

## CONTENTS

Introduction . . . . .	3
Specifications . . . . .	3
Pipe Orientation and Sensor Mounting . . . . .	4
Installation Instructions, Single Support . . . . .	5
Installation Instructions, Double Support . . . . .	6
Location Instructions . . . . .	7

## 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 BHR comes with instrument shutoff valves that can be plumbed to a transmitter or direct indicating gauge.

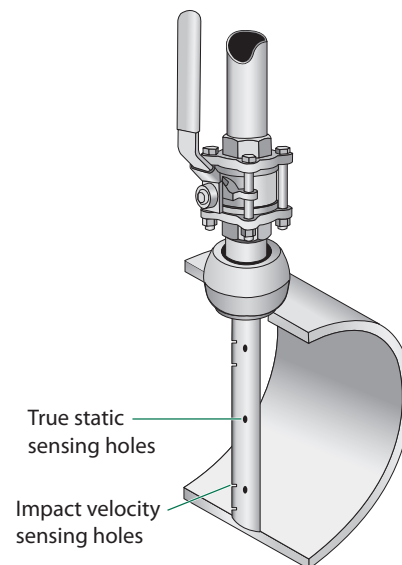


Figure 1: BHR pressure sensing holes

## SPECIFICATIONS

<b>Applications</b>	Liquids and gases
<b>Pipe Sizes</b>	2...24 inches (50...610 mm)
<b>Pressure</b>	75 psi (517 kPa) maximum
<b>Temperature</b>	120° F (49° C) maximum
<b>Accuracy</b>	±0.75% of reading
<b>Turndown Ratio</b>	17:1 with no vacuum effect
<b>Standard Components</b>	Y-type head, brass 1/8" FNPT connection Sensor connection: 2"...5", Ellipse 1/2"; 3/4" Brass compression fitting with SS ferrule 6"...12", Ellipse 7/8"; 1" Brass compression fitting with SS ferrule 14"...24", Ellipse 1-1/4"; 1-1/4" Brass compression fitting with SS ferrule 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 Bronze isolation ball valve
<b>Reynolds Number</b>	Greater than 75,000 maintains most accurate flow measurements Less than 75,000 consult factory for estimated results
<b>Resonance</b>	If greater than 0.8, use double support

