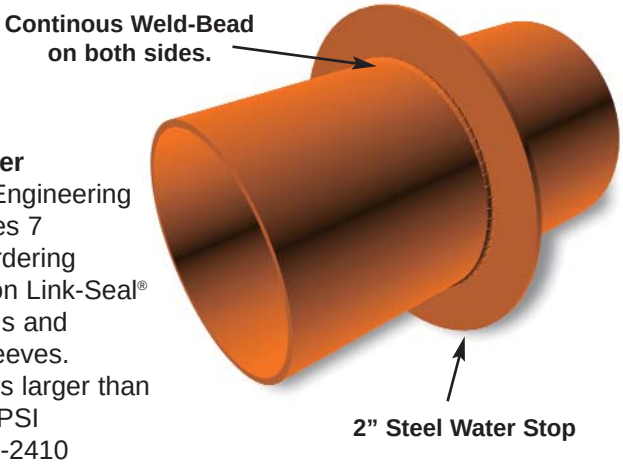
- WALL SLEEVE
- SLEEVE NOMINAL
- STEEL WALL THICKNESS
- STEEL
- LENGTH IN INCHES

QTY.	PIPE SIZE & TYPE	PIPE O.D.	LINK-SEAL® MODEL NO.	WALL SLEEVE MODEL	LOCATION OR TAG NO.

VISIT WWW.LINKSEAL.COM FOR LITERATURE, CAD DRAWINGS & INSTALLATION TECHNIQUES

WS Steel Wall Sleeves

WS Wall Sleeves are constructed from steel and available in a wide range of diameters and lengths.
They are an excellent choice for installations where the Link-Seal® Modular Seal and WS sleeve assembly would be subject to extremely high temperatures or where fire seals are specified.



How To Order
Please see Engineering Manual Pages 7 and 24 for ordering information on Link-Seal® modular seals and WS Steel Sleeves.
For diameters larger than 24", contact PSI at 1-800-423-2410

Model WS (12" length)

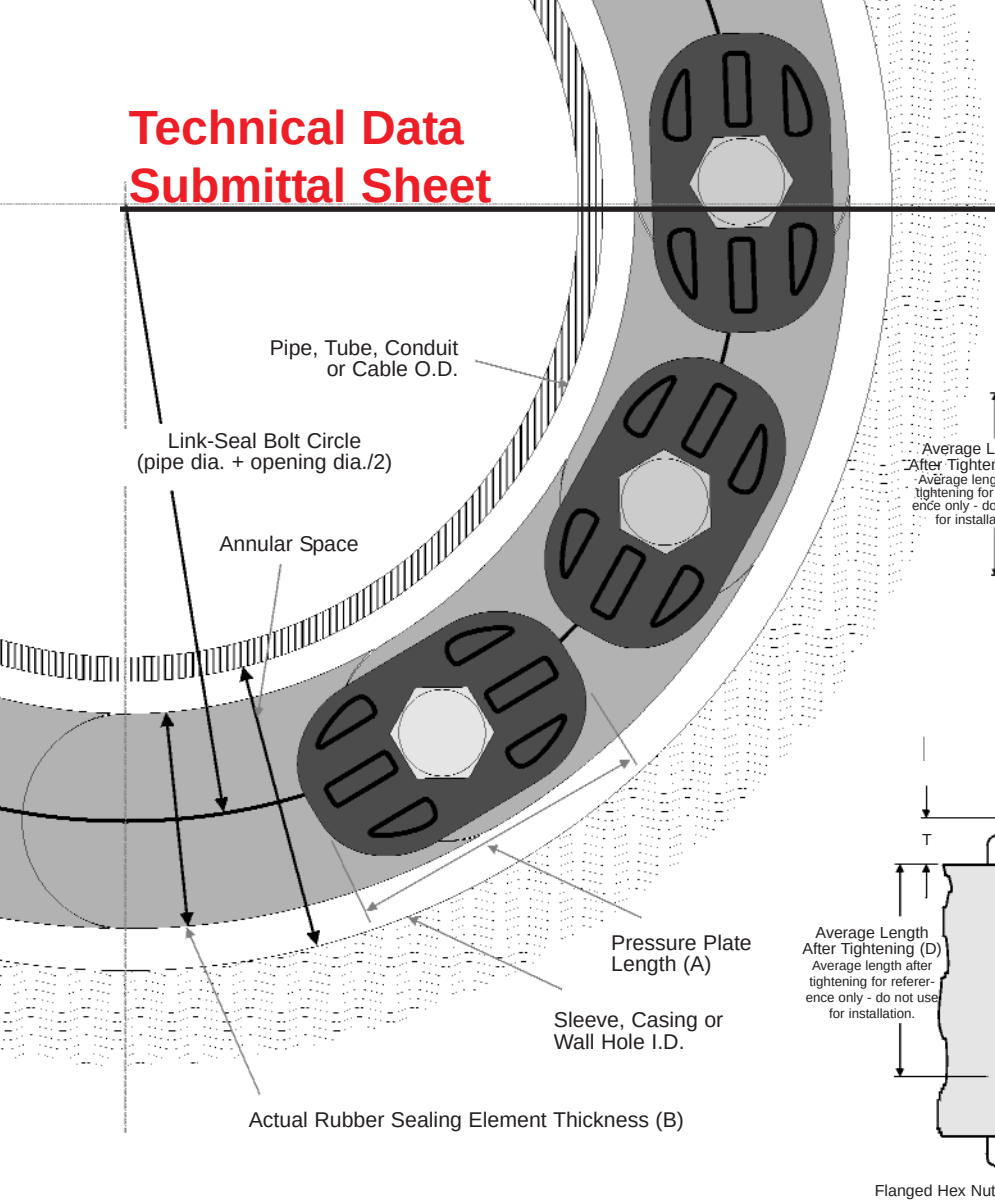
MODEL	I.D.	lbs.	Kg.
WS-2-21-S-12	1.94	5.90	2.67
WS-2-15-S-12	2.07	5.53	2.51
WS-2-1/2-27-S-12	2.32	9.78	4.43
WS-2-1/2-20-S-12	2.47	7.91	3.58
WS-3-30-S-12	2.90	12.60	5.71
WS-3-21-S-12	3.07	9.93	4.51
WS-3-1/2-22-S-12	3.55	11.70	5.31
WS-4-23-S-12	4.03	13.61	6.17
WS-5-25-S-12	5.05	17.91	8.12
WS-6-28-S-12	6.07	22.73	10.31
WS-6-18-S-12	6.25	14.82	6.72
WS-8-32-S-12	7.98	33.55	15.22
WS-8-18-S-12	8.25	21.94	9.95
WS-10-36-S-12	10.02	46.12	20.92
WS-10-25-S-12	10.25	33.67	15.27
WS-12-37-S-12	12.00	60.14	27.28
WS-14-37-S-12	13.25	62.04	28.14
WS-16-37-S-12	15.25	71.04	32.22
WS-18-37-S-12	17.25	79.98	36.28
WS-20-37-S-12	19.25	90.00	40.82
WS-22-37-S-12	21.25	98.00	44.45
WS-24-37-S-12	23.25	107.00	48.53

WS Steel Wall Sleeve Specification

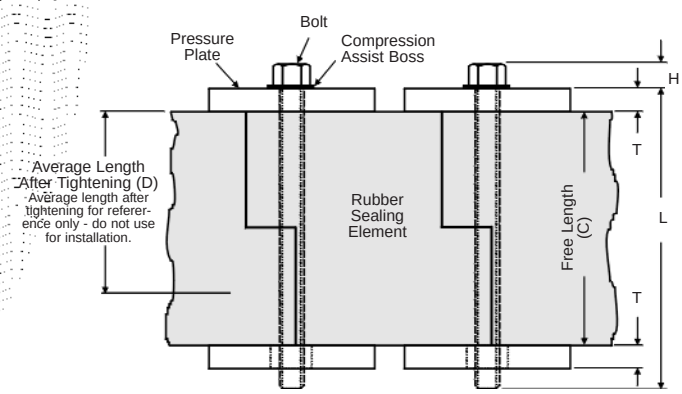
Provide WS Steel sleeves for all pipes passing through concrete or masonary structures. The WS Sleeves shall be provided free of welding slag. WS Steel Sleeve sizes though 10" shall be Schedule 40 Steel Pipe or standard wall thickness. WS Steel Sleeve sizes 12" and larger shall have a .375" or standard wall thickness. WS Sleeves through wall shall be cast in place and the pipe shall be installed centered in sleeve. The 2" collar, (water-stop) shall be the same type of steel as the WS sleeve. The collar shall be welded all around on both sides to the sleeve at the point on the sleeve that positions it at the mid-point of the structural wall when the sleeve is in place. The WS Steel Sleeve w/water-stop shall be primed inside and outside with Rust-o-Leum red primer #5268 or approved equivalent.

Pipeline Seal and Insulator, Inc., Houston, Texas, U.S.A shall provide WS Steel Sleeves.

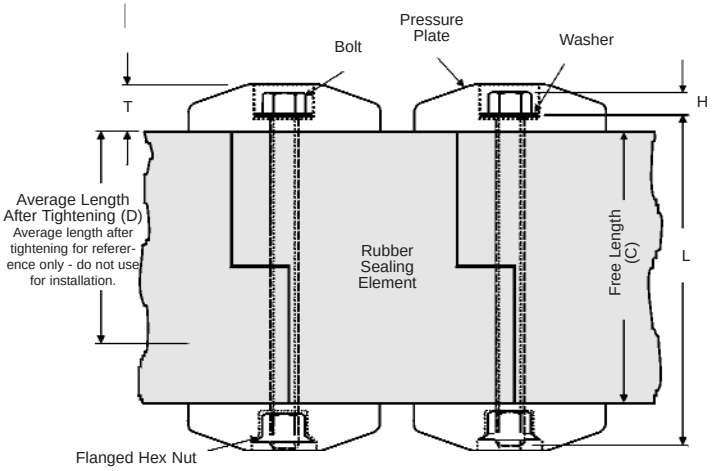
Technical Data Submittal Sheet



For LS-200 through LS-315



For LS-325 through LS-600



Dimensional Data for Models C, L, O, S-316 and OS-316 (Dimensions in inches except as noted)

LINK-SEAL MODEL NO.	RUBBER SEALING ELEMENT			PRESSURE PLATE		BOLT				WEIGHT FOR 10 LINK SECTION (LBS)	MIN. REQUIRED SEATING WIDTH
	ACTUAL THICKNESS (B)	FREE LENGTH (C)	AVG. LENGTH AFTER TIGHTENING (D)	(A)	(T)	HEX ACROSS FLATS	(H)	THREAD SIZE	(L)		
LS-200-C	0.48	1.75	1.38	1.06	0.31	M5 (slotted hex)	0.18	M5	2.50	0.75	2.25
LS-275-C	0.61	1.75	1.38	0.90	0.31	M5 (slotted hex)	0.18	M5	2.50	0.85	2.25
LS-300-C	0.69	2.37	1.87	1.50	0.44	0.50	0.22	5/16-18	3.50	2.10	3.00
LS-315-C	0.81	2.37	1.87	1.44	0.44	0.50	0.22	5/16-18	3.50	3.00	3.00
LS-325-C	0.88	2.63	2.00	3.13	1.00	0.50	0.22	5/16-18	4.50	5.50	4.00
LS-340-C	1.00	2.70	2.25	1.52	0.67	0.50	0.22	5/16-18	4.50	3.40	4.00
LS-360-C	1.24	2.70	2.25	2.05	0.77	0.50	0.22	5/16-18	4.50	5.00	4.00
LS-400-C	1.38	3.50	2.75	3.50	1.06	0.56	0.25	3/8-16	5.00	12.00	5.00
LS-410-C	1.43	3.37	2.87	2.52	0.88	0.56	0.25	3/8-16	5.00	8.20	5.00
LS-425-C	1.06	3.00	2.25	3.50	1.19	0.56	0.25	3/8-16	5.00	10.00	5.00
LS-475-C	1.56	3.38	2.63	2.63	0.88	0.56	0.25	3/8-16	5.00	10.00	5.00
LS-500-C	2.25	3.75	2.75	3.63	1.06	0.75	0.34	1/2-13	5.50	22.50	5.00
LS-525-C	2.06	3.75	2.87	3.63	1.06	0.75	0.34	1/2-13	5.50	21.00	5.00
LS-575-C	1.81	3.75	3.00	3.00	1.00	0.75	0.34	1/2-13	5.50	15.50	5.00
LS-600-C	3.09	4.00	3.00	6.00	1.90	29.6mm	12.8mm	M20X2.5	180mm	60.60	6.00

Link-Seal® Modular Seal Model Properties

with EPDM Seal Elements

EPDM (Black)
EPDM (Blue) Low Durometer

Model "C" or "L" Link-Seal Modular Seal

Suitable for use in water, direct ground burial and atmospheric conditions. Provides electrical isolation where cathodic protection is required.
Type: Standard
Seal Element: EPDM (Black) or EPDM (Blue)
Pressure Plates: Reinforced Nylon Polymer
Bolts & Nuts: Steel with 2-part Zinc Dichromate & proprietary corrosion inhibiting coating.
Temp. Range: -40 to +250ºF (-40 to +121ºC)*

Model "S-316" Link-Seal Modular Seal

For chemical processing & waste water treatment. EPDM rubber is resistant to most inorganic acids and alkalis, some organic chemicals (acetone, alcohol, ketones).
Type: Stainless
Seal Element: EPDM (Black) or EPDM (Blue)
Pressure Plates: Reinforced Nylon Polymer
Bolts & Nuts: 316 Stainless Steel
Temp. Range: -40 to +250ºF (-40 to +121ºC)*

* = Sustained operation near temperature limits may affect life expectancy.

with Nitrile Seal Elements

Nitrile (Green)

Model "O" Link-Seal Modular Seal

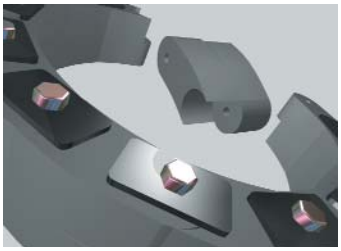
Nitrile rubber is resistant to oils, fuel and many solvents (gasoline, motor oil, kerosene, methane, jet fuel, hydraulic fluid, water, etc.).
Type: Oil Resistant
Seal Element: Nitrile (Green) Note: Not U.V resistant.
Pressure Plates: Reinforced Nylon Polymer
Bolts & Nuts: Steel with 2-part Zinc Dichromate & proprietary corrosion inhibiting coating.
Temp. Range: -40 to +210ºF (-40 to +99ºC)*

Model "OS-316" Link-Seal Modular Seal

Combination of oil resistant rubber and stainless steel hardware.
Type: Oil Resistant
Seal Element: Nitrile (Green) Note: Not U.V resistant.
Pressure Plates: Reinforced Nylon Polymer
Bolts & Nuts: 316 Stainless Steel
Temp. Range: -40 to +210 ºF (-40 to +99ºC)*

* = Sustained operation near temperature limits may affect life expectancy.

with Silicone Seal Elements



Silicone (Grey)

Model "T" Link-Seal Modular Seal

Silicone rubber is ideal for temperature extremes. The "T" model is the one hour Factory Mutual approved.
Type: High/Low Temperature
Seal Element: Silicone (Grey)
Pressure Plates: Steel Zinc Dichromate
Bolts: Steel with 2-part Zinc Dichromate & proprietary corrosion inhibiting coating.
Temp. Range: -67 to +400ºF (-55 to +204ºC)*

Model "FD/FS" Link-Seal Modular Seal

Double seal for added protection.
Type: Fire Seals
Seal Element: Silicone (Grey)
Pressure Plates: Steel zinc dichromate
Bolts: Steel with 2-part Zinc Dichromate proprietary corrosion inhibiting coating.
Temp. Range: -67 to +400ºF (-55 to +204ºC)*

NOTE: Sustains a constant temp. of 325ºF. (163º C.)
* = Sustained operation near temperature limits may affect life expectancy.

Material Properties of Link-Seal Modular Seal Elements

PROPERTY	ASTM METHOD	EPDM (EPDM L)	NITRILE	SILICONE
Hardness (shore A)	D-2240	50 ±5 (40 ±5)	50 ±5	50 ±5
Tensile	D-412	1450 psi	1300 psi	860 psi
Elongation	D-412	400%	300%	250%
Compression Set	S-395	15% 22 hrs. @ 158ºF (70ºC)	45% 22 hrs. @ 212ºF (100ºC)	40% 22 hrs. @ 350ºF (177ºC)
Specific Gravity	D-297	1.10	1.42	1.40

Material Properties of Composite Pressure Plates

PROPERTY	ASTM METHOD	VALUE
Izod Impact - Notched	D-256	2.05 ft-lb/in
Tensile Strength @ Yield	D-638	20,000 psi
Tensile Strength - Break	D-638	20,250 psi
Flexural Strength @ Yield	D-790	30,750 psi
Flexural Modulus	D-790	1,124,000 psi
Elongation, Break	D-638	11.07%
Specific Gravity	D-792	1.38
Moisture Content	--	0.18%

Bolt & Nut Specifications

Standard: Carbon Steel
Carbon steel, zinc dichromated per ASTM B633, with an additional corrosion inhibiting proprietary organic coating. (passes 1470 hour salt spray test)
Tensile Strength = 60,000 psi, minimum.

Option: Stainless Steel
ANSI Type = 316, Per ASTM F593-95
Tensile Strength = 85,000 psi, average.

PSI-Thunderline/Link-Seal®
6525 Goforth Street, Houston TX 77021 U.S.A.
Tel: 713-747-6948, Fax: 713-747-6029, Toll Free: 800-423-2410
www.linkseal.com, e-mail: info@psipsi.com

Submittal LS-10/05

Weiss Temperature/Pressure Plugs allows for quick efficient and accurate testing of hydronic pipe lines throughout HVAC systems. Offered in both nordel (blue cap) for hot and chilled water and neoprene (red cap) for natural gas, Weiss plugs are consistently rated at 1000 PSI. The self-sealing core insures long life and continuous service.

TEST PLUGS

CAT. NO.	NPT SIZE	BODY & CAP	PLUG CORE	LAG EXT	MAX TEMP
BP25-NP	1/4"	BRASS	NEOPRENE	—	200˚F
BP25-NR	1/4"	BRASS	NORDEL	—	275˚F
BP25L-NP	1/4"	BRASS	NEOPRENE	1-3/4"	200˚F
BP25L-NR	1/4"	BRASS	NORDEL	1-3/4"	275˚F
BP50-NP	1/2"	BRASS	NEOPRENE	—	200˚F
BP50-NR	1/2"	BRASS	NORDEL	—	275˚F
BP50L-NP	1/2"	BRASS	NEOPRENE	1-1/2"	200˚F
BP50L-NR	1/2"	BRASS	NORDEL	1-1/2"	275˚F


BP25-NP


BP25L-NR


BP50-NR

TEST PLUG ACCESSORIES

CAT. NO	DESCRIPTION
GA18	Gauge adaptor with 1/8" 304SS probe (probe guard included)
GA16	Gauge adaptor with 1/16" 304SS probe (probe guard included)
ES25	Cap Retainer Strap 1/4"
RS50	Cap Retainer Strap 1/2"


RS25


GA18

INSTRUMENT ACCESSORIES

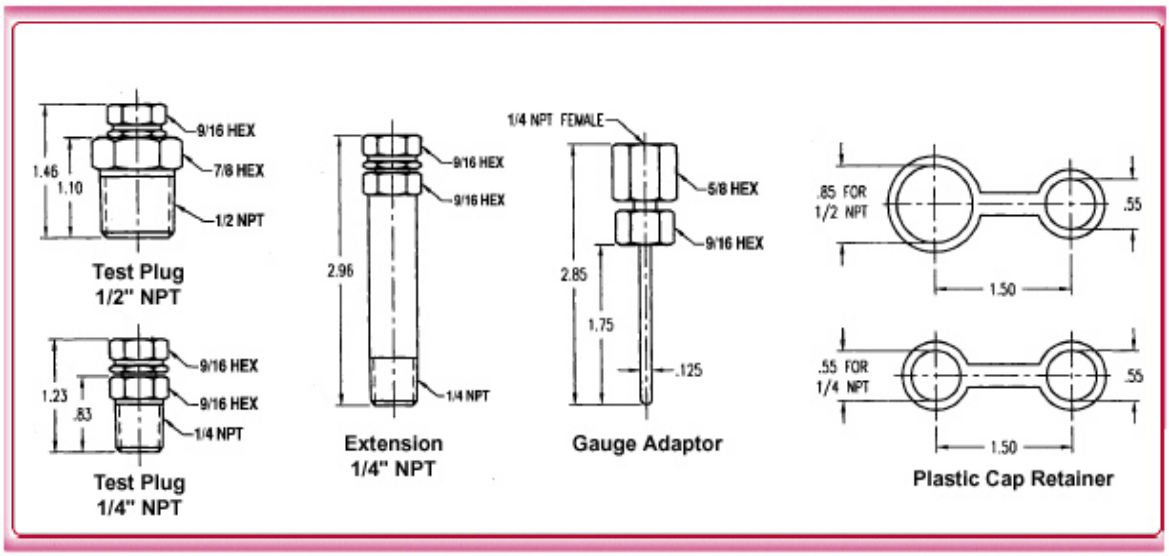
CAT. NO	DESCRIPTION
PT220	Pocket test 1" dial thermometer 0-220˚F
PT125	Pocket test 1" dial thermometer 25-125˚F
DP300	Pocket test digital thermometer 0-300˚F
TL25-030-4L	Pressure gauge 0-30 PSI
TL25-060-4L	Pressure gauge 0-60 PSI
TL25-100-4L	Pressure gauge 0-100 PSI
TL25-160-4L	Pressure gauge 0-160 PSI
TL25-200-4L	Pressure gauge 0-200 PSI

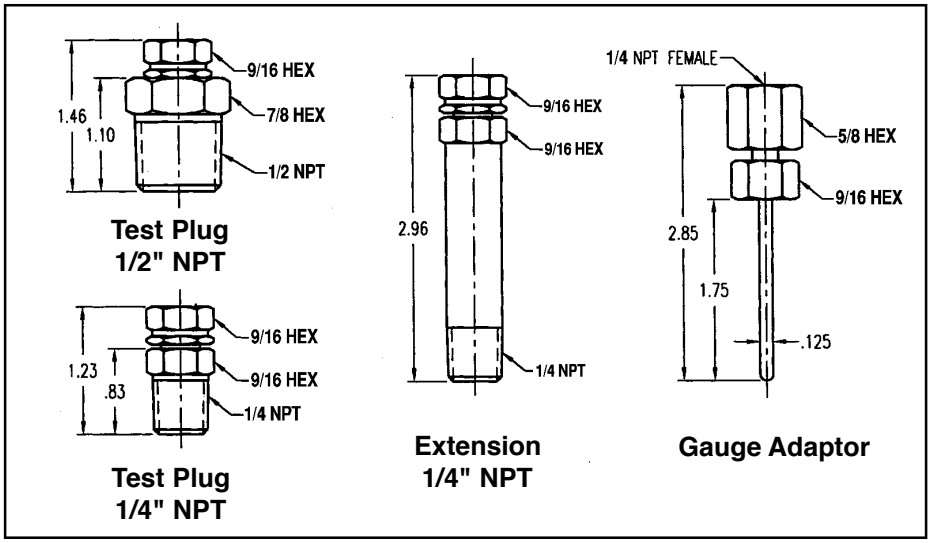

PT220


TL25-100-4L

TEST KIT

CAT. NO	DESCRIPTION
TPK	Carrying Case includes (1) TL25-030-4L; (1) TL25-160-4L (1) PT220 (1) GA18





TEST PLUGS

CAT. NO.	NPT SIZE	BODY&CAP	PLUG CORE	LAG EXT	MAX TEMP
BP25-NP	1/4"	BRASS	NEOPRENE	—	200F
BP25-NR	1/4"	BRASS	NORDEL	—	275F
BP25L-NP	1/4"	BRASS	NEOPRENE	1 3/4"	200F
BP25L-NR	1/4"	BRASS	NORDEL	1 3/4"	275F
BP50-NP	1/2"	BRASS	NEOPRENE	—	200F
BP50-NR	1/2"	BRASS	NORDEL	—	275F

TEST PLUG ACCESSORIES

CAT. NO.	DESCRIPTION
GA18	Gauge adaptor w/ 1/8" 304SS probe (probe guard included)
GA16	Gauge adaptor w/1/16" 304SS probe (probe guard included)

TEST KIT

CAT. NO.	DESCRIPTION
TPK	Carrying Case includes (1) TL25-030-4L (1) TL25-160-4L (1) PT220 (1) GA18

QTY.	CAT. NO.	TAG

CUSTOMER _____

PROJECT _____

ENGINEER _____

PRO or P.O. NO. _____

WEISS INSTRUMENTS, INC.
HOLTSVILLE, NEW YORK 11742

DESCRIPTION:

Temperature / Pressure Plugs

DRAWN BY: DATE: DRAWING:

Brimar
IDENTIFICATION & SAFETY PRODUCTS

Product Information Bulletin

64 Outwater Lane, Garfield, NJ 07026 973-340-7889 1-800-274-6271 fax: 973-340-7809

E-Z Pipe Markers

Material:
Extended life vinyl film, high gloss dimensionally stable, 4 mils thick.

Use:
Pressure sensitive pipe label.

Special properties:
This product is printed with weather resistant inks and therefore suitable for both indoor and outdoor applications.

Adhesive:
Acrylic pressure sensitive, application 1.5 mil

Outdoor durability:
5-8 years mid-continental United States

Water Resistance:
Excellent

Chemical Resistance:
Good except for strong solvents.

Storage Stability:
2 years 70° 50% RH

Service Temperature:
-40°F to 170°F. Minimum application temp. 36°F.

Specification Compliance:
Meets ANSI & ASME Standards A13.1-1981.

Note:
Matching directional flow arrows or Arrow banding tape required to completely conform to ANSI A13.1-1981

Standard Colors:
Yellow, Blue, Green, Red, White, Black and Orange
(Color matching available).

STYLE 1XSM

HOT WATER RETURN

FOR PIPE O.D. OF 3/4" - 1-1/4"
MARKER SIZE: 1-1/8" X 4"
CHARACTER SIZE: 1/2"

STYLE 1SM

HOT WATER RETURN

FOR PIPE O.D. OF 1-1/2"- 2-3/8"
MARKER SIZE: 1-1/2" X 8"
CHARACTER SIZE: 3/4"

STYLE 1

HOT WATER RETURN

FOR PIPE O.D. OF 2-1/2"- 6"
MARKER SIZE: 2-1/4" X 14"
CHARACTER SIZE: 1-1/4"

STYLE 1LG

HOT WATER RETURN

FOR PIPE O.D. OF 6-1/8""- 10"
MARKER SIZE: 4" X 24"
CHARACTER SIZE: 2-1/2"

STYLE 1XLG

HOT WATER RETURN

FOR PIPE O.D. OVER 10"
MARKER SIZE: 4" X 32"
CHARACTER SIZE: 3-1/2"

BRIMAR PIPE MARKERS MEET ANSI SIZE SPECIFICATIONS

OUTSIDE DIAMETER OF PIPE	LENGTH OF COLOR FIELD	SIZE OF LETTERS
3/4" - 1 1/4"	8 inches	1/2 inch
1 1/2" - 2"	8 inches	3/4 inch
2 1/2" - 6"	12 inches	1 1/4 inch
8" - 10"	24 inches	2 1/2 inch
OVER 10"	32 inches	3 1/2 inch

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

JOB: _____ **CONTRACTOR:** _____

Brimar
IDENTIFICATION & SAFETY PRODUCTS

Product Information Bulletin

64 Outwater Lane, Garfield, NJ 07026 973-340-7889 1-800-274-6271 fax: 973-340-7809

Premium & Arrow Banding Tapes

Brimar tapes conform to OSHA and ANSI color codes and complete the E-Z pipe marking system by establishing 360º color banding or 360º color & directional flow banding.

Material:
Extended life vinyl film, high gloss dimensionally stable, 4 mil thick, line mounted.

Use:
Pressure sensitive pipe marking.

Special Properties:
This product is printed with weather resistant inks and therefore suitable for both indoor and outdoor applications.

Size:
Width: 1", 2", & 4"
Length: 30 Yards

Adhesive:
Acrylic pressure sensitive, application 1.7 mil.

Outdoor Durability:
5 years mid-continental United States.

Water Resistant:
Excellent

Chemical Resistant:
Good except for strong solvents.

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San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

☐ Premium Banding Tape
☐ Arrow Banding Tape

Storage Stability:
2 Years 70º F 50% RH

Conformance:
Meets ANSI & ASME color codes for pipe identification.

Standard Colors:
Yellow, Green, Blue, Red,
White, Black.

JOB: _____ **CONTRACTOR:** _____

Brimar
IDENTIFICATION & SAFETY PRODUCTS

Product Information Bulletin

64 Outwater Lane, Garfield, NJ 07026 973-340-7889 1-800-274-6271 fax: 973-340-7809

Brimar Detectable Underground Warning Tapes

Use:
Detectable warning tape for the protection, location and identification of underground utility installations.

Material:
Solid Aluminum foil core with an imprinted warning legend that is completely encased to prevent ink rub-off. Thickness is a nominal 4.5 mil overall construction.

Special properties:
Constructed of materials that are impervious to acids, alkalis and other destructive elements found in soil. The imprint is such that it allows for total reflectivity of the background and imprinted legend.

Elongation:	**90%**
Tensil Strength (Transverse):	**5,530 psi**
Tensile Strength (Longitudial):	**4,544 psi**

Test Method: ASTM-D-882, Method A

Specification Compliance:
All Warning tapes shall be specified and supplied in accorndance with the APWA Nation Color Code, requiring a black ink message against a high-intensity, color coded background along with the appropriate legend to define the type of utility line it protects.

Standard Colors:
Yellow, Blue, Green, Red, and Orange

Standard Sizes:
3” x 1000’ and 6” x 1000’

Conforms to the following Specifications:

-D.O.T. Office of Pipeline Safety USAS B31.8

-NTSB PSS-73-1.

-API RP 1109

-GSA Public Buildings Service Guide

-American Gas Association 72-D-56

-OSHA 1926.956 (c) (1)

-APWA Uniform Color Code

-Federal Gas Safety Regulation S 192-321 (e)

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210.349.5244 Phone
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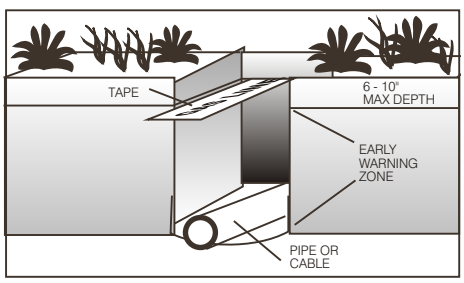

A typical excavator starts with a shallow cut to mark the spot and check for obstructions. for maximum early benefit this tape should be buried no deeper than 6-10" below grade. The wider the tape the greater the detection capabilities and visibility.

JOB: _____ **CONTRACTOR:** _____

Brimar
IDENTIFICATION & SAFETY PRODUCTS

Product Information Bulletin

64 Outwater Lane, Garfield, NJ 07026 973-340-7889 1-800-274-6271 fax: 973-340-7809

Brimar System #1 Pipe Markers

Brimar System #1 Mechanical Pipe Markers Conform to ANSI A13.1-1981 Scheme for the Identification of Piping Systems.

Apply in seconds. Just uncoil and snap around pipe. No pipe preparation necessary. No need for banding or taping. Directional flow arrows included. 360° visibility (visible from every angle).

Product Description:
Brimar System #1 Pipemarkers (sizes A-E) are thermoformed, coiled, vinyl printed sheets. Brimar System #1 (sizes F-H) are flat vinyl printed sheets which attach to pipe using nylon ties.

Use:
For marking all varieties of pipe, especially unclean surfaces.

Physical Properties:

Width:	Size A&B	8" LONG
	Size C,D,E,F	12" LONG
	Size G	24" LONG
	Size H	32" LONG
Thickness:	Size A&B	.015 THICK
	Size C,D,E	.025 THICK
	Size F,G,H	.015 THICK
Gloss:	135 Units (20 °F Test)	

NYLON TIES

36" for size F
48" for sizes G-H

Chemical Resistance:
Excellent resistance to most petroleum solvents and low apliphatic alcohols

Water Resistance:
Excellent

Service Temperature:

All Sizes	Without adhesive strip -20°F 120°F With use of adhesive strip -20°F 150°F System #1 is not recommended for use in environments or on pipes constantly above 150°F

Expected Exterior Life:
Five years, Mid Continental United States.

Storage Stability:
Indefinite shelf life at conditions of 70°F (21°C) and 60% RH.

Compliance:
System #1 meets or exceeds ANSI A13.1 guidelines for length, color and letter height.

Standard Colors:
White, Yellow, Green, Blue, Red, Orange, Black. (Color matching available).

