

OVERVIEW

Used in conjunction with any Badger Meter flow monitor or transmitter, Badger Meter non-magnetic flow sensors provide an accurate reading of the rate of liquid flow and total accumulated flow. The sensor models offered cover applications for a wide range of pipe sizes and pressure/temperature specifications.

The flow sensors generate a frequency proportional to flow rate. An internal preamplifier allows the pulse signal to travel up to 2000 feet without further amplification. Power to operate the sensor is provided by the flow monitor. The impeller bearing assembly, shaft and O-rings are replaceable in the field.

Badger Meter flow sensors feature a closed, six-bladed impeller design, using a proprietary, non-magnetic sensing technology. The forward-swept impeller shape provides higher, more constant torque than four-bladed impeller designs, and is less prone to fouling by water-borne debris. The forward-curved shape, coupled with the absence of magnetic drag, provides improved operation and repeatability, even at lower flow rates. As the liquid flow turns the impeller, a low impedance signal is transmitted with a frequency proportional to the flow rate.

Sensors of similar type are interchangeable, so there is no need for recalibration after servicing or replacement.

Series 228PV (Formerly 220P)

These models feature a modified PVC tee with solvent weld socket end connections, and a removable PPS or PVDF sensor insert. Sizes include 1-1/2, 2, 3, and 4 inch.

ELECTRONIC TYPES

Badger Meter provides several basic sensor configurations, using the same impeller element, allowing for a wide range of applications and pipe sizes. Sensors are normally supplied with 20 feet of 2-conductor 20 AWG shielded UL type PTLC 105° C cable. All Series 200 sensor electrical components are self-contained. Pressure/temperature ratings for the models are contained in the specifications section of this document. These models are further described as follows.

Standard Sensor

These sensors are designed for indoor or protected area applications such as HVAC, pump control, and industrial process monitoring where flow rates are between 0.5...30 feet/second and temperatures are below 140° F. Standard sensors are supplied with 20 feet of 2-conductor 20 AWG shielded UL type PTLC 105° C cable.



IR Sensor

These sensors are designed for below grade applications such as irrigation, municipal, and groundwater monitoring where the flow rates are between 0.5...30 feet/second and temperatures are below 140°F. IR sensors are supplied with two single conductor, 18 AWG solid copper wire leads, 48 inches in length, with UL Style 116666 direct burial insulation.

CSA Sensor

These sensors are designed for indoor or protected area applications where intrinsic safety is required, the flow rates are between 0.5...30 feet/second and temperatures are below 140° F. CSA sensors are supplied with 20 feet of 2-conductor 20 AWG shielded UL type PTLC 105° C cable. These sensors must be used with an approved safety barrier.

ORDERING MATRIX

Example: 2		28	PV	15	0	5	-	1	2	1	1
STYLE											
Tee Mounted Insert Sensor		28									
MATERIAL											
PVC (1.5", 2", 3", 4" Sch 80 only)			PV								
SIZE											
1.5"				15							
2"				20							
3"				30							
4"				40							
1.5" with BSP Adapters				16							
2" with BSP Adapters				21							
3" with BSP Adapters				31							
4" with Flange Adapters				41							
ELECTRONICS HOUSING											
PPS					0						
ELECTRONICS											
CSA Approved						4					
Standard Flow (STANDARD)						5					
IR-Irrigation						6					
O-RING											
Viton [®]								0			
EPDM (STANDARD)								1			
Buna N								8			
SHAFT											
Zirconia Ceramic									0		
Tungsten Carbide (STANDARD)									2		
316 Stainless Steel									6		
IMPELLER											
Nylon (STANDARD)										1	
Tefzel [®]										2	
BEARING											
UHMWPE (STANDARD)											1
Tefzel [®]											2
Teflon [®]											3

Series 200 Plastic Tee Sensor Matrix (1-1/2...4 inch)

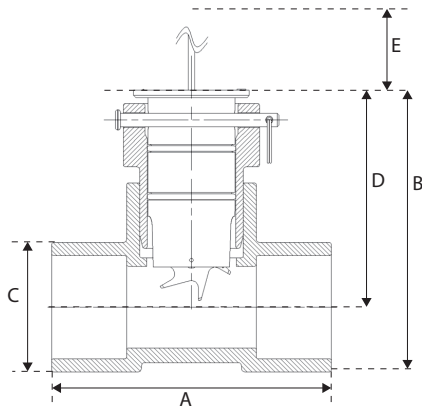
NOTE: See Parts & Accessories at www.badgermeter.com for additional items. Special order shaft material and O-rings are available. Consult factory for pricing and delivery.

