



Badger Meter

Series 228PV

Tee Type PVC Flow Sensors 1-1/2" to 4"

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 2,000 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 1½, 2, 3, and 4 inches.

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 PTLTC 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 manual. These models can be further described as follows:

"STANDARD" SENSOR

Designed for indoor or protected area applications such as HVAC, pump control, and industrial process monitoring where the 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 PTLTC 105°C cable.

"IR" SENSOR

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.

DTB-064-02-EN (April 2012)

Rev. 2



"FM/CSA" SENSOR

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

	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 BSP Adapters			41							
ELECTRONICS HOUSING											
	PPS				0						
ELECTRONICS											
	FM/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											
	LHMWPE (STANDARD)										1
	Tefzel®										2
	Teflon®										3

Series 200 Plastic Tee Sensor Matrix (1-1/2" to 4")

Note: See accessories section for additional items. Special order shaft material and o-rings are available - consult factory for pricing and delivery.

Technical Brief

SPECIFICATIONS

Wetted Materials (except tees)

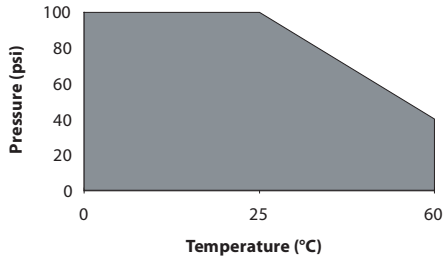
- See Ordering Matrix

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

- Depends on hardware configurations.



Recommended Design Flow Range

- 1/2 to 30 ft/sec

Accuracy

- $\pm 1.0\%$ of full scale over recommended design flow range

Repeatability

- $\pm 0.3\%$ of full scale over recommended design flow range

Linearity

- $\pm 0.2\%$ of full scale over recommended design flow range

Transducer Excitation

- Quiescent current 600uA@8V DC to 35V DC max
- Quiescent voltage (Vhigh)
- Supply Voltage $-(600\text{uA} \times \text{Supply impedance})$
- ON State (VLow) Max. 1.2V DC@40mA current limit ($15\Omega + 0.7V$ DC)

Output Frequency

- 3.2 Hz to 200 Hz

Output Pulse Width

- 5 msec $\pm 25\%$



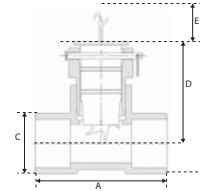
Please see our website at www.badgermeter.com for specific contacts.

Electrical Cable for Standard Sensor Electronics

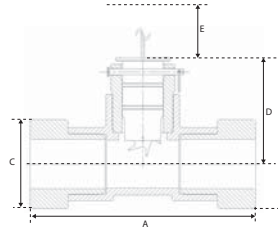
- 20 feet of 2-conductor AWG 20 with AWG 22 drain wire shielded UL type PTLC wire provided for connection to display or transmitter unit. Rated to 105°C. May be extended to a maximum of 2,000 feet with similar cable and insulation appropriate for application.

Electrical Cable for IR Sensor Electronics

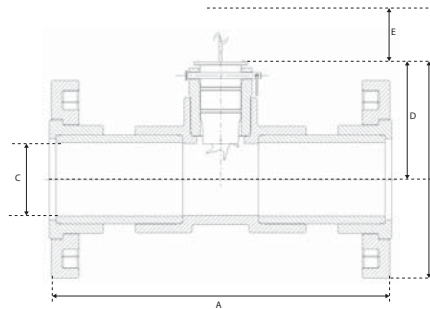
- 48 inches of UL Style 116666 copper solid AWG 18 wire w/direct burial insulation. Rated to 105°C.



No Fittings



BSP Fittings



Flanged

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

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

www.badgermeter.com

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