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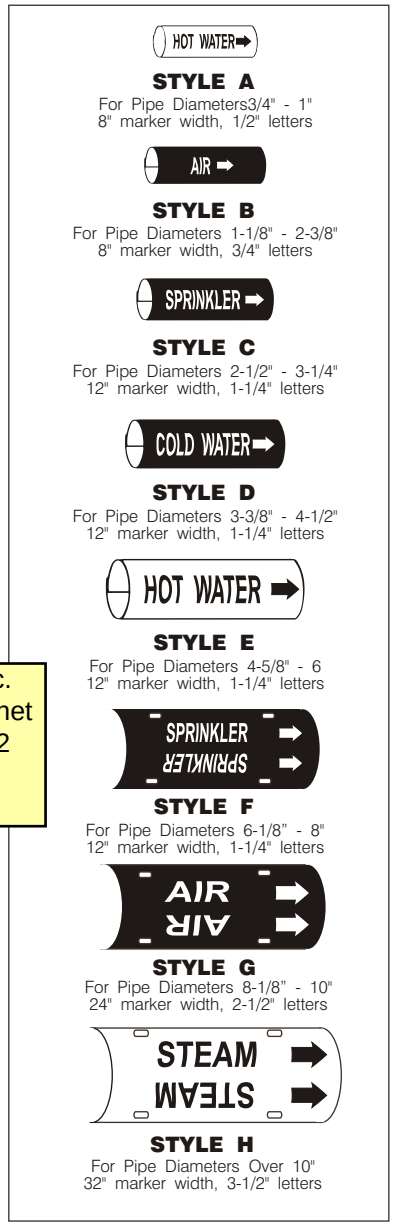


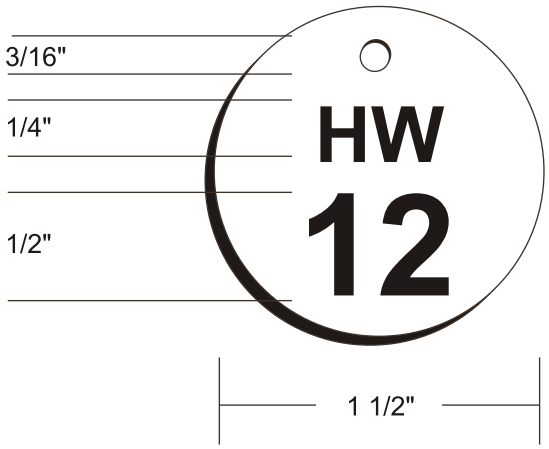
JOB: _____ **CONTRACTOR:** _____

Brimar
IDENTIFICATION & SAFETY PRODUCTS

Product Information Bulletin

64 Outwater Lane, Garfield, NJ 07026 973-340-7889 1-800-274-6271 fax: 973-340-7809

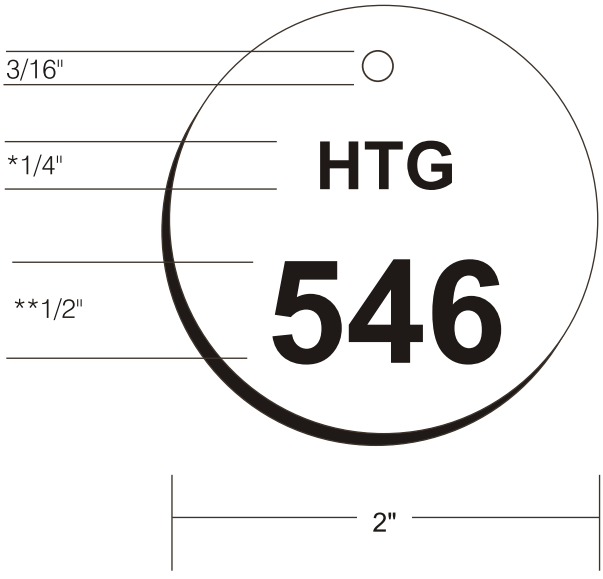
Custom Brass Valve Tags



Valve Tags:
Dia. 1.5" & 2.0"
Gauge: 19 (brass)

Valve Tag Fasteners:
- ☐ METER SEALS
- ☐ #16 BRASS JACK CHAIN
- ☐ #6 BRASS BEADED CHAIN (4 1/2")
- ☐ NYLON TIES (6.0")
- ☐ BRASS "S" HOOKS

Shapes & Sizes:
- ☐ ROUND 1 1/2"
- ☐ SQUARE 1 1/2"
- ☐ ROUND 2"
- ☐ SQUARE 2"
- ☐ TRIANGLE 2"
- ☐ OCTAGON 2"



* ALSO AVAILABLE 1/2" LETTERS
** ALSO AVAILABLE 1/4" NUMBERS

Specification Compliance:
Meets ANSI & ASME Standards A13.1-1981

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JOB: _____ **CONTRACTOR:** _____

Brimar
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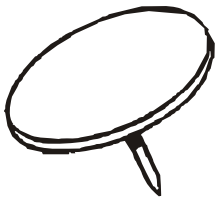
Product Information Bulletin

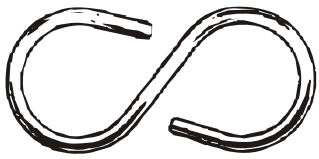
64 Outwater Lane, Garfield, NJ 07026 973-340-7889 1-800-274-6271 fax: 973-340-7809

Accessories



CEILING TACKS ☐

Use Ceiling Tacks on accessible ceilings to indicate the location of balancing cocks, volume dampers, fire dampers and other concealed mechanical items that may require service or adjustments.



SOLID BRASS "S" HOOKS ☐
STAINLESS STEEL "S" HOOKS ☐

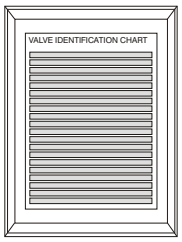
Easy to use. Just put "S" hook through object you wish to attach and close "S" hook. Order by package. 100 "S" hooks per package. Ships full packages only.

LEAD SEALS ☐

Copper or Stainless Steel Wire. The tamper resistant way to attach tags. 4 ply 10 inches in length in both copper or Stainless Steel. 100 per package. Ship full packages only.

VALVE CHART FRAMES ☐

Use Valve Chart frames to carry and display your valve tag charts. This rugged aluminum extruded frame comes with a clear plastic window. Holds 8-1/2" x 11" valve tag charts.

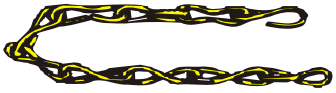


STEEL STAMPS ☐

Make your own valve tags by using our blank brass tags and steel stamps to make the impression. Simply place blank valve tag on a hard surface, place steel stamp on the blank tag and strike with hammer.

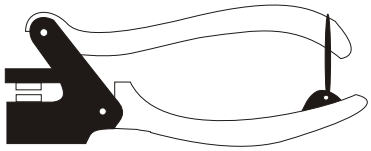
#16 SOLID BRASS JACK CHAIN ☐
#16 STAINLESS STEEL JACK CHAIN ☐

Approximately 25 links per 12". Approximately 12" is enough to fasten one tag.



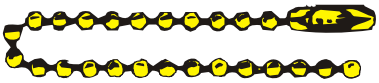
HAND SEALING PRESS ☐

Crimp your lead seals with Brimar's Hand seal press. Quick and permanent.



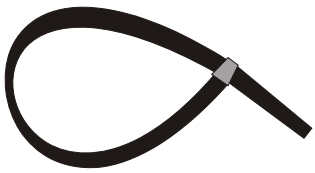
4-1/2" BRASS BEADED CHAIN ☐
4-1/2" STAINLESS STEEL BEADED CHAIN ☐

#6 Stainless Steel. Flexible 4.5" bead chain and locking link. 100 chains per package. Shipped in full packages only.



6" NYLON TIES ☐

One piece of nylon tie provides easy fastening of valve tags without tools. 100 pieces per package. Full packages only.



JOB: _____ **CONTRACTOR:** _____

For Residential and Commercial Applications

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

Approval _____ Representative LWA

Series N55B-M1

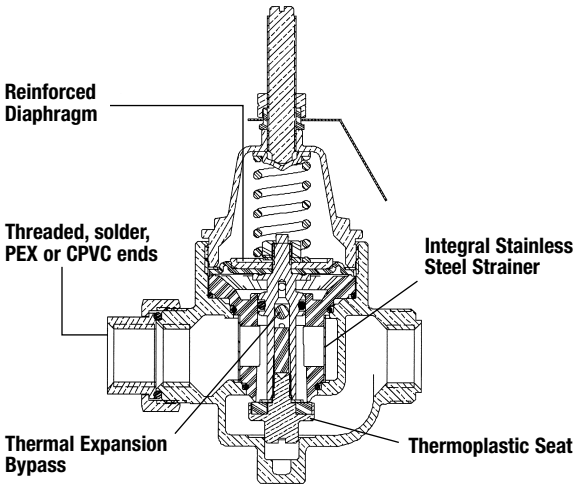
Water Pressure Reducing Valves*

Sizes: ½" – 1" (15 – 25mm)

Series N55B-M1 Water Pressure Reducing Valves are designed to reduce incoming water pressure to a sensible level to protect plumbing system components and reduce water consumption. This series is suitable for water supply pressures up to 400psi (27.6 bar) and may be adjusted from 25 to 75psi (172 – 517kPa). The standard setting is 50psi (345kPa). All parts are quickly and easily serviceable without removing the valve from the line. The standard bypass feature permits the flow of water back through the valve into the main when pressures, due to thermal expansion on the outlet side of the valve, exceed the pressure in the main.

Features

- Double union inlet & outlet connections (option DU)
- Integral stainless steel strainer
- Thermoplastic seat
- Bronze body construction
- Serviceable in line
- Bypass feature controls thermal expansion pressure**
- Sealed spring cage on all models for waterworks pit installations



Models

N55B-M1	NPT threaded female inlet x NPT female outlet
N55BU-M1	NPT threaded union inlet x NPT female outlet
N55BU-S-M1	Solder union inlet x NPT female outlet
N55BDU-M1	Double Union – NPT threaded union female inlet and outlet
N55BDU-S-M1	Double Union – Solder union inlet and outlet
N55BDU-PEX-M1	Double Union – PEX union inlet and outlet
N55BDU-CPVC-M1	Double Union – CPVC union inlet and outlet

Specifications

Standard Specifications: A Water Pressure Reducing Valve with integral strainer shall be installed in the water service pipe near its entrance to the building where supply main pressure exceeds 60psi (413 kPa) to reduce it to 50psi (345 kPa) or lower. The valve shall feature a bronze body suitable for water supply pressures up to 400psi (27.6 bar). Provision shall be made to permit the bypass flow of water around the valve back into the main when pressures, due to thermal expansion on the outlet side of the valve, exceed the pressure in the main. Water Pressure Reducing Valve with built-in bypass check valves will be acceptable. Approved valve shall be listed to ASSE 1003 and IAPMO and certified to CSA B356. Valve shall be a Watts Regulator Company Series N55B-M1.

*** A water saving test program concluded that reducing the supply pressure from 80 – 50psi (551 – 346kPa) resulted in a water savings of 30%.**

**** Bypass will not work if inlet pressure is above 150psi (10.34 bar).**

Lead Free Specifications: A Water Pressure Reducing Valve with integral strainer shall be installed in the water service pipe near its entrance to the building where supply main pressure exceeds 60psi (413 kPa) to reduce it to 50psi (345 kPa) or lower. The valve shall feature a bronze body where suitable for water supply pressures up to 400psi (27.6 bar). The combined metal components of the valve contacted by potable water shall contain less than one half of one percent (0.5%) lead by weight. Provision shall be made to permit the bypass flow of water around the valve back into the main when pressures, due to thermal expansion on the outlet side of the valve, exceed the pressure in the main. Water Pressure Reducing Valve with built-in bypass check valves will be acceptable. Approved valve shall be listed to ASSE 1003 and IAPMO and certified to NSF 61-8 and CSA B356. Valve shall be a Watts Regulator Company Series LF N55B-M1.

Larry Wunsch & Associates, Inc.
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San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

WATTS®

Materials

Body:	Bronze
Seat:	Thermoplastic
Cage:	Bronze
Integral Strainer:	Stainless steel
Diaphragm:	Reinforced EPDM
Valve Disc:	Elastomer

Pressure — Temperature

Temperature Range: 33°F – 180°F (5°C – 82°C)
Maximum Working Pressure: 400psi (27.6 bar)
Adjustable Reduced Pressure Range: 25 – 75psi (172 – 517kPa)
Standard Reduced Pressure Setting: 50psi (345kPa)

Standards

Meets requirements of ASSE Standard 1003; (ANSI A112.26.2) and CSA Standard B356. Certified by NSF to ANSI/NSF Standard 61-8 (LF N55B-M1 Models only). Listed by IAPMO and City of Los Angeles.

Options

Add Suffix

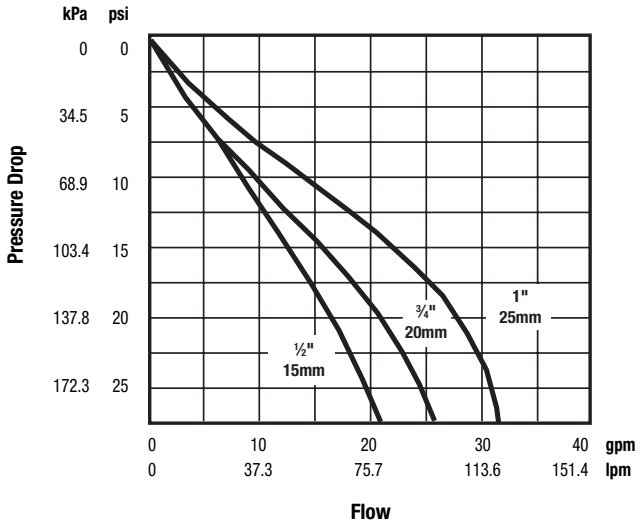
G	Gauge tapping
GG	Gauge tapping and 160psi (11 bar) gauge
LP	Low Pressure Range 10-35psi (69-241kPa)

Add Preffix

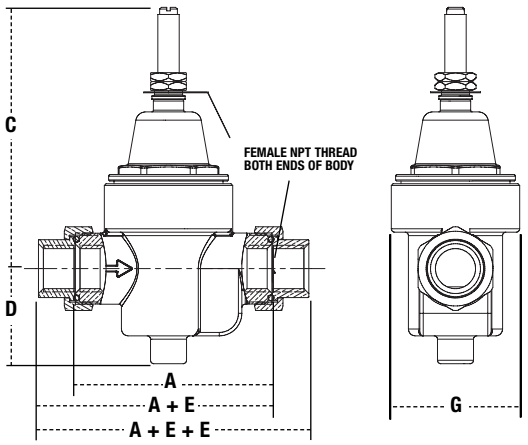
LF	Lead Free† construction

†The combined metal components of this product contacted by potable water contain less than one half of one percent (0.5%) of lead by weight.

Capacity



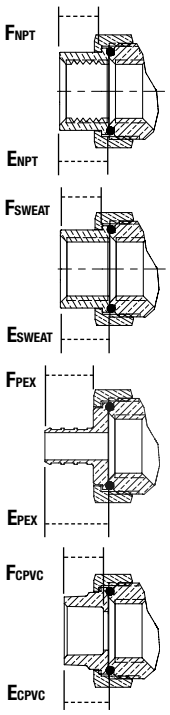
Dimensions – Weights



ABOVE VALVE SHOWN WITH SINGLE NPT UNION CONNECTION ON INLET

VALVES MAY BE ORDERED WITH 0,1,OR 2 UNION CONNECTIONS USING ANY COMBINATION OF NPT, SOLDER, PEX OR CPVC CONNECTIONS REQUIRED

"F" DIMENTIONS ARE APPROXIMATE ENGAGEMENT LENGTHS.



SIZE (DN)		DIMENSIONS																				WEIGHT	
		A		C		D		ENPT		ESWEAT		EPEX		ECPVC		FNPT		FSWEAT		FPEX		FCPVC		G			
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	lbs	kg
½	15	3 7/16	88	4 9/16	116	1 11/16	43	5/8	16	5/8	15	13/16	21	9/16	15	1/2	13	1/2	13	5/8	16	1/2	13	2 1/4	57	1.5	.68
¾	20	3 7/16	88	4 9/16	116	1 11/16	43	5/8	16	7/8	21	15/16	24	13/16	21	9/16	14	3/4	19	5/8	16	3/4	18	2 1/4	57	1.5	.68
1	25	4 1/8	105	4 9/16	116	1 11/16	43	3/4	20	1	26	1 1/8	29	1 1/16	26	11/16	17	15/16	23	13/16	21	15/16	23	2 1/4	57	1.75	.79

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210.349.5244 Phone
210.349.6129 Fax

ISO 9001 CERTIFIED

Water Safety & Flow Control Products

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

Submittal Data Information

101-005

Pressure Reducing Valves, Dual Controls

Numbers: 329, 329T, 335, 334, 334T **Supersedes:** October 1, 1989 Effective: January 1, 2003

Job: _____ Engineer: _____ Contractor: _____ Rep: _____

ITEM NO.	MODEL NO.	

Features

- Fast Fill Rate on All Models.
- Exclusive Fast Fill Lever Lock.
- Built-In Check to Prevent Emptying the System if Incoming Pressure Fails.
- Adjustable Set Pressure of 10 to 25 psi.
- Pressure Setting Adjustment Separated from Fast Fill Lever for Easy, Fast Adjustment.

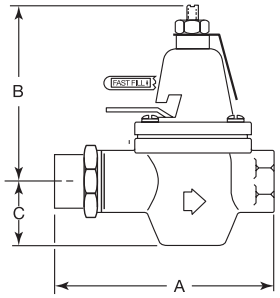
Purpose

To automatically feed water to a system whenever pressure in the system drops below the pressure setting of the valve. The Dual Control combines the Boiler Feed Valve with an in-line Pressure Relief Valve connected at the outlet end.

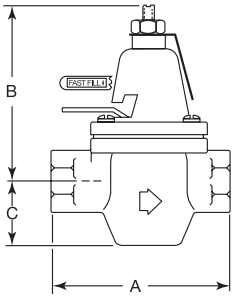
Pressure Reducing Valves Dimensions & Weights

		A		B		C		Ship Wt.		Ship Wt. Ctn. 6	
Model	Material	in.	mm	in.	mm	in.	mm	lbs.	Kg	lbs.	Kg
329	Cast Iron	4-1/4	108	3-3/4	95	1-3/8	35	2.4	1.4	30	14
329-T	Cast Iron	4-3/8	111	3-3/4	95	1-3/8	35	2.4	1.4	30	14
335	Bronze	3-3/4	95	3-3/4	95	1-3/8	35	2.4	1.4	30	14

Models 329 & 329-T



Model 335



Performance Data
Pressure Reducing Valves

Maximum Fluid Temperature: 212°F (100°C)

Maximum Supply Side Pressure: 100 psi (689kpa)

Set Pressure Range: 10 - 25 psi (69 - 172kpa)

Factory Setting of System Side: 12 psi (83kpa)

Performance Data
Dual Controls

Maximum Fluid Temperature: 212°F (100°C)

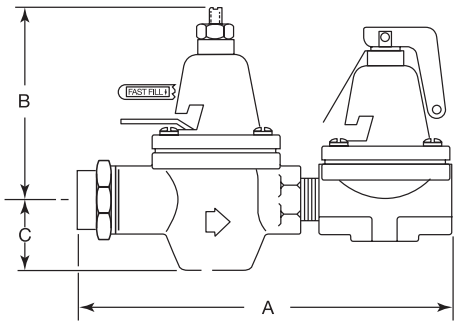
Maximum Supply Side Pressure: 100 psi (689kpa)

Relief Valve Set to Release at: 30 psi (207kpa)

Dual Controls Dimensions & Weights

		A		B		C		Ship Wt.		Ship Wt. Ctn. 6	
Model	Material	in.	mm	in.	mm	in.	mm	lbs.	Kg	lbs.	Kg
334	Cast Iron	7-1/4	184	3-3/4	95	1-3/8	35	3.9	1.8	24	11
334-T	Cast Iron	7-3/8	187	3-3/4	95	1-3/8	35	3.9	1.8	24	11

Models 334 & 334-T



Connection Sizes

Model 329: 1/2" Sweat Union Inlet, 1/2" NPT Outlet

Model 329-T: 1/2" NPT Union Inlet, 1/2" NPT Outlet

Model 335: 3/4" NPT Union Inlet, 3/4" NPT Outlet

Model 334: 1/2" Sweat Union Inlet, 1/2" NPT Outlet

Model 334-T: 1/2" NPT Union Inlet, 1/2" NPT Outlet

Do it Once. Do it Right.

Taco, Inc., 1160 Cranston Street, Cranston, RI 02920 Telephone: (401) 942-8000 Fax: (401) 942-2360
Taco (Canada), Ltd., 6180 Ordan Drive, Mississauga, Ontario L5T 2B3 Telephone: (905) 564-9422 Fax: (905) 564-9436

Visit our website at: www.taco-hvac.com

For Residential and Commercial Applications

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

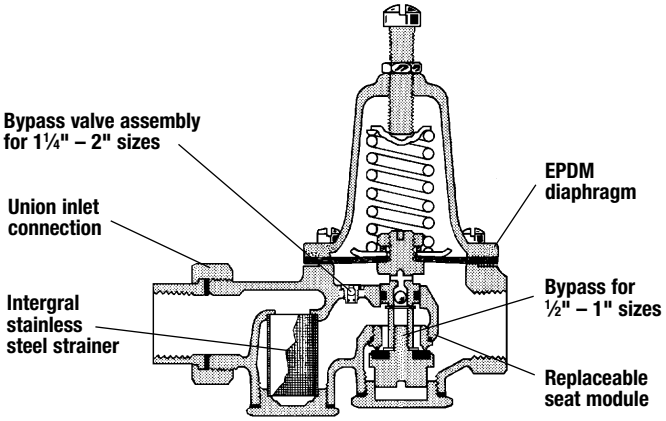
Approval _____ Representative LWA

Series 25AUB-Z3

Water Pressure Reducing Valves*

Sizes: ½" – 2" (15 – 50mm)

Series 25AUB-Z3 Water Pressure Reducing Valves are designed to reduce incoming water pressure to a sensible level to protect plumbing system components and reduce water consumption. This series is suitable for water supply pressures up to 300psi (21 bar) and may be adjusted from 25 – 75psi (172 – 517kPa). The standard setting is 50psi (345kPa). All parts are quickly and easily serviceable without removing the valve from the line. The standard bypass feature permits the flow of water back through the valve into the main when pressures, due to thermal expansion on the outlet side of the valve, exceed the pressure in the main.



Features

- Standard construction includes Z3 sealed spring cage and corrosion resistant adjusting & cage screws for outdoor/waterworks pit installations
- Union inlet connection
- Integral stainless steel strainer
- Replaceable seat module
- Bronze body construction
- Serviceable in line
- Bypass feature controls thermal expansion pressure**
- High temperature resistant reinforced diaphragm for hot water

Models

25AUB-Z3	NPT threaded female union inlet x NPT female outlet
25AUB-S-Z3	Solder union inlet x NPT female outlet
25AUB-DU-Z3	Double Union – NPT threaded union female inlet and outlet
25AUB-S-DU-Z3	Double Union – Solder union inlet and outlet
25AUB-DU-THDxPEX-Z3	Double Union – NPT threaded female inlet and PEX union outlet
25AUB-DU-CPVC-Z3	Double Union – CPVC union inlet and outlet
25AUB-DU-LF-Z3	Double union body less fittings

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Specifications

Standard Specifications: A Water Pressure Reducing Valve with integral strainer shall be installed in the water service pipe near its entrance to the building where supply main pressure exceeds 60psi (413 kPa) to reduce it to 50psi (345 kPa) or lower. The valve shall feature a bronze body suitable for water supply pressures up to 300psi (21 bar). Provision shall be made to permit the bypass flow of water around the valve back into the main when pressures, due to thermal expansion on the outlet side of the valve, exceed the pressure in the main. Water Pressure Reducing Valve with built-in bypass check valves will be acceptable. Approved valve shall be listed to ASSE 1003 and IAPMO and certified to CSA B356. Valve shall be a Watts Regulator Company Series 25AUB-Z3.*

A water saving test program concluded that reducing the supply pressure from 80-50psi (551-346kPa) resulted in a water savings of 30%.

**** Bypass will not work if inlet pressure is above 150psi (10.34 bar).**

Lead Free Specifications: A Water Pressure Reducing Valve with integral strainer shall be installed in the water service pipe near its entrance to the building where supply main pressure exceeds 60psi (413 kPa) to reduce it to 50psi (345 kPa) or lower. The valve shall feature a bronze body where suitable for water supply pressures up to 300psi (21 bar). The combined metal components of the valve contacted by potable water shall contain less than one half of one percent (0.5%) lead by weight. Provision shall be made to permit the bypass flow of water around the valve back into the main when pressures, due to thermal expansion on the outlet side of the valve, exceed the pressure in the main. Water Pressure Reducing Valve with built-in bypass check valves will be acceptable. Approved valve shall be listed to ASSE 1003 and IAPMO and certified to CSA B356. Valve shall be a Watts Regulator Company Series LF 25AUB-Z3.

WATTS® REGULATOR

Materials

Body:	Bronze
Seat:	½"-1" (15-25mm) Replaceable engineered polymer (10% glass filled Noryl®)
	1¼"-2" (32-50mm) Replaceable stainless steel
Integral Strainer:	Stainless steel
Diaphragm:	Reinforced EPDM
Valve Disc:	EPDM

Note: for LP models where application temperatures exceed 160°F (71°C), but not over 180°F (82°C), a Teflon® protector should be added to sizes 1¼"-2" (32-50mm).

Pressure – Temperature

Temperature Range: 33°F - 160°F (5°C - 71°C)
Maximum Working Pressure: 300psi (21 bars)
Adjustable Reduced Pressure Range: 25-75psi (172 - 517kPa)
Standard Reduced Pressure Setting: 50psi (345kPa)

Options

Add Suffix

G	Gauge tapping, 1/8"
GG	Gauge tapping and 160psi (11 bar) gauge
HP	High pressure range 75-125psi (5.27 – 8.79 bar)
LP	Low pressure range 10-35psi (69 – 241 kPa)
Z7	400psi (28 bar) initial pressure, 1⁄2" (20mm) models only

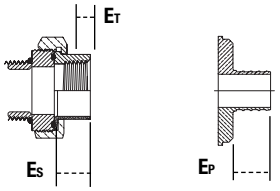
Add Prefix

LF	Lead Free† construction

†The combined metal components of this product contacted by potable water contain less than one half of one percent (0.5%) of lead by weight.

Noryl® is a registered trademark of General Electric Company.
Teflon® is a registered trademark of E.I. Dupont de Nemours & Company.

Dimensions — Weights



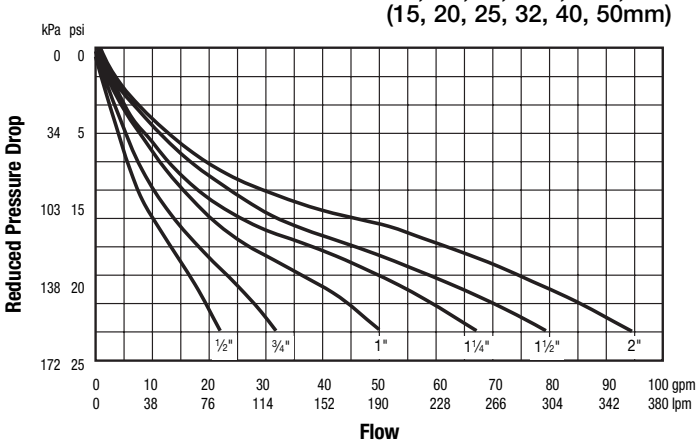
A - 25AUB-Z3
A1 - 25AUB-S-Z3
A2 - 25AUB-DU-LF-Z3
B - 25AUB-DU-Z3
B1 - 25AUB-S-DU-Z3
B2 - 25AUB-DU-THDxPEX-Z3
ET - NPT Engagement for tight joint
ES - Female sweat socket depth
EP - PEX end connection

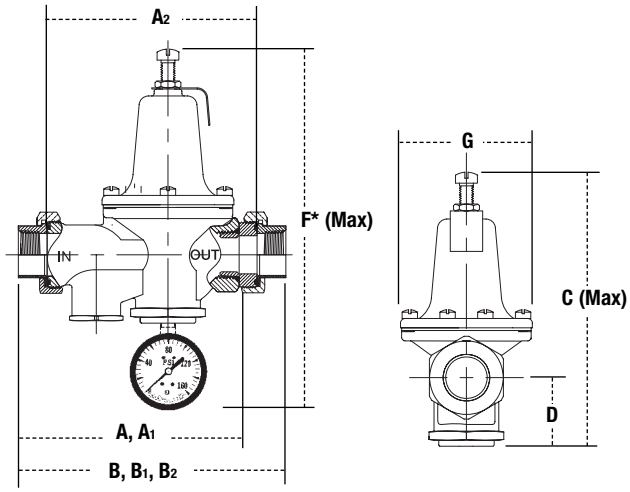
Standards

Meets requirements of ASSE Standard 1003: (ANSI A112.26.2: CSA Standard B356; Southern Standard Plumbing Code and listed by IAPMO.
Military Standard MIL-V-18146B Type I.

Capacity

Sizes: ½", ¾", 1", 1¼", 1½", 2" (15, 20, 25, 32, 40, 50mm)





SIZE (DN)		DIMENSIONS											
		A		A1		A2		B		B1		B2	
in	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*
½	15	5⅜	137	5 5⁄16	135	5 3⁄16	132	6 7⁄16	164	6⅜	162	–	–
¾	20	5 5⁄16	135	5½	140	5¼	133	6½	165	6⅞	175	6¾	171
1	25	6	152	6¼	159	5⅞	149	7⅜	187	7 13⁄16	198	7 11⁄16	195
1¼	32	8¾	222	8 15⁄16	227	8¼	210	10¾	273	11	279	–	–
1½	40	8¾	222	9	229	8¼	210	10¾	273	11 3⁄16	284	–	–
2	50	9¾	235	10	254	8¾	222	11 5⁄16	287	12 11⁄16	322	–	–

DIMENSIONS												WEIGHT	
C		D		F *		G		ET		ES		EP			
in.	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*in*	*mm*	*lbs.*	*kg.*
7	178	1½	38	9 7⁄16	240	3⅛	79	½	13	½	13	–	–	3.5	1.6
7	178	1½	38	9 7⁄16	240	3⅛	79	½	13	¾	19	⅝	16	3.5	1.6
8	203	1¾	44	10 7⁄16	266	3⅝	92	⅝	16	15⁄16	23	13⁄16	21	6.5	3.0
9	229	2⅛	54	11 7⁄16	291	3⅝	92	⅝	16	1	25	–	–	10	4.5
9½	241	2⅜	60	11 15⁄16	304	4 1⁄16	103	⅝	16	1 1⁄16	28	–	–	10	4.5
11¼	286	3¼	83	13 11⁄16	348	4¾	121	⅝	16	1 5⁄16	34	–	–	15	6.8

* Dimension includes optional gauge

WATTS® REGULATOR

ISO 9001 CERTIFIED

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

HV

Section IV
Heating Boilers

10 Series
Hot Water Boiler Safety Relief Valves

10 Series

10-102
10-303

10-104
10-301

10-321

10-407 & 10-417

10-408
10-418

10-624
10-634 OEM

Brass/bronze safety relief valves protect ASME Section IV hot water heating boilers and hydronic heating systems. High capacity design features corrosion resistant construction. Brass, satin or polished chrome finishes available.

ASME Section IV
Sizes 3/4" - 1"
Set Pressure 20-150 psi
Maximum temperature service: 250°F

Applications: Ideal for use with hot water boilers and hydronic heating systems.

Features

- Pressures from 20 to 150 psig
- Registered in all Canadian provinces and territories, CRN #0G8547.5C
- Stainless steel springs standard
- 10-624/634 are ideal for use in various plumbing systems, commercial boiler applications and swimming pool heaters
- 10-418/417 are ideal for use in swimming pool heater applications

Options

- Model 10-104 and 10-301 are available with optional satin or polished chrome finish
- 10-321 in polished chrome only

Dimensions and Weights

Model Number	Size(in./*mm.*) Inlet NPT	Outlet NPT	Certified Pressure Range psig	Height (in./*mm.*)	Wt./100 (lbs./*kg.*)
10-102	3/4F *20 F*	1F *25 F*	20-60	3.94 *100*	105 *47.7*
10-104	3/4 M *20 M*	1 F *25 F*	20-60	3.75 *95*	109 *49.5*
10-301	3/4 M *20 M*	3/4 F *20 F*	20-60	3.75 *95*	114 *51.8*
10-303	3/4 F *20 F*	3/4 F *20 F*	20-60	3.94 *100*	115 *52.3*
10-321	3/4 M *20 M*	3/4 F *20 F*	20-60	3.75 *95*	123 *55.9*
10-407	3/4 M *20 M*	3/4 F *20 F*	30	3 *76*	62 *28.2*
10-408	3/4 F *20 F*	3/4 F *20 F*	30	2.75 *70*	65 *29.5*
10-417	3/4 M *20 M*	3/4 F *20 F*	20-80	3 *76*	62 *28.1*
10-418	3/4 F *20 F*	3/4 F *20 F*	20-80	2.75 *70*	65 *29.5*
10-624	3/4 M *20 M*	3/4 F *20 F*	30-150	4.62 *117*	106 *48.2*
10-634	3/4 F *20 F*	3/4 F *20 F*	30-150	4.62 *117*	106 *48.2*

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Hot Water Boiler Safety Relief Valves

ASME Section IV Hot Water

BRITISH THERMAL UNITS PER HOUR (KILOCALORIES PER HOUR) AT 10% OVERPRESSURE. NATIONAL BOARD CERTIFIED. RATINGS ARE 90% OF ACTUAL.

U.S. Customary Units Btu/Hr.							Metric Units Kcal/Hr.						
Model No.	10-102 10-104	10-301 10-303	10-321	10-407 10-408	10-417 10-418	10-624 10-634	Model No.	10-102 10-104	10-301 10-303	10-321	10-407 10-408	10-417 10-418	10-624 10-634
Set Pressure psig							Set Pressure barg						
5*	-	225,000	175,000	-	-	-	0.34	-	57	44	-	-	-
10*	-	295,000	230,000	-	-	-	0.69	-	74	58	-	-	-
15	-	365,000	285,000	-	-	-	1.03		92	72	-	-	-
20	545,000	420,000	325,000	-	377,000	-	1.38	137	106	82	-	95	-
25	625,000	485,000	375,000	-	427,000	-	1.72	158	122	95	-	108	-
30	710,000	550,000	425,000	535,000	477,000	689000	2.07	179	139	107	135	120	174
35	790,000	610,000	475,000	-	532,000	769000	2.41	199	154	120	-	134	194
40	870,000	675,000	525,000	-	587,000	848000	2.76	219	170	132	-	148	214
45	955,000	740,000	575,000	-	642,000	928,000	3.10	241	187	145	-	162	234
50	1,035,000	805,000	625,000	-	697,000	1,007,000	3.45	261	203	158	-	176	254
55	1,115,000	870,000	675,000	-	752,000	1,087,000	3.80	281	219	170	-	190	274
60	1,200,000	935,000	725,000	-	807,000	1,166,000	4.14	303	236	183	-	204	294
65	-	-	-	-	862,000	1,246,000	4.48	-	-	-	-	217	314
70	-	-	-	-	917,000	1,325,000	4.83	-	-	-	-	231	334
75	-	-	-	-	972,000	1,405,000	5.17	-	-	-	-	245	354
80	-	-	-	-	1,027,000	1,484,000	5.51	-	-	-	-	259	374
85	-	-	-	-	-	1,564,000	5.86	-	-	-	-	-	394
90	-	-	-	-	-	1,643,000	6.20	-	-	-	-	-	414
95	-	-	-	-	-	1,723,000	6.55	-	-	-	-	-	435
100	-	-	-	-	-	1,802,000	6.89	-	-	-	-	-	454
105	-	-	-	-	-	1,882,000	7.24	-	-	-	-	-	475
110	-	-	-	-	-	1,961,000	7.58	-	-	-	-	-	495
115	-	-	-	-	-	2,041,000	7.93	-	-	-	-	-	515
120	-	-	-	-	-	2,120,000	8.27	-	-	-	-	-	535
125	-	-	-	-	-	2,199,000	8.62	-	-	-	-	-	555
130	-	-	-	-	-	2,279,000	8.96	-	-	-	-	-	575
135	-	-	-	-	-	2,358,000	9.31	-	-	-	-	-	595
140	-	-	-	-	-	2,438,000	9.65	-	-	-	-	-	615
145	-	-	-	-	-	2,517,000	10.00	-	-	-	-	-	635
150	-	-	-	-	-	2,597,000	10.34	-	-	-	-	-	655

** Pressure settings below 15 psi are non-ASME Code.*

P/N Suffix Key

Set Pressure psig	Exterior Finish: Plain Brass	Satin Chrome	Polished Chrome
20	-02	-41	-67
22	-03	-42	-68
25	-04	-43	-69
30	-05	-44	-70
35	-06	-45	-71
40	-07	-46	-72
43	-08	-47	-73
45	-09	-48	-74
50	-10	-49	-75
55	-11	-50	-76
60	-12	-51	-77
65	-13		
70	-14		
75	-15		
80	-16		

ORDERING CODE:

Use two-digit suffix number to indicate set pressure and body finish. Suffix for 10-624 / 10-634 models is actual set pressure in psig.

