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INTRODUCTION

The Preso patented elliptical design outperforms and provides greater accuracy than traditional differential pressure flow measurement devices. This differential pressure flow meter is designed with a series of ports facing the upstream velocity pressures, as well as flow sensing ports strategically located ahead of the trailing edge flow separation.

The multi-ported, self-averaging flow element consists of an elliptical shape with two independent flow sensing chambers. The impact velocity sensing holes (high pressure) are located along the leading edge and the true static sensing holes (low pressure) are on the exterior probe side. Model BHL comes with instrument shutoff valves that can be plumbed to a transmitter or direct indicating gauge.

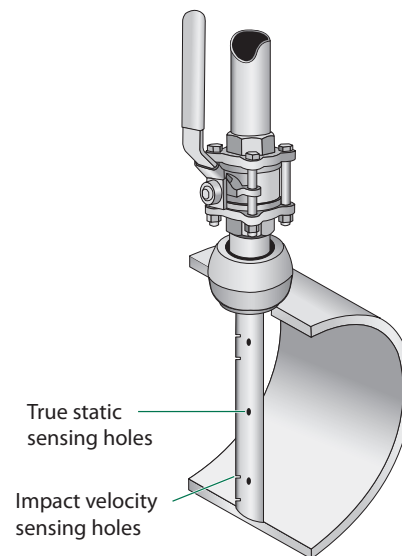


Figure 1: BHL pressure sensing holes

SPECIFICATIONS

Applications	Liquids and gases
Pipe Sizes	2...24 inches (50...610 mm)
Pressure	400 psi (2760 kPa) maximum
Temperature	250° F (120° C) maximum
Accuracy	±0.75% of reading
Turndown Ratio	17:1 with no vacuum effect
Standard Components	Y-type head, brass 1/8" FNPT connection CS 3000 lb thread fitting, ASTM A105 316/316L SS Ellipse sensor Instrument valves (2 per sensor), 1/4" SAE flare brass ball type Polycarbonate ID tag with wire CS packing chamber with molythane packing gland CS threaded rods, nuts and bolts Bronze isolation ball valve
Reynolds Number	Greater than 75,000 maintains most accurate flow measurements Less than 75,000 consult factory for estimated results
Resonance	If greater than 0.8, use double support