Table 1: Specifications

## PIPE ORIENTATION AND SENSOR MOUNTING

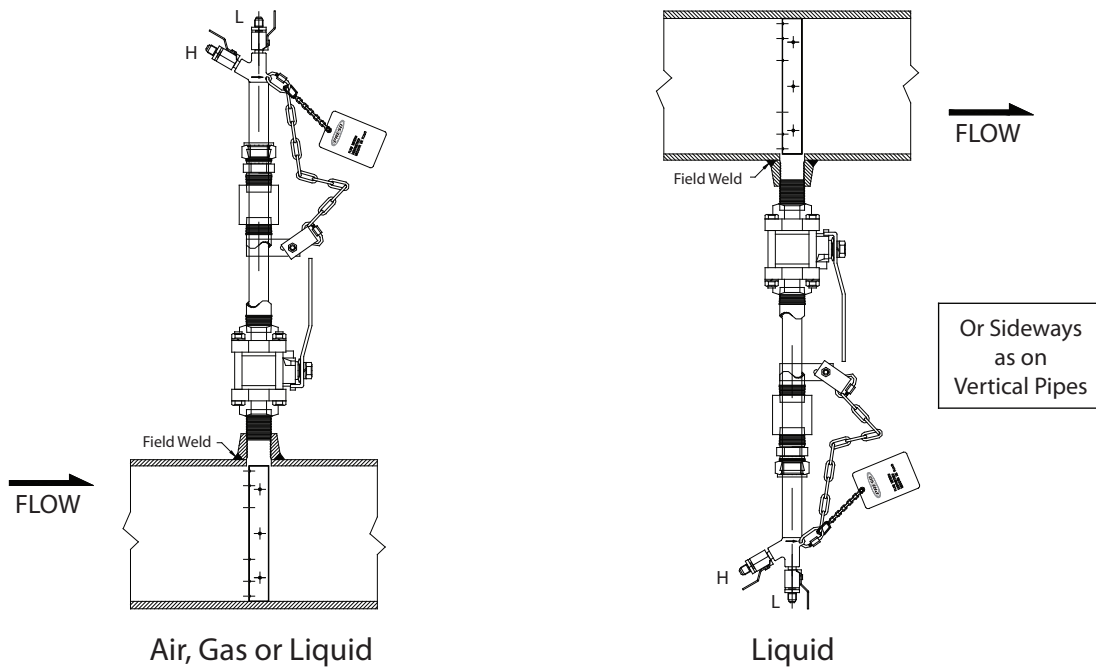
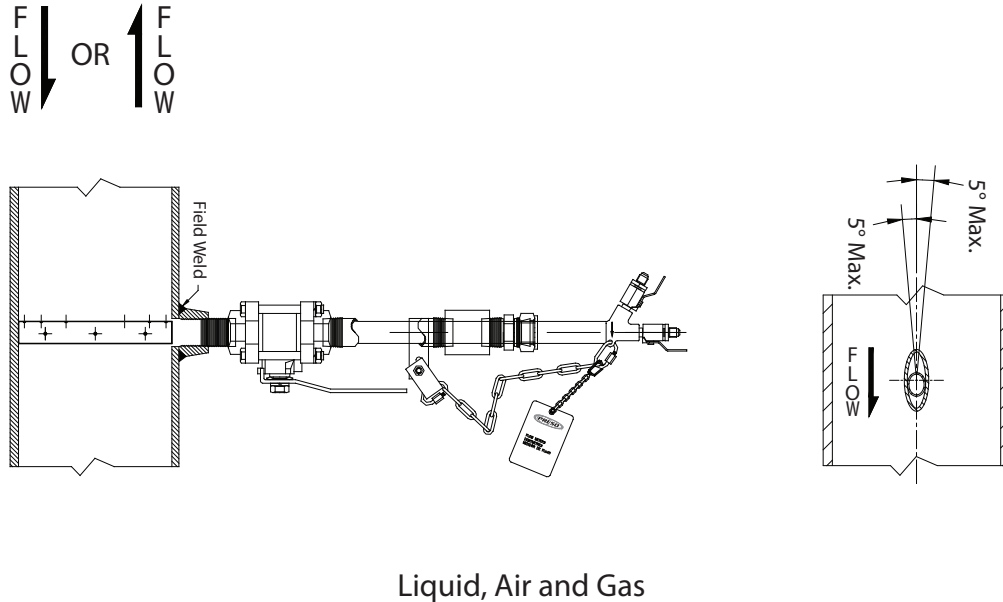


Figure 2: Horizontal pipe installation



**NOTE:** Illustration represents installation for downward flow.

Figure 3: Vertical pipe installation

## INSTALLATION INSTRUCTIONS, SINGLE SUPPORT

1. Choose the proper location to install the BHR Ellipse using AGA/ASME standards (or equivalent). See "Location Instructions" on page 7.
2. Grind the surface of the pipe where the BHR 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. Install the close (short) nipple by threading it 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. Remove 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 10.
7. Thread the supplied cage (long) nipple into the isolating ball valve. Install the supplied reducer (1-1/4" × 1" coupling) on the cage nipple.
8. Thread the supplied packing gland onto the reducer.
9. Install the instrument valves (optional) at the pressure connections on the BHR Ellipse sensor head. Make sure the valves are FULLY CLOSED before proceeding.
10. Insert the BHR Ellipse through the packing gland and cage nipple until it reaches the isolating ball valve. Slightly tighten the compression nut of the packing gland and attach the safety chain to the BHR Ellipse. Open the isolating ball valve and push the sensor down by hand until it reaches the opposite side of the pipe.