EXAMPLE:

10-301-44 = 3/4" 10-301 set @ 30 psig, satin chrome finish.
10-624-125 = 3/4" 10-624 set @ 125 psig (plain bronze finish only)

NOTE:

- Model 10-322 available in polished chrome finish only.
- All other models are furnished with plain bronze finish.
- Model 10-104 and 10-301 available with optional satin or polished chrome finish.

For Hot Water Boiler Applications

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

Approval _____ Representative LWA

Series 174A, 374, 740

ASME Water Pressure Relief Valves

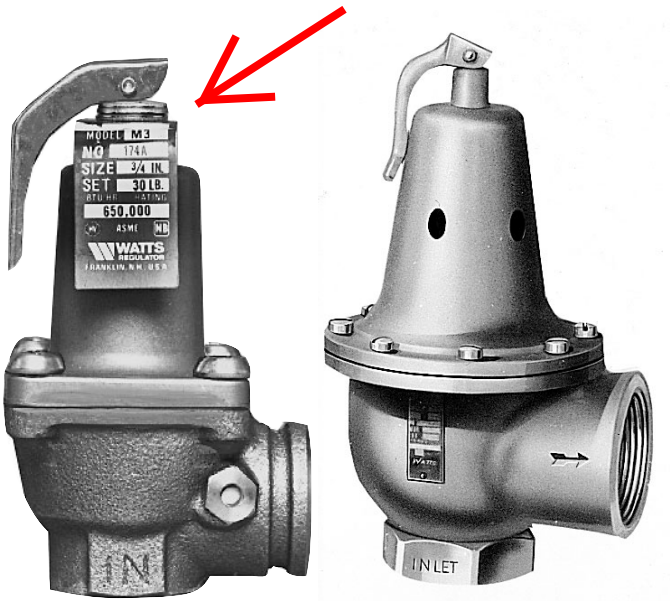
For Pressure Protection of Hot Water Heating Boilers

Sizes: ¾" – 2" (20 - 50mm)

Series 174A
Bronze body safety relief valves for pressure protection only of all types of hot water heating boiler equipment. Pressure range 30 to 150psi (2 - 10 bar) with corresponding high ratings from 650,000 to 14,370,000 BTU/hr. Female inlet and outlet connections. Sizes ¾" - 2" (20 - 50mm).

Series 374A
Iron body with forged bronze inlet, 550,000 BTU/hr rating. ¾" (20mm) only.

Series 740
Iron body with expanded outlets for hot water space heating boilers. Pressure range 30 to 75psi (2 to 5 bar) with corresponding high ratings from 925,000 to 10,700,000 BTU/hr.



Series 174A **Series 740**

Features

- Seat located above drain; water can't be trapped and sediment can't foul seat.
- Non-mechanical seat-to-disc alignment will not stick or freeze.
- Water seal of high temperature resisting material isolates spring working parts from water during relief.

Specifications

Boiler Relief Valves
An ASME Section IV certified pressure relief valve shall be installed on each boiler as noted. The valve shall have a BTU rating in excess of the BTU rating of the boiler's heating output. Each hot water space heating boiler shall be equipped with a pressure relief valve set to relieve below the maximum boiler working pressure. The valve shall feature a raised seat and non-mechanical disc alignment. Working parts and spring shall be isolated from any discharge by a high temperature resistant material. Valve shall be a Watts Regulator Company Series 174A, 374A or 740.

Operation

As thermal expansion conditions develop, pressure builds up to the setting of the relief valve. This will cause discharging of small quantity of water.

Should operating controls fail, permitting runaway firing, the boiler water may reach steam temperatures. The valve will then open to discharge steam at the rate or faster than the boiler can generate it, thus restoring system pressure to a safer level.

Important: The discharge line must be the same size as the valve outlet, and must pitch downward from the valve to a safe place for disposal.

Valve lever must be tripped at least once a year to ensure that waterways are clear. This device is designed for emergency safety relief and shall not be used as an operating control.

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

WATTS® REGULATOR

Materials

Series 174A
- Bronze body construction
- Nonmetallic disc-to-metal seating

Series 740
- Iron body construction
- Nonmetallic disc-to-metal seating

Pressure – Temperature

Series 174A
Pressure range: 30psi to 150psi (2 to 10 bar) with corresponding high BTU/hr ratings from 650,000 to 14,370,000 BTU/hr.
Maximum Temperature: 250ºF (121ºC)

Series. 374A
Pressure range: rated up to 550,000 BTU/hr at a 30psi (2 bar) setting only.

Series 740
Pressure range: 30psi to 75psi (2 to 5 bar) with corresponding high ratings from 925,000 to 10,700,000 BTU/hr.
Maximum Temperature: 250ºF (121ºC)

Standards

ASME

Tested and rated by the National Board of Boiler and Pressure Vessel Inspectors to the requirements of ASME. Meets Military Spec. MIL-V-18634B, Type I, Class 3A, Style A (Bronze Body), Style B (Iron Body).

Dimensions – Weights

Model	Size (Dn) in.	Size (Dn) mm	Height Model	Height in.	Height mm	Length in	Length mm	Weight lbs.	Weight kg.
SERIES 174A									
374A	¾ x ¾	20 x 20	–	3⅝	92	2½	64	1.13	.5
174A	¾ x ¾	20 x 20	M3	5⅛	130	2½	64	1.50	.7
174A	1 x 1	25 x 25	M1	5¾	146	3	76	3.13	1.4
174A	1¼ x 1¼	32 x 32	M1	8⅜	213	4¾	121	6.25	2.8
174A	1½ x 1½	40 x 40	M	9	229	4⅞	124	7.25	3.3
174A	2 x 2	50 x 50	M	11⅝	295	6¼	159	13.75	6.2
SERIES 740									
740	¾ x 1	20 x 25	M1	5⅝	143	3	76	1.88	9
740	1 x 1¼	25 x 32	M	7¼	184	3½	89	3.13	1.4
740	1¼ x 1½	32 x 40	M	8¾	222	4⅝	117	6.13	2.8
740	1½ x 2	40 x 50	M	9¼	235	5¼	133	7.50	3.4
740	2 x 2½	50 x 65	M	11⅝	295	6¾	171	16.50	7.5

Capacity*

BTU/hr Steam Pressure Discharge Capacities
As tested and rated by the National Board of Boiler and Pressure Vessel Inspectors

Set Pressure psi	Set Pressure bar	¾" x ¾" 20 x 20mm Model M3	1" x 1" 25 x 25mm Model M1	1¼" x 1¼" 32 x 32mm Model M1	1½" x 1½" 40 x 40mm Model M	2" x 2" 50 x 50mm Model M
SERIES 174A						
30	2.07	650,000	1,005,000	1,682,000	2,020,000	3,815,000
33	2.27	695,000	1,075,000	1,788,000	2,150,000	4,080,000
35	2.41	725,000	1,125,000	1,877,000	2,250,000	4,250,000
36	2.48	740,000	1,145,000	1,916,000	2,310,000	4,344,000
40	2.76	800,000	1,240,000	2,071,000	2,490,000	4,690,000
45	3.10	875,000	1,355,000	2,265,000	2,720,000	5,130,000
50	3.45	950,000	1,470,000	2,459,000	2,950,000	5,575,000
55	3.79	1,025,000	1,590,000	2,653,000	3,190,000	6,010,000
60	4.13	1,100,000	1,702,000	2,847,000	3,425,000	6,450,000
65	4.58	1,170,000	1,820,000	3,041,000	3,660,000	6,890,000
70	4.82	1,245,000	1,935,000	3,325,000	3,890,000	7,330,000
75	5.17	1,320,000	2,055,000	3,429,000	4,125,000	7,770,000
80	5.51	1,400,000	2,166,000	3,605,000	4,360,000	8,215,000
85	5.86	1,470,000	2,285,000	3,817,000	4,590,000	8,650,000
90	6.60	1,545,000	2,400,000	4,011,000	4,825,000	9,090,000
95	6.55	1,620,000	2,520,000	4,205,000	5,060,000	9,530,000
100	6.89	1,695,000	2,635,000	4,399,000	5,290,000	9,970,000
105	7.23	1,770,000	2,750,000	4,593,000	5,525,000	10,410,000
110	7.58	1,845,000	2,865,000	4,787,000	5,760,000	10,850,000
115	7.92	1,920,000	2,980,000	4,981,000	5,990,000	11,290,000
120	8.27	1,995,000	3,100,000	5,175,000	6,225,000	11,730,000
125	8.61	2,070,000	3,215,000	5,370,000	6,460,000	12,170,000
130	8.96	2,145,000	3,330,000	5,564,000	6,690,000	12,610,000
135	9.30	2,220,000	3,445,000	5,758,000	6,925,000	13,050,000
140	9.65	2,295,000	3,565,000	5,952,000	7,160,000	13,490,000
145	9.99	2,370,000	3,680,000	6,146,000	7,390,000	13,390,000
150	10.34	2,445,000	3,795,000	6,340,000	7,630,000	14,370,000
SERIES 740						
Set Pressure psi	Set Pressure bar	¾" x 1" 20 x 20mm Model M1	1" x 1¼" 25 x 25mm Model M	1¼" x 1½" 32 x 32mm Model M	1½" x 2" 40 x 40mm Model M	2" x 2½" 50 x 50mm Model M
30	2.07	925,000	1,300,000	2,105,000	2,900,000	5,250,000
33	2.27	989,000	1,390,000	2,250,000	3,100,000	5,613,000
35	2.41	1,032,000	1,450,000	2,345,000	3,235,000	5,855,000
36	2.48	1,053,000	1,480,000	2,395,000	3,300,000	5,975,000
40	2.76	1,139,000	1,600,000	2,590,000	3,569,000	6,461,000
45	3.10	1,245,000	1,750,000	2,830,000	3,903,000	7,067,000
50	3.45	1,352,000	1,899,000	3,075,000	4,237,000	7,672,000
55	3.79	1,459,000	2,049,000	3,315,000	4,572,000	8,277,000
60	4.13	1,566,000	2,200,000	3,560,000	4,907,000	8,833,000
65	4.58	1,672,000	2,349,000	3,800,000	5,241,000	9,488,000
70	4.82	1,779,000	2,499,000	4,045,000	5,575,000	10,093,000
75	5.17	1,886,000	2,649,000	4,285,000	5,909,000	10,700,000

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
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WATTS® REGULATOR

ISO 9001 CERTIFIED

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

ROOF SUPPORT SYSTEMS

DESIGN FEATURES

- STRONG STEEL CONSTRUCTION
- RUST PROOF (HOT DIP GALVANIZED)
- FEWER JOINTS FOR BETTER STABILITY. (ONLY 1 JOINT IN VERTICAL MEMBERS)
- NO BREAKABLE PARTS. (NO PLASTIC)
- UNAFFECTED BY AGE OR WEATHER (NO PLASTIC OR WOOD)
- 9" ***ADJUSTABLE*** BASE HEIGHT FOR FUTURE ROOF REPAIRS. (SPECIFY ALTERNATE HEIGHT)
- ***VARIABLE*** FINAL WIDTH ADJUSTMENT AVAILABLE ON DUCT SUPPORTS. (SQUEEZE DUCT FOR ADDED STABILITY).
- LIMITED 5 YEAR WARRANTY

Larry Wunsch & Associates, Inc.
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FCI

FCI MANUFACTURING 1090 RAINBOW DR SPRING BRANCH, TX 78070
1-866-4FCIMFG (1-866-432-4634) FAX 210-767-1979
info@fcimfg.com

ROOF SUPPORT SYSTEM **SPECIFICATION**

Contractor shall furnish and install complete factory pre-fabricated no-penetration roof support system, as manufactured by FCI Manufacturing or approved equal. Field fabricated supports will not be accepted.

Support bases shall be plasma cut welded steel, with 1 ½" radius corners, hot dip galvanized after fabrication. Plastic support bases will not be accepted.

Vertical members shall be galvanized and ***telescoping*** with a maximum of one (1) bolted joint. Height shall have a minimum ***adjustability*** of nine (9) inches to allow bases to be raised for future roof repairs. [Specify Alternate Height]

OPTION: Cross members on duct supports to have variable final width adjustment for added lateral stability.

Hangers, rollers and hardware shall be galvanized and/or Cadmium plated.

Contractor shall install bases on 3/8" thick Johns Manville Dyna Tred Plus roof walkway pads or equal. All supports shall be level and plumb.

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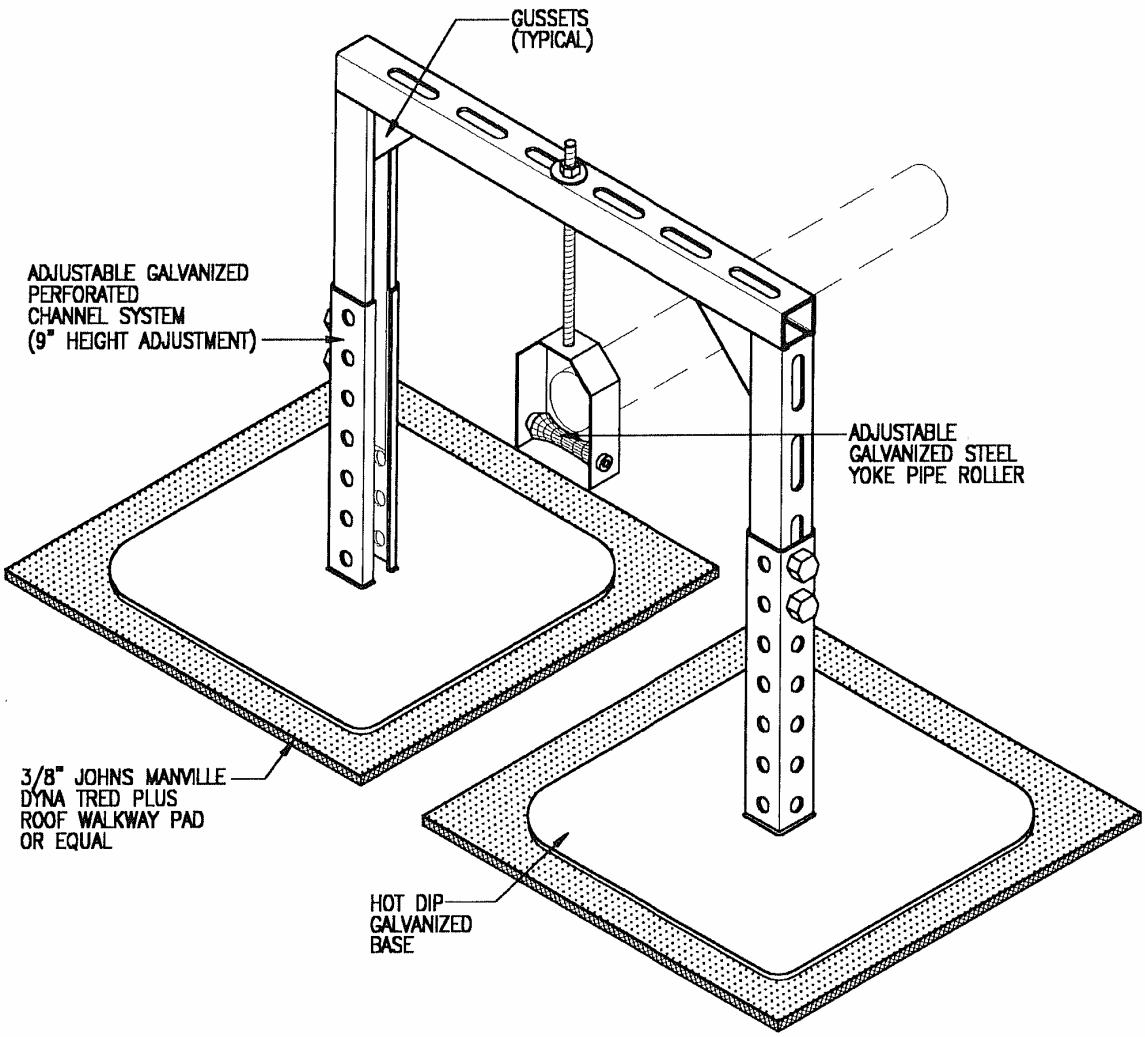
info@fcimfg.com

NO PENETRATION ROOF SUPPORT SYSTEMS

SUPPORT FOR 1 PIPE WITH ROLLER CLEVIS

MODEL NO. NP-1RC



Project:	Date:
Mechanical Engineer:	Rep:
Mechanical Contractor:	Tag:

FCI Manufacturing
1090 Rainbow Dr
Spring Branch, TX 78070
Phone: 866.4FCIMFG (866.432.4634)
Fax: 210.767.1979

REPRESENTED BY:

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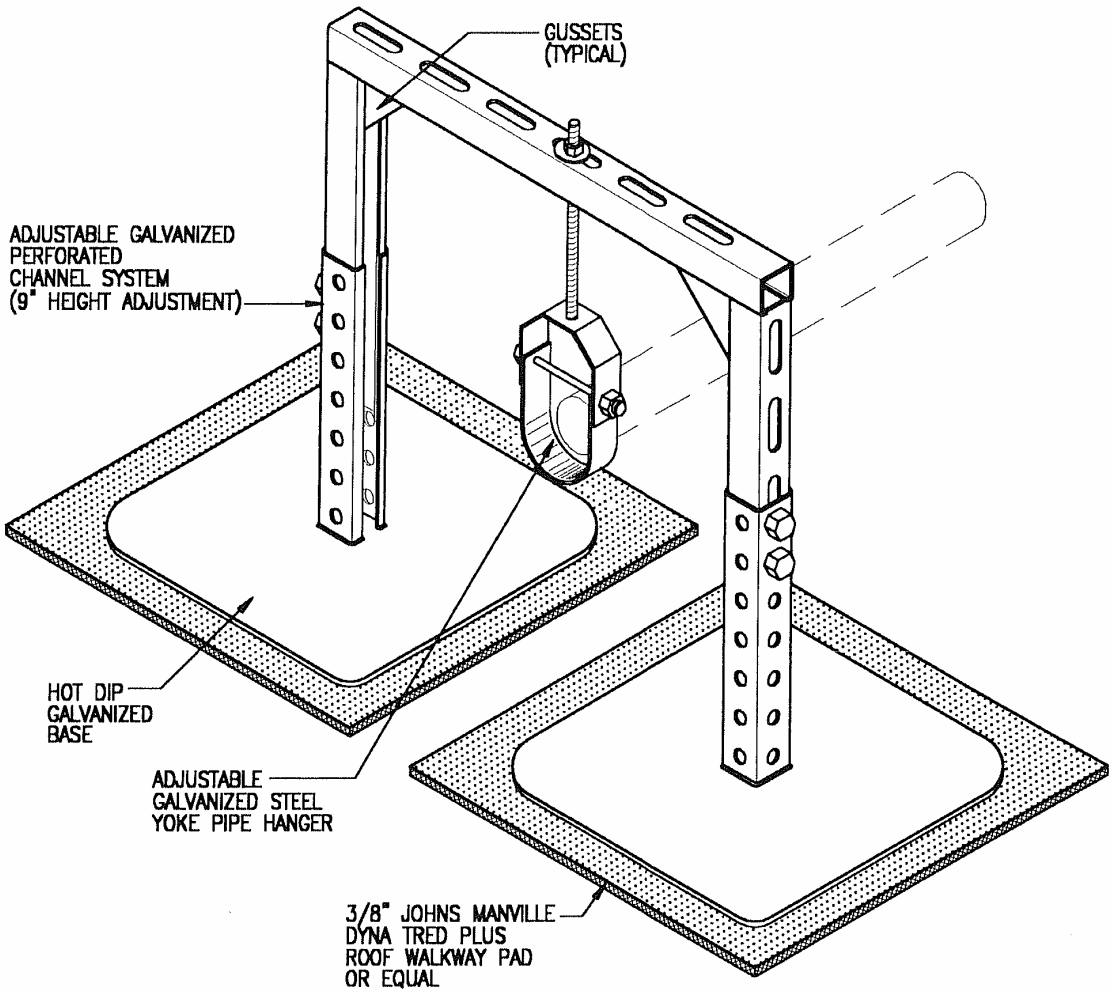
NO PENETRATION ROOF SUPPORT SYSTEMS

SUPPORT FOR PIPE WITH CLEVIS HANGER

MODEL NO. NP-1CH



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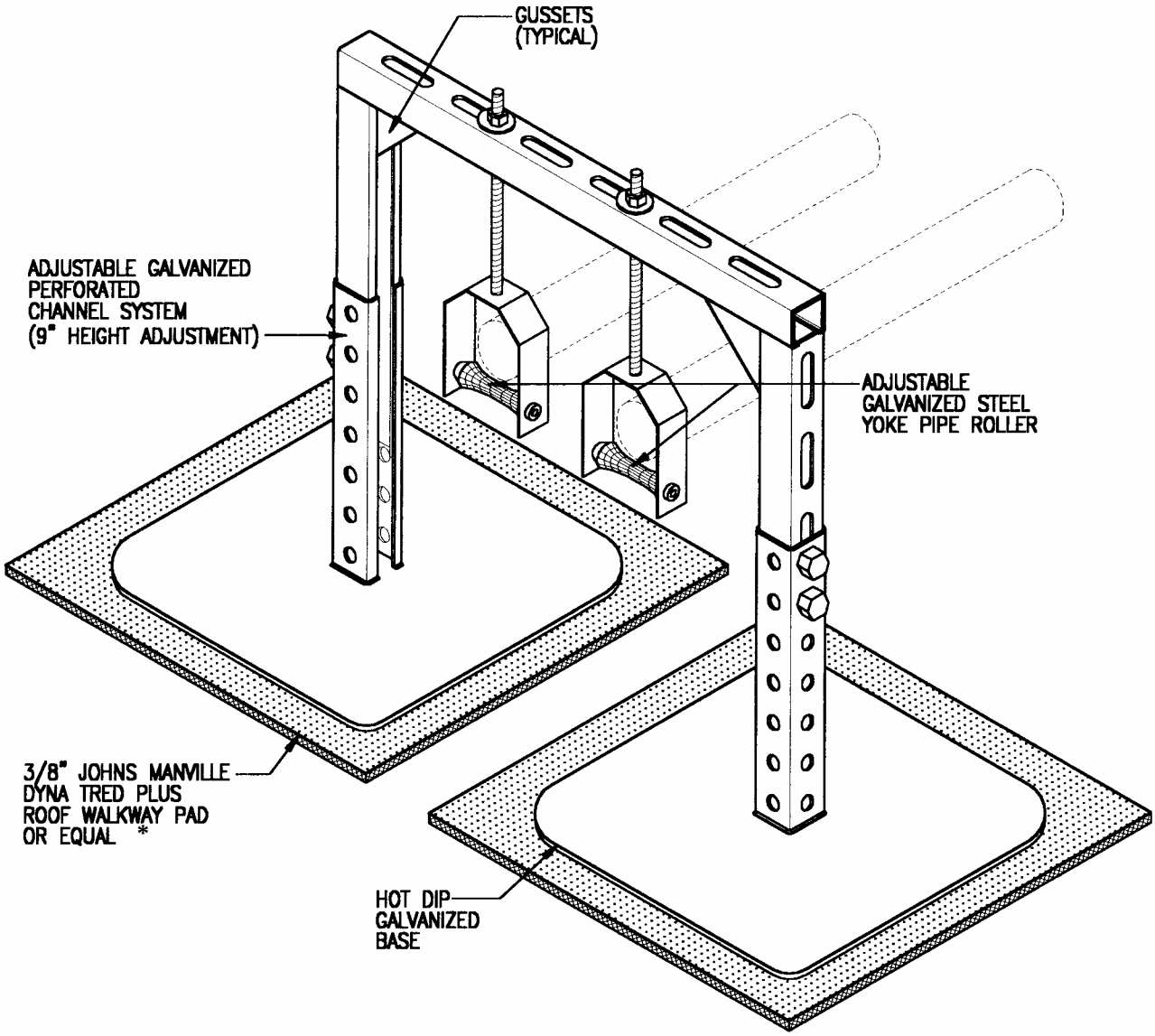
NO PENETRATION ROOF SUPPORT SYSTEMS

SUPPORT FOR 2 PIPES WITH ROLLER CLEVIS'

MODEL NO. NP - 2RC



*** Optional Accessory**

Project:	Date:
Mechanical Engineer:	Rep:
Mechanical Contractor:	Tag:

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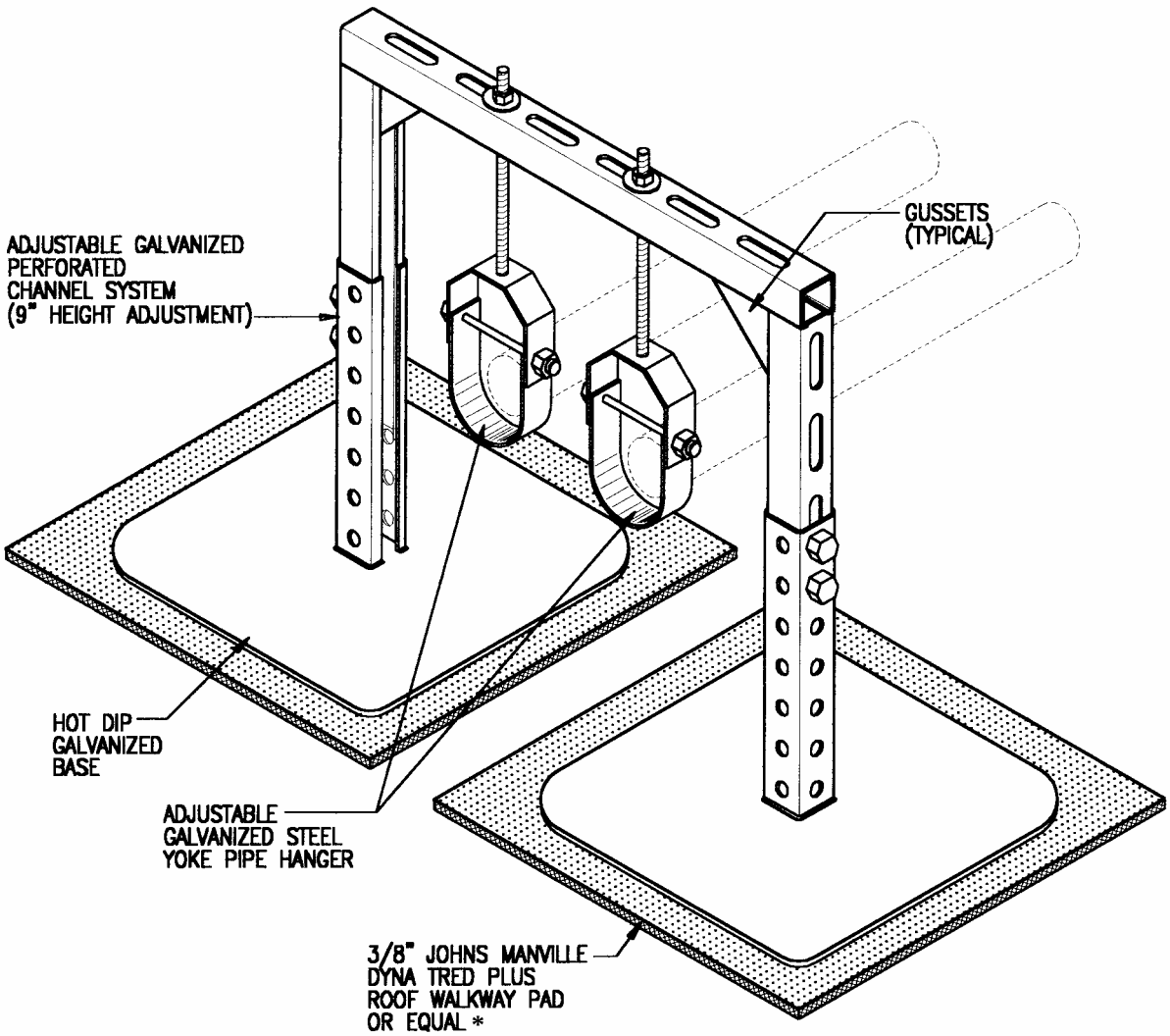
NO PENETRATION ROOF SUPPORT SYSTEMS

SUPPORT FOR 2 PIPES WITH CLEVIS' HANGERS

MODEL NO. NP - 2CH



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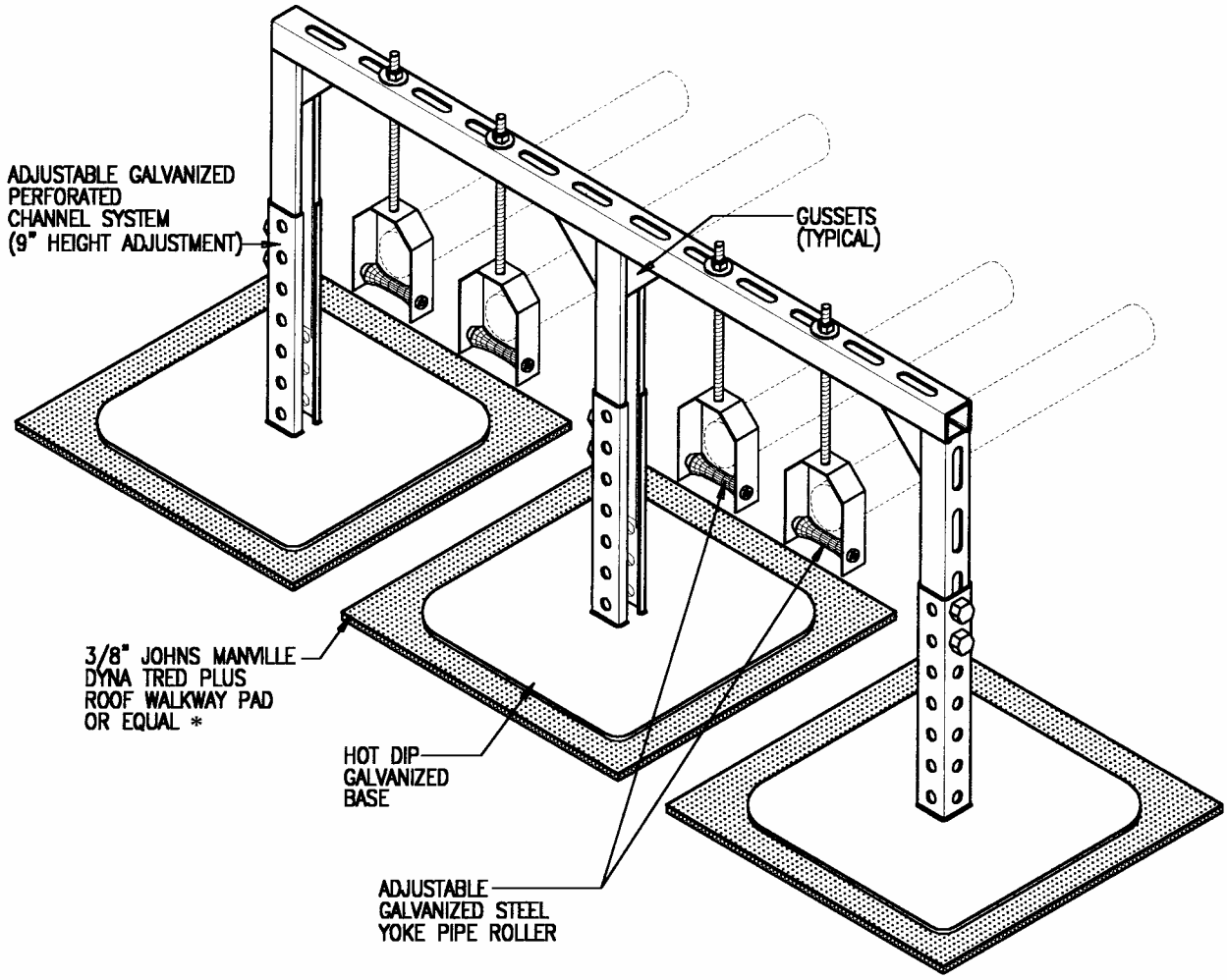
NO PENETRATION ROOF SUPPORT SYSTEMS

SUPPORT FOR 4 PIPES WITH ROLLER CLEVIS'

