

**Badger®
Series 228**

**Metallic Tee Flow Sensors
Small Pipe Tee Type
Flow Sensor**

**Technical
Brief**

The Badger® Series 228 flow sensors feature a six bladed impeller design with a proprietary non-magnetic sensing mechanism. The forward swept impeller shape provides higher, more consistent torque than four bladed impeller designs and is less prone to be fouled 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. This is especially true where the impeller is exposed to metallic or rust particles found in steel or iron pipes. As the liquid flow turns the impeller, a low impedance square wave signal is transmitted with a frequency proportional to the flow rate. The signal can travel up to 2000 feet between the flow sensor and the display unit without the need for amplification. All sensors except irrigation versions are supplied with 20 feet of 2-conductor 20 AWG shielded U.L. type PTLC 105°C cable.

SERIES 228 TEE SENSORS

The tee mounted flow sensors consist of a standard 220BR or 220SS mounted in a 2" or 2.5" tee.

- Model 228BR - brass/bronze sensor mounted in a bronze tee.
- Model 228SS - stainless steel sensor mounted in a stainless steel tee.
- Model 228CB - brass/bronze sensor mounted in a cast iron tee.
- Model 228CS - stainless steel sensor mounted in a cast iron tee.



Example: 2 28 BR 20 0 5 0 2 1 1	
STYLE	
Tee Mounted Insert Sensor (2" and 2.5" only)	28
Cast Bronze Tee (0.5" to 1.5" only)	50
MATERIAL	
Brass/Bronze	BR
Stainless Steel (2" and 2.5" only)	SS
Tee - Carbon Steel Sensor Brass	CB
Tee - Carbon Steel Sensor Stainless Steel	CS
SIZE	
2"	20
2.5"	25
ELECTRONICS HOUSING	
PPS	0
ELECTRONICS	
Magnetic	2
FM/CSA Approved	4
Standard	5
IR-Irrigation	6
High Temperature	8
O-RING	
Viton®	0
EPDM	1
Buna N	8
SHAFT	
Zirconia Ceramic	0
Hastalloy® C	1
Tungsten Carbide	2
Titanium	3
Monel®	5
316 Stainless Steel	6
Tantalum	7
IMPELLER	
Nylon	1
Tefzel®	2
BEARING	
Pennlon®	1
Tefzel	2
Teflon®	3

228 Series Metal Tee Sensors Ordering Matrix (2" to 2½")
(See 250 Series for pipe sizes ½" to 1½")



SPECIFICATIONS

Wetted Materials (except tees)

- See Ordering Matrix

Sensor Sleeve and Hex Adapter for 228BR, 228CB,

- Sleeve: Admiralty Brass, UNS C44300;
Hex Adapter: Valve Bronze, UNS C83600

Sensor Sleeve and Hex Adapter for 228SS and 228CS

- 300 Series Stainless Steel

Tee for 228BR

- Cast Bronze, Class 125 Per ASME B16.15, and Copper Coupling

Tee for 228SS

- Cast 316 Stainless, Class 150

Tee for 228CB and 228CS

- Cast Iron, Class 125 Per ASME B16.4

Temperature Ratings

- Standard Version: 221°F (105°C) continuous service
- Irrigation Version: 150°F (66°C) continuous service

Pressure

At 100°F

228B	200 psi
228CB	175 psi
228SS	300 psi

Recommended Design Flow Range

- 0.5 to 30 ft/sec for 228

Accuracy

- ± 1.0% of full scale over recommended design flow range

Repeatability

- ± 0.3% of full scale over recommended design flow range for 228

Linearity

- ± 0.2% of full scale over recommended design flow range for 228

Transducer Excitation

- Quiescent current 600uA @ 8VDC to 35VDC max.
- Quiescent voltage (V_{high}) Supply Voltage $-(600uA \times \text{Supply impedance})$
- ON State (V_{low}) Max. 1.2VDC @ 40mA current limit (15ohm+0.7VDC)

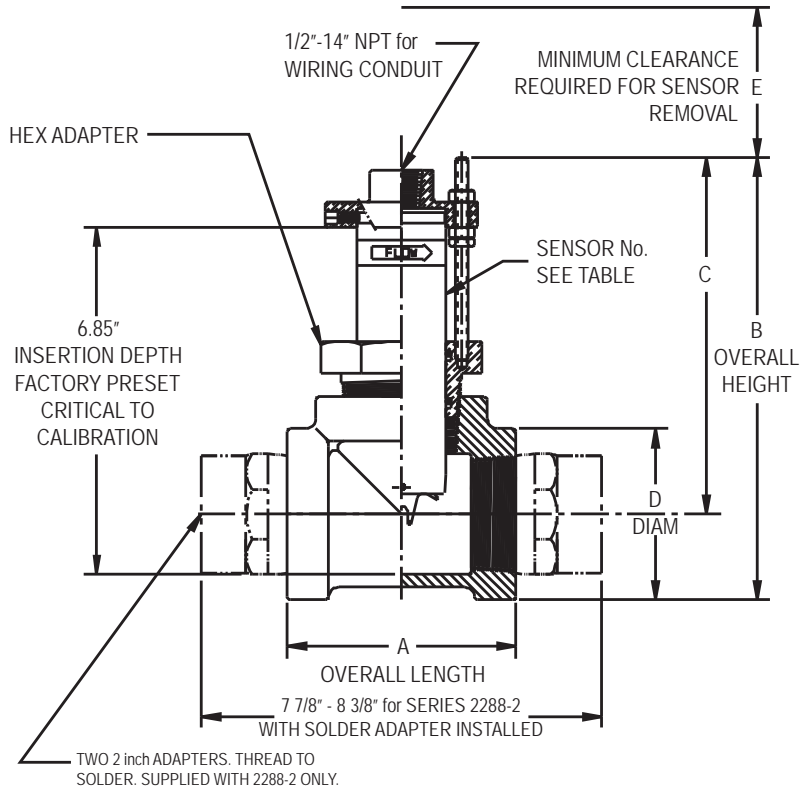
Electrical Cable for Standard Sensor Electronics

- 20 feet of 2-conductor 20 AWG shielded U.L. type PTLC wire provided for connection to display or analog transmitter unit. Rated to 105°C. 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 U.L. Style 116666 copper solid AWG 18 wire with direct burial insulation. Rated to 105°C.

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NOTE - DIMENSIONS "8" AND "C" MAY VARY +/- 1/4 inch. DEPENDING UPON MAKE-UP ON PIPE THREADS>

228CB-2.5	SEE MATRIX	71881T	2.5-8	4.98	9	7	4	6
2288-2.5	SEE MATRIX	71883T	2.5-8	4.75	8.78	7	3.56	6
2288SS-2	SEE MATRIX	711338T	2.11-8	4.5	5.38	5.88	3	6
228CS-2	SEE MATRIX	71876T	2.11-8	4.5	8.57	5.88	3.38	6
228CB-2	SEE MATRIX	71876T	2.11-8	4.5	8.57	5.88	3.38	6
228B-2	SEE MATRIX	71879T	2.11-8	4.25	8.35	5.88	2.94	6
SERIES No. COMPLETE	SENSOR No.	TEE No.	NPT	A	B	C	D	E

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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.



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