### **CAUTION**

**THE BHR ELLIPSE MUST BE MANUALLY HELD IN ITS FULLY INSERTED POSITION UNTIL THE COMPRESSION NUT HAS BEEN COMPLETELY TIGHTENED IN STEP 12 AND THE SAFETY CHAIN HAS BEEN PROPERLY ATTACHED.**

11. While holding the BHR Ellipse in its fully inserted position, align the arrow on the sensor head with the direction of flow. See *Figure 4* on page 6.
12. Completely tighten the packing gland in order to prevent leakage.
13. Connect the instrument lines to the sensor head valves. Connect these lines to a gage or transmitter.

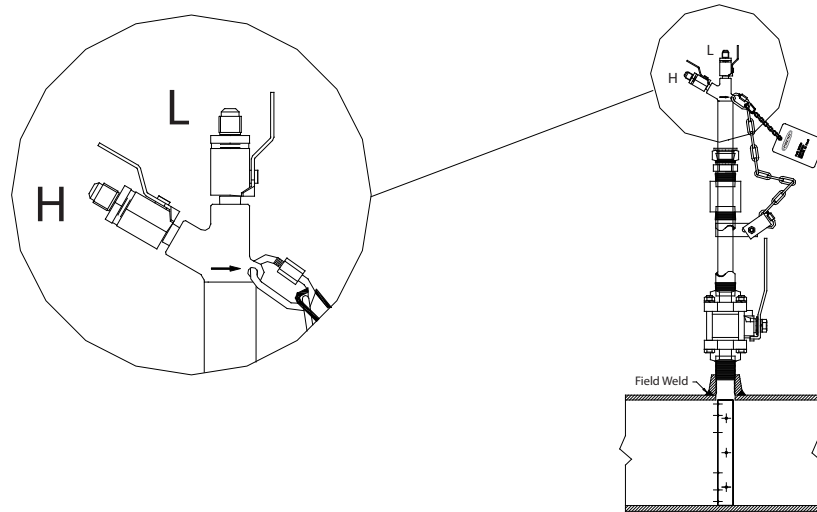


Figure 4: Sensor alignment

## INSTALLATION INSTRUCTIONS, DOUBLE SUPPORT

1. Follow steps 1 through 10 in *“Installation Instructions, 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. The hole used for the double support should be sized according to Table 3.

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

Table 3: Double support drill bit size

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

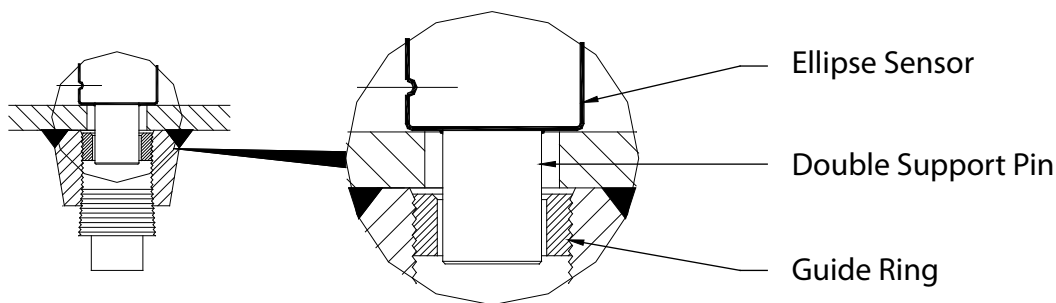


Figure 5: Double support pin

4. Align the arrow located on the sensor head in the direction of flow as in step 11, *“Installation Instructions, Single Support”* on page 5.
5. Check that the BHR Ellipse is in the correct orientation and spans the inside of the pipe. Tighten the compression nut manually, then use a wrench to tighten it an additional 1-1/4 turns.
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.

