

### 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 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 UL type PTLC 221° F (105° C) cable.

### MATERIALS

The 228SS tee-mounted flow sensor consists of a standard 220SS sensor mounted in a 2 inch stainless steel tee.



### SPECIFICATIONS

|   |  |                                    |
|---|--|------------------------------------|
| <b>Wetted Materials (except tees)</b>                   | See "Part Number Construction" on page 3   |                                    |
| <b>Sensor Sleeve and Hex Adapter</b>                    | Series 300 stainless steel   |                                    |
| <b>Tee for 228SS</b>                                    | Cast 316 stainless, Class 150, per MSS SP-114  |                                    |
| <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  | 300                                |
|   | 200  | 265                                |
|   | 250  | 225                                |
|   | 300  | 165                                |
| <b>Recommended Design Flow Range</b>                    | 0.5...30 ft/sec  |                                    |
| <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   |                                    |
| <b>Linearity</b>  | ±0.2% of full scale over recommended design flow range   |                                    |
| <b>Transducer Excitation</b>                            | Supply voltage = 8V DC min. 35V DC max.  |                                    |
|   | Quiescent current = 600 uA (typical)   |                                    |
|   | OFF State ( $V_{High}$ ) = Supply voltage - (600 $\mu$ × Supply impedance)   |                                    |
|   | ON State ( $V_{Low}$ ) = 1.2V DC @ 40 mA (15 $\Omega$ + 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 feet 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

228SS Standard Sensor

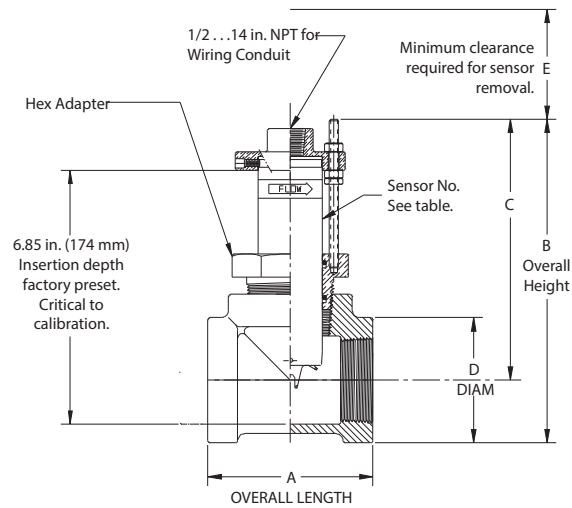


Figure 1: Standard 228SS flow sensor

| Series No. | Tee No.    | NPT<br>Threads per inch | A                    | B *                  | C *                  | D                   | E                 |
|------------|------------|-------------------------|----------------------|----------------------|----------------------|---------------------|-------------------|
| 228SS      | 8813019-20 | 2...11.5                | 4.50 in. (114.30 mm) | 8.38 in. (212.85 mm) | 6.89 in. (175.01 mm) | 2.98 in. (75.69 mm) | 6 in. (152.40 mm) |

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

228SS High Temperature Sensor

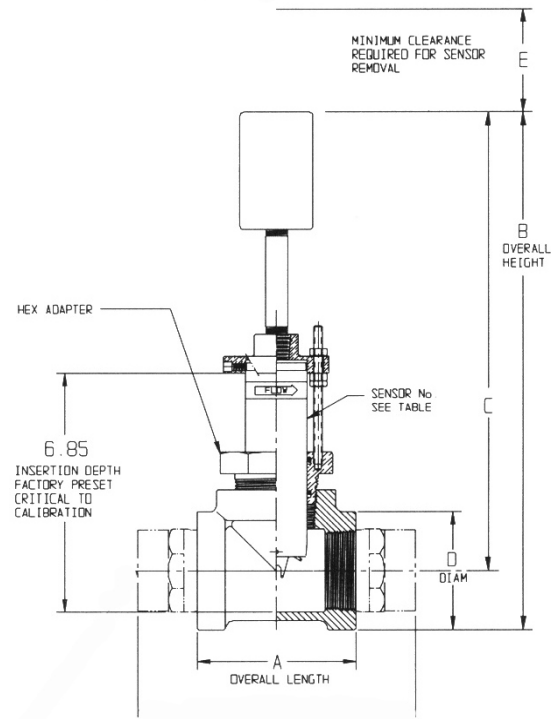


Figure 2: High temperature 228SS flow sensor

| Series No. | Tee No.    | NPT<br>Threads per inch | A                    | B *                   | C *                   | D                   | E                 |
|------------|------------|-------------------------|----------------------|-----------------------|-----------------------|---------------------|-------------------|
| 228SS      | 8813019-20 | 2...11.5                | 4.50 in. (114.30 mm) | 18.00 in. (457.20 mm) | 16.50 in. (419.10 mm) | 2.98 in. (75.69 mm) | 6 in. (152.40 mm) |

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

## PART NUMBER CONSTRUCTION

### Standard Sensor

|                             |  |    |    |    |   |   |   |   |   |   |   |
|-----------------------------|--|----|----|----|---|---|---|---|---|---|---|
| Example: 82                 |  | 28 | SS | 20 | 0 | 5 | - | 1 | 2 | 1 | 1 |
| <b>STYLE</b>                |  |    |    |    |   |   |   |   |   |   |   |
| Tee Mounted Insert Sensor   |  | 28 |    |    |   |   |   |   |   |   |   |
| <b>MATERIAL</b>             |  |    |    |    |   |   |   |   |   |   |   |
| Stainless Steel             |  |    | SS |    |   |   |   |   |   |   |   |
| <b>SIZE</b>                 |  |    |    |    |   |   |   |   |   |   |   |
| 2"                          |  |    |    | 20 |   |   |   |   |   |   |   |
| <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 | SS | 20 | 4 | 8 | - | 0 | 2 | 2 | 3 |
| <b>STYLE</b>               |  |    |    |    |   |   |   |   |   |   |   |
| Tee Mounted Insert Sensor  |  | 28 |    |    |   |   |   |   |   |   |   |
| <b>MATERIAL</b>            |  |    |    |    |   |   |   |   |   |   |   |
| Stainless Steel            |  |    | SS |    |   |   |   |   |   |   |   |
| <b>SIZE</b>                |  |    |    |    |   |   |   |   |   |   |   |
| 2"                         |  |    |    | 20 |   |   |   |   |   |   |   |
| <b>ELECTRONICS HOUSING</b> |  |    |    |    |   |   |   |   |   |   |   |
| PEEK                       |  |    |    |    | 4 |   |   |   |   |   |   |
| <b>ELECTRONICS</b>         |  |    |    |    |   |   |   |   |   |   |   |
| High Temperature           |  |    |    |    |   | 8 |   |   |   |   |   |
| <b>O-RING</b>              |  |    |    |    |   |   |   |   |   |   |   |
| Viton®                     |  |    |    |    |   |   |   | 0 |   |   |   |
| <b>SHAFT</b>               |  |    |    |    |   |   |   |   |   |   |   |
| Tungsten Carbide           |  |    |    |    |   |   |   |   | 2 |   |   |
| <b>IMPELLER</b>            |  |    |    |    |   |   |   |   |   |   |   |
| Tefzel®                    |  |    |    |    |   |   |   |   |   | 2 |   |
| <b>BEARING</b>             |  |    |    |    |   |   |   |   |   |   |   |
| Teflon®                    |  |    |    |    |   |   |   |   |   |   | 3 |

**Control. Manage. Optimize.**

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