Table 1: Specifications

PIPE ORIENTATION AND SENSOR MOUNTING

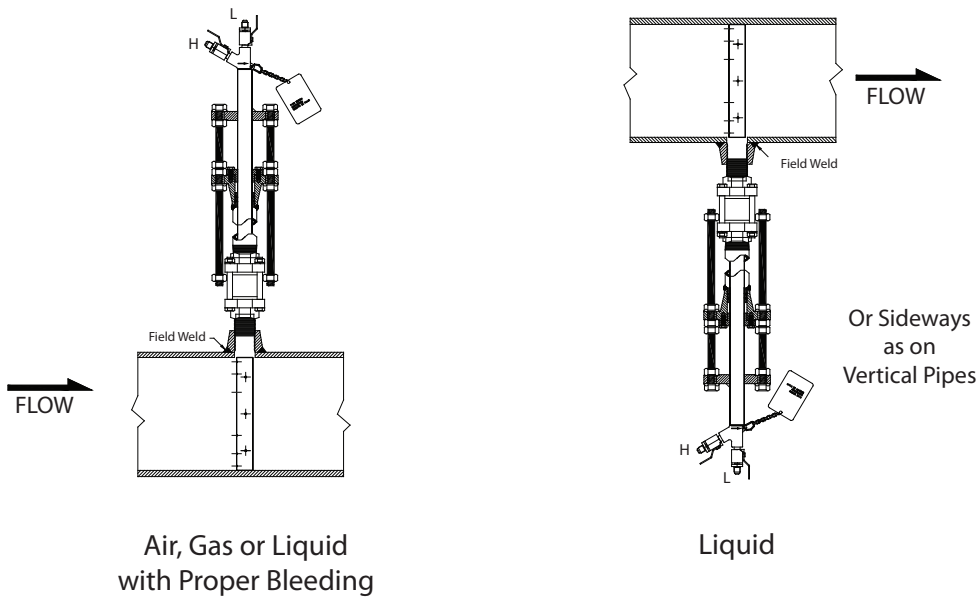


Figure 2: Horizontal pipe installation

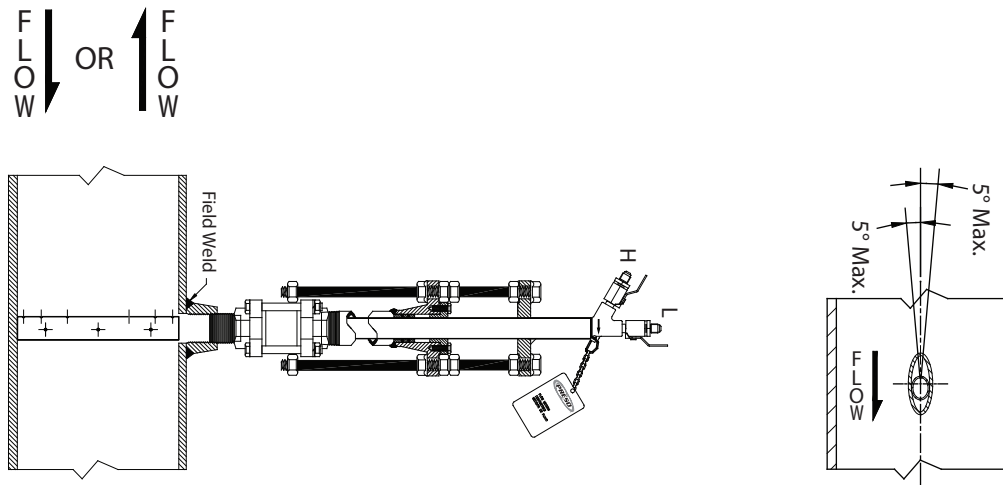


Figure 3: Vertical pipe installation

INSTALLATION INSTRUCTION, SINGLE SUPPORT

1. Choose the proper location to install the BHL Ellipse using AGA/ASME standards (or equivalent). See "Location Instructions" on page 7.
2. Grind the surface of the pipe where the BHL Ellipse is to be inserted to provide a clean area for welding.
3. Weld the supplied thread-o-let to the pipe using standard codes for your application (1/16" weld gap recommended). Take care to protect the threads during the welding process.
4. Thread the close nipple into the weld connector. Install the supplied three-piece isolating ball valve.
5. Mount the high pressure drilling machine onto the ball valve. Open the ball valve. Drill a hole through the pipe wall according to *Table 2*.

Pipe Size	Model / Sensor	Weld Connector	Drill Bit
2"...5"	BHL (1/2")	3/4"	5/8"
6"...12"	BHL (7/8")	1-1/4"	1-1/8"
14"...24"	BHL (1-1/4")	1-1/2"	1-3/8"

Table 2: Single support drill bit size

NOTE: There is no need for a drilling machine if it is not a hot tap installation or if the system is not pressurized.

6. Withdraw the drill bit through the isolating ball valve. CLOSE the ball valve and dismantle the drilling machine. Make sure there is no leakage at the valve and close nipple connections. The ball valve is to remain completely closed until step 9.
7. Install the cage nipple assembly and packing gland with the threaded rods assembly by threading it into the isolating ball valve. Align the arrow on the sensor head with the direction of flow. See *Figure 4*.

