Badger® SDI Series	SDI Hot Tap Flow Sensor	Technical Brief

The Badger® SDI Series flow sensor offers accurate liquid flow measurement in closed pipe systems in an easy to install economical package. Impeller sensors offer a quick response to changes in flow rate and are well suited to flow control and batch type applications in addition to flow monitoring. The new four-bladed impeller design is rugged, non-fouling and does not require custom calibration. Coupled with the proprietary patented digital detection circuit, the sensor measures flows from under 0.3 ft/sec to over 20 ft/sec regardless of the conductivity or turbidity of the liquid. The standard frequency output produces a low impedance square wave signal proportional to flow rate that may be transmitted up to 2000 feet without amplification. Models are available to measure flow in one or both directions.

Hot Tap Sensors
Hot tap sensors feature an isolation valve and mounting hardware to install or remove the sensor from a pipeline that would be difficult to shut down or drain. In a true "hot tap" installation the sensor is mounted in the pipe under pressure by attaching a service saddle or weld-on fitting to the pipe and mounting the isolating valve to the threaded connection. A hole is then cut in the wall of the pipe through the valve using a commercial tapping machine with a 1" size cutter. Once the hole is cut, the tapping machine is removed and the valve is shut. Then the sensor assembly is mounted to the isolation valve and extended into the pipeline to measure flow. Even in new construction a hot tap sensor may be appropriate for service considerations. The Data Industrial hot tap sensor is constructed of 316 Stainless Steel and is rated for service to 1000 psi at 70° F (refer to Pressure vs. Temperature chart on page 2.) The sensor installs in a 1" NPT tap for both wet and dry installations. The small stem diameter allows the sensor to be inserted into the pressurized pipeline by hand without the need for an installation tool. The mounting hardware holds the sensor firmly in place at the correct depth and alignment.

Output Configurations
Standard Frequency
Badger Sensor output is a pulse proportional to flow. The signal is similar to all 200 Series flow sensors and will interface with all existing Badger transmitters and monitors. The power supply to the sensor and the output signal from the sensor is carried on the same two wires. Wire connections are made at screw terminals on removable headers inside the NEMA 4X housing.

Analog Output
The sensor is also available with a two-wire loop powered 4-20 mA output. The analog output is produced by an on-board micro-controller for precise, drift-free signals. The unit is programmed from a computer using Windows® based software and a connection cable. Units may be pre-programmed at the factory or field programmed. All information is stored in non-volatile memory in the flow sensor.

Scaled Pulse Output
The scaled pulse is produced by an on-board micro-controller for precise, accurate outputs. This option may be programmed to produce an isolated solid state contact closure scaled to any number of engineering units of measure. Sensors may be pre-programmed at the factory or field programmed using a Badger Meter connection

cable and a Windows based software program. All information is stored in non-volatile memory in the flow sensor. This is a four-wire option.

Bi-directional Flow- Analog Output
This option provides a programmable 4-20 mA signal proportional to flow rate and a contact closure to indicate the direction of flow. All programming is accomplished as previously mentioned. The user can program the unit for pipe size, flow scale and the direction of flow. This is a six-wire option.

Bi-directional Flow- Scaled Pulse Output
This option provides the user with a choice of outputs. In one case the sensor provides an output scaled to the required number of engineering units on one set of terminals and a contact closure to indicate the direction of flow on another. The other choice provides two isolated scaled pulse outputs, one for each direction. Programming the output choice, pipe size, output scale and direction of flow by the user are also accomplished by using a PC with Data Industrial software and connection cable. This option also requires six wires.

Display Options
All models except the standard frequency output version may also be equipped with a display. Integrated into the NEMA 4X housing, the 8 digit LCD may be programmed to show rate of flow, flow total or toggle between the two. Bi-directional models also show flow direction.

SPECIFICATIONS:

Wetted Materials:
Sensor stem, mounting adapter, and isolation valve:
- 316 Stainless steel

Sensor Tip:
- Polyphenylene Sulfide (PPS)
- Polyetheretherketone (PEEK)

O-rings,bearings,shaft:
- See ordering matrix

Maximum Temperature Ratings:

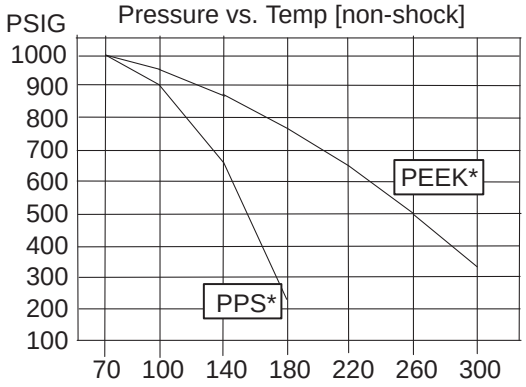
Fluid measured:
- +300° F (135°C) See Chart

Operating temperature: Electronics:
- +14°F (20°C) - +150°F (65°C)

Operating temperature: LCD:
- 20°C - +65°C

Pressure Drop:

Maximum Pressure Rating for SST Stem
(Note: PPS or PEEK Tip)



* Max. Pressure Temp. Ratings for Brass:
- 600 PSI up to 140°F
- 225 PSI up to 180°F

Power Specifications

	Raw Pulse Option 0	Analog Loop Option 1	Scaled Pulse Option 2
Number of wire connections	2	2	4
Pulse Units			
Operating Voltage	8-35 VDC	N/A	12-30 VAC 12-35 VDC
Overvoltage protection	30 VAC ±40 VDC	±40 VDC	30 VAC ±40 VDC
Quiescent Current Draw @12VDC or 24VAC	330uA TYP	Software Controlled Current of 3.5-20.5mA	< 2mA
Short Circuit Current	50mA TYP	N/A	> 100 mA
Output Frequency	800 Hz max	N/A	Scaled by Customer
Output Pulse Width	5 mS Below 100 Hz	N/A	Adjustable 50mS to 5.0 Second in 50 mS Increments
Output Isolation	N