

### DESCRIPTION

The Series 228 flow sensors from Badger Meter® 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 ft between the flow sensor and the display unit without the need for amplification.

All sensors, except irrigation versions, are supplied with 20 ft of 2-conductor 20 AWG shielded UL type PTLC 221° F (105° C) cable.

### MATERIALS

The 228CB tee-mounted flow sensor consists of a 220 brass/bronze sensor mounted in a 2 in. or 2.5 in. cast iron tee.



### SPECIFICATIONS

<b>Wetted Materials (except tees)</b>	See "Part Number Construction" on page 3	
<b>Sensor Sleeve and Hex Adapter</b>	<i>Sleeve</i>	Admiralty brass, UNS C44300
	<i>Hex Adapter</i>	Lead-free brass, C89833
<b>Tee for 228CB</b>	Cast iron, Class 125 per ASME B16.4	
<b>Temperature Ratings</b>	<i>Standard Version</i>	221° F (105° C) continuous service
	<i>Irrigation Version</i>	150° F (66° C) continuous service
<b>Pressure Ratings</b>	<b>Temperature (F)</b>	<b>Pressure (psi)</b>
	-20...150	175
	200	165
	250	150
	300	140
<b>Recommended Design Flow Range</b>	0.5...30 ft/sec for 228	
<b>Accuracy</b>	±1.0% of full scale over recommended design flow range	
<b>Repeatability</b>	±0.3% of full scale over recommended design flow range for 228	
<b>Linearity</b>	±0.2% of full scale over recommended design flow range for 228	
<b>Transducer Excitation</b>	Supply voltage = 8V DC min. 35V DC max.	
	Quiescent current = 600 µA (typical)	
	OFF State ( $V_{High}$ ) = Supply voltage - (600 µA × Supply impedance)	
	ON State ( $V_{Low}$ ) = 1.2V DC @ 40 mA (15 Ω + 0.7V DC)	
<b>Electrical Cable for Standard Sensor Electronics</b>	20 ft (6 m) of 2-conductor 20 AWG shielded UL type PTLC wire provided for connection to display or analog transmitter unit. Rated to 221° F (105° C). May be extended to a maximum of 2000 ft (610 m) with similar cable and insulation appropriate for application.	
<b>Electrical Cable for IR Sensor Electronics</b>	48 in. (122 cm) of UL Style 116666 copper solid AWG 18 wire with direct burial insulation. Rated to 221° F (105° C).	

## DIMENSIONS

### Standard 228CB Sensor

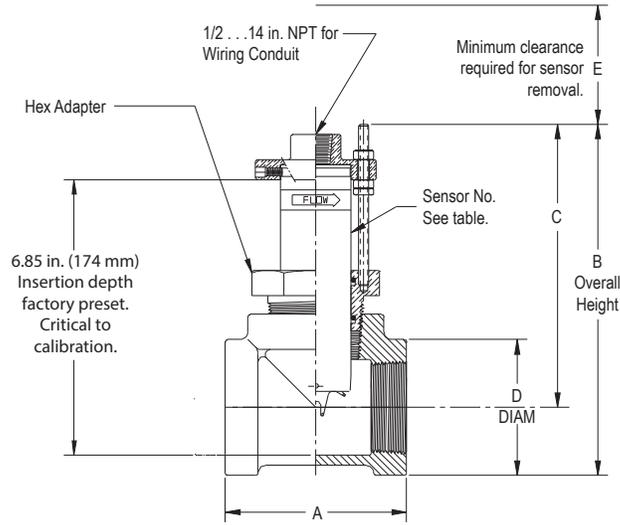


Figure 1: Standard 228CB flow sensor

Series No.	Tee No.	NPT Threads per inch	A	B *	C *	D	E
228CB-2	8813075-20	2...11.5	4.50 in. (114.30 mm)	8.52 in. (216.41 mm)	6.88 in. (174.75 mm)	3.28 in. (83.31 mm)	6 in. (152.4 mm)
228CB-2.5	8813075-25	2.5...8	4.80 in. (121.92 mm)	9.16 in. (232.66 mm)	7.23 in. (183.64 mm)	3.86 in. (98.04 mm)	6 in. (152.4 mm)

\* Dimensions (B, C) may vary  $\pm 0.25$  in., depending on the makeup of the pipe threads.