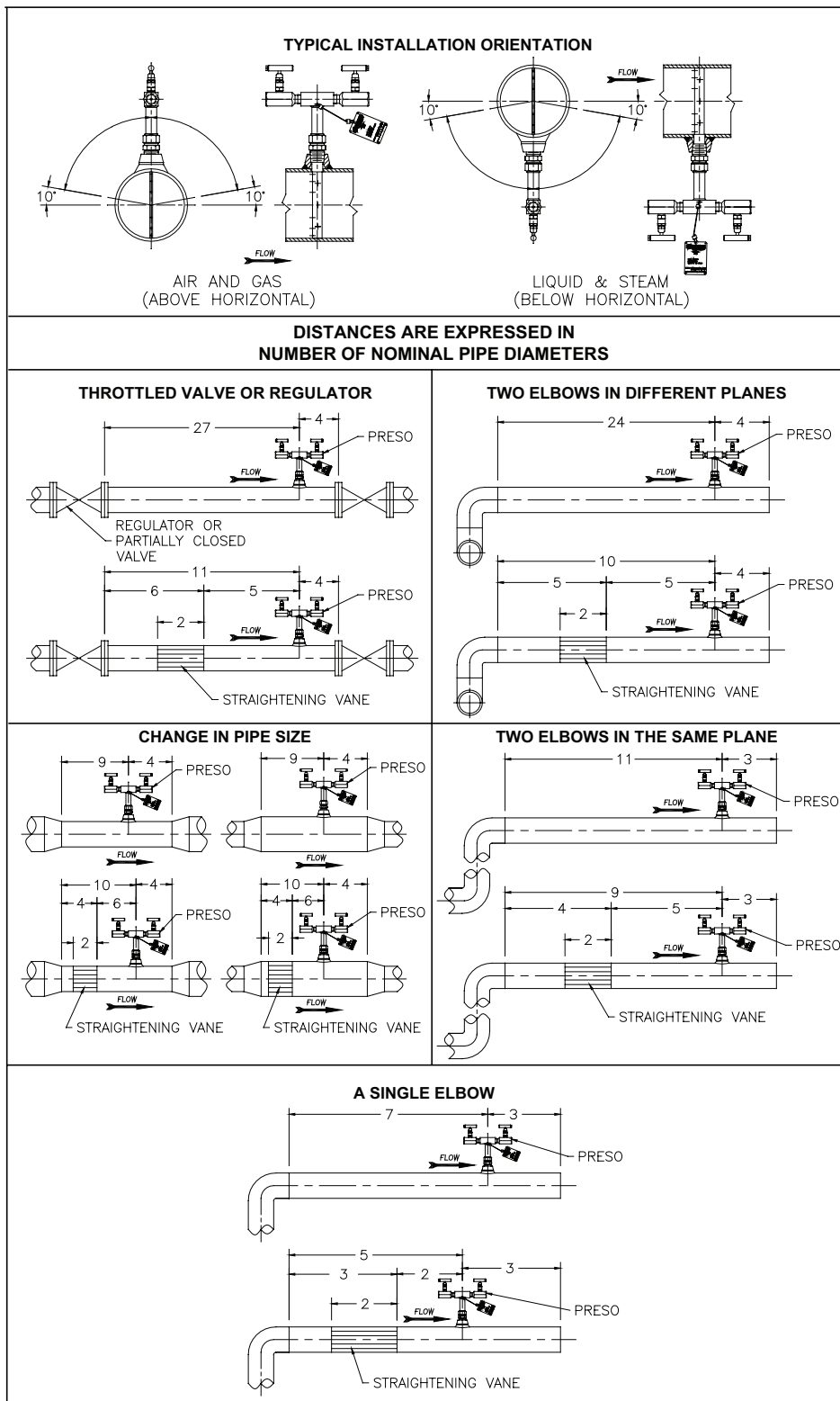


Figure 6: Location instructions

# FLOW CURVE

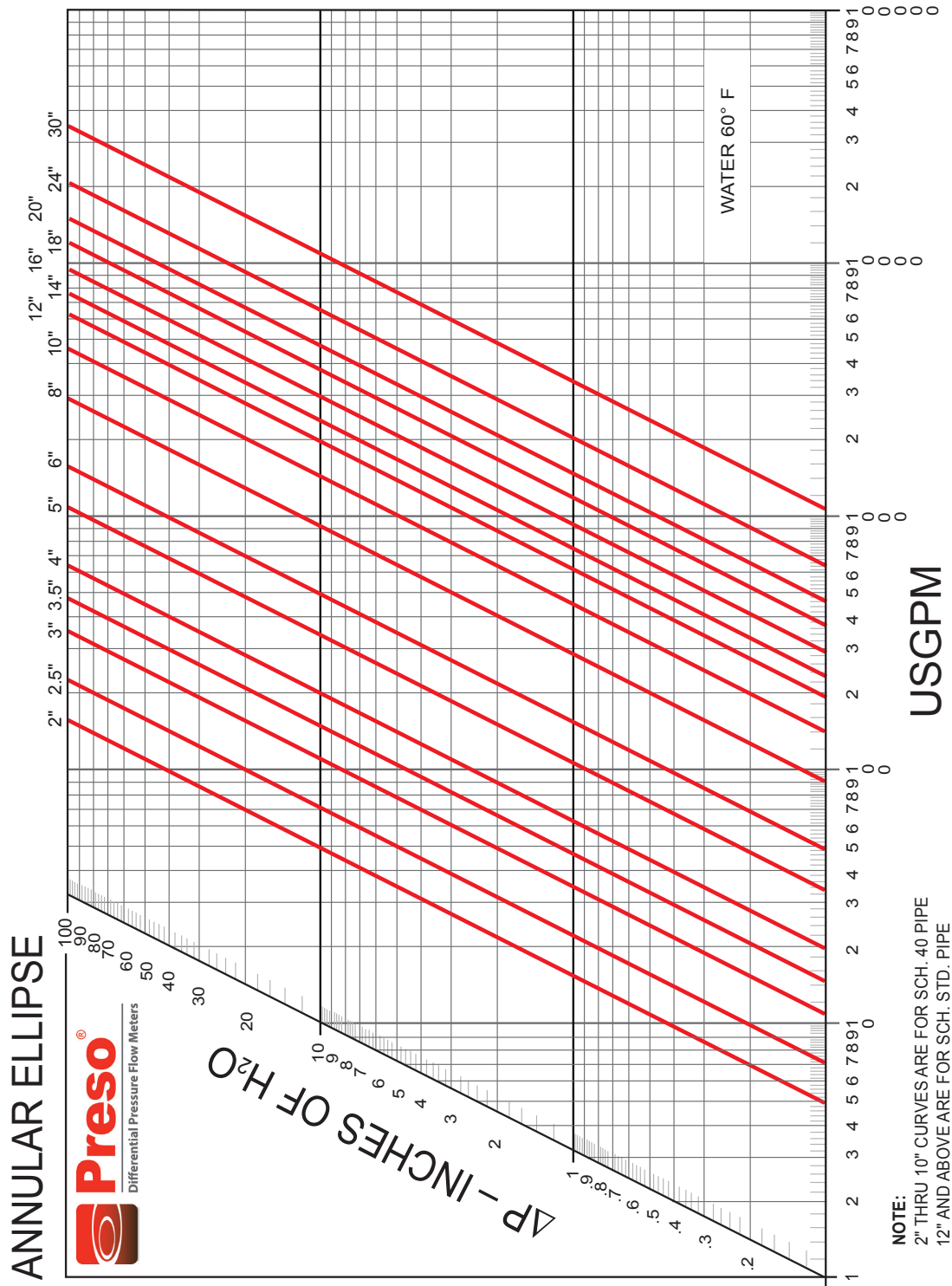


Figure 7: Flow curve

## Control. Manage. Optimize.

PRESO is a registered trademark of Badger Meter, Inc. Other trademarks appearing in this document are the property of their respective entities. Due to continuous research, product improvements and enhancements, Badger Meter reserves the right to change product or system specifications without notice, except to the extent an outstanding contractual obligation exists. © 2014 Badger Meter, Inc. All rights reserved.

[www.badgermeter.com](http://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