MODEL NO. NP - 4RC



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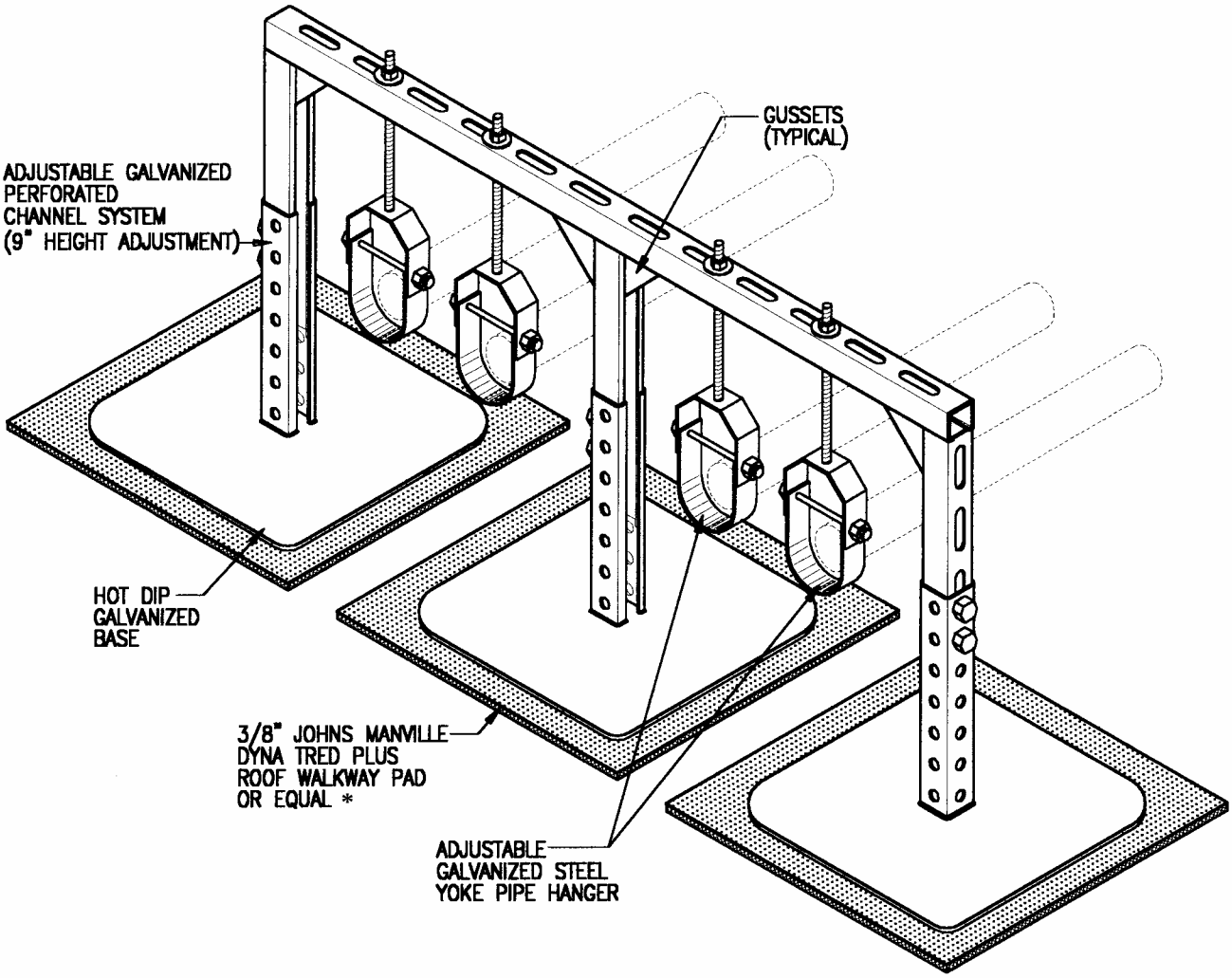
NO PENETRATION ROOF SUPPORT SYSTEMS

SUPPORT FOR 4 PIPES WITH CLEVIS' HANGERS

MODEL NO. NP - 4CH



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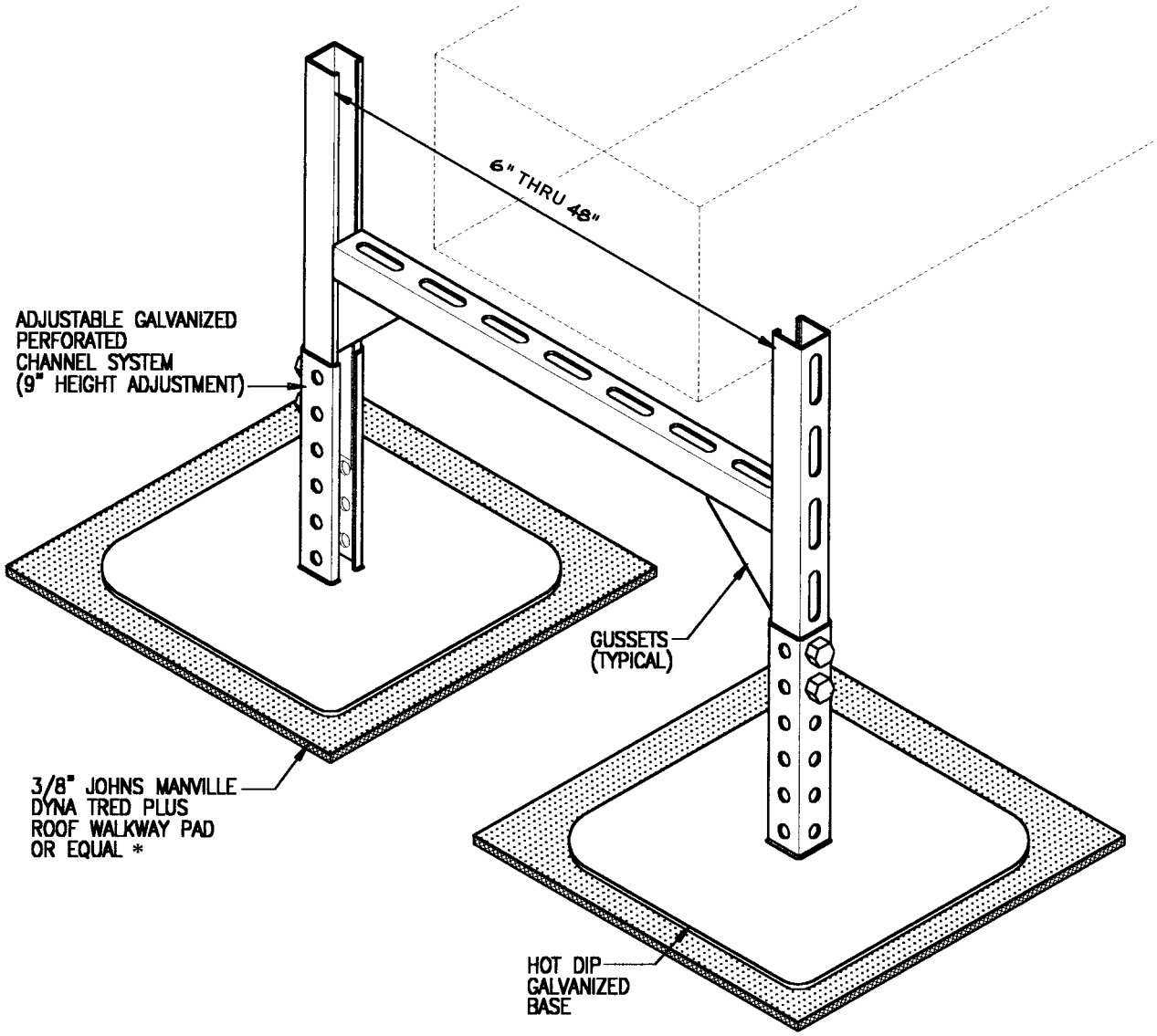
NO PENETRATION ROOF SUPPORT SYSTEMS

SUPPORT FOR 6" THRU 48" DUCT

MODEL NO. NP - D



*** Optional Accessory**

Project:	Date:
Mechanical Engineer:	Rep:
Mechanical Contractor:	Tag:

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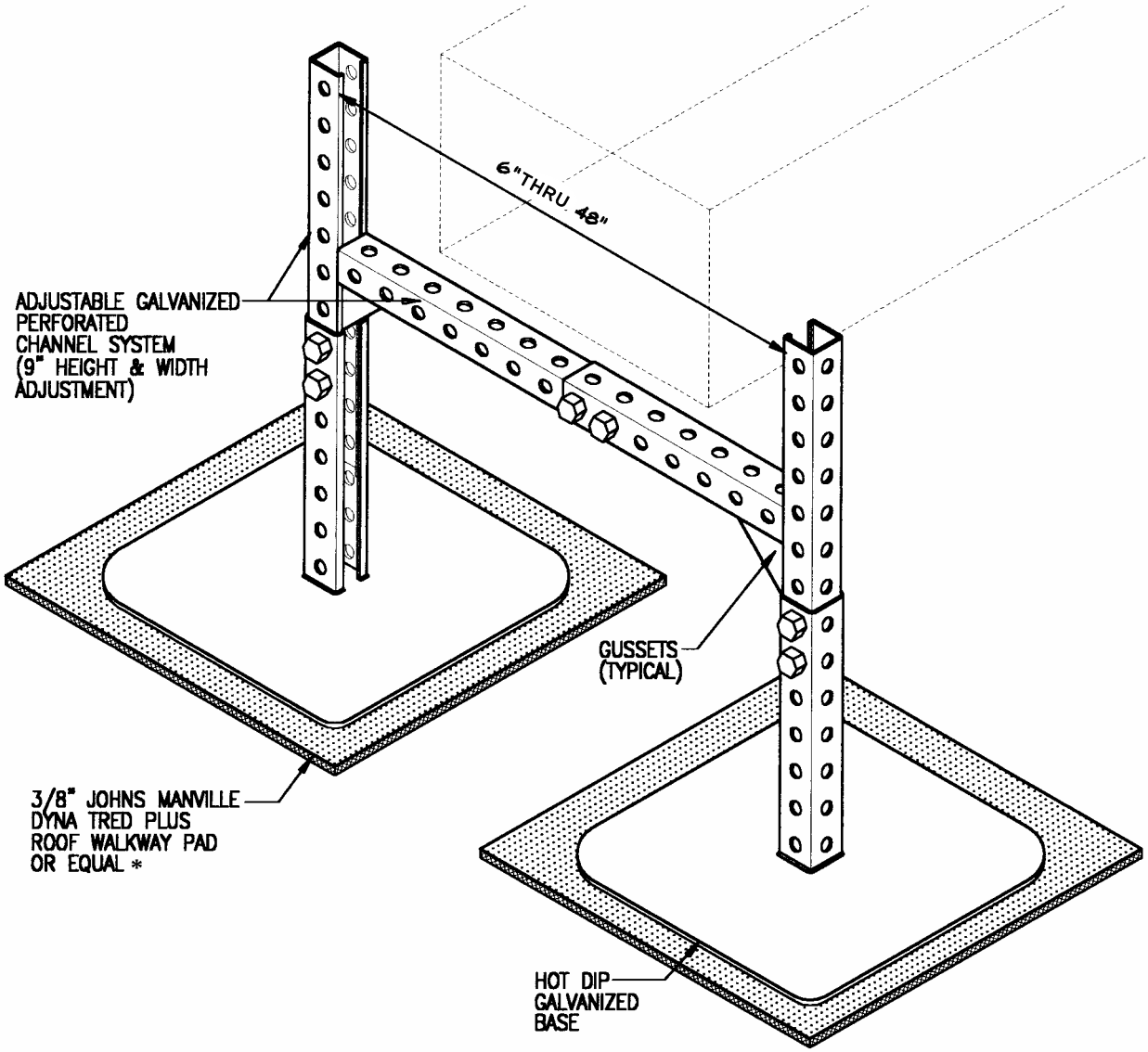
NO PENETRATION ROOF SUPPORT SYSTEMS

SUPPORT FOR 6" THRU 48" DUCT- VARIABLE WIDTH OPTION

MODEL NO. NP-D-VW



*** Optional Accessory**

Project:	Date:
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Mechanical Contractor:	Tag:

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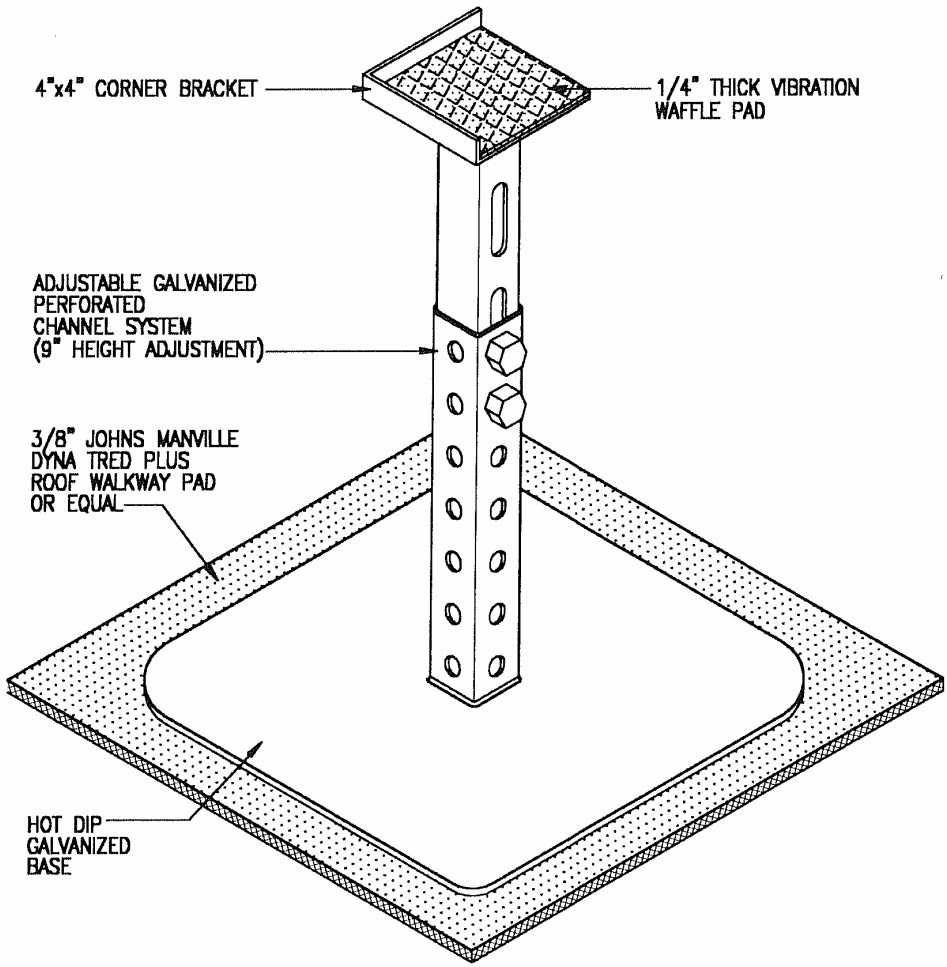
NO PENETRATION ROOF SUPPORT SYSTEMS

EQUIPMENT CORNER SUPPORT

MODEL NO. NP-CS



Project:	Date:
Mechanical Engineer:	Rep:
Mechanical Contractor:	Tag:

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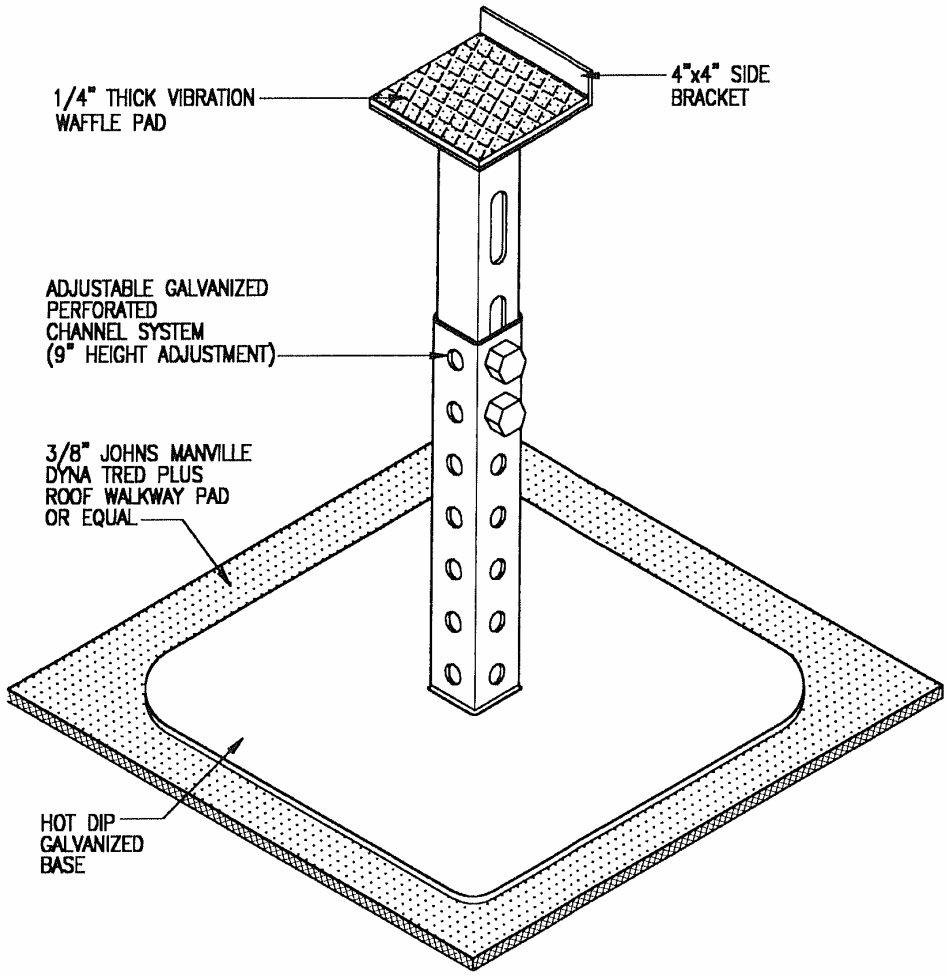
NO PENETRATION ROOF SUPPORT SYSTEMS

EQUIPMENT SIDE SUPPORT

MODEL NO. NP-SS



Project:	Date: LWA
Mechanical Engineer:	Rep:
Mechanical Contractor:	Tag:

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Barnes & Jones® INC. Float & Thermostatic Steam Traps Series 2000 (VAC-30 PSIG)

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Features

- Variety of hook-up combinations
- Unaffected by sudden or wide pressure changes
- Responds quickly to condensate load changes
- Continuous discharge
- Condensate discharge temperature closely follows the saturated steam curve
- Function is not impaired by high back pressure
- Energy efficient
- Simple construction
- On-line repair

Description

The Barnes & Jones float and thermostatic traps, Series 2000 are designed for all types of low pressure or vacuum steam heating systems and steam process equipment. Typical applications include; unit heaters, space heaters, water heaters, pressing machines and low pressure mains and risers.

Float and thermostatic traps are specially well suited for apartments, hospitals, office buildings and schools or wherever quiet operation is necessary.

Operation

The opening and closing of the valve is caused by changes of the condensate level within the trap shell.

When the water level drops, the weight of the float closes the valve. As condensate enters the traps, the float rises and opens the valve, allowing condensate to be discharged. The float is designed to provide sufficient buoyancy to overcome the differential pressure across the valve. The internal float and valve configuration is such that the condensate level is always above the valve, creating a continuous water seal at the seat.

Air and other gasses are freely discharged as they reach the trap through the air vent. The calibrated thermostat will close the air vent immediately when the temperature surrounding the element reaches saturated steam temperature.

MATERIALS

Part	Description
Head	Cast Iron, ASTM-A278 Class 30
Body	Cast Iron, ASTM-A278 Class 30
Bolting	Steel, Grade 5
Gaskets	Non-Asbestos Fiber
Float	Stainless Steel
Plug	Stainless Steel
Seat	Brass, 15#; Stainless Steel, 30#

Construction

Barnes & Jones float and thermostatic traps are compact, of rugged design, with easy access to all interior parts. The body is cast with two inlet and two outlet pipe connections that permit four combinations of pipe hook-ups for all types of applications.* All working parts are made of corrosion resistant materials and attached to the cover casting. The repair kit consists of a complete, factory assembled head which simply bolts on for ease of repair.* No pipe connections need to be broken.

*except the 2" model which is piped through the head.

Engineering Specifications

CAPACITIES (SHEMA)

lbs. condensate per hour.

Pipe Size	Model No.	Pressure Differential (PSIG)						
		¼	½	1	2	5	10	15
¾"	FT2015-3	70	100	140	200	210	220	230
1"	FT2015-4	175	250	350	500	525	550	575
1¼"	FT2015-5	425	600	850	1200	1260	1320	1380
1½"	FT2015-6	850	1200	1700	2400	2520	2640	2760
2"	FT2015-8	1775	2500	3550	5000	5250	5500	5750

Note on capacity: Low pressure F & T Trap capacities are in accordance with standard adopted by the Steam Heating Manufacturer's Association (SHEMA) providing for the continuous elimination of air when the trap is operating at its maximum rating. No Safety factor need be applied. *Actual capacities are significantly greater than the SHEMA rating indicate.*

Larry Wunsch & Associates, Inc.
210.349.5244 Phone
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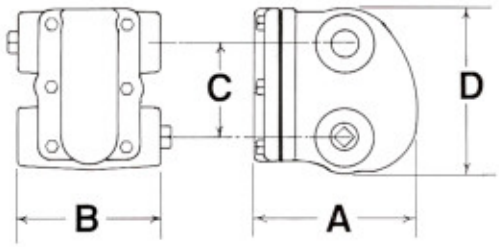
CAPACITIES (Gross)

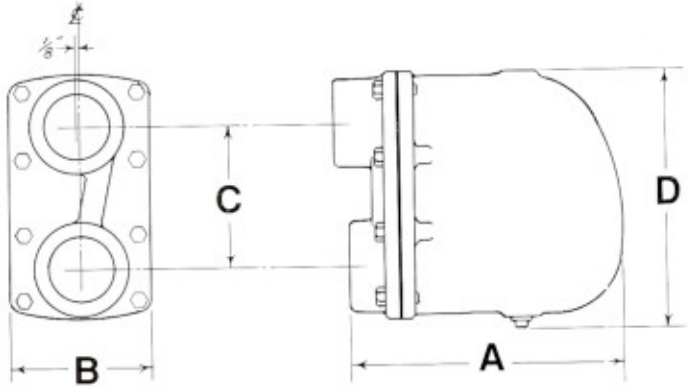
lbs. condensate per hour.

Pipe Size	Model No.	Pressure Differential (PSIG)									
		¼	½	1	2	5	10	15	20	25	30
¾"	FT2015-3	293	387	513	683	824	1050	1129	–	–	–
1"	FT2015-4	293	387	513	683	824	1050	1129	–	–	–
1¼"	FT2015-5	630	808	1029	1302	1722	2100	2457	–	–	–
1½"	FT2015-6	1155	1785	2520	3465	5250	6930	7980	–	–	–
2"	FT2015-8	2415	2940	3780	4883	7245	9450	11445	–	–	–
¾"	FT2030-3	293	387	513	683	824	1050	1129	1271	1365	1439
1"	FT2030-4	293	387	513	683	824	1050	1129	1271	1365	1439
1¼"	FT2030-5	394	525	725	956	1260	1575	1764	1890	1995	2100
1½"	FT2030-6	1050	1365	1785	2415	3570	4830	5775	6300	6930	7350
2"	FT2030-8	1365	1890	2625	3570	5460	7140	8190	9030	9765	10500

Note on capacity: Trap capacities are based on continuous discharge at stream temperature. The published figures are the result of an extensive testing program conducted in accordance with ANSI/ASME PTC 39.1 – 1980, *Condensate Removal Devices for Steam Systems*, at the B & J factory. Significantly greater capacities are realized when condensate temperature is below saturated steam temperature. Appropriate safety factors should be applied to these ratings.

NOTE: FLOAT TRAPS are available for those applications where draining liquid is the only requirement of the trap. In those instances the thermostatic air vent is replaced by a solid plug. To order, use the previous model numbers with the prefix "F" instead of "FT". All pipe sizes and pressure ratings are available.





DIMENSIONS

¾" - 1½" | 2"

Size	Models	A	B	C	D	WT.
¾"	FT2015-3, FT2030-3	5 11/16	5	3 5/16	5⅝	11 lbs.
1"	FT2015-4, FT2030-4	5 11/16	5	3 5/16	5⅝	11 lbs.
1¼"	FT2015-5, FT2030-5	6⅛	5½	3	5⅜	12 lbs.
1½"	FT2015-6, FT2030-6	8¼	6	3	8¼	24 lbs.
2"	FT2015-8, FT2030-8	10	4⅞	4⅞	9¼	22 lbs.

Barnes® & Jones Inc.

Bucket Traps

(VAC - 250 PSIG)
Inverted Bucket Design

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Features:

- Available in 1/2", 3/4", 1", 1-1/4", 1-1/2", 2" and 2-1/2" sizes to meet nearly every industrial and process application
- High strength cast iron bodies
- Low maintenance - tolerates dirty steam - for maximum service life and reliability
- Immediate condensate discharge at saturated steam temperature
- Meets MIL Spec WW T 696

Description:

Designed for extended service and low maintenance with medium and high pressure steam, Barnes & Jones Bucket Traps feature an inverted bucket design with corrosion resistant stainless parts for optimal performance with blast coils, laundry equipment, hot water heaters, steam kettles and a broad range of industrial and process applications.

Operation:

Key to the reliability of a Barnes & Jones Bucket Trap is that the the trap is selected for the actual pressure differential of your application, and the valve seat and plug are in the top, away from the dirt and debris that collects in the trap body. A trap being used for a greater differential than its rating will not open. Conversely, a trap with a rating which exceeds the differential will operate at a reduced capacity.

Barnes & Jones offers seven models in 20 capacities. Using the table on the reverse, specify the B&J trap which delivers the most efficient energy saving operation and lowest maintenance cost.

Initially primed to create a water seal with the bucket in a down (fully open) position, air and water enter the trap though the inlet tube. Air is vented from a small orifice in the top of the bucket, while condensate flows out from under the bucket. When steam enters the trap, it fills the bucket, causing it to become bouyant, overcoming the weight of the bucket, and rising to "snap" the plug into the seat. The trap stays fully shut until sufficient steam has condenses to allow the bucket to immediately drop, and return to it's fully open state.

Engineering Specifications: Capacities (Gross)

lbs. condensate per hour

DIFFERENTIAL PRESSURE (PSIG)

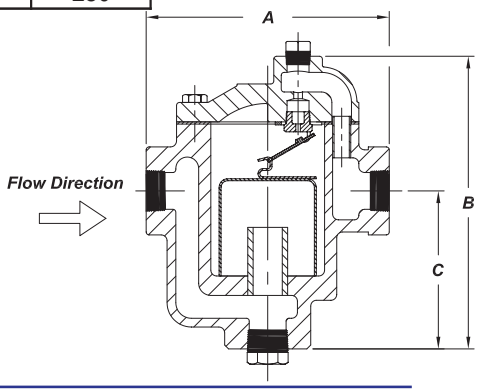
Model	Pipe Size	PMO	Orifice	1/4	1	5	10	15	20	30	60	70	80	100	125	150	180	200	225	250
8000	1/2"	20	3/16	140	272	460	560	646	698	-	-	-	-	-	-	-	-	-	-	-
	and	80	1/8	48	112	200	310	370	420	510	640	662	690	-	-	-	-	-	-	-
	3/4"	125	7/64	24	56	92	150	200	262	350	490	530	570	642	685	-	-	-	-	-
		150	#38	20	54	75	112	153	205	275	385	415	442	482	545	572	-	-	-	-
8011	1/2"	15	1/4	192	452	835	952	1062	-	-	-	-	-	-	-	-	-	-	-	-
	and	30	3/16	125	310	545	672	775	882	1000	-	-	-	-	-	-	-	-	-	-
	3/4"	70	5/32	72	170	185	440	500	590	715	905	952	-	-	-	-	-	-	-	-
	and	125	1/8	56	135	225	342	396	465	565	715	762	805	862	955	-	-	-	-	-
	1"	200	7/64	32	70	155	232	277	338	410	550	582	615	665	740	812	855	865	-	-
		250	#38	46	82	100	155	192	243	295	426	455	475	525	576	621	675	702	732	765
8012	1/2"	15	5/16	350	825	1610	1920	2110	-	-	-	-	-	-	-	-	-	-	-	-
	and	30	1/4	285	510	950	1385	1640	1800	2060	-	-	-	-	-	-	-	-	-	-
	3/4"	70	3/16	198	425	790	950	1125	1270	1510	2010	2210	-	-	-	-	-	-	-	-
		125	5/32	110	310	565	690	820	910	1075	1450	1555	1660	1810	2020	-	-	-	-	-
		200	1/8	70	180	330	470	510	585	712	990	1060	1111	1240	1375	1525	1580	1605	-	-
		250	7/64	40	130	250	350	375	425	525	725	790	820	915	1020	1111	1180	1230	1285	1320
8013	3/4"	15	1/2	955	1880	2910	3525	3900	-	-	-	-	-	-	-	-	-	-	-	-
	and	30	3/8	500	1420	2310	2700	3320	3510	4000	-	-	-	-	-	-	-	-	-	-
	1"	60	5/16	350	950	1745	2050	2525	2830	3140	4440	-	-	-	-	-	-	-	-	-
		80	9/32	310	740	1355	1600	1960	2220	2450	3500	3825	4025	-	-	-	-	-	-	-
		125	1/4	270	620	1110	1320	1620	1820	2020	2850	3120	3320	3610	3925	-	-	-	-	-
		180	7/32	185	500	880	1170	1350	1600	2100	2510	2700	2830	3070	3200	3520	3725	-	-	-
		250	3/16	140	410	715	960	1125	1310	1710	2060	2220	2320	2510	2610	2715	3030	3225	3410	3500
8014	1"	15	5/8	1410	2920	4825	5810	6500	-	-	-	-	-	-	-	-	-	-	-	-
	and	30	1/2	955	2255	3710	4750	5220	6010	6810	-	-	-	-	-	-	-	-	-	-
	1-1/4"	60	3/8	510	1775	2960	3560	4000	4725	5420	6810	-	-	-	-	-	-	-	-	-
		80	11/32	390	1570	2525	2925	3225	3525	4440	5775	6000	6420	-	-	-	-	-	-	-
		125	5/16	320	1210	2000	2500	2750	3125	3510	4820	5275	5625	6220	6710	-	-	-	-	-
		180	9/32	275	960	1510	1925	2220	2360	2910	3800	4260	4510	4820	5520	5710	6010	-	-	-
		250	1/4	190	590	1010	1260	1465	1810	2220	3160	3360	3520	3810	4310	4460	4710	5330	5525	5725
8015	1-1/4"	15	3/4	2060	4170	7625	9020	10000	-	-	-	-	-	-	-	-	-	-	-	-
	and	30	9/16	925	2920	5220	6430	7725	8525	9825	-	-	-	-	-	-	-	-	-	-
	1-1/2"	60	7/16	600	2220	3810	5025	6025	6625	7625	9525	-	-	-	-	-	-	-	-	-
	and	100	3/8	510	1720	3030	3620	4525	5220	6110	8525	9225	9725	10420	-	-	-	-	-	-
	2"	125	11/32	390	1510	2625	3200	3910	4525	5440	7505	8060	8525	9610	10910	-	-	-	-	-
		180	5/16	340	1210	2110	2620	3220	3710	4525	6600	7025	7260	8120	8980	9500	10000	-	-	-
		225	9/32	310	980	1710	2125	2600	2960	3620	5420	5710	5925	6610	7320	7360	7900	9225	9810	-
		250	1/4	260	710	1220	1510	1920	2110	2610	3800	4010	4170	4600	5110	5500	6000	6375	6800	7000
8016	2"	15	1-1/16	4060	8420	14525	17350	19200	-	-	-	-	-	-	-	-	-	-	-	-
	and	25	7/8	2090	5500	10000	12950	15620	18525	-	-	-	-	-	-	-	-	-	-	-
	2-1/2"	40	3/4	1905	4510	8220	10625	12810	15000	18000	-	-	-	-	-	-	-	-	-	-
		60	5/8	1460	3520	6910	8720	10620	12110	14270	19825	-	-	-	-	-	-	-	-	-
		80	9/16	1270	3100	6000	7620	9330	10620	12500	17325	18320	19000	-	-	-	-	-	-	-
		125	1/2	1065	2620	5000	6410	7820	8900	10500	14525	15420	16330	18100	20000	-	-	-	-	-
		180	7/16	915	2220	4190	5550	6660	7525	9250	12420	13330	14200	15800	17500	18500	20000	-	-	-
		250	3/8	590	1820	3410	4525	5410	6110	7500	10125	10825	11510	12830	14300	15610	16900	17500	18500	19000

Dimensions

MODEL #	8000	8011	8012	8013	8014	8015	8016
Pipe Size	1/2"- 3/4"	1/2"- 3/4"- 1"	1/2" - 3/4"	3/4" - 1 "	1" - 1-1/4"	1-1/4"-1-1/2"-2"	2" - 2-1/2"
Prime Plug	1/4"	1/4"	1/2"	3/4"	1"	1-1/2"	2"
A Face to Face	5"	5"	6-1/2"	7-3/4"	9"	10-1/4"	13
B Height	5-7/16"	6-7/8'	9-1/16"	11-3/4"	13-5/8"	16-1/4"	21-5/16
C C.L. to bottom	2-3/4"	4-1/4"	5-3/8"	7-1/32"	7-13/16"	8-1/16"	11"
Weight	5#	6#	15#	27-1/2#	44#	71#	131#
Max Op. Press.	150	250	250	250	250	250	250

List of Materials

Part	Material
Cap & Body	ASTM A48 Cl 30
Gasket	Compressed Non Asbestos
Bolt/Nut	Grade 5 or 7
Valve/Valve Seat	Stainless Steel
Retainer	Stainless Steel
Lever	Stainless Steel
Bucket	Stainless Steel



Barnes & Jones INC.

Barnes & Jones INC.

Vacuum Breakers

Barnes & Jones Vacuum Breakers are simple, reliable devices that provide a positive means to automatically relieve or "break" an unwanted vacuum condition. The rugged hex design provides for long service life and ease of installation. Bubble tight sealing is assured due to the soft silicon O-ring and spring pressure against the valve.