### High Temperature 228CB Sensor

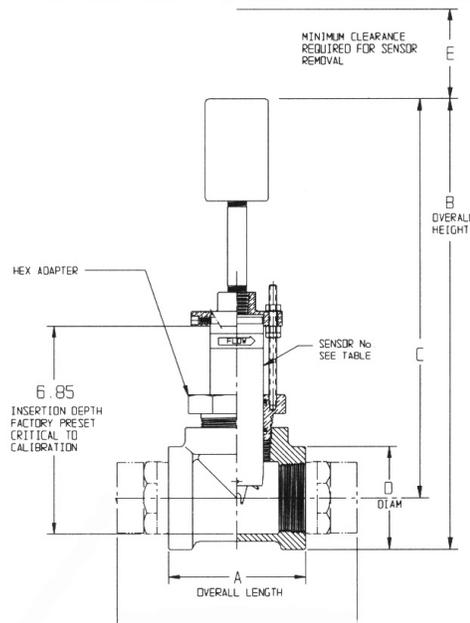


Figure 2: High temperature 228CB flow sensor

Series No.	Tee No.	NPT Threads per inch	A	B *	C *	D	E
228CB-2	8813075-20	2...11.5	4.50 in. (114.30 mm)	18.14 in. (460.76 mm)	16.50 in. (419.10 mm)	3.28 in. (83.31 mm)	6 in. (152.4 mm)
228CB-2.5	8813075-25	2.5...8	4.80 in. (121.92 mm)	18.18 in. (461.77 mm)	16.25 in. (412.75 mm)	3.86 in. (98.04 mm)	6 in. (152.4 mm)

\* Dimensions (B, C) may vary  $\pm 0.25$  in., depending on the makeup of the pipe thread.

## PART NUMBER CONSTRUCTION

### Standard Sensor

Example: 82		28	CB	20	0	5	-	1	2	1	1
<b>STYLE</b>											
Tee Mounted Insert Sensor		28									
<b>MATERIAL</b>											
Tee - Carbon Steel, Sensor - Brass (2" and 2.5" Only)			CB								
<b>SIZE</b>											
2"				20							
2.5"				25							
<b>ELECTRONICS HOUSING</b>											
PPS					0						
<b>ELECTRONICS</b>											
Standard Flow (STANDARD)						5					
IR-Irrigation						6					
<b>O-RING</b>											
Viton®								0			
EPDM (STANDARD)								1			
Buna N								8			
<b>SHAFT</b>											
Zirconia Ceramic										0	
Tungsten Carbide (STANDARD)										2	
316 Stainless Steel										6	
<b>IMPELLER</b>											
Nylon (STANDARD)											1
Tefzel®											2
<b>BEARING</b>											
UHMWPE (STANDARD)											1
Tefzel®											2
Teflon®											3

### High Temperature Sensor

Example: 82		28	CB	20	4	8	-	0	2	2	3
<b>STYLE</b>											
Tee Mounted Insert Sensor		28									
<b>MATERIAL</b>											
Tee - Carbon Steel, Sensor - Brass (2" and 2.5" Only)			CB								
<b>SIZE</b>											
2"				20							
2.5"				25							
<b>ELECTRONICS HOUSING</b>											
PEEK					4						
<b>ELECTRONICS</b>											
High Temperature						8					
<b>O-RING</b>											
Viton®								0			
<b>SHAFT</b>											
Tungsten Carbide (STANDARD)										2	
<b>IMPELLER</b>											
Tefzel®											2
<b>BEARING</b>											
Teflon®											3

**Control. Manage. Optimize.**

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