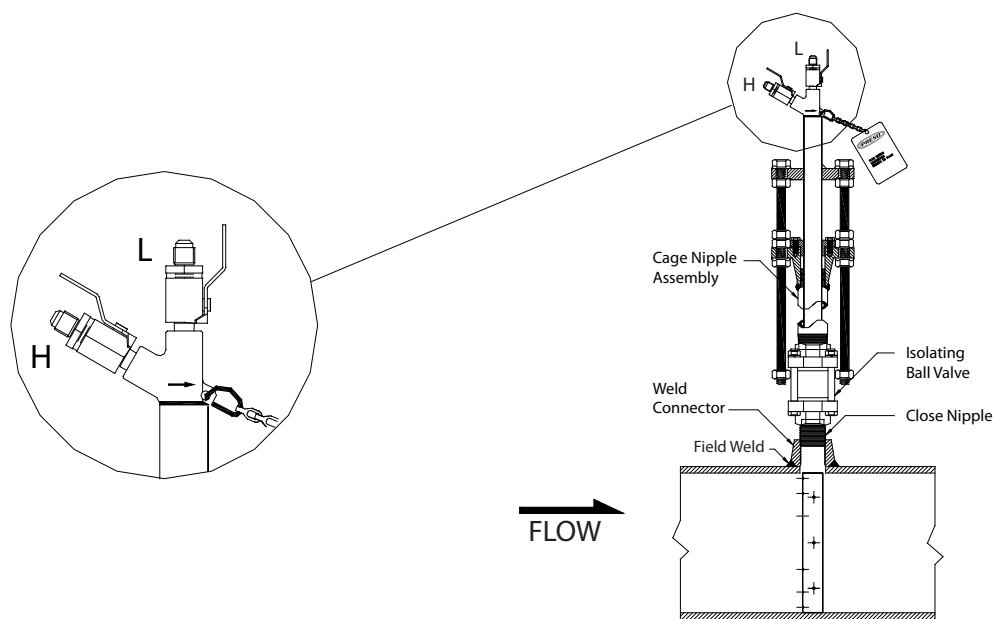


Figure 4: Sensor alignment

8. Install the instrument valves (optional) at the pressure connections on the BHL Ellipse sensor head. Make sure the valves are FULLY CLOSED before proceeding.
9. Open the isolating ball valve. Using a wrench, turn the threaded insertion rods clockwise into the pipe until the sensor reaches the opposite pipe wall.
10. Connect the instrument lines to the sensor head valves. Connect these lines to a gage or transmitter.

INSTALLATION INSTRUCTIONS, DOUBLE SUPPORT

NOTE: For non-hot tap installations only.

1. Follow steps 1 through 6 in *"Installation Instruction, Single Support"* on page 5. At 180° from and on the same plane as the previously drilled hole, grind the surface of the pipe to provide a clean area for welding. Drill a hole and deburr, especially on the inside of the pipe. Size the hole used for the double support according to *Table 3*.

Pipe Size	Model / Sensor	Weld Connector	Drill Bit
2"...5"	BHL (7/16")	1/8"	3/8"
6"...12"	BHL (7/8")	1/2"	1/2"
14"...24"	BHL (1-1/4")	1"	7/8"

Table 3: Double support drill bit size

2. Weld the double support thread-o-let making sure it is centered with the drilled hole (1/16" weld gap recommended).
3. Install the BHL Ellipse sensor through the two holes. Make sure that the double support pin passes through the guide ring. See *Figure 5*.

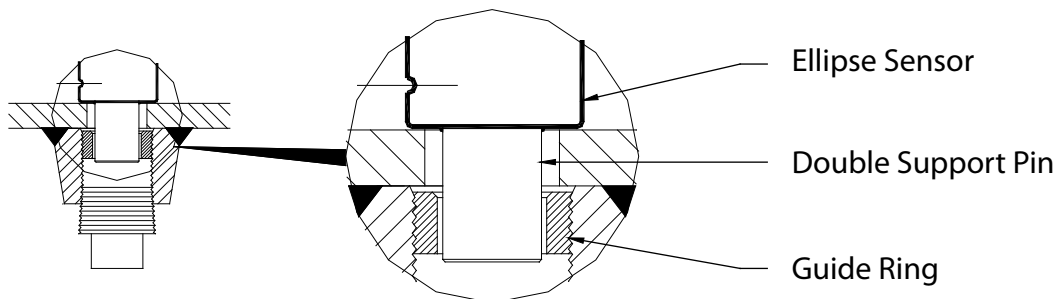


Figure 5: Double Support Pin

4. Align the arrow on the sensor head in the direction of flow as in step 7, *"Installation Instruction, Single Support"* on page 5.
5. Check that the BHL Ellipse is in the correct orientation and spans the inside of the pipe. Tighten the threaded insertion rods until the sensor reaches the other end of the pipe.
6. Install the plug into the end of the double support thread-o-let. Tighten the plug to prevent leakage.

LOCATION INSTRUCTIONS

Straight pipe requirements: Accuracy is affected by the piping configurations due to the disturbances of the flow profile. A fully developed symmetrical flow profile is achieved with the minimum upstream and downstream recommended lengths.