Applications

- Air/Heat Coils for Space Heating
- Process Air Heater
- Shell & Tube Heat Exchanger
- Make-Up Air Coils
- Textile Dry Cans
- Steam Boilers
- Storage Heaters
- Jacketed Kettles
- Steam Main Zoning
- One Pipe Steam Non-Electric Valve

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

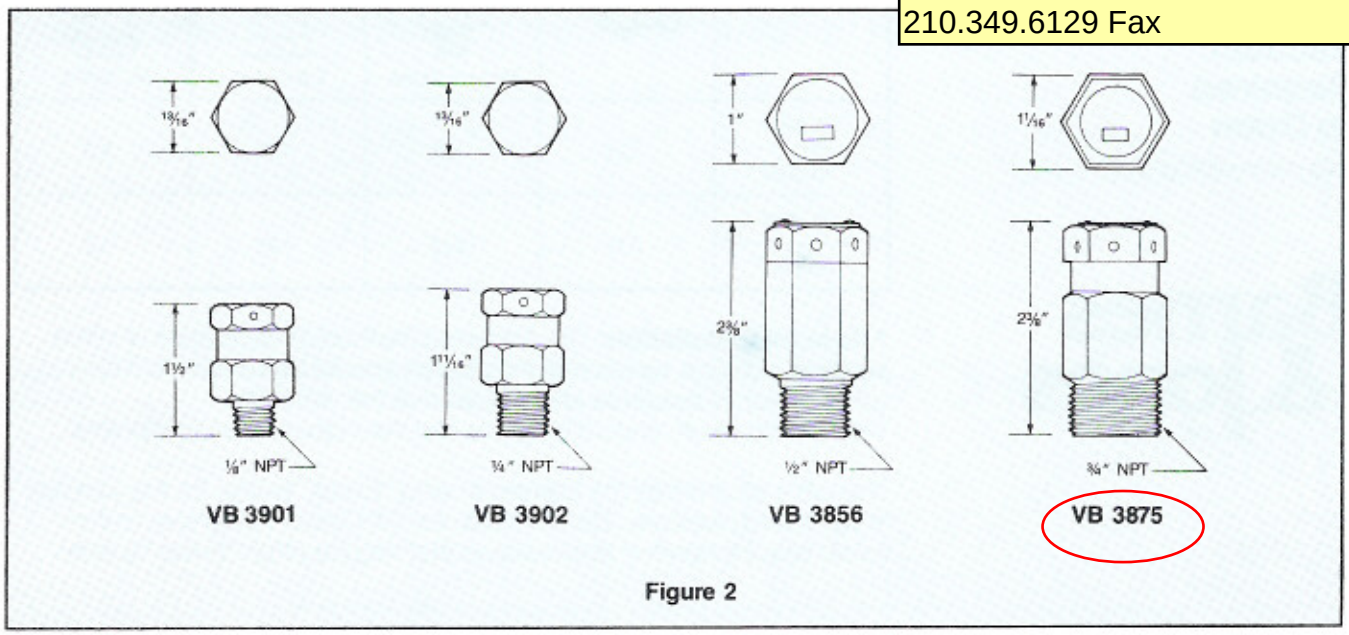


Figure 2

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Vacuum Breaker Engineering Specifications

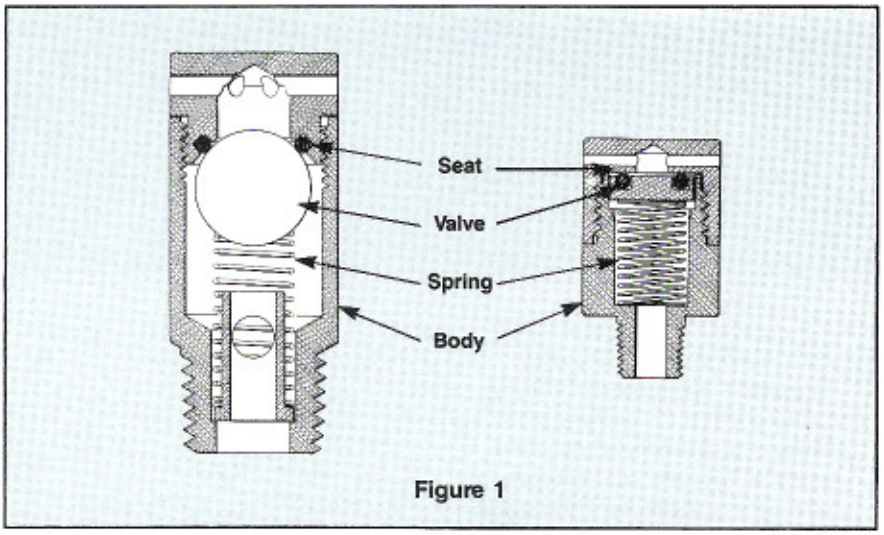


Figure 1

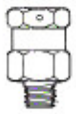
Materials

Model No.	Body	Spring	Valve	Seat
VB 3901	Brass	Stainless Steel	Brass and Silicon	Brass
VB 3902				
VB 3856	Brass	Stainless Steel	Stainless Steel	Silicon
VB 3875				

Models are available in four NPT Pipe Sizes. They are ⅛", ¼", ½" and ¾", all of which are rated for use with pressures up to 125 PSIG (8.6 Bar), and temperatures to 350°F (180°C). Materials of construction are listed in the table above.

Vacuum Required to Open

(INCHES OF MERCURY)

Model No.	Horizontal*	Vertical		
		 Bottom Outlet	 Top Outlet	 No Spring
VB 3901	1.27	1.25	1.75	0.2
VB 3902				
VB 3856	0.77	0.75	1.25	0.3
VB 3875				

Note on installation:** The preferred method of installation is in the ***vertical position. Horizontal installation should be used only if no other option is available and only above the water line. Vacuum breakers should be placed at the highest practical points.

The table above lists the corresponding "break" points for the various models and positions. Barnes & Jones will Custom Engineer to customer requirements in applications that require other "break" points.

Barnes & Jones INC.

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

KECKLEY

Style A

Y-Strainer
Cast Iron (ASTM A 126, Class B)
125 lb. & 250 lb. Flanged

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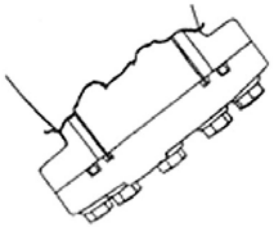
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Style GA

(Natural Gas Service)

Y-Strainer
Cast Iron (ASTM A 126, Class B)
125 lb. & 250 lb. Flanged



(Special O-Ring Seal With Solid Cover Plate)

Cast Iron Y-Strainer

APPLICATIONS

Steam, water, oil or gas where protection from foreign matter in a pipeline is required.

CONSTRUCTION

The Keckley Style A strainers are constructed from rugged cast iron castings that are machined to exacting specifications. These bodies have drilled flanges that are in accordance with ASME B16.1.

The Keckley Style GA strainers are used extensively for protecting gas meters and compressors in metering stations. The strainer utilizes a Buna N-70-Durometer O-Ring instead of a conventional gasket on the solid cover plate.

FEATURES

The Keckley Style A strainer features a machined groove in both the body and cover for proper screen alignment and to ensure accurate reseating when servicing is required. The gasket is a synthetic fiber that is compressed between the body and cover for maximum strength and durability. Keckley Style A strainers can be furnished with a blow-off plug upon request.

SCREENS

Standard perforated 304 stainless steel screens are spot welded along the seam for maximum strength. Different size perforations and meshes are available in stainless steel, monel, and brass to meet specific media requirements. If the media is not indicated, screens for *water* will be supplied.

SELF CLEANING

Self cleaning is accomplished by opening the valve or drain plug connected to the blow-off port. **Warning:** See Maintenance Instructions on page S6 of the Strainer Information Section for additional precautions and detailed information on servicing the strainer.

WORKING PRESSURES – NON SHOCK

NOM. RATING	MEDIA	2" to 12"	50 mm to 300 mm
125# F.F.& D. (STANDARD FLANGE)	STEAM	125 PSI @ 450°F	862 KPa @ 232°C
	W.O.G.	200 PSI @ 150°F	1379 KPa @ 66°C
	MEDIA	14" and UP	350 mm and UP
	STEAM	100 PSI @ 353°F	690 KPa @ 178°C
	W.O.G.	150 PSI @ 150°F	1035 KPa @ 66°C
NOM. RATING	MEDIA	2" to 12"	50 mm to 300 mm
250# R.F.& D. (EX. HEAVY FLANGE)	STEAM	250 PSI @ 450°F	1724 KPa @ 232°C
	W.O.G.	500 PSI @ 150°F	3449 KPa @ 66°C
	MEDIA	14" and UP	350 mm and UP
	STEAM	200 PSI @ 406°F	1379 KPa @ 208°C
	W.O.G.	300 PSI @ 150°F	2069 KPa @ 66°C

GOVERNMENT/MILITARY SPECIFICATIONS

Style A cast iron flanged strainers meet or exceed government specification WW-S-2739 (Supersedes MIL-S-16293).

KECKLEY

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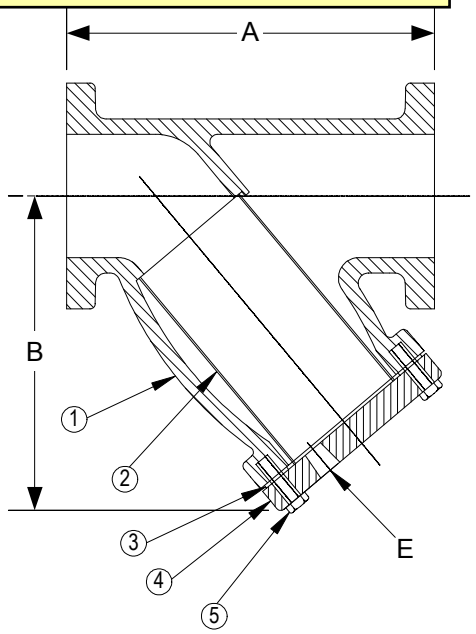
TECHNICAL DATA
DIMENSIONS AND WEIGHTS

Style A & GA

Y-Strainer, 125 lb. & 250 lb. Flanged
Cast Iron (ASTM A 126, Class B)



PARTS LIST		
ITEM	DESCRIPTION	MATERIAL
1	BODY	CAST IRON (ASTM A 126, CLASS B)
2	SCREEN	STAINLESS STEEL (304)
3	GASKET	COMPOSITION
4	COVER	CAST IRON (ASTM A 126, CLASS B)
5	HEX HEAD CAP SCREWS	STEEL

Optional: Blow-off Plug, Malleable Iron

STANDARD SCREENS SUPPLIED

SIZE		SCREEN GAGE	SCREEN PERFORATION					
			FOR STEAM		OPEN AREA	FOR LIQUID		OPEN AREA
in	mm		in	mm		in	mm	
2 to 4	50 to 100	28	3/64	1.2	33%	1/16	1.6	30%
5 to 10	125 to 250	24	3/64	1.2	33%	1/8	3.2	43%
12	300	24	1/16	1.6	30%	1/8	3.2	43%
14 & UP	350 & UP	20	1/8	3.2	43%	1/8	3.2	43%

Standard screens supplied are for **liquid service**, unless otherwise specified.
Options: Other perforations, meshes, and screen materials are available.

SIZE		DIMENSIONS												WEIGHTS			
		A				B				E							
		125#		250#		125#		250#		125#		250#		125#		250#	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kgs	lbs	kgs
2	50	8-3/8	213	9-7/8	251	8-3/8	213	6-1/4	159	1-1/4	32	1/2	15	30	14	33	15
2-1/2	65	9-7/8	251	11-1/4	286	8-3/8	213	7-3/4	197	1-1/4	32	1	25	35	16	49	22
3	80	10-1/4	260	12-1/2	318	7-3/8	187	8-1/4	210	1	25	1	25	35	16	57	26
4	100	12-1/8	308	14-5/8	371	8-3/4	222	10-1/8	257	1-1/2	40	1-1/4	32	65	29	106	48
5	125	15-5/8	397	18	457	12	305	12-1/2	318	2	50	1-1/4	32	105	48	157	71
6	150	18-9/16	471	20-3/8	518	14	356	14-3/8	365	2	50	1-1/2	40	155	70	215	98
8	200	24-1/8	613	23-7/8	606	17-3/4	451	17-1/2	445	2	50	1-1/2	40	240	109	315	143
10	250	29-9/16	751	29-5/8	752	21-1/4	540	21	533	2	50	2	50	400	181	525	238
12	300	33-3/4	857	33-3/4	857	24	610	23-5/8	600	2	50	2	50	500	227	700	318
14	350	37-1/8	943	37-1/4	946	25-1/2	648	27-1/8	689	2	50	2	50	825	374	1400	635
16	400	42-3/8	1076	42-3/8	1076	29-1/8	740	29-1/4	743	2	50	2	50	1050	476	1850	839
18	450	46-3/16	1173	--	--	41	1041	--	--	2	50	--	--	1723	782	--	--
20	500	54-1/2	1384	--	--	43	1092	--	--	2	50	--	--	2660	1207	--	--

24" consult factory – on application.
Certified dimensional drawings are available upon request.
†This table reflects only the nearest metric equivalents.

FLOW COEFFICIENTS

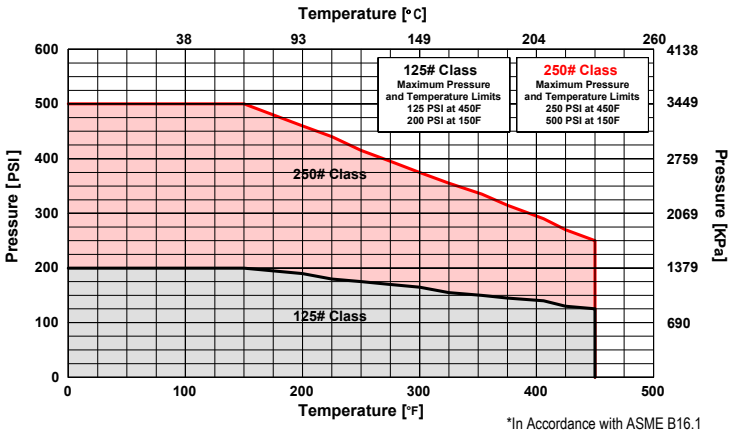
Size	C_v	Size	C_v	Size	C_v	Size	C_v
2"	62	5"	364	12"	2261	20"	8064
2 ½"	98	6"	585	14"	3479	Reflects 125# castings only.	
3"	155	8"	942	16"	5060		
4"	269	10"	1572	18"	6008		

TOTAL SCREEN AREA

Size	(in²)	Size	(in²)	Size	(in²)	Size	(in²)
2"	51.55	5"	136.09	12"	835.53	20"	2947.1
2 ½"	70.01	6"	242.72	14"	1175.30	Reflects 125# castings only.	
3"	61.34	8"	411.16	16"	1471.34		
4"	99.64	10"	610.51	18"	2381.54		

*See DETERMINING RATIOS on page S5 of the Strainer Information Section for calculating NET FREE AREA of the screen to inside pipe area.

PRESSURE vs. TEMPERATURE CHART
125# & 250# Flanged Cast Iron (ASTM A126, Class B)
Suitable for use with pipe sizes up to 12"



*In Accordance with ASME B16.1

KECKLEY

Style B

Y-Strainer
Cast Iron (ASTM A 126, Class B)
250 lb. Threaded

Cast Iron Y-Strainer

APPLICATIONS
Steam, water, oil or gas where protection from foreign matter in a pipeline is required.

CONSTRUCTION
The Keckley Style B strainers are constructed from rugged cast iron castings that are machined to exacting specifications.

FEATURES
The Keckley Style B strainer features a tapered bushing in sizes ¼" thru 2" and bolted cover with gasket for sizes 2-1/2", 3" and 4". All Keckley Style B strainers are furnished standard with a NPT blow-off connection and can be supplied with a cast iron blow-off plug upon request.

SCREENS
Standard screens are 20 mesh 304 stainless steel through size 2". Sizes 2-1/2", 3" and 4" are furnished with 1/16" perforated 304 stainless steel screens. All screens are spot welded for maximum strength. Different size perforations and meshes are available in stainless steel, monel, and brass to meet specific media requirements. If media is not indicated, screens for *water* will be supplied.

SELF CLEANING
Self cleaning is accomplished by opening the valve or drain plug connected to the blow-off port. **Warning:** See Maintenance Instructions on page S6 of the Strainer Information Section for additional precautions and detailed information on servicing the strainer.

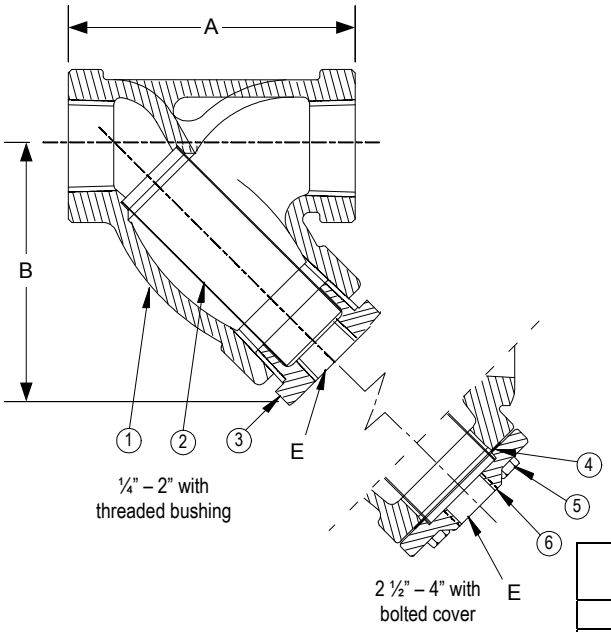
WORKING PRESSURES – NON SHOCK

NOM. RATING	MEDIA	1/4" to 4"	8 mm to 100 mm
250# (THREADED)	STEAM	250 PSI @ 406°F	1724 KPa @ 208°C
	W.O.G.	400 PSI @ 150°F	2759 KPa @ 66°C

GOVERNMENT/MILITARY SPECIFICATIONS
Style B cast iron threaded strainers meet or exceed government specification WW-S-2739 (Supersedes MIL-S-16293).

KECKLEY

TECHNICAL DATA
DIMENSIONS AND WEIGHTS



Style B

Y-Strainer, 250 lb. Threaded
Cast Iron (ASTM A 126, Class B)

PARTS LIST		
ITEM	DESCRIPTION	MATERIAL
1	BODY	CAST IRON (ASTM A 126, CLASS B)
2	SCREEN	STAINLESS STEEL (304)
3	BUSHING	MALLEABLE IRON
4	GASKET*	COMPOSITION
5	CAP SCREW*	STEEL
6	COVER*	CAST IRON (ASTM A 126, CLASS B)

Optional: Blow-off Plug, Malleable Iron * 2 ½", 3" & 4" ONLY

STANDARD SCREENS SUPPLIED

SIZE		SCREEN GAGE	SCREEN PERFORATION					
			FOR STEAM		OPEN AREA	FOR LIQUID		OPEN AREA
in	mm		in	mm		in	mm	
1/4 to 2	8 to 50	20 MESH STAINLESS STEEL						49%
2-1/2 to 4	65 to 100	28	3/64	1.2	33%	1/16	1.6	30%

Standard screens supplied are for **liquid service**, unless otherwise specified.
Options: Other meshes, perforations, and screen materials are available.

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SIZE		DIMENSIONS						WEIGHTS	
		A		B		E			
in	mm	in	mm	in	mm	in	mm	lbs	kgs
1/4	8	3	76	2-5/8	67	3/8	10	2	0.9
3/8	10	3	76	2-5/8	67	3/8	10	2	0.9
1/2	15	3	76	2-5/8	67	3/8	10	2	0.9
3/4	20	4	102	3-5/8	92	1/2	15	3	1.4
1	25	4-7/8	124	4-1/2	114	3/4	20	4.5	2.0
1-1/4	32	5-1/8	130	4-3/4	121	3/4	20	6	2.7
1-1/2	40	5-3/4	146	4-7/8	124	1	25	8	3.6
2	50	7-1/4	184	5-3/4	146	1-1/4	32	15.5	7.0
2-1/2	65	8-7/8	225	7-1/2	191	1-1/4	32	25	11.3
3	80	10	254	8	203	1-1/2	40	36	16.3
4	100	15-1/4	387	12-1/2	318	2	50	95	43.1

Certified dimensional drawings are available upon request.
†This table reflects only the nearest metric equivalents.

FLOW COEFFICIENTS

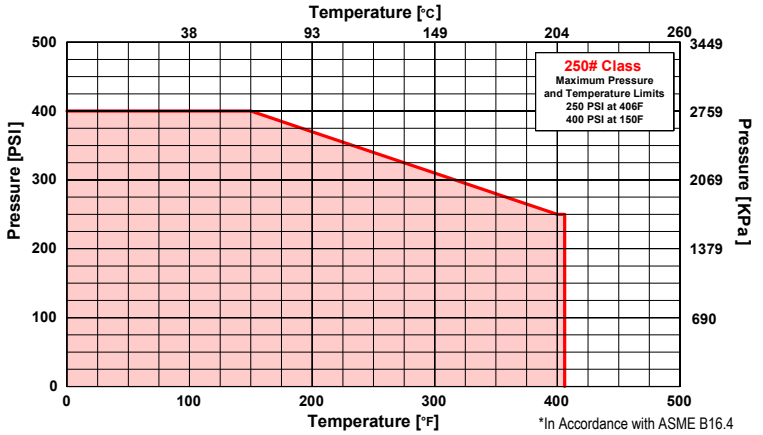
Size	C_v	Size	C_v	Size	C_v
1/2"	9.5	1-1/4"	44.9	2-1/2"	129.7
3/4"	18.7	1-1/2"	61	3"	161.3
1"	30	2"	98	4"	256.2

TOTAL SCREEN AREA

Size	(in^2)	Size	(in^2)	Size	(in^2)
1/2"	5.50	1-1/4"	18.69	2-1/2"	54.13
3/4"	8.59	1-1/2"	23.37	3"	73.51
1"	15.22	2"	36.23	4"	154.98

*See DETERMINING RATIOS on page S5 of the Strainer Information Section for calculating NET FREE AREA of the screen to inside pipe area.

PRESSURE vs. TEMPERATURE CHART
250# Threaded Cast Iron (ASTM A 126, Class B)



*In Accordance with ASME B16.4

KECKLEY

Style F-150

Y-Strainer
Cast Bronze (C84400)
125 lb. Threaded

Style E-150

Y-Strainer
Cast Bronze (C84400)
125 lb. Solder Joint

Cast Bronze Y-Strainer

APPLICATIONS

Steam, water, oil or gas where protection from foreign matter in a pipeline is required.

CONSTRUCTION

The Keckley Style F-150 & E-150 strainers are constructed from the finest bronze castings and are machined to exacting specifications.

Solder Joint Ends are in compliance with ASME B16.18 unless otherwise specified.

FEATURES

The Keckley Style F-150 & E-150 strainers feature a machined seat in the body and cap for proper alignment and to ensure accurate reseating when servicing is required. These strainers have a straight threaded cap and are furnished standard with a NPT blow-off connection. The gasket is a flat fiber gasket that is compressed between the body and cap for maximum strength and durability. Keckley Style F-150 & E-150 strainers are furnished with a bronze blow-off plug unless otherwise specified.

SCREENS

Standard screens are 20 mesh 304 stainless steel through size 2". Sizes 2-1/2" and 3" are furnished with 3/64" perforated 304 stainless steel screens. All screens are spot welded for maximum strength. Different size meshes and perforations are available in stainless steel, monel, and brass to meet specific media requirements.

SELF CLEANING

Self cleaning is accomplished by opening the valve or drain plug connected to the blow-off port. **Warning:** See Maintenance Instructions on page S6 of the Strainer Information Section for additional precautions and detailed information on servicing the strainer.

WORKING PRESSURES – NON SHOCK

NOM. RATING	MEDIA	1/4" to 3"	8 mm to 80 mm
125# (THREADED & SOLDER JOINT)	STEAM	125 PSI @ 400°F	862 KPa @ 204°C
	W.O.G.	200 PSI @ 150°F	1379 KPa @ 66°C

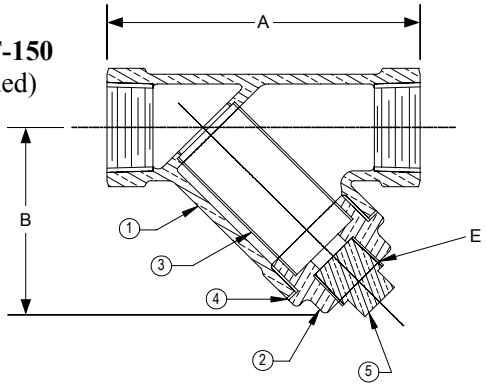
KECKLEY

TECHNICAL DATA
DIMENSIONS AND WEIGHTS

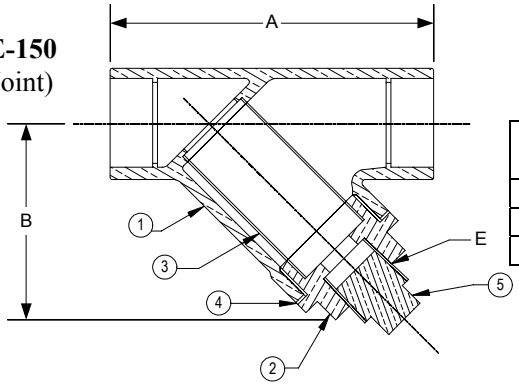
Style F-150 & E-150

Y-Strainer, 125 lb. Threaded & Solder Joint Cast Bronze (C84400)

STYLE F-150
(Threaded)



STYLE E-150
(Solder Joint)



PARTS LIST		
ITEM	DESCRIPTION	MATERIAL
1	BODY	BRONZE (C84400)
2	CAP	BRONZE (C84400)
3	SCREEN	STAINLESS STEEL (304)
4	GASKET	COMPOSITION
5	PLUG	BRONZE (C84400)

STANDARD SCREENS SUPPLIED

SIZE		SCREEN GAGE	SCREEN PERFORATION					
			FOR STEAM		OPEN AREA	FOR LIQUID		OPEN AREA
in	mm		in	mm		in	mm	
1/4 to 2	8 to 50	20 MESH STAINLESS STEEL						49%
2-1/2 & 3	65 & 80	28	3/64	1.2	33%	3/64	1.2	33%

Options: Other meshes, perforations, and screen materials are available.

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210.349.5244 Phone
210.349.6129 Fax

SIZE		DIMENSIONS												WEIGHTS			
		A				B				E							
		F-150		E-150		F-150		E-150		F-150		E-150		F-150		E-150	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kgs	lbs	kgs
1/4	8	2-7/16	62	3-3/8	86	1-5/8	41	2-1/4	57	1/4	8	3/8	10	0.50	0.2	.75	0.3
3/8	10	2-9/16	65	3-3/8	86	1-5/8	41	2-1/4	57	1/4	8	3/8	10	0.50	0.2	.75	0.3
1/2	15	3-3/16	81	3-3/8	86	2-1/4	57	2-1/4	57	3/8	10	3/8	10	0.80	0.4	.75	0.3
3/4	20	3-15/16	100	4-1/4	108	2-5/8	67	2-5/8	67	3/8	10	3/8	10	1.20	0.5	1.00	0.5
1	25	4-1/2	114	5	127	3	76	3-3/16	81	1/2	15	1/2	15	1.80	0.8	2.25	1.0
1-1/4	32	5-5/16	135	5-7/8	149	3-9/16	90	3-3/4	95	1/2	15	1/2	15	2.70	1.2	2.75	1.2
1-1/2	40	6-3/16	157	6-7/8	175	4	102	4-1/8	105	1/2	15	1/2	15	3.60	1.6	3.25	1.5
2	50	7-7/16	189	8-5/8	219	4-5/8	117	5-1/8	130	1/2	15	1/2	15	5.60	2.5	5.75	2.6
2-1/2	65	9	229	10-3/8	264	5-1/2	140	5-3/4	146	1/2	15	1/2	15	10.00	4.5	8.5	3.9
3	80	10	254	11-3/4	298	6-1/8	156	6-1/2	165	1/2	15	1/2	15	13.50	6.1	12.5	5.7

Certified dimensional drawings are available upon request.
†This table reflects only the nearest metric equivalents.

FLOW COEFFICIENTS

Size	C_v	Size	C_v	Size	C_v
1/2"	9.5	1-1/4"	44.9	2-1/2"	129.7
3/4"	18.7	1-1/2"	61	3"	161.3
1"	30	2"	98		

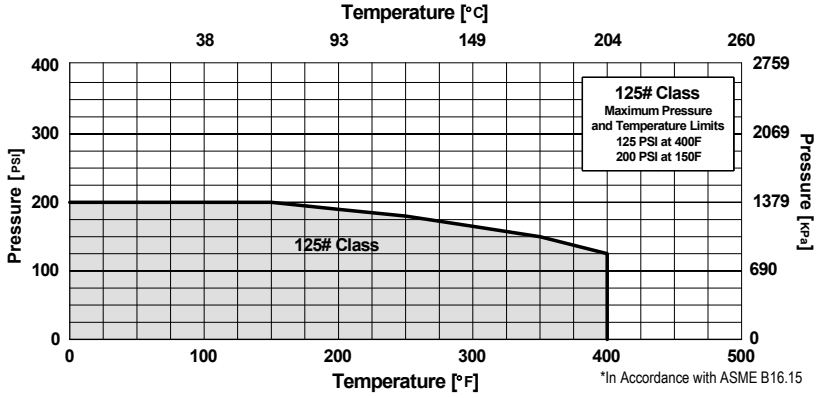
TOTAL SCREEN AREA

Size	(in²)	Size	(in²)	Size	(in²)
1/2"	3.09	1-1/4"	14.26	2-1/2"	46.98
3/4"	7.36	1-1/2"	19.94	3"	62.87
1"	9.54	2"	33.39		

*See DETERMINING RATIOS on page S5 of the Strainer Information Section for calculating NET FREE AREA of the screen to inside pipe area.

PRESSURE vs. TEMPERATURE CHART

125# Threaded & Solder Joint Cast Bronze (C84400)



*In Accordance with ASME B16.15

ABS
COST-EFFECTIVE PUMPING

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
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SCAVENGER™ Effluent & Sewage Ejector Pumps

Rugged submersible pumps for residential, commercial, municipal, and industrial applications.

- Unique triple seal design
- ABS patented Contra Block® impeller with adjustable wear plate system, for clog-free operation.
- Single phase models through 5 HP. Three phase models through 10 HP
- Discharges, 1 1/4 to 4 “
- High torque capacitor start single phase motors
- Rugged cast iron construction with stainless steel fasteners and motor shaft
- Oil filled motors (non-toxic oil)
- Stainless steel open loop lifting bale for ease of removal
- Optional seal leakage sensor probe available on all EJ models
- UL 778 and CSA C22.2-108 approval on all models

SCAVENGER™ Effluent & Sewage Ejector Pumps

Effluent Pumps

1 ¼ Inch Discharge

Model	HP	Phase*	RPM	Voltage**	Amps	Discharge	Solids Size	Max Head (feet)	Max Flow (gpm)	Weight (Lbs.)
EF 05W-1H	½	1	3450	115, 208-230	15.0, 8.3-7.5	Horiz. NPT	5/8"	73	44	68
EF 10W-1H	1	1	3450	208-230	14.4-13.0	Horiz. NPT	5/8"	108	44	70

2 Inch Discharge

Model	HP	Phase*	RPM	Voltage**	Amps	Discharge	Solids Size	Max Head (feet)	Max Flow (gpm)	Weight (Lbs.)
EF 10W-2	1	1	3450	208-230	14.4-13.0	Vert. NPT	3/4"	73	160	62
EF 10D-2	1	3	3450	208-230/460, 575	6.4-5.8/2.9, 2.3	Vert. NPT	3/4"	73	160	57

Sewage Ejector Pumps

2 Inch Discharge

Model	HP	Phase*	RPM	Voltage**	Amps	Discharge	Solids Size	Max Head (feet)	Max Flow (gpm)	Weight (Lbs.)
EJ 07W-2	3/4	1	1750	115, 208-230	14.0 / 7.7-7.0	Horiz. Flange ‡	2"	25	200	84
EJ 07D-2	3/4	3	1750	208-230/460, 575	5.5-5.0/2.5, 2.0	Horiz. Flange ‡	2"	25	200	80
EJ 10W-2	1	1	1750	208-230	11.1-10.0	Horiz. Flange ‡	2"	30	240	84
EJ 10D-2	1	3	1750	208-230/460, 575	5.5-5.0/2.5, 2.0	Horiz. Flange ‡	2"	30	240	80
EJ 15W-2	1½	1	1750	208-230	16.6-15.0	Horiz. Flange ‡	2"	37	300	90
EJ 15D-2	1½	3	1750	208-230/460, 575	7.7-7.0/3.5, 2.8	Horiz. Flange ‡	2"	37	300	84
EJ 20W-2	2	1	1750	208-230	21.0-19.0	Horiz. Flange ‡	2"	45	320	90
EJ 20D-2	2	3	1750	208-230/460, 575	9.9-9.0/4.5, 3.6	Horiz. Flange ‡	2"	45	320	84

3 Inch Discharge

Model	HP	Phase*	RPM	Voltage**	Amps	Discharge	Solids Size	Max Head (feet)	Max Flow (gpm)	Weight (Lbs.)
EJ 10W-3	1	1	1750	208-230	11.1-10.0	Horiz. Flange	2½"	30	265	77
EJ 10D-3	1	3	1750	208-230/460, 575	5.5-5.0/2.5, 2.0	Horiz. Flange	2½"	30	265	70
EJ 15W-3	1½	1	1750	208-230	16.6-15.0	Horiz. Flange	2½"	35	300	90
EJ 15D-3	1½	3	1750	208-230/460, 575	7.7-7.0/3.5, 2.8	Horiz. Flange	2½"	35	300	84
EJ 20W-3	2	1	1750	208-230	21.0-19.0	Horiz. Flange	2½"	44	330	90
EJ 20D-3	2	3	1750	208-230/460, 575	9.9-9.0/4.5, 3.6	Horiz. Flange	2½"	44	330	84
EJ 30W-3	3	1	1750	208-230	25.4-23.0	Horiz. Flange	2½"	50	450	147
EJ 30D-3	3	3	1750	208-230/460, 575	14.4-13.0/6.5, 5.2	Horiz. Flange	2½"	50	450	143
EJ 50W-3	5	1	1750	208-230	29.9-27.0	Horiz. Flange	2½"	57	470	161
EJ 50D-3	5	3	1750	208-230/460, 575	21.0-19.0/9.5, 7.6	Horiz. Flange	2½"	57	470	154
EJ 75D-3	7½	3	1750	208-230/460, 575	25.4-23.0/11.5, 9.2	Horiz. Flange	2½"	67	525	161

4 Inch Discharge

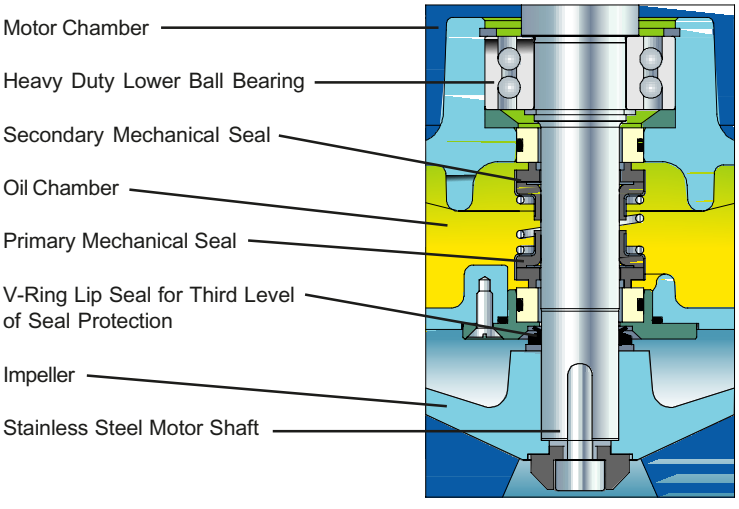
Model	HP	Phase*	RPM	Voltage**	Amps	Discharge	Solids Size	Max Head (feet)	Max Flow (gpm)	Weight (Lbs.)
EJ 30W-4	3	1	1750	208-230	25.4-23.0	Horiz. Flange	3"	46	525	154
EJ 30D-4	3	3	1750	208-230/460, 575	14.4-13.0/6.5, 5.2	Horiz. Flange	3"	46	525	150
EJ 50W-4	5	1	1750	208-230	29.9-27.0	Horiz. Flange	3"	52	550	165
EJ 50D-4	5	3	1750	208-230/460, 575	21.0-19.0/9.5, 7.6	Horiz. Flange	3"	52	550	158
EJ 75D-4	7½	3	1750	208-230/460, 575	25.4-23.0/11.5, 9.2	Horiz. Flange	3"	61	600	165
EJ 100D-4	10	3	1750	208-230/460, 575	31.0-28.0/14.0, 11.2	Horiz. Flange	3"	70	620	170

*Single phase pumps from ½ HP through 2 HP have capacitor and thermal protection built into pump. Single phase pumps from 3 HP through 5 HP require an external capacitor start box or control panel, with overload protection. All three phase pumps require a control panel with overload protection.
** 230 Volt pumps can be operated on 208 volts without modifications.
‡ Pump comes complete with bolt-on discharge elbow, 2" flange x 2" NPT, standard, 2" flange x 3" NPT, optional.