SPECIFICATIONS

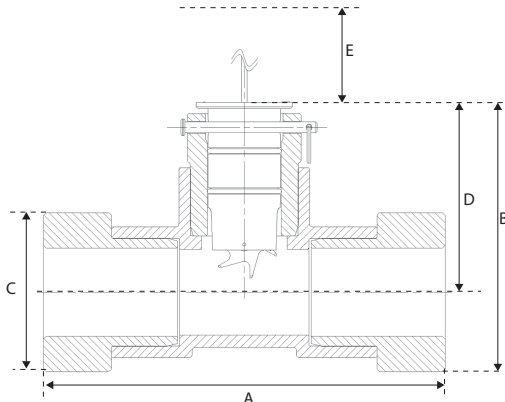
Wetted Materials (except tees)	See Ordering Matrix
Tee for 228PV	Schedule 80 PVC per ASTM D-2462 and D-2467, Virgin, unplasticized PVC resin, Type 1 cell classification 12454-B. Fittings and solvent carry approval for potable water by NSF and IAMPO.
Pressure/Temperature Ratings (DO NOT EXCEED)	Depends on hardware configurations. Pressure (psi) Temperature (°C)
Rated Temperature (DO NOT EXCEED)	Operating: 35...110° F (2...43° C) Storage 14...110° F (–10...43° C)
Recommended Design Flow Range	0.5...30 ft/sec
Accuracy	± 1.0% of full scale over recommended design flow range
Repeatability	± 0.3% of full scale over recommended design flow range
Linearity	± 0.2% of full scale over recommended design flow range
Transducer Excitation	8...35V DC max. input, source limited to 100 mA - Quiescent current 600 uA @ 8...35V DC max. - Quiescent voltage ($V_{high} = \text{Supply Voltage} - (600 \text{ uA} \times \text{Supply impedance})$) - ON State (Vlow) Max. 1.2V DC @ 40 mA current limit (15 Ω + 0.7V DC)
Output Frequency	3.2...200 Hz
Output Pulse Width	5 msec ±25%
Environmental	- IP 68 / NEMA 4X - Suitable for pollution degree 4 environments - Suitable for outdoor use above grade, IR version below grade - Suitable for use in 100% humidity
Electrical Cable for Standard Sensor Electronics	20 feet of 2-conductor AWG 20 with AWG 22 drain wire shielded UL type PTLC wire provided for connection to display or transmitter unit. Rated to 105° C (221° F). May be extended to a maximum of 2000 feet with similar cable and insulation appropriate for application.
Electrical Cable for IR Sensor Electronics	48 inches of UL Style 116666 copper solid AWG 18 wire w/direct burial insulation. Rated to 105° C (221° F).

DIMENSIONS

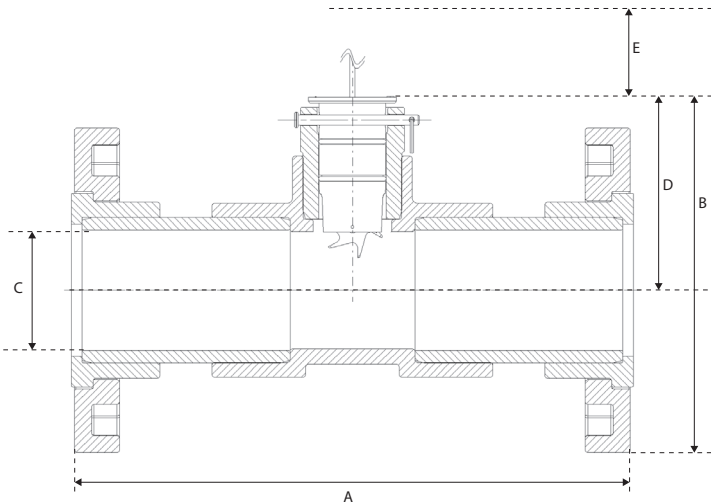
Dimensions	Series No. Complete			
	228PV15XX-XXX	228PV2XXX-XXXX	228PV3XXX-XXXX	228PV4XXX-XXXX
A	5.0 in. (127 mm)	5.63 in. (143 mm)	6.50 in. (165 mm)	7.38 in. (187 mm)
B	5.16 in. (131 mm)	5.64 in. (143 mm)	6.83 in. (173 mm)	6.83 in. (199 mm)
C	2.38 in. (60 mm)	2.88 in. (73 mm)	4.23 in. (107 mm)	5.38 in. (137 mm)
D	3.97 in. (101 mm)	4.20 in. (107 mm)	4.68 in. (119 mm)	5.10 in. (130 mm)
E	5.0 in. (127 mm)	5.0 in. (127 mm)	5.0 in. (127 mm)	5.0 in. (127 mm)



No Fittings



BSP Fittings



Flanged (4 in. only)

A = Overall Length; B = Overall Height; C = Diameter; D = Center of Tube to Top Height; E = Minimum Clearance for Sensor Removal

Control. Manage. Optimize.

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