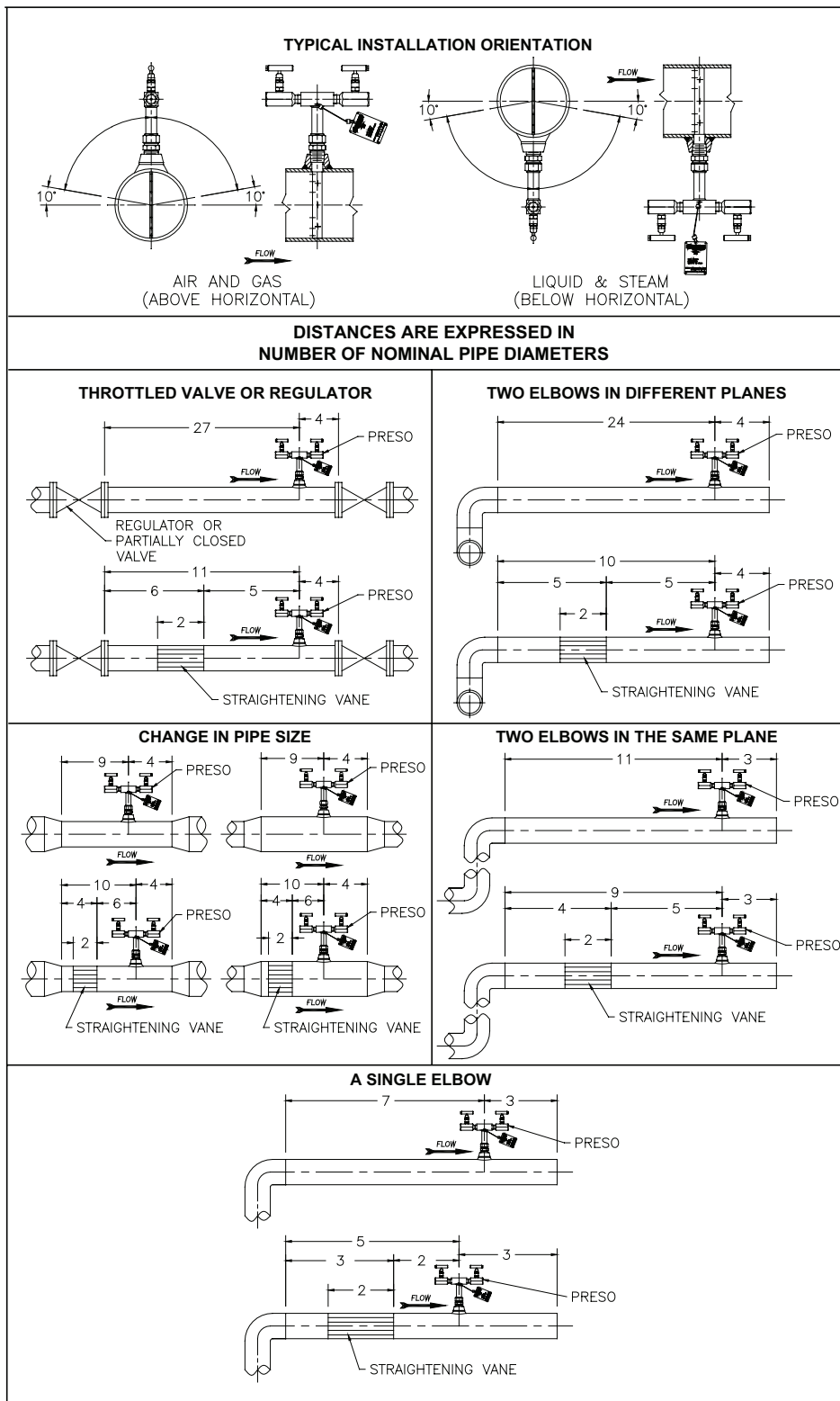


Figure 6: Location instructions

FLOW CURVE

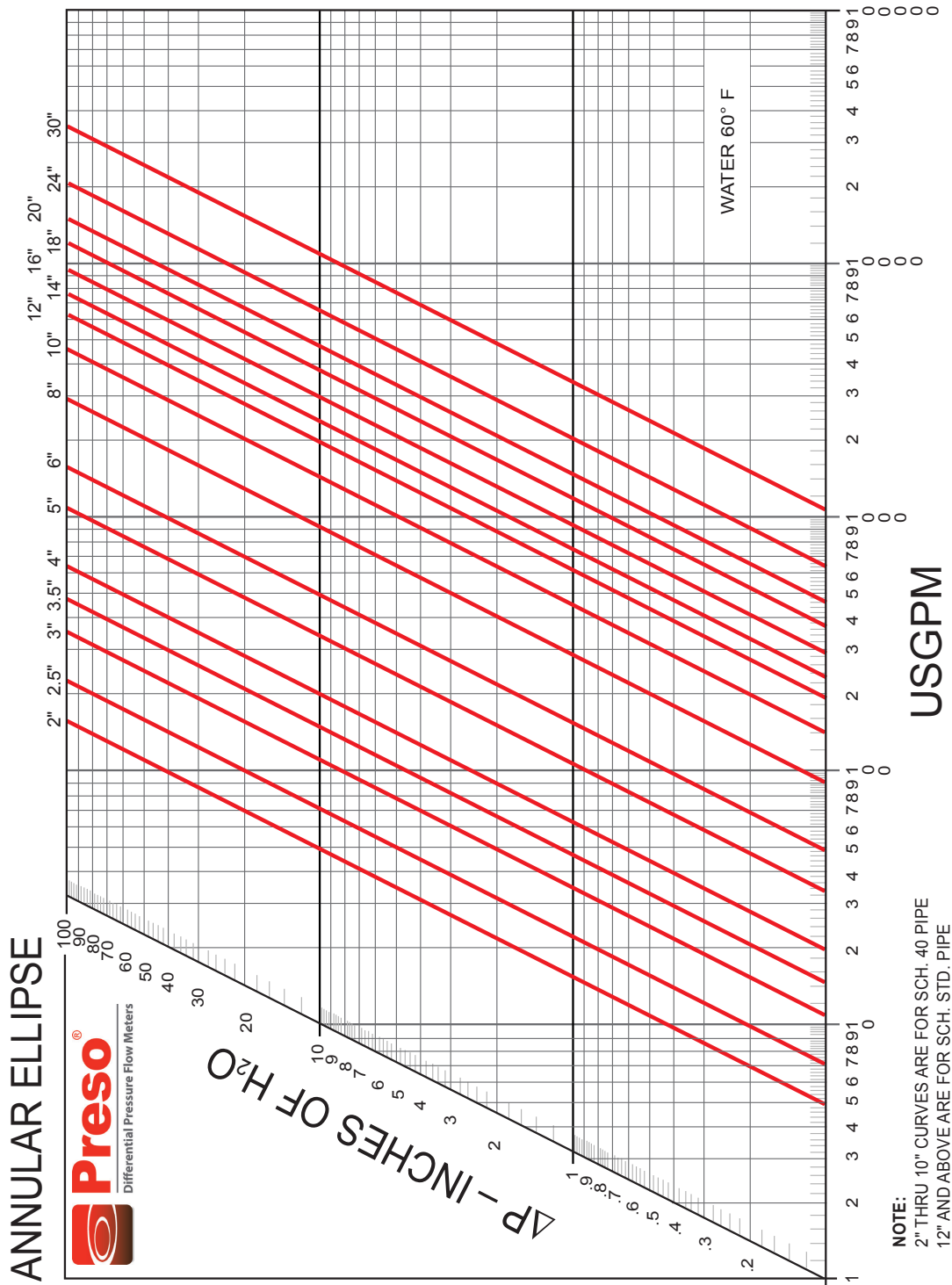


Figure 7: Flow curve

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www.badgermeter.com

The Americas | Badger Meter | 4545 West Brown Deer Rd | PO Box 245036 | Milwaukee, WI 53224-9536 | 800-876-3837 | 414-355-0400
 México | Badger Meter de las Americas, S.A. de C.V. | Pedro Luis Ogazón N°32 | Esq. Angelina N°24 | Colonia Guadalupe Inn | CP 01050 | México, DF | México | +52-55-5662-0882
 Europe, Middle East and Africa | Badger Meter Europa GmbH | Nurtinger Str 76 | 72639 Neuffen | Germany | +49-7025-9208-0
 Europe, Middle East Branch Office | Badger Meter Europe | PO Box 341442 | Dubai Silicon Oasis, Head Quarter Building, Wing C, Office #C209 | Dubai / UAE | +971-4-371 2503
 Czech Republic | Badger Meter Czech Republic s.r.o. | Mařikova 2082/26 | 621 00 Brno, Czech Republic | +420-5-41420411
 Slovakia | Badger Meter Slovakia s.r.o. | Racianska 109/B | 831 02 Bratislava, Slovakia | +421-2-44 63 83 01
 Asia Pacific | Badger Meter | 80 Marine Parade Rd | 21-04 Parkway Parade | Singapore 449269 | +65-63464836
 China | Badger Meter | 7-1202 | 99 Hangzhong Road | Minhang District | Shanghai | China 201101 | +86-21-5763 5412