Identification Code

EF 10W-1H

- EF = E Series Scavenger Pump
- EJ = 1750 rpm Sewage Ejector Pump
- EF = 3450 rpm Effluent Pump
- 10 = Motor HP (X10)
- W = Single Phase
- D = Three Phase
- 1 = 1 1/4 inch discharge size
- 2 = 2 inch discharge size
- 3 = 3 inch discharge size
- 4 = 4 inch discharge size
- H = High Head Version



Materials of Construction

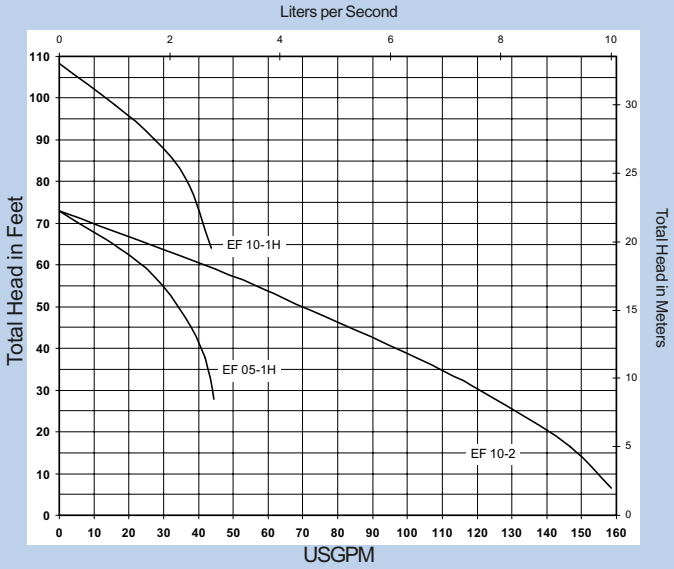
Housings & Volute	Cast Iron
Impeller and Wear Plate	Cast Iron
External Hardware	304 Stainless Steel
Motor Shaft	420 Stainless Steel
Mechanical Seals	Carbon/Ceramic (optional Silicon Carbide)
Bearings	Ball Bearings
Motor Windings	Copper (class B or F depending on model)
Start Switch (1 phase)	Solid State Electronic Switch
Power Cable	Thermoplastic Elastomer, 20 feet standard
O-Rings	Buna-N
Oil	Non-Toxic

The Scavenger Triple Seal System

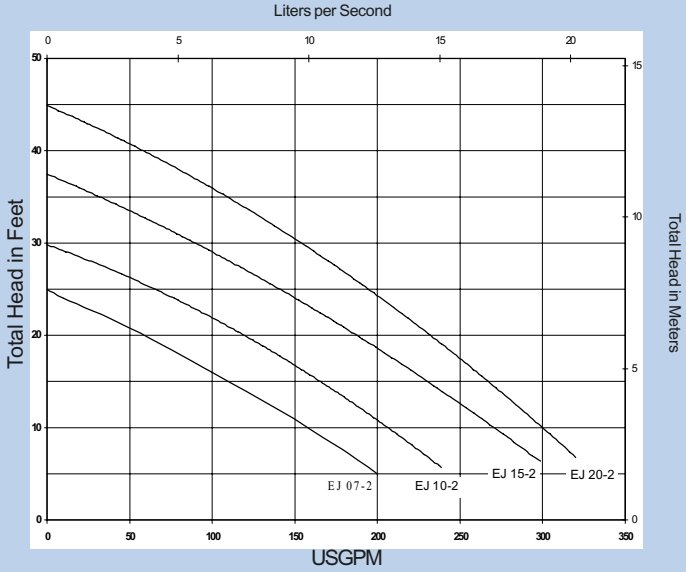
This *ABS exclusive* design provides three levels of sealing for outstanding reliability! A double mechanical seal located inside the oil chamber provides two full levels of sealing. An additional V-Ring type lip seal between the oil chamber and pump volute provides a third, extra level of sealing, and enhanced mechanical seal protection.

SCAVENGER™ Effluent & Sewage Ejector Pumps

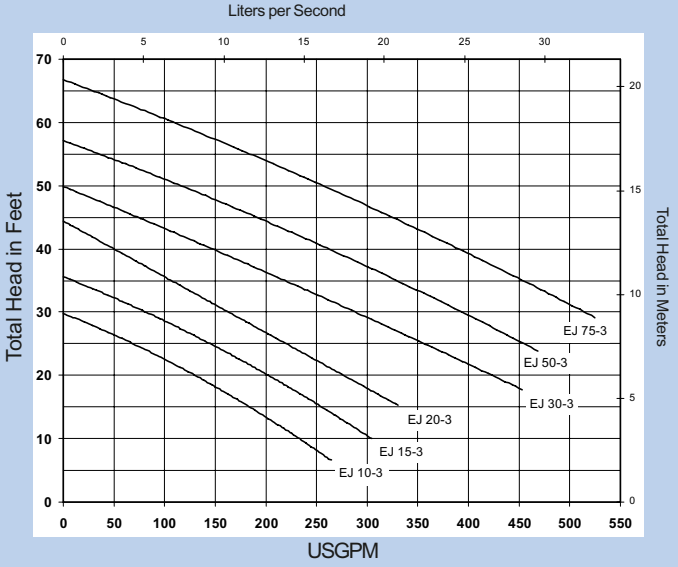
Effluent Pumps 1 1/4 & 2 Inch



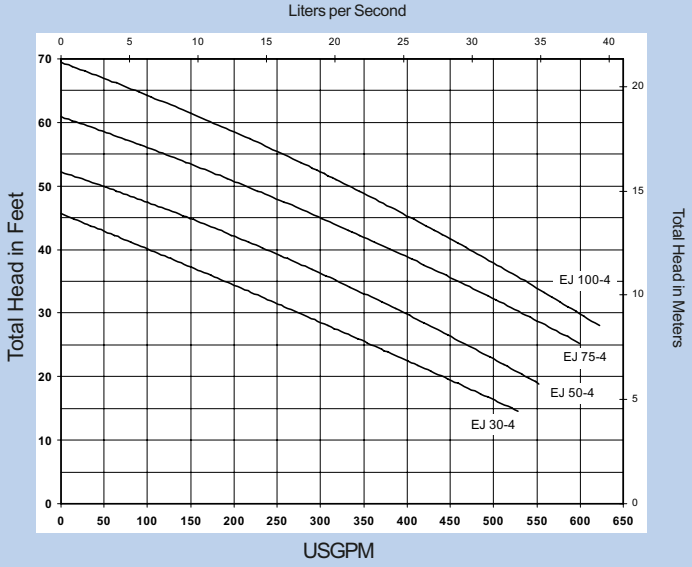
Sewage Ejectors, 2 Inch



Sewage Ejectors, 3 Inch



Sewage Ejectors, 4 Inch



Example Applications:

Commercial
Airports
Apartments & Hotels
Bus & Train Terminals
Car Washes
Condominiums
Convention Centers
Hospitals
Office Buildings
Restaurants
Shopping Malls
Trailer Parks

Industrial
Factory Sewage
Garages
HVAC Condensate
Machine Effluent
Transfer Tanks
Washdown Tanks
Waste Treatment

Marine
Ballast Transfer
Bilge Dewatering
Bilge Transfer
Dry Docks
Fish Hatcheries

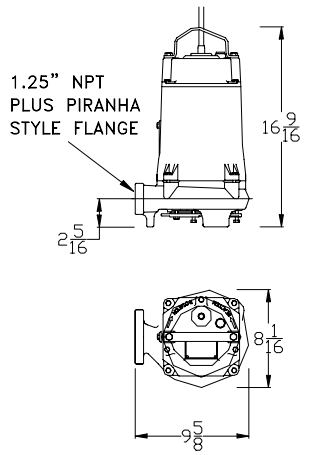
Residential & Municipal
Building Sumps
Home Sewage
Irrigation
Schools
Small Lift Stations
Water Features

Agriculture
Dairy Sewage
Irrigation
Tail Water Transfer

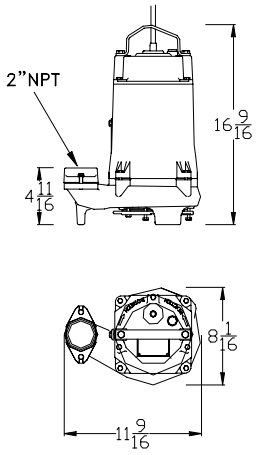
Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

SCAVENGER™ Effluent & Sewage Ejector Pumps

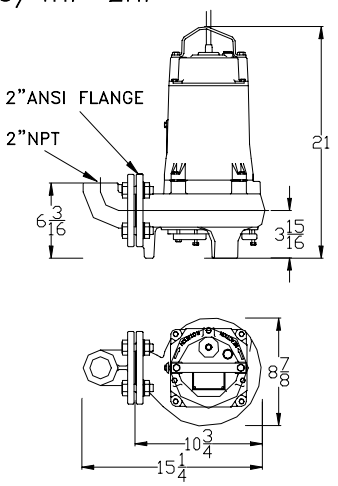
EF 1.25 Inch,
.5HP–1HP



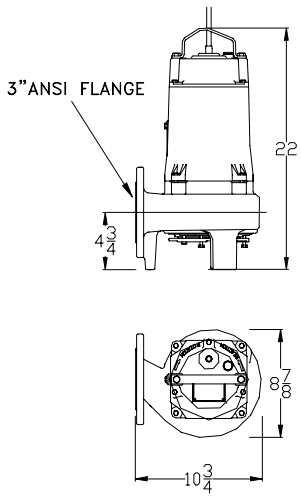
EF 2 Inch,
1HP



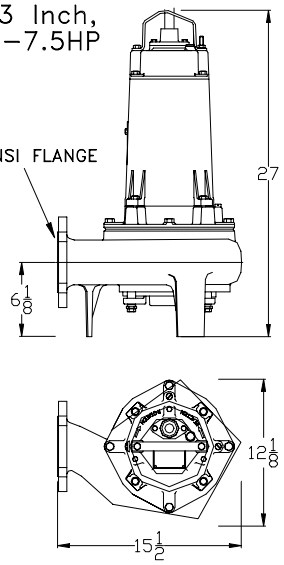
EJ 2 Inch,
3/4HP–2HP



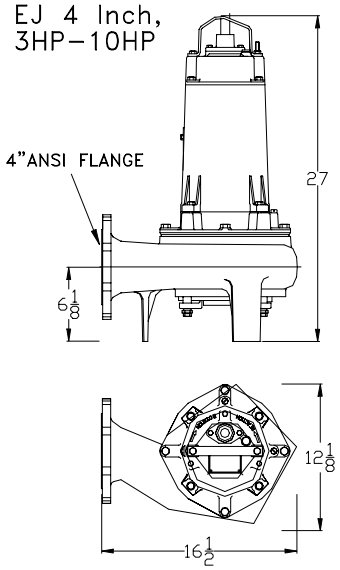
EJ 3 Inch,
1HP–2HP



EJ 3 Inch,
3HP–7.5HP



EJ 4 Inch,
3HP–10HP



Corporate Office:
ABS Pumps, Inc.
140 Pond View Drive
Meriden, CT 06450
Tel: (203) 238-2700
Fax: (203) 238-0738

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

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CH&E Pumps
3849 N. Palmer Street
Milwaukee, WI 53212
Tel: (414) 964-3400
Fax: (414) 964-0677

ABS Pumps Corp.
1215 Meyerside Drive, Unit # 7
Mississauga, ONT L5T 1H3
Tel: (905) 670-4677
Fax: (905) 670-3709

ABS
COST-EFFECTIVE PUMPING

Scavenger® Effluent & Sewage Ejector Pumps

Rugged, cast iron submersible $^{4}/_{10}$ and $^{1}/_{2}$ horsepower pumps

- **High torque capacitor motors**
- **2” NPT vertical discharge, vortex impellers**
- **Rugged cast iron housings**
- **Stainless steel fasteners and motor shaft**
- **Oil filled motors (non-toxic oil)**
- **Integrated clip for float switch cable**
- **Available with or without ABS piggyback float switch**
- **UL and CSA listed**

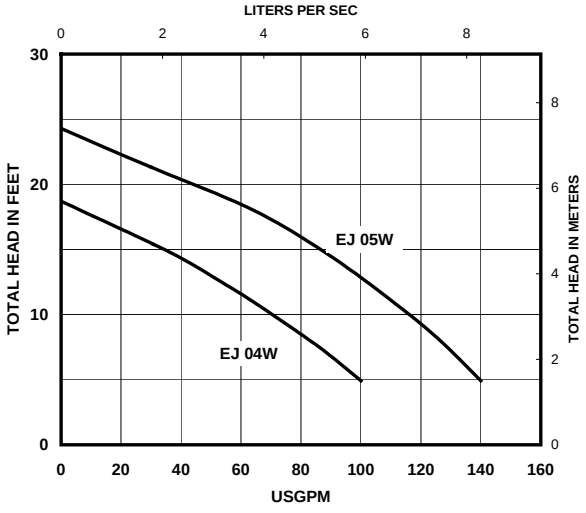
The new Scavenger® E Series pumps are now available in $^{4}/_{10}$ and $^{1}/_{2}$ HP sizes, including both effluent and sewage ejector models. These new pumps are designed from the ground up to deliver the dependable service and long life expected from any product wearing the ABS name. They include all the features required for residential and light commercial applications, as well as several new features not normally found in pumps of this size. These new features include: all ball bearing construction, non-toxic oil, an integrated clip to hold the float switch cable, and of course, ABS' legendary resistance to clogging. All this, plus a competitive price puts the new Scavenger® E Series pumps in a class by themselves.

Materials of Construction:

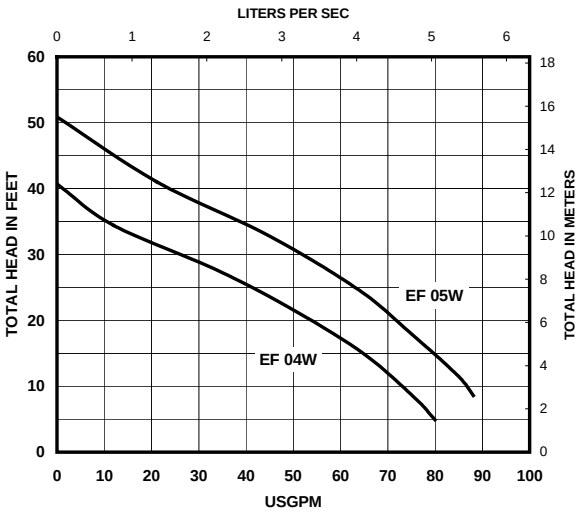
Housings & Volute	Cast Iron
Impeller	Glass Fiber Reinforced PBT
External Hardware	304 Stainless Steel
Motor Shaft	420 Stainless Steel
Mechanical Seal	Carbon/Ceramic
Bearings	Ball Bearings
Motor Windings	Copper, Class B Insulation
Power Cable	Thermoplastic Elastomer, 15 ft
O-Rings	Buna-N

Model	HP	Phase	RPM	Voltage	Discharge	Solids Size	Max Head (ft)	Max Flow (gpm)	Weight (lbs)	Height
EJ 04W	$^{4}/_{10}$	1	1750	115, 230	2" Vert NPT	2"	19	100	31.9	14 $^{7}/_{8}$"
EJ 05W	$^{1}/_{2}$	1	1750	115, 230	2" Vert NPT	2"	24.5	140	35.2	15 $^{7}/_{8}$"
EF 04W	$^{4}/_{10}$	1	3450	115, 230	2" Vert NPT	¾"	41	80	28.6	12 ¼"
EF 05W	$^{1}/_{2}$	1	3450	115, 230	2" Vert NPT	¾"	51	88	30.1	13 ¼"

Ejector Pumps, 1750 RPM



Effluent Pumps, 3450 RPM



EJ 05W **EJ 04W** **EF 05W** **EF 04W**

Corporate Office:
ABS Pumps Inc
140 Pondview Drive
Meriden CT 06450
Tel (203) 238 2700
FAX (203) 238 0738

Regional Offices:
ABS Pumps Inc
111 Maritime Drive
Sanford FL 32771
Tel (407) 330 3456
FAX (407) 330 3404

O'Dell's
1650 Bell Ave Suite 140
Sacramento CA 95838
Tel (916) 925 8508
FAX (916) 925 3914

CH&E
3849 N. Palmer St.
Milwaukee WI 53212
Tel (414) 964 3400
FAX (414) 964 0677

ABS Pumps Corp.
1215 Meyerside Dr. Unit 7
Mississauga Ont L5T 1H3
Tel (905) 670 4677
FAX (905) 670 3709

ABS COST-EFFECTIVE PUMPING

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled (non toxic)
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120° C
Motor Protection	Integral Bi-Metallic current sensing switch providing over temperature shut down
Service Factor	1.10
Voltage Tolerance	± 10% from nominal
Approvals	UL 778 and CSA C22.2-108

MOTOR DATA, 60Hz

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
EF 04W	1	0.4	115	9.1	40	N	0.6	49	2/3450

MATERIALS of CONSTRUCTION

Motor Housing	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
External Hardware	304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	420 Stainless Steel
Oil	Non-toxic white mineral oil (Marcol 52)
Upper Bearing	Single row ball bearing
Lower Bearing	Single row ball bearing.
Lower Shaft Seal	Spring loaded rotating carbon face w/ stationary ceramic face.
Impeller	Polybutylene Terephthalate (PBT) 30% glass fiber, Vortex

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, single phase (lb.)	32
Maximum submergence (feet)	30
Discharge size, standard	2 Inch, Vertical
Discharge thread type	Female NPT
Discharge size, optional	none
Maximum temp. of pumped fluid	40°C continuous, 50°C intermittent

CABLE SPECIFICATIONS

MODEL	POWER CABLE Quantity, Type	LENGTH, Feet	OUTER JACKET
EF 04W	1 - 16/3 SJTOW-A or equiv. 115V w/ 3 prong plug	15	Thermoplastic elastomer

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled (non toxic)
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120° C
Motor Protection	Integral Bi-Metallic current sensing switch providing over temperature shut down
Service Factor	1.10
Voltage Tolerance	± 10% from nominal
Approvals	UL 778 and CSA C22.2-108

MOTOR DATA, 60Hz

Model	Phase	Rated Output Power	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
EF 05W	1	0.5 Hp	115	13.2	58.5	P	0.85	50	2/3450
	1	0.5 Hp	230	6.6	35.2	S	0.85	50	2/3450

MATERIALS of CONSTRUCTION

Motor Housing	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
External Hardware	304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	420 Stainless Steel
Oil	Non-toxic white mineral oil (Marcol 52)
Upper Bearing	Single row ball bearing
Lower Bearing	Single row ball bearing.
Lower Shaft Seal	Spring loaded rotating carbon face w/ stationary ceramic face.
Impeller	Polybutylene Terephthalate (PBT) 30% glass fiber, Vortex

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, single phase (lb.)	36
Maximum submergence (feet)	30
Discharge size, standard	2 Inch, Vertical
Discharge thread type	Female NPT
Discharge size, optional	none
Maximum temp. of pumped fluid	40°C continuous, 50°C intermittent

CABLE SPECIFICATIONS

MODEL	POWER CABLE Quantity, Type	LENGTH, Feet	OUTER JACKET
EF 05W	115 volt - 16/3 SJEOOW or equiv. w/ 3 prong plug 230 volt - 16/3 SJEOOW or equiv. w/3 prong plug	15	Thermoplastic elastomer

MOTOR SPECIFICATIONS

Motor Design	NEMA design B, squirrel cage induction, oil filled (non toxic)
Motor Type	Enclosed submersible
Insulation Class	Class B, rated at 120° C
Motor Protection	Integral Bi-Metallic current sensing switch providing over temperature shut down
Service Factor	1.10
Voltage Tolerance	± 10% from nominal
Approvals	UL 778 and CSA C22.2-108

MOTOR DATA, 60Hz

Model	Phase	Rated Output Power	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/ Speed (rpm)
EJ 05W	1	0.5 Hp	115	10.6	21.4	E	0.87	59	4/1750
	1	0.5 Hp	230	5.3	10.5	E	0.87	59	4/1750

MATERIALS of CONSTRUCTION

Motor Housing	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
External Hardware	304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	420 Stainless Steel
Oil	Non-toxic white mineral oil (Marcol 52)
Upper Bearing	Single row ball bearing
Lower Bearing	Single row ball bearing.
Lower Shaft Seal	Spring loaded rotating carbon face w/ stationary ceramic face.
Impeller	Polybutylene Terephthalate (PBT) 30% glass fiber, Vortex

DIMENSIONS, WEIGHT, AND MISC.

Pump weight, single phase (lb.)	37
Maximum submergence (feet)	30
Discharge size, standard	2 Inch, Vertical
Discharge thread type	Female NPT
Discharge size, optional	none
Maximum temp. of pumped fluid	40°C continuous, 50°C intermittent

CABLE SPECIFICATIONS

MODEL	POWER CABLE Quantity, Type	LENGTH, Feet	OUTER JACKET
EF 05W	115 volt - 16/3 SJEOOW or equiv. w/ 3 prong plug 230 volt - 16/3 SJEOOW or equiv. w/ 3 prong plug	15	Thermoplastic elastomer

STANCOR *Elevator Pit* Oil-Minder® Control System

Larry Wunsch & Associates
210.349.5244 Phone
210.349.6129 Fax

STANCOR

Oil-Minder Control
and Accessories

SE40 Pump
(Optional Model)

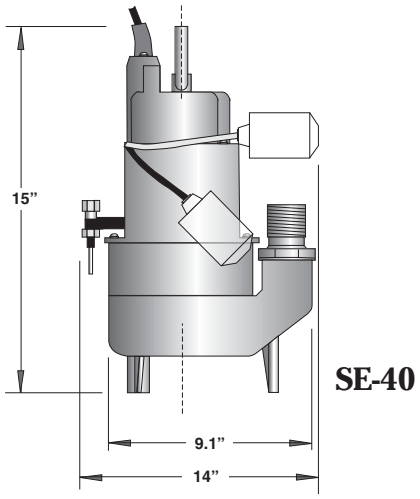
SE50 with Float
& Oil-Minder Probe

The Stancor Oil-Minder Control System is a submersible pump and control package which allows water to be automatically pumped from elevator pits in accordance with ASME A17.1 without danger of ejecting potentially harmful oily substances into sewers, rivers and waterways. The product is engineered for efficient and trouble free pumping, even under the most severe conditions. The patented oil-minder system has a proven record of protecting valuable equipment and the environment while being extremely cost effective.

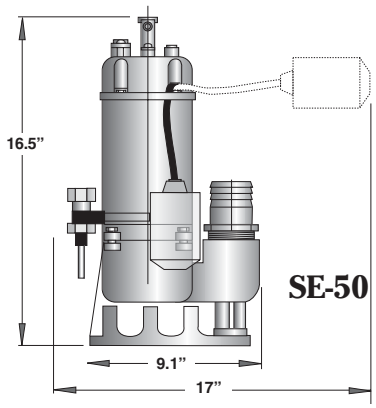
Features

- NEMA 4x weathertight corrosion resistant fiberglass enclosure
- Stainless steel sensor probe
- Single direct plug-in power source for efficient, economical hook-up
- Alarm, light, and remote monitoring circuit
- Complete factory packaging insures quality of entire control and pump system
- Patented - Pat. #4,715,785, #4,752,188, #6,203,281 and others pending
- Oil-minder system can be combined with a variety of different pumps and valves to meet non-standard requirements
- Choice of: 115v or 220v (1 phase) OR 230v/460v/575v (3 phase)
- Approved to UL508 and UL778 Standards
- ENTELA tested and certified
- Lights for oil spill, power, high liquid level, overload, and pump run

Quality You Can Believe In



SE-40

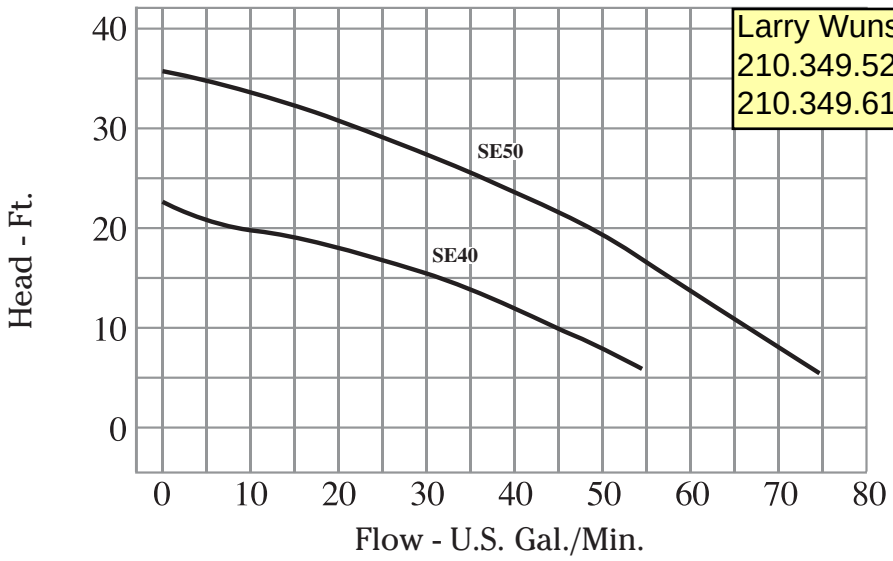


SE-50

The Stancor Oil-Minder Pump System is the overwhelming choice among design engineers and compliance authorities throughout the U.S. and abroad. The Oil-Minder System provides continuous, automatic operation without need for a separate oil-water separator. Local and remote audio and visual warning systems are provided separately for (a) hydraulic oil spill alert (b) high liquid condition, and (c) high amperage. Local alarms and a remote monitoring circuit are provided as standard features. An optional remote alarm is also available.

The system is designed for easy, fool-proof installation. All pump and control cables are factory wired into a wall mountable junction box. Between the junction box and the main Oil-Minder control panel are multi-pin quick control connectors. This single cable, 8-pin system allows the electrical cable between the junction box and control panel to be run through conduit and interconnected up to 200 feet long, using a single “push and turn” motion. There is no need for field wiring and all connections are secure and water-tight.

While the Oil-Minder SE-50 is our most popular model, Stancor can provide custom systems for virtually any application up to 45 H.P., including duplex controls.



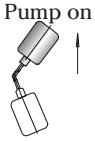
Larry Wunsch & Associates, Inc.
210.349.5244 Phone
210.349.6129 Fax

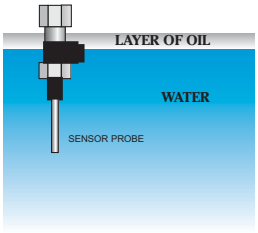
General & Electrical Specifications (Special voltages available upon request)

Model	H.P.	Voltage	RPM	Rated Full-Load Amps	Discharge Size	Max Head Ft.	Max Flow GPM	Weight Lbs.	Height In.	Width In.
SE50	0.5	115 or 230	3600	8/4	2”	37’	74	30.8	16.2”	9.1”
SE40	0.4	115	3600	5	2”	22’	64	24.2	14.96	9.1

How the Stancor Oil Minder System Works:

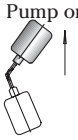
1) Pump on

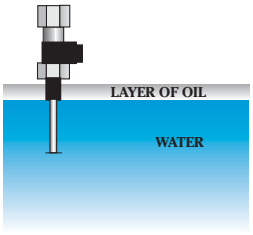




Pump goes on with water in contact with sensor probe.

2) Pump on

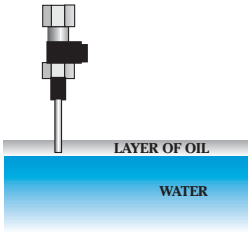




Pump continues to pump down water

3) Pump on

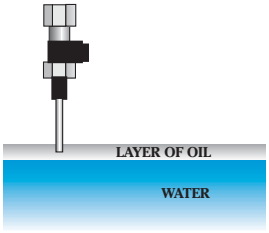
Pump off



Pump will continue to run, pumping water only until
1) water level drops below tip of sensor probe or
2) only oil is in contact with sensor probe, eliminating electrical conductivity

4)

Pump off

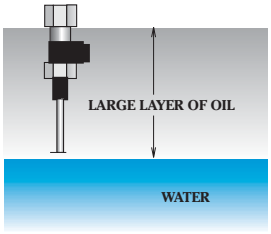


Pump shuts off before oil is pumped, leaving approximately 3" of liquid in bottom of sump.

5)

Float up

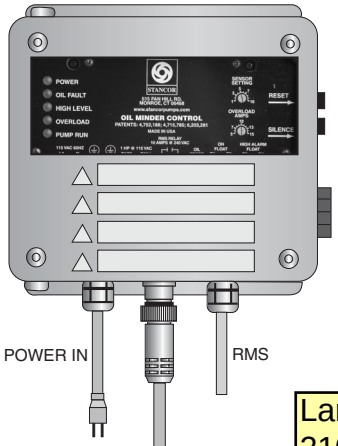
Pump off



Sump floods with oil, sensor probe overrides pump switch and pump remains off. (Oil is contained).

If the water level in the elevator pit increases, the oil (which is lighter than water) **will** rise above the oil-sensing probe and allow the pump to function in the normal manner until the water is pumped down and oil, once again, comes into contact with the probe.

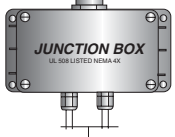
Stancor Oil-Minder SE50 Pump & Oil-Minder Control

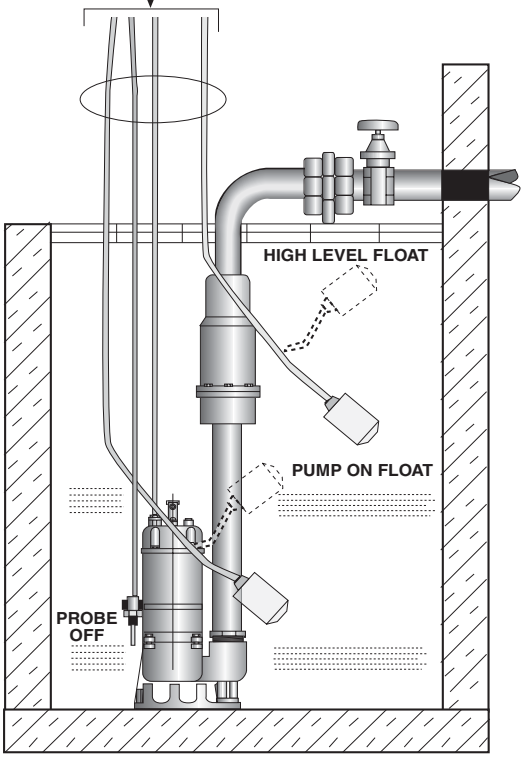


POWER IN

RMS

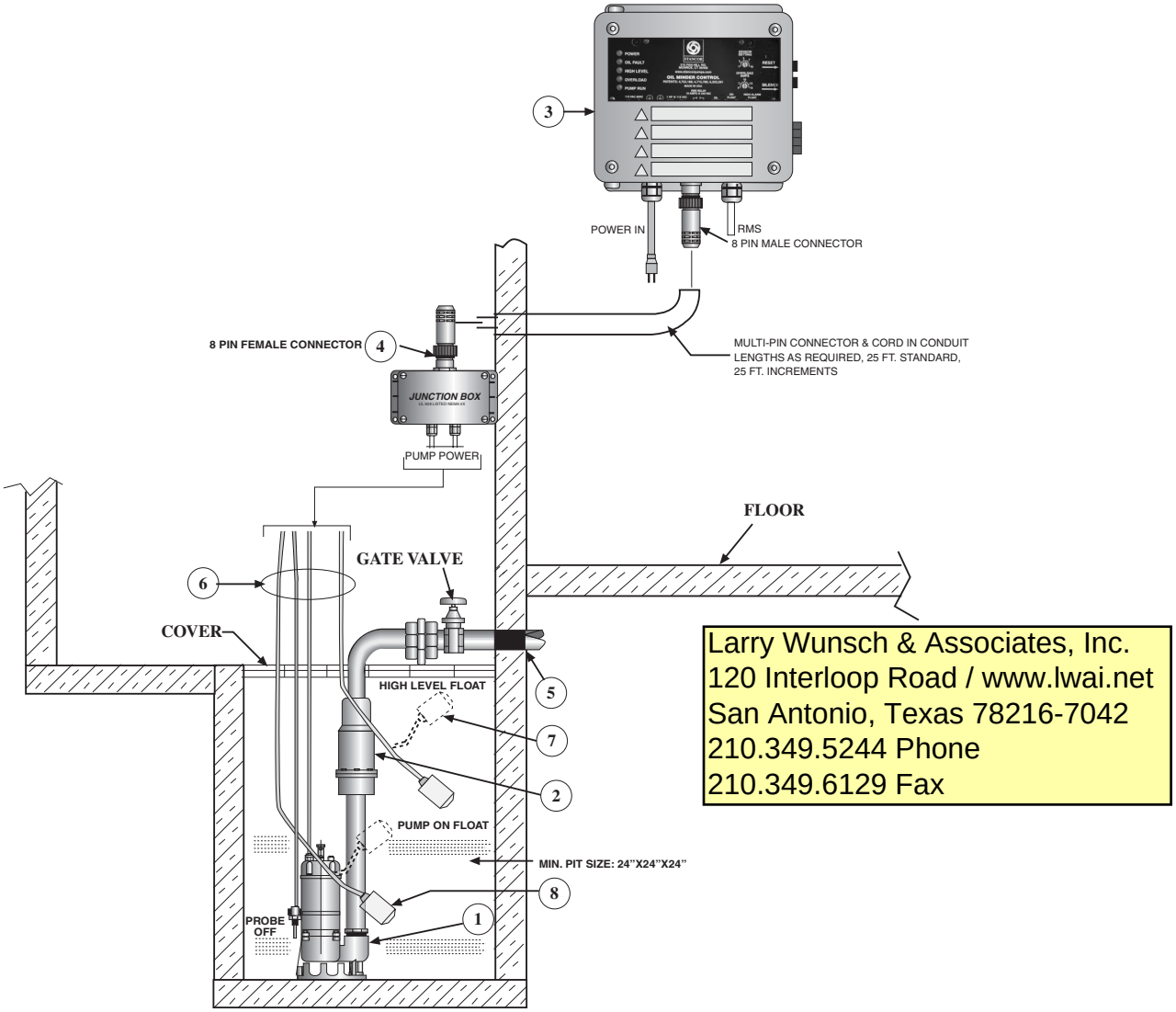
Larry Wunsch & Associates
210.349.5244 Phone
210.349.6129 Fax





See back page for illustration of typical engineered Oil-Minder® Control and Pump System (Type SE-50)

Standard Elevator Oil-Minder System Diagram



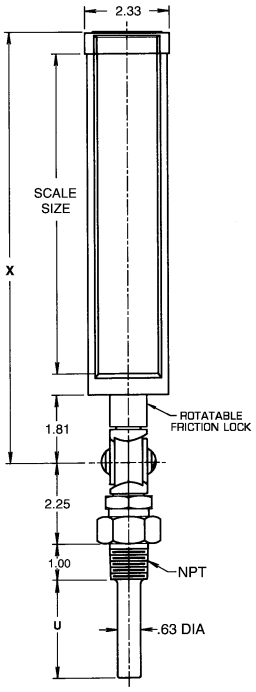
Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

1. Stancor Model SE-50 submersible effluent pump .5 HP, 115 volt, 3600 RPM, 2" discharge connection
2. Stancor check valve
3. Stancor Oil-Minder 115V, 1Ø control system with optional built in audible and visual alarm when pump does not run due to oil in pit or high liquid alarm. Provide silencing button for audible alarm built into panel. Panel shall have additional contact for a remote alarm location. Junction box will be provided with multi-pin connector and cord in lengths as required, 25 ft. standard, optional 25 ft. increments. Lights for oil spill, power, high liquid level, overload, & pump run.
4. Junction box will be provided with multi-pin connector and cord in lengths as required; 25 ft. is standard, optional 25 ft. increments available.
5. All buried pump pressure discharge piping shall be protected with tapecoat CT corrosion protection tape.
6. Oil-Minder cable, power cable, probe cable, high liquid alarm cable, and pump on float cable.
7. High liquid alarm float with clamp device to mount to pump discharge piping.
8. Pump On float.

ITEMS 1, 2, 3, 4, 6, 7 AND 8 PROVIDED BY STANCOR AS A STANDARD PACKAGE

STANCOR

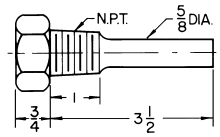
Stancor, Inc.
515 Fan Hill Road • Monroe, CT 06468
Phone 203-268-7513 • Fax 203-268-7958 • www.stancorpumps.com



CASE: Modern V-shape design, high pressure die cast aluminum in black textured finish. Heavy glass protected front firmly secured against rattles by spring action. **STEM:** For 3 1/2" stems only and ranges up to and including 300°F, the stem material is a precision die cast Zamac alloy. For ranges above 300°F, bulb chamber is a precision machined aluminum alloy with copper plated steel stem extension. *For Separable Socket connections only.* **LOCKING DEVICE:** A hand rotatable friction lock with the angle adjusting screw work independently to provide a full 360° positioning of thermometer case and stem. **ADJUSTABLE JOINT:** Die cast aluminum finished to match case. **ACCURACY:** Within 1% of scale range. Silicone shock mounted for lasting durability. **SCALE:** White coated aluminum with permanently baked bold black markings. **FILL:** Blue liquid.

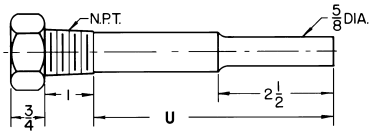
® Vari-angle is a registered trademark of Weiss Instruments, Inc.

Scale Size	X
7"	9 3/4"
9"	11 3/4"



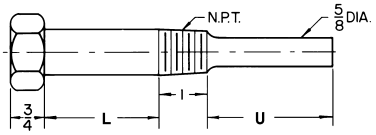
Standard Stem - E Series

CAT. NO.	NPT
E35-75BS	3/4"



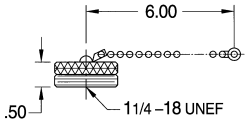
Long Stem - ER Series

CAT. NO.	U	NPT
ER6-75BS	6	3/4"
ER9-75BS	9	3/4"
ER12-75BS	12	3/4"



Extension Neck - ESS,EN,ENS Series

CAT. NO.	L	U	NPT
ESS35-75BS	1	11/2	3/4"
EN6-75BS	21/2	21/2	3/4"
ENS9-75BS	21/2	51/2	3/4"
ENS12-75BS	21/2	81/2	3/4"



Cat.No. ECC - Brass Cap & Chain

VARI-ANGLE INDUSTRIAL THERMOMETERS

QTY.	CAT. NO.	SCALE LGTH.	STEM LGTH	RANGE	TAG
	A9VU35	9"	3 1/2"		
	A9VU6	9"	6"		

THERMOWELLS w/insulation extended neck

QTY.	CAT. NO.	STEM LGTH.	INSERTION	NPT	MATERIAL	TAG
	E35-75BS	3 1/2"	2 1/2"	3/4"	BRASS	
	ER6-75BS	6"	5"	3/4"	BRASS	
	EN6-75BS	6"	2 1/2"	3/4"	BRASS	

°F RANGES	SCALE DIVISION
40-0-110°F	2°
0-120°F	1°
0-160°F	2°
30-180°F	2°
30-240°F	2°
30-300°F	2°
50-400°F	5°
50-550°F	5°

As Req'd

NOTE: Dual and Centigrade Scales available.

STEM	CAT. NO.	CAT. NO.
3 1/2"	A7VU35	A9VU35
6"	A7VU6	A9VU6
9"	A7VU9	A9VU9
12"	A7VU12	A9VU12

CUSTOMER _____

PROJECT _____

ENGINEER _____

PRO or P.O. NO. _____

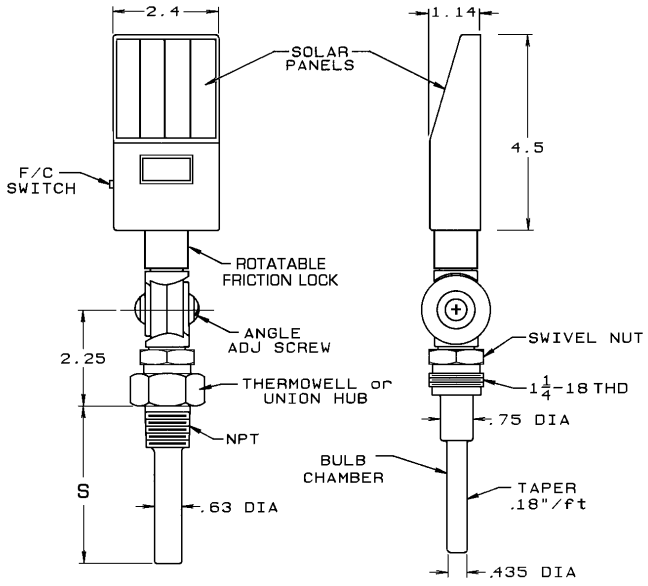
Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

WEISS INSTRUMENTS

WEISS INSTRUMENTS, INC.
HOLTSVILLE, NEW YORK 11742

DESCRIPTION: **Aluminum Case Design**
***Vari-angle*® Industrial Glass Thermometer**
Full Conformance with Fed Spec. GG-T-321D

DRAWN BY: DATE: DRAWING:

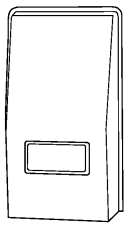


SPECIFICATIONS

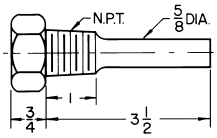
CASE	Hi-impact ABS
RANGE with F/C Switch	-50/300°F (-45/150°C)
DISPLAY	1/2" LCD digits, wide ambient formula
ACCURACY	1% of reading or 1° whichever is greater
RESOLUTION	1/10° between -19.9/199.9°F (-28/93°C)
RECALIBRATION	Through case potentiometer adjustment
LUX RATING	10 Lux (one foot-candle)
UPDATE	10 seconds
AMBIENT OPERATING	-30/140°F (-35/60°C)
AMBIENT TEMP ERROR	Zero
HUMIDITY	100%
SENSOR	Glass passivated thermistor - NTC
STEM ASSEMBLIES	**INDUSTRIAL GLASS** Full conformance with Fed Spec GG-T-321D. Fully interchangeable with Industrial Glass Thermometers.

WITHOUT SOCKET	STEM	S-Dim.
DVU35	31/2"	31/2"
DVU6	6"	5"

QTY.	CAT. NO.	TAG
	DVU 35	
	DVU 6	

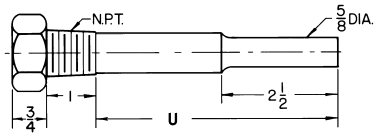


CAT. NO.	DESCRIPTION
DVC-4	Outdoor Waterproof Cover (4 pcs per pack)



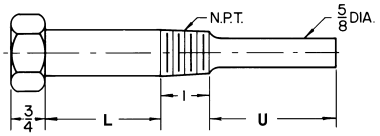
Standard Stem - E Series

CAT. NO.	NPT
E35-75BS	3/4"



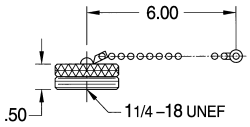
Long Stem - ER Series

CAT. NO.	U	NPT
ER6-75BS	5	3/4"
ER9-75BS	8	3/4"
ER12-75BS	11	3/4"



Extension Neck - ESS,EN,ENS Series

CAT. NO.	L	U	NPT
ESS35-75BS	1	11/2	3/4"
EN6-75BS	21/2	21/2	3/4"
ENS9-75BS	21/2	51/2	3/4"
ENS12-75BS	21/2	81/2	3/4"



Cat.No. ECC - Brass Cap & Chain

THERMOWELLS

QTY.	CAT. NO.	STEM LGTH.	INSERTION	NPT	MATERIAL	TAG
	E35-75BS	31/2"	21/2"	3/4"	BRASS	
	ER6-75BS	6"	5"	3/4"	BRASS	
	EN6-75BS	6"	21/2"	3/4"	BRASS	

CUSTOMER _____

PROJECT _____

ENGINEER _____

PRO or P.O. NO. _____

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

WEISS INSTRUMENTS

WEISS INSTRUMENTS, INC.
HOLTSVILLE, NEW YORK 11742

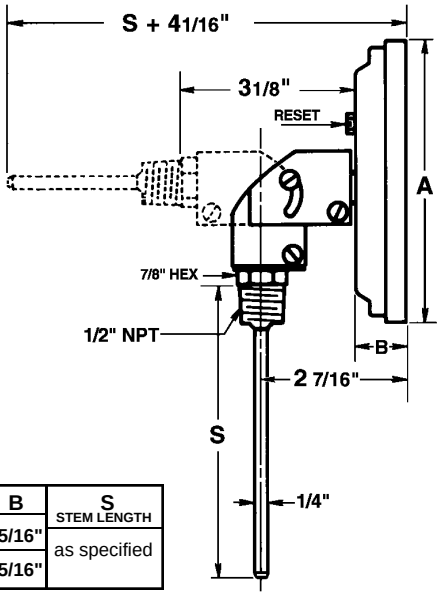
DESCRIPTION:

Vari-angle® Digital Thermometer
Industrial Stem Assembly

DRAWN BY: DATE: DRAWING:

Vari-angle
BIMETAL THERMOMETER

WINDOW - Glass
CASE & RING - 304SS Hermetically Sealed
STEM - Welded Stainless Steel
ACCURACY - 1% Full Scale
EXTERNAL RECALIBRATION



DIAL SIZE	A	B	S STEM LENGTH
3"	31/4"	15/16"	as specified
5"	51/4"	15/16"	

QTY.	CAT. NO.	DIAL SIZE	STEM LENGTH	RANGE	TAG

3" DIAL

Catalog No. 3" Vari-angle	Stem Length (incl.thread)	NPT
3VBM25	21/2"	1/2"
3VBM4	4"	1/2"
3VBM6	6"	1/2"
3VBM9	9"	1/2"
3VBM12	12"	1/2"

Longer stem lengths available

NOTE: When ordering Liquid Filled Bimetals add Prefix **SF** to appropriate Catalog No. **EX: SF3VBM4**

5" DIAL

Catalog No. 5" Vari-angle	Stem Length (incl.thread)	NPT
5VBM25	21/2"	1/2"
5VBM4	4"	1/2"
5VBM6	6"	1/2"
5VBM9	9"	1/2"
5VBM12	12"	1/2"

Longer stem lengths available

FAHRENHEIT	FIG.INTERVAL	SCALE DIV.	CELSIUS	FIG.INTERVAL	SCALE DIV.	DUAL SCALE - F&C	
-80/0/120	20°	2°	-50/0/50	10°	1°	-80/0/120F	-60/0/50C
-20/0120	20°	2°	**0/50	5°	1/2°	-20/0/120F	-30/0/50C
**30/130	10°	1°	0/100	10°	1°	**30/130F	0/55C
0/200	20°	2°	0/150	10°	1°	0/200F	-15/0/90C
0/250	20°	2°	0/200	20°	2°	0/250F	-20/0/120C
50/300	20°	2°	0/300	50°	2°	50/300F	10/150C
50/400	50°	5°	*0/450	50°	5°	50/400F	10/200C
50/550	50°	5°	•*100/550	50°	5°	50/550F	10/260C
*100/800	100°	10°				*100/800F	40/425C
•*200/1000	100°	10°				•*200/1000F	100/540C

• Satisfactory for continuous service up to 800°F or 425°C. Can be used for intermittent service from 800-1000°F or 425-500°C.
* Minimum stem length for these Ranges is 4". ** Minimum stem length is 4"Straight and Vari-angle Form.

CUSTOMER _____

PROJECT _____

ENGINEER _____

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

WEISS INSTRUMENTS

WEISS INSTRUMENTS, INC.
HOLTSVILLE, NEW YORK 11742

DESCRIPTION:
3" & 5" Dial Vari-angle® Bimetals
Series 3VBM and 5VBM

DRAWN BY: DATE: DRAWING:

INERTIA BASE

DESIGN FEATURES

- STRONG STEEL CONSTRUCTION.
- RE-BAR RE-ENFORCED.
- HEIGHT SAVING MOUNTING BRACKETS.
- RE-ENFORCED CORNERS.
- COLOR CODED SPRINGS.
- LEVELING BOLTS.

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

FCI

FCI MANUFACTURING 1090 RAINBOW DR SPRING BRANCH, TX 78070
1-866-4FCIMFG (1-866-432-4634) FAX 210-767-1979
info@fcimfg.com

INERTIA BASE **SPECIFICATION**

Contractor shall furnish and install rectangular or T-shaped steel concrete pouring forms for floating concrete bases. Bases for split case pumps shall be large enough to provide support for suction and discharge elbows. Base thickness shall be a minimum of 1/12 of the longest dimension of the base but not less than 6". Forms shall include concrete reinforcing consisting of 3/8" bars welded in place on 8" centers running both ways in a layer 1" above the bottom. Height saving brackets shall be employed in all mounting locations to maintain a 1" clearance below the base.

Spring isolators shall be free standing and laterally stable without any housing and complete with a molded neoprene cup between the spring and the floor. All mountings shall have leveling bolts that must be rigidly bolted to the equipment . Springs shall be properly sized and color coded as to locations. Base shall be as manufactured by FCI Manufacturing or approved equal.

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120 Interloop Road / www.lwai.net
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1-866-4FCIMFG (1-866-432-4634) FAX 210-767-1979
info@fcimfg.com

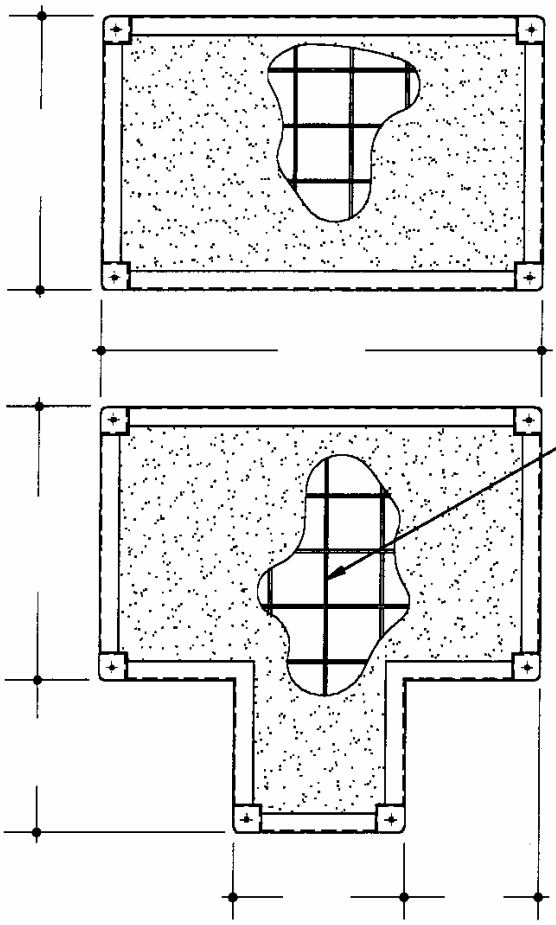
SPRING INERTIA BASE

STEEL POURING FRAME WITH RE-ENFORCED SPACE SAVER POCKETS, WELDED RE-BAR AND PROPERLY SIZED SPRING MOUNTS

Pump Mfgr:	Horiz. Split Case: ☐	End Suction: ☐	C.Coupled: ☐
Pump Model:	Size: x	HP:	RPM:
Specified Deflection:	Pump Wt.	Motor Wt:	Base Wt:
Base Wt. W/Concrete:	Rectangular: ☐	Tee Shape: ☐	Base Ht.
Suction Diffuser: x	Suction Diffuser Brand:		Quantity:

Motor End (_____) _____lb. Spring Mts.( )

Pump End (_____) _____lb. Spring Mts.( )



SPRING DATA

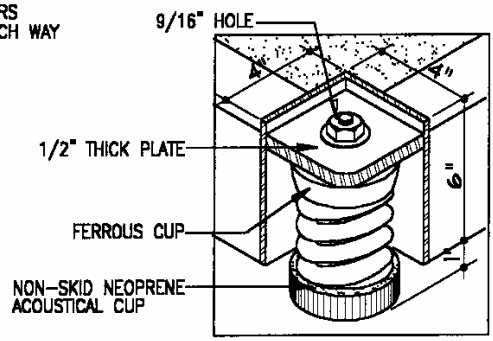
LBS	DEFL	COLOR
450	1.31	RED
750	1.12	WHITE
1000	1.00	BLUE
1350	1.00	YELLOW
1750	1.00	BLACK*
2100	1.00	YELLOW*
2385	1.00	YELLOW**
2650	1.00	RED*
2935	1.00	RED*

1" DEFL →

LBS	DEFL	COLOR
460	2.00	BLUE
610	2.00	GREEN
880	2.00	GRAY
1210	2.00	SILVER
1540	2.00	GRAY*
1870	2.00	SILVER*

2" DEFL →

* RED INNER SPRING
** GREEN INNER SPRING



☐ **Submitted for type approval only**
Allow 3-4" All Around For Housekeeping Pad.

Project:	Date:
Mechanical Engineer:	Rep:
Mechanical Contractor:	Tag:

FCI Manufacturing
1090 Rainbow Dr
Spring Branch, TX 78070
Phone: 866.4FCIMFG (866.432.4634)
Fax: 210.767.1979

Represented By:

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

INERTIA BASE

INSTALLATION INSTRUCTIONS

Make sure area to receive base is flat and level. Place waterproof film over area where base is set.

Pour 3,000 psi concrete into frame, compacting thoroughly. Trowel top surface smooth and level with top frame.

After concrete has set and cured, raise base and install temporary blocks.

Piping and electrical connections can now be made to equipment. Note: All connections to equipment must be flexible.

Set spring mounts under brackets on base with cap screw of adjusting bolt passing through hole in bracket arm. Do not tighten down on cap screw at this time.

Turn up on adjusting bolt of each mount eight (8) complete turns.

Take two (2) additional turns on adjusting bolt of each mount. Repeat as many times as necessary to raise foundation off blocks, remove blocks.

Level foundation by taking additional turns on adjusting bolts at lower side or corner of foundation.

When foundation is level, lock down cap screw in adjusting bolts to lock adjustment. THIS IS VERY IMPORTANT!

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210.349.5244 Phone
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FCI

FCI MANUFACTURING 1090 RAINBOW DR SPRING BRANCH, TX 78070
1-866-4FCIMFG (1-866-432-4634) FAX 210-767-1979
info@fcimfg.com

NEW GALVANIZED SPRINGS

SPRING NO.	COLOR		RL	SL	DEFLECTION AT SL	SPRING CONSTANT	O.D.	FSH
	MAIN	STRIPE	(LB.)	(LB.)	(INCH)	(LB./INCH)	(INCH)	(INCH)
021	SILVER	BLUE	20	30	0.75	40	1 1/4	1 1/2
022	SILVER	RED	44	66	0.75	88	1 1/4	1 1/2
023	SILVER	YELLOW	70	105	0.75	140	1 1/4	1 1/2
024	SILVER	WHITE	100	150	0.75	200	1 1/4	1 1/2
101	SILVER	PINK	56	85	1.40	61	2	4
102	SILVER	BLACK	76	115	1.30	89	2	4
103	SILVER	BLUE	113	170	1.30	131	2	4
104	SILVER	YELLOW	150	225	1.30	174	2	4
105	SILVER	BROWN	216	325	1.20	271	2	4
106	SILVER	RED	300	450	1.20	375	2	4
107	SILVER	PURPLE	400	600	1.20	500	2	4
108	SILVER	ORANGE	500	750	1.10	682	2	4
109	SILVER	GREEN	600	900	1.00	900	2	4
110	SILVER	GRAY	733	1100	0.80	1375	2	4
111	SILVER	WHITE	866	1300	0.80	1625	2	4
112	SILVER	GOLD	1000	1500	1.00	1500	2	4
113	SILVER	NIL	466	700	1.00	700	1 5/32	4
121	SILVER	BLUE	40	60	1.30	47	2	2 3/4
122	SILVER	ORANGE	66	100	1.30	77	2	2 3/4
123	SILVER	BROWN	110	165	1.20	138	2	2 3/4
124	SILVER	BLACK	173	260	1.00	260	2	2 3/4
125	SILVER	YELLOW	246	370	0.80	463	2	2 3/4
126	SILVER	RED	300	450	0.50	900	2	2 3/4
127	SILVER	GREEN	560	840	1.15	731	2	2 3/4
131	SILVER	BLUE	83	125	1.30	97	3 1/4	4
132	SILVER	BLACK	266	400	1.30	308	3 1/4	4
133	SILVER	RED	433	650	1.10	591	3 1/4	4
134	SILVER	GREEN	666	1000	1.10	910	3 1/4	4
135	SILVER	GRAY	1066	1600	1.00	1600	3 1/4	4
138	SILVER	YELLOW	866	1300	1.00	1300	3 1/4	4
140	SILVER	BLUE	66	100	2.25	45	2	5
141	SILVER	BLACK	133	200	2.25	89	2	5
142	SILVER	RED	250	375	2.00	188	2	5
143	SILVER	GREEN	333	500	2.00	250	2	5
144	SILVER	GRAY	476	714	2.00	357	2	5
145 **	SILVER	ORANGE	100	150	2.00	75	1 1/4	5
146 **	SILVER	BROWN	186	280	2.00	140	1 1/4	5
146A **	SILVER	BLUE	233	350	2.00	175	1 1/4	5
146B	SILVER	WHITE	400	600	2.00	300	1 1/4	5
147	SILVER	WHITE	953	1430	2.00	715	2	5
148A	SILVER	YELLOW	1261	1892	2.00	946	2	5
150	SILVER	BROWN	83	125	1.30	97	2 1/2	3 5/8
151	SILVER	ORANGE	150	225	1.30	174	2 1/2	3 5/8
152	SILVER	GREEN	216	325	1.20	271	2 1/2	3 5/8
153	SILVER	RED	300	450	1.20	375	2 1/2	3 5/8
154	SILVER	BLACK	400	600	1.20	500	2 1/2	3 5/8
155	SILVER	WHITE	500	750	1.10	682	2 1/2	3 5/8
156	SILVER	GRAY	600	900	1.00	900	2 1/2	3 5/8
157	SILVER	BLUE	733	1100	0.90	1223	2 1/2	3 5/8
158	SILVER	GOLD	1200	1800	1.00	1800	2 1/2	3 5/8
159	SILVER	NIL	1666	2500	1.00	2500	2 1/2	3 5/8
161	SILVER	RED	416	625	1.00	625	1 5/16	3 5/8

**** Production discontinued, available till stocks last**

NOTES :

1) SL = LOAD IN LB. AT WHICH SPRING WILL BECOME SOLID
2) RL = RATED LOAD IN LBS., BASED ON ASHRAE DEFINED 50% ADDITIONAL TRAVEL TO SOLID.
3) FSH = FREE SPRING HEIGHT
4) ISOLATORS SHOULD BE SELECTED IN THE RANGE OF **MINUS 30% TO PLUS 25%** OF RATED LOAD

Notes / Remarks :

VIBRATION MANAGEMENT CORPORATION
3532-A EAST TC JESTER, HOUSTON - TEXAS 77018 , USA
Intenet address: www.vimco.biz

Project :
Client :
Consultant :
Representative : ***LARRY WUNSCH & ASSOC.***

Title : **Spring Chart**

Larry Wunsch & Associates, Inc.
210.349.5244 Phone
210.349.6129 Fax

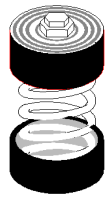
Drawing no. **S-1200.00**

Rev. **7**

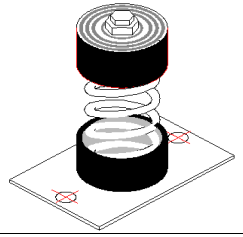
VIBRATION MANAGEMENT CORPORATION

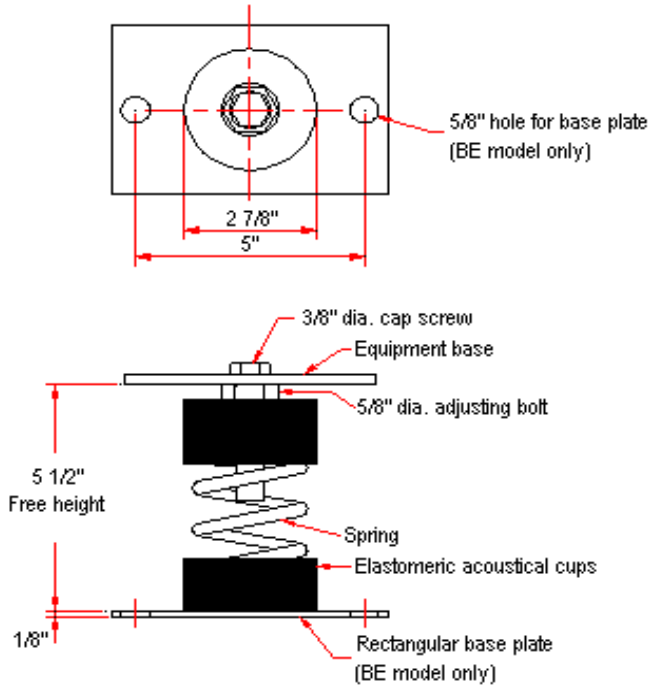
3532-A EAST TC JESTER , BROOKWOOD BUSINESS PARK , HOUSTON , TEXAS 77018 , U.S.A INTERNET ADDRESS: www.vimco.biz

Model '**BB**' (w/o base plate)



Model '**BE**' (with base plate)





N.T.S

ISOLATOR MODEL	RATED LOAD (lbs)	SOLID LOAD (lbs)
BB-150	83	125
BB-151	150	225
BB-152	216	325
BB-153	300	450
BB-154	400	600
BB-155	500	750
BB-156	600	900
BB-157	733	1100
BB-158	1200	1800
BB-159	1666	2500
BB-150-161	481	722
BB-151-161	532	799
BB-152-161	597	896
BB-153-161	666	1000
BB-154-161	750	1125
BB-155-161	871	1307
BB-156-161	1016	1525
BB-157-161	1108	1663
BB-158-161	1616	2425
BB-159-161	2083	3125

NOTES

1. Isolators have a min. operating Kx/Ky ratio of 1.0
2. Springs have 50% additional travel to solid beyond rated load.
3. Isolators should be selected in the range of -30% to +25 % of rated load.
4. Consult spring chart for isolator performance data.

FEATURES

* Large diameter laterally stable springs
* Weld-free construction
* Anti-skid elastomeric acoustical cup
* Built-in leveling device
* Spring elements color-coded for easy field verification

Larry Wunsch & Associates, Inc.
210.349.5244 Phone
210.349.6129 Fax

Notes / Remarks :			Title :	Drawing no.
	Project :		**BB / BE** Free-standing Spring Mount Rubber Cup Construction (1" deflection)	**S-2025.02**
	Client :			
	Consultant :			
	Representative :	***LARRY WUNSCH & ASSOC.***		Rev. **1**

VIBRATION MANAGEMENT CORPORATION

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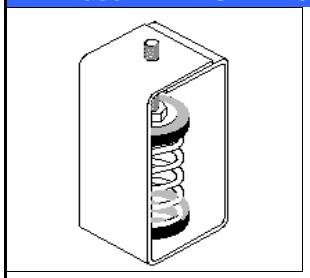

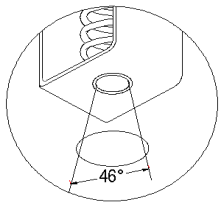

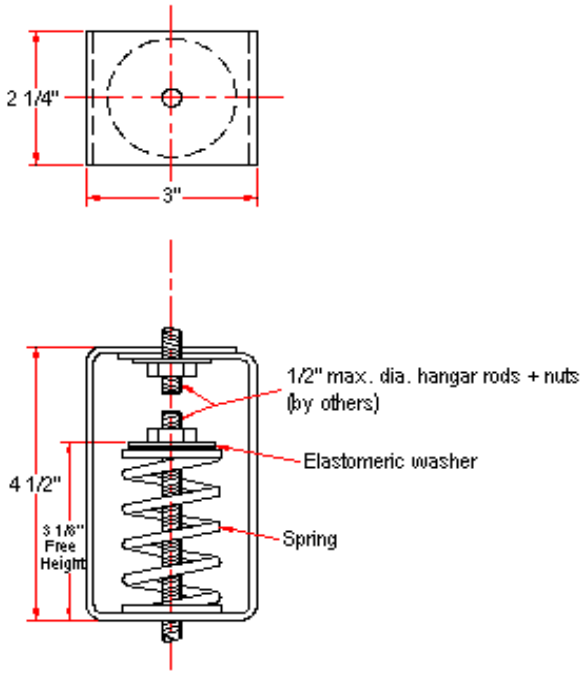

N.T.S.

ISOLATOR MODEL	RATED LOAD (lbs)	SOLID LOAD (lbs)
HSA-121	40	60
HSA-122	66	100
HSA-123	110	165
HSA-124	173	260
HSA-125	246	370
HSA-126	300	450
HSA-127	560	840

FEATURES

* Spring elements color-coded for easy field verification
* Load distribution steel washer

NOTES

1. Springs have 50% additional travel to solid beyond rated load.
2. Isolators should be selected in the range of -30% to +25% of rated load.
3. Consult spring chart for isolator performance data.
4. Nuts, washers & rods by others.

Notes / Remarks :			Title :	Drawing no.
	Project :		**HSA** Spring Hanger (1" deflection)	**S-2100.01**
	Client :			
	Consultant :			
	Representative :	***LARRY WUNSCH & ASSOC.***		Rev. **1**

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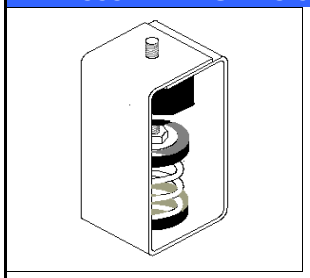
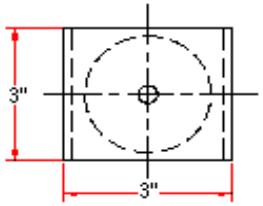
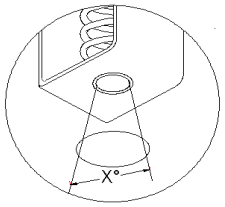
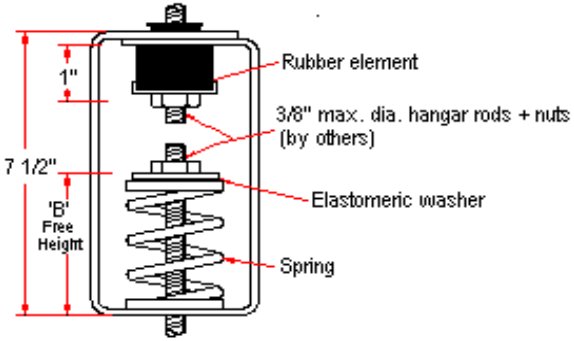






X=46° for springs 121 to 127
X=28° for springs 101 to 112



N.T.S.

ISOLATOR MODEL	RATED LOAD (lbs)	SOLID LOAD (lbs)	'B' inches
HSB-HM-121	40	60	3 3/8
HSB-HM-122	66	100	3 3/8
HSB-HM-123	110	165	3 3/8
HSB-HM-124	173	260	3 3/8
HSB-HM-125	246	370	3 3/8
HSB-HM-126	300	450	3 3/8
HSB-HM-127	560	840	3 3/8
HSB-HM-101	56	85	4 5/8
HSB-HM-102	76	115	4 5/8
HSB-HM-103	113	170	4 5/8
HSB-HM-104	150	225	4 5/8
HSB-HM-105	216	325	4 5/8
HSB-HM-106	300	450	4 5/8
HSB-HM-107	400	600	4 5/8
HSB-HM-108	500	750	4 5/8
HSB-HM-109	600	900	4 5/8
HSB-HM-110	733	1100	4 5/8
HSB-HM-111	866	1300	4 5/8
HSB-HM-112	1000	1500	4 5/8

NOTES

1. Springs have 50% additional travel to solid beyond rated load.
2. Isolators should be selected in the range of -30% to +25% of rated load.
3. Consult spring chart for isolator performance data.

FEATURES

* Oil + water resistant rubber element
* Rubber element incorporates projected collar to prevent metal to metal contact between rod and bracket.

Notes / Remarks :			Title :	Drawing no.
	Project :		**HSB-HM** Neo-Spring™ Hanger (1" deflection)	**S-2400.06**
	Client :			
	Consultant :			
	Representative :	***LARRY WUNSCH & ASSOC.***		Rev. **2**

VIBRATION MANAGEMENT CORPORATION

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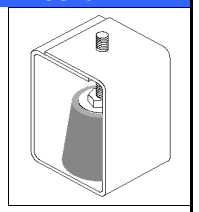
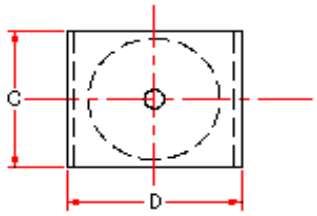
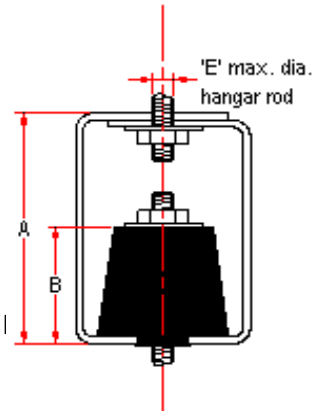
ISOLATOR MODEL	MAX. LOAD (lbs)	DEFLECTION (inches)	ISOLATOR DIMENSIONS (inches)					COLOR
			A	B	C	D	E	
HND-A-1	30	2/5	3	1 3/8	2	2 1/4	3/8	BLUE
HND-A-2	40	2/5	3	1 3/8	2	2 1/4	3/8	RED
HND-A-3	70	2/5	3	1 3/8	2	2 1/4	3/8	GREEN
HND-A-4	115	2/5	3	1 3/8	2	2 1/4	3/8	BLACK
HND-B-1	165	1/2	4 1/2	1 7/8	2 1/4	3	1/2	BLUE
HND-B-2	235	1/2	4 1/2	1 7/8	2 1/4	3	1/2	RED
HND-B-3	375	1/2	4 1/2	1 7/8	2 1/4	3	1/2	GREEN
HND-B-4	545	1/2	4 1/2	1 7/8	2 1/4	3	1/2	BLACK
HND-C-3	745	1/2	6	3 1/8	3 1/2	4	1/2	GREEN
HND-C-4	1245	1/2	6	3 1/8	3 1/2	4	1/2	BLACK
HND-D-2	2240	1/2	6	3 1/8	4	4 1/2	5/8	RED
HND-D-3	3000	1/2	6	3 1/8	4	4 1/2	5/8	GREEN
HND-D-4	4000	1/2	6	3 1/8	4	4 1/2	5/8	BLACK







NOTES

1. Nuts, washer & rods by others.
2. Do not exceed maximum load by more than 5%

FEATURES

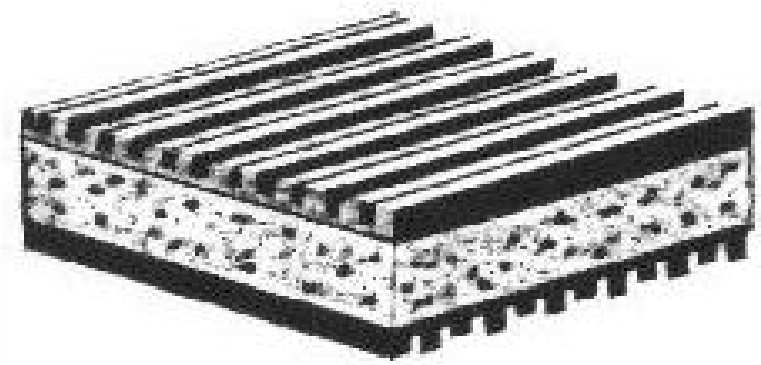
* Element incorporates projected collar to prevent metal to metal contact between rod and bracket.
* Embedded steel plates for uniform loading.
* Oil + water resistant element
* High deflection, low natural frequency
* Elements color-coded for easy field verification (*Color coding can be by 'dot' or 'complete element'*)

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Notes / Remarks :			Title :	Drawing no.
	Project :		**HND** Rubber-In-Shear Hangar (Double deflection)	**S-2300.01**
	Client :			
	Consultant :			Rev. **0**
	Representative :	***LARRY WUNSCH & ASSOC.***		

VIBRATION MANAGEMENT CORPORATION

3532-A EAST TC JESTER , BROOKWOOD BUSINESS PARK , HOUSTON , TEXAS 77018 , U.S.A INTERNET ADDRESS: www.vimco.biz



MODEL	SIZE (inches)
CRMP 181878	18" x 18" x 7/8"
CRMP 121278	12" x 12" x 7/8"
CRMP 080878	8" x 8" x 7/8"
CRMP 060678	6" x 6" x 7/8"
CRMP 040478	4" x 4" x 7/8"
CRMP 030378	3" x 3" x 7/8"
CRMP 020278	2" x 2" x 7/8"
CRMP 181801	18" x 18" x 1"
CRMP 121201	12" x 12" x 1"
CRMP 080801	8" x 8" x 1"
CRMP 060601	6" x 6" x 1"
CRMP 040401	4" x 4" x 1"
CRMP 030301	3" x 3" x 1"
CRMP 020201	2" x 2" x 1"
CRMP 181802	18" x 18" x 2"
CRMP 121202	12" x 12" x 2"
CRMP 080802	8" x 8" x 2"
CRMP 060602	6" x 6" x 2"
CRMP 040402	4" x 4" x 2"
CRMP 030302	3" x 3" x 2"
CRMP 020202	2" x 2" x 2"
CRMP SSSSSS	SPECIAL (contact factory)

APPLICATION

* Wherever bolting is to be avoided and minor, non-critical vibration conditions exist. (pumps, motors, airconditioning units, generators etc.)
* Recommended for acoustic problem applications.

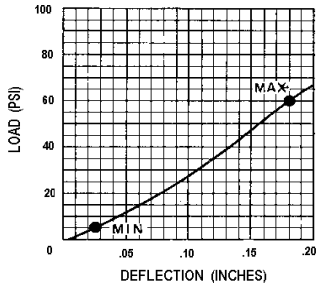
NOTES

1. Material: Special Rubber + Low-Density Cork + Special Rubber
2. Maximum loading: 60 lbs/sq.in.
3. Working range: 15 to 55 lbs/sq.in.

FEATURES

* Alternate High-Low Rib construction.
* Excellent sound attenuation capability.
* No bolting required.
* Simple field installation.

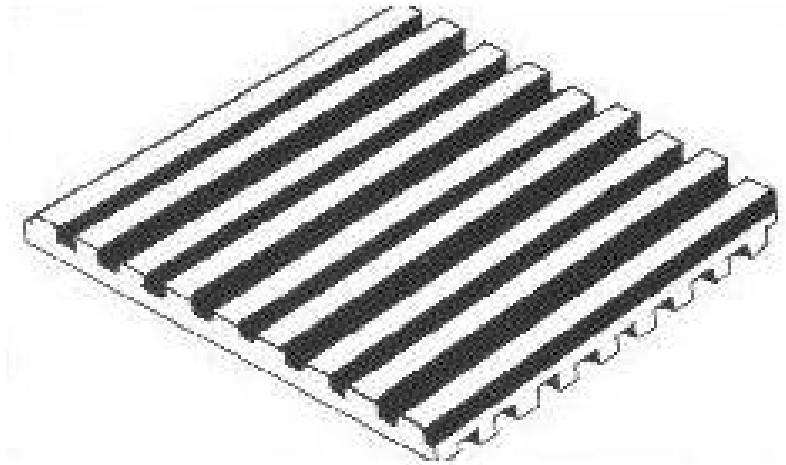
Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax



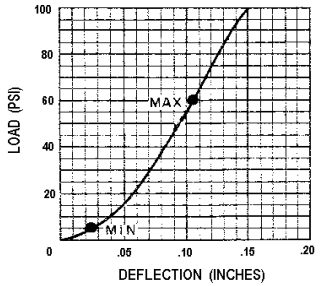
Notes / Remarks :			Title :	Drawing no.
	Project :		**CRMP** Cork-Rubber Mounting Pad	**S-2200.01**
	Client :			
	Consultant :			
	Representative :	***LARRY WUNSCH & ASSOC.***		Rev. **0**

VIBRATION MANAGEMENT CORPORATION

3532-A EAST TC JESTER , BROOKWOOD BUSINESS PARK , HOUSTON , TEXAS 77018 , U.S.A INTERNET ADDRESS: www.vimco.biz



MODEL	SIZE (inches)
RMP 181838	18" x 18" x 3/8"
RMP 121238	12" x 12" x 3/8"
RMP 080838	8" x 8" x 3/8"
RMP 060638	6" x 6" x 3/8"
RMP 040438	4" x 4" x 3/8"
RMP 030338	3" x 3" x 3/8"
RMP 020238	2" x 2" x 3/8"
RMP SSSS38	SPECIAL (contact factory)



APPLICATION

* Wherever bolting is to be avoided and minor, non-critical vibration conditions exist. (pumps, motors, airconditioning units, generators etc.)

NOTES

1. Material: Special Rubber
2. Maximum loading: 60 lbs/sq.in.
3. Working range: 15 to 55 lbs/sq.in.

FEATURES

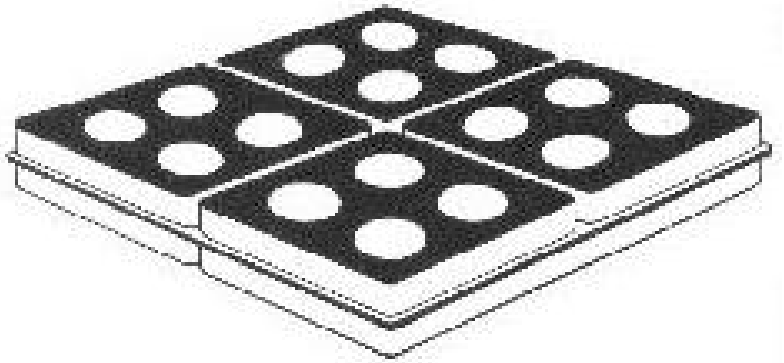
* Alternate High-Low Rib construction.
* No bolting required.
* Simple field installation.

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

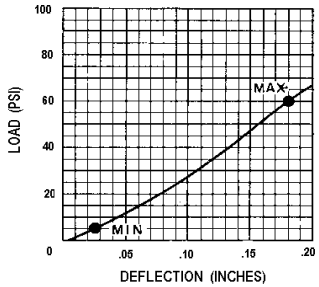
Notes / Remarks :			Title :	Drawing no.
	Project :		**RMP** Rubber Mounting Pad	**S-2200.11**
	Client :			
	Consultant :			Rev. **0**
	Representative :	***LARRY WUNSCH & ASSOC.***		

VIBRATION MANAGEMENT CORPORATION

3532-A EAST TC JESTER , BROOKWOOD BUSINESS PARK , HOUSTON , TEXAS 77018 , U.S.A INTERNET ADDRESS: www.vimco.biz



MODEL	SIZE (inches)
ECRMP 181834	18" x 18" x 3/4"
ECRMP 121234	12" x 12" x 3/4"
ECRMP 101034	10" x 10" x 3/4"
ECRMP 080834	8" x 8" x 3/4"
ECRMP 060634	6" x 6" x 3/4"
ECRMP 040434	4" x 4" x 3/4"
ECRMP 020234	2" x 2" x 3/4"
ECRMP SSSS34	SPECIAL (contact factory)



APPLICATION

* Wherever bolting is to be avoided and minor, non-critical vibration conditions exist. (pumps, motors, airconditioning units, generators etc.)

NOTES

1. Material: Special Rubber
2. Maximum loading: 60 lbs/sq.in.
3. Working range: 15 to 55 lbs/sq.in.

FEATURES

* "Waffle pad" design with inbuilt suction cups.
* "Easy-Cut" (by hand!) design allows flexibility of pad size to suit job site requirements.
* No bolting required.
* Simple field installation.

Larry Wunsch & Associates, Inc.
120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Notes / Remarks :			Title :	Drawing no.
	Project :		**ECRMP** Easy-Cut Rubber Mounting Pad	**S-2200.21**
	Client :			
	Consultant :			
	Representative :	***LARRY WUNSCH & ASSOC.***		Rev. **2**

Larry Wunsch & Associates, Inc.
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San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

Multi-Jet Water Meters

5/8", 3/4" and 1"

Our Multi-Jets quietly perform to a high standard. Yours.

Millions of our 5/8", 3/4", and 1" meters are in operation today. Using superior measurement technology, these meters represent the perfect balance between accuracy, cost, and longevity. With sensitivity to measure water flowing as low as 1/8 gallon per minute and accuracy unaffected by common particulates and build-up that would freeze other types, you can count on a Multi-Jet.

Our meters are designed with the future in mind as well. Choose from the many optional devices and you can create a modular reading system that has no equal. Remote Read? We can handle that. Wireless? We make it almost too easy. These meters are ready to work for you.

FEATURES & BENEFITS

- **Meets All AWWA Standards; NSF Certified**
- **Tamper Detection and Prevention**
- **Patented Frost Protection (option)**
- **High-Quality, Long-Life Parts**
- **Durable Basket Strainer Protects from Damage**

TECHNICAL SPECIFICATIONS:

AWWA/NSF Standards — Meets or exceeds all sections of AWWA Standard C-708, most recent revision; Certified by NSF to NSF/ANSI Standard 61.

Design/Operation — Velocity-type meter. Water, evenly distributed by multiple jet nozzles, flows past an impeller in the measuring chamber, creating an impeller velocity directly proportional to water flow rate. The meter's register integrates velocity into totalized flow.

Main Case — Choice of waterworks bronze case of 81% copper composition or EnviroBrass® II, 87% copper, low lead bronze. All main cases incorporates externally threaded ends and wrench pads to aid installation. Bronze register retaining rings are standard.

Measuring Chamber — The measuring chamber housing and measurement element are constructed of a durable synthetic polymer and can easily be removed from the main case without removal of the meter from the line. The chamber housing is constructed in two parts to allow access to the impeller.

Measurement surfaces are not wear surfaces, providing sustained accuracy despite the presence of entrained solids in the water. A long-life, sapphire serves as a wear surface, with balanced water flows minimizing bearing wear.

Magnetic Drive — A reliable, direct magnetic drive provides linkage between measurement element and register. No intermediate gearing is required; no gearing is exposed to water.

Register — Standard direct read, DIALOG® Reading System and Electrical Output Registers are available. A six wheel odometer is standard.

Register Sealing — Direct read and DIALOG registers are permanently sealed, with a tempered glass lens, stainless steel base and wrap-around gasket to prevent intrusion of dirt or moisture.

Register Units — Registration available in U.S. gallons, cubic feet or cubic metres.

Test Circle — Large center sweep hand with ten clearly indicated gradations per minimum registration unit.

Low Flow/Leak Indicator — Center mounted indicator with high sensitivity resulting from direct one to one linkage to the measuring element.

Strainer — A rugged, 360-degree polymer basket strainer protects the critical measuring element from damage.

Frost Protection (option) — Patented, pressure-activated plug is expelled from the meter by expansion of freezing water. The frost plug can be replaced without meter removal or disassembly.

Adjusting Port — Sealed after factory calibration. Port is accessible for utility recalibration, to compensate for inaccuracy in older meters without parts replacement.

Tamper Detection — The Master Meter Multi-Jet adjusting port is sealed to prevent tampering and provides a visual indication of tampering attempts.

See reverse side for more specifications »

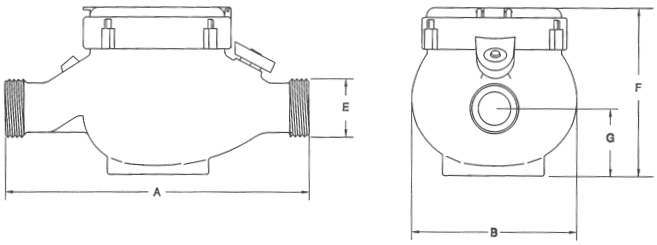
Multi-Jet Water Meters

5/8", 3/4" and 1"

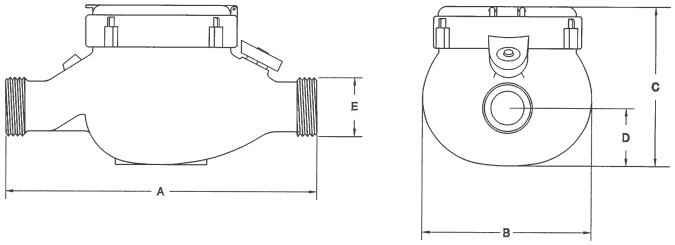
METER OPERATING CHARACTERISTIC/DIMENSION	5/8"	5/8" x 3/4"	3/4" SL	1"
Flow Rating (gpm)	20	20	30	50
Continuous Flow (gpm)	15	15	20	30
Normal Flow Range (gpm)	1-20	1-20	2-30	3-50
Low Flow (gpm)	1/4	1/4	1/2	3/4
Maximum Working Pressure (psi)	150	150	150	150
Maximum Working Temperature (°F)	122	122	122	122
Length (A below)	7-1/2"	7-1/2"	7-1/2"	10-3/4"
Width (B below)	3-3/4"	3-3/4"	3-3/4"	4-1/8"
Width, side-mounted DIALOG unit	4-1/2"	4-1/2"	4-1/2"	4-1/2"
Height, standard register with lid (C below)	4-1/8"	4-1/8"	4-1/8"	3-7/8"
Height with DIALOG register	4-7/8"	4-7/8"	4-7/8"	4-5/8"
Height, Frost Proof, standard register with lid 4-3/8" (F below)	4-3/8"	4-3/8"	4-3/8"	4-3/8"
Height, bottom to center line (D below)	1-3/16"	1-3/16"	1-3/16"	1-3/16"
Height, Frost Proof, bottom to center line (G below)	1-3/4"	1-3/4"	1-3/4"	1-3/4"
Meter Casing Spuds, Nominal Thread Size* (E below)	3/4"	1"	1"	1-1/4"
Weight (lbs)	3.6	3.7	3.6	5.25
Packed To Carton	6	6	6	4
Carton Weight (lbs)	23	23.6	23	22.4

*External Straight Threads

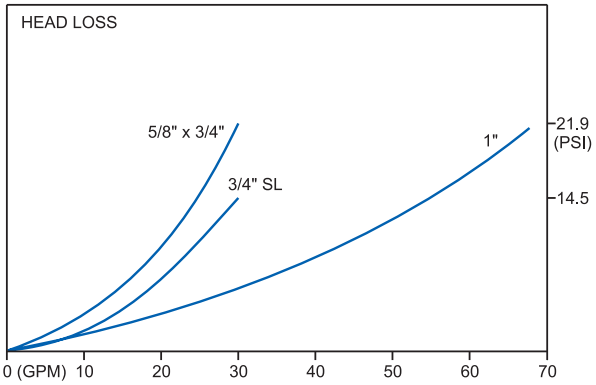
Frost Proof 5/8" to 1"



Standard 5/8" to 1"



Head Loss Curves



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MMDS_MJ-58341 Rev11/01/06

Electrical Output Registers
for Multi-Jet and Turbine Meters

Convert to electrical output, reliably.

Registers compatible with Master Meter 5/8" to 2" Multi-jet Cold or Hot Water Meters and 2" to 12" Turbine Meters providing single or double contact closure corresponding to defined volume increments.

Commonly used in utility, industrial and agricultural installations where totalization is required at a site remote from the meter, and where precise volume input to batching equipment is required, for injection of chemicals, dyes or other additives.

FEATURES & BENEFITS

- **Great for utility, industrial, and agricultural applications**
- **Compatible with MM 5/8" to 2" Multi-Jet Cold or Hot Water meters**
- **Switch enclosed in a vacuum-sealed glass tube**
- **Available as single or dual switch output**

TECHNICAL SPECIFICATIONS:

Description
Registers compatible with Master Meter 5/8" to 2" Multi-jet Cold or Hot Water Meters and 2" to 12" Turbine Meters providing single or double contact closure corresponding to defined volume increments.

Applications
In utility, industrial & agricultural installations where:
- Totalization is required at a site remote from the meter;
- Precise volume input to batching equipment is required, for injection of chemicals, dyes or other additives.

Swith Type
Reed Switch Type Proximity Sensor.
Dry contact switch.

Construction
Permanently sealed, magnetic drive register, with stainless steel register base, plastic lens and wrap-around gasket. A standard six-wheel mechanical odometer accommodates on-site reading when required.

Single Switch Output
Switch is enclosed in a vacuum-sealed glass tube. The switch assembly locks, with a bayonet fit, into a sealed cavity in the register.

Dual Switch Output
Switches are enclosed in a vacuum-sealed glass tube and permanently epoxy sealed in the register lens.

Output
Quantity of water per switch closure varies with meter size. Output options include 1, 10 and 100 percent of register sweep, specified on order. Output options by meter size and registration are summarized on the reverse side of this bulletin.

Compatible Equipment
Master Meter: LCD Remote Counter & Batching Unit.

Other Equipment: Electrical/electronic counters, totalizers, actuators, injection equipment and proportional feed pumps.

Wiring Distances
Reed switch assembly is factory sealed to 3 feet of 24 gauge, 2-conductor stranded cable. Remote counting or batching equipment can be installed up to 500 feet from the meter, connected by 24 gauge, 2-conductor stranded cable.

Electrical Specifications

Maximum Switched Current
500 mA

Maximum Recommended Switching
32 Volts (AC or DC)

WARNING: We recommended contacts be kept within the stated parameters.

Contact Resistance
70 mOhms

Power Requirements
Electrical output register consumes no power, making it suitable for use with low current, dry battery powered devices.

Warranty
Electrical Output registers are warranted for one year from shipment date.

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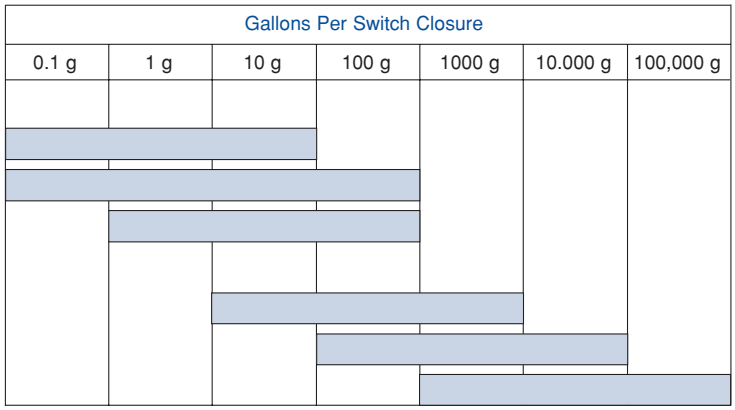
Electrical Output Registers
for Multi-Jet and Turbine Meters

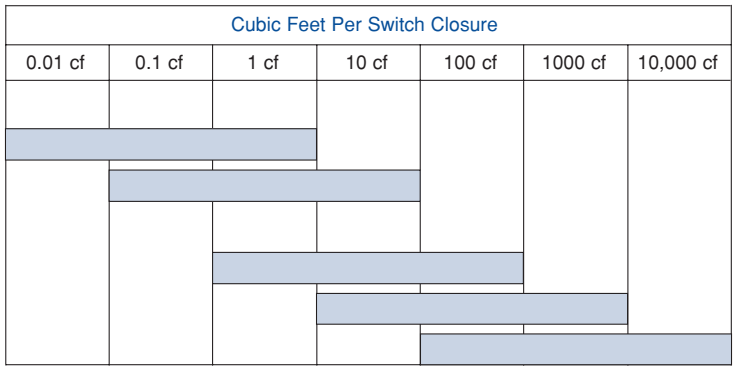
Register Output Options by Meter Type, Size and Registration

Usage in Gallons



Specify 1, 10, 100 gallon pulse if ordering.

Usage in Cubic Feet

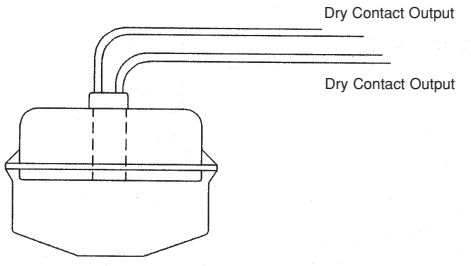


Compound Meter Outputs

Output From Both High and Low Flow

	High Flow	Low Flow
Size	Turbine	Multi-jet
2"	2"	5/8"
3"	3"	5/8"
4"	4"	1"
6"	6"	1-1/2"

Dual Output Register Configuration



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MMDS EOR Rev07/27/06

KAL-DIN

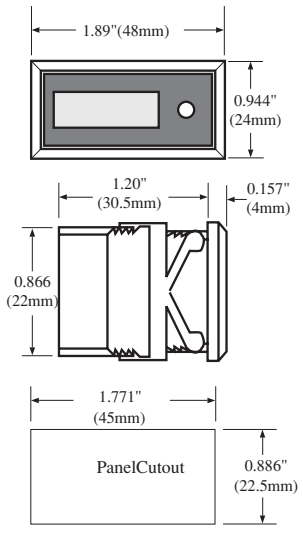
Miniature, Low Cost, LCD, Electronic Counter

Features

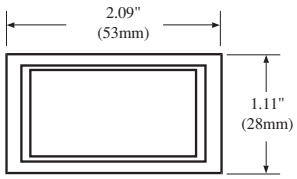
- UL, CSA Listed, CE Certified
- 8 Digits Standard
- Meets NEMA 4X and IP65 Ratings
- Long Life Lithium Battery
- 10 kHz Count Speed
- Plug-on Adapter with Terminal Block and AC Pulsing
- Slow Speed Input for Contact Closures
- High Speed Input for Sinking Inputs from a Max. of 18VDC Without Module

Description:
These are small, lithium battery powered, totalizing counters that are panel mounted. The counters are designed as replacements for standard electro-mechanical counters. They use the latest custom CMOS technology and incorporate an 8 digit, 0.276" high, LCD display.
The KAL-DIN operates from a long life lithium battery (life 10 years) and can be operated from contact closure or high speed electronic devices. No separate alkaline batteries are required. The front reset button can be disabled if desired.
Connections are via .025" (6.35mm) square posts.Push on connector with 9" (229mm) leads are supplied with unit.
When installed, with the gasket provided, the unit meets NEMA 4X/IP65 ratings from the front.
Use the KAL-DAC/DC adaptor to pulse from 5 to 240 volts AC or DC.
Use the KAL-DTB adaptor for screw terminals.

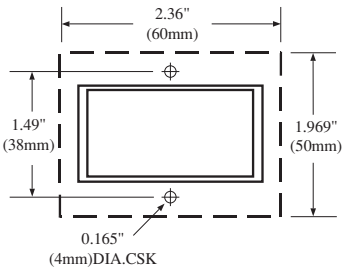
Mounting:



Adaptors (included)
KAL-DP1X2

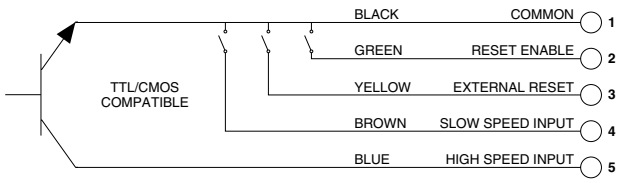


KAL-DP1



Specifications:
Power: Internal lithium battery
Display: 8 digit black LCD, Digit size 0.276" (7mm) high
Reset: Panel or remote
Temperature Range: 14 to 140^{0}F (-10 to 60^{0}C)
Signal Input:
Common (Pin 1)
Manual Reset Enable (Pin 2)
Link to Common to enable front panel reset key
External Reset (Pin 3)
Contact closure/open collector neg. edge triggered, 0.7V threshold, minimum pulse length 15mS.
Slow Speed Count Input (Pin 4)
Contact closure/open collector, minimum pulse length 15mS, 30Hz max. negative edge triggered,
Low: < 0.7V,
High: 3 to 18 V or open.
High Speed Count Input (Pin 5)
Open collector input, 10KHz max.,min. pulse length 50μS. negative edge triggered,
Low: < 0.7V,
High: 3 to 18 V or open.
TTL/CMOS compatible.
Approvals: UL File: E135458, CSA File: LR9602, CE Approved
Material: ABS Plastic.
Battery Life: 10 years (calculated)
Connection: 5 pin, plug in connector with 9" (229mm) leads supplied with counter.
Sealing: Front Panel (without adaptors) sealed to NEMA 4X/IP65 when used with clip mount and gasket provided.
Mounting Adaptors: KAL-DP1x2 for 1" x 2" cutout and KAL-DP1 for screw mount are supplied.

WIRING DIAGRAM



TERMINAL BLOCK MODULE

Description -- KAL-D TB
(For screw terminal connection with standard pulse characteristics)
Pin numbers shown on terminal block correspond to wire lead numbers.
Two Pins #1 are internally connected.

DO NOT CONNECT KAL-D TB TO AC VOLTAGE

5-240 VOLT INPUT MODULES

Description -- KAL-D AC/DC (Counter)
KAL-DTIME AC/DC (Timer)
The KALD AC/DC Module enables the KALD to accept 5-240 VAC/DC input signals. (The KAL-DTime AC/DC is used for the KAL-DTIME series). The module snaps into the back of the counter. The circuitry allows various voltage pulses to be used for counting and provides opto-isolation of 2500V.

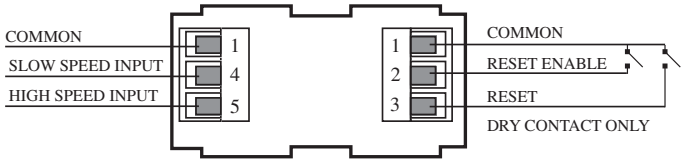
KAL-D AC/DC (Counter) SPECIFICATIONS:

Signal Inputs:
18 Hz max. (15 msec. pulse width min.)
5 to 48 VAC/DC
Low: < 1.5 VAC/DC or open
High: 5 to 55 VAC/DC
48 to 240 VAC/DC
Low: <15 VAC/DC or open
High: 48 to 264 VAC/DC
Input Impedance:
5 to 48 VAC/DC - 10K ohms
48 to 240 VAC/DC - 58.5K ohms

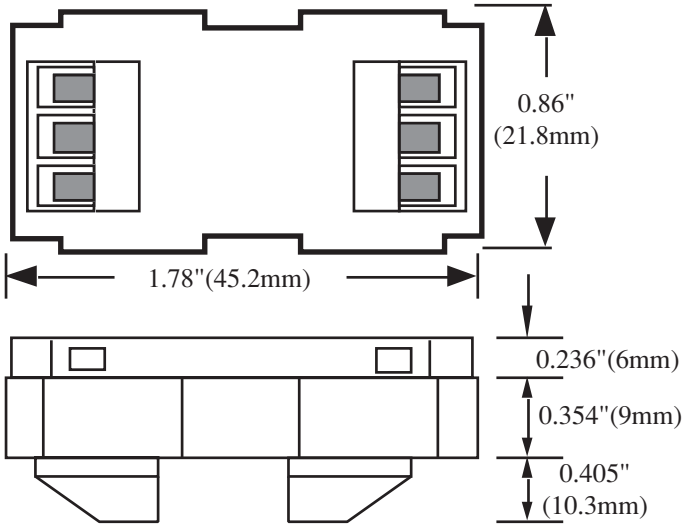
Reset:
Dry contact closure only.
15msec. min. pulse.

Temperature Range:
Same as KAL-D series

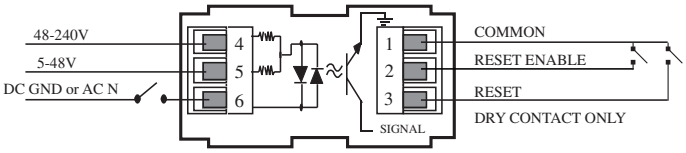
Terminal Block (TB) Adaptor Connections



Dimensions for AC/DC Adaptor and Terminal Block



AC/DC Adaptor Connections



NOTE:
Jumper terminal 5 to terminal 6 to raise the low threshold to 25V for triac inputs or when low voltage does not reach 0V. Connect input to terminals 4 & 6.
It may be necessary to place a 10 kΩ 7W resistor across terminals 4 & 6 to bring voltage below 25V.

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120 Interloop Road / www.lwai.net
San Antonio, Texas 78216-7042
210.349.5244 Phone
210.349.6129 Fax

How To Order:

KAL-D ..... 8 digit counter with 10 yr battery
KAL-DAC/DC ..... 5-240V AC/DC input module
KAL -DTB ..... Terminal block adaptor

Accessories
N7 - Explosion proof housing (see accessories section)
E200 - Outdoor Enclosure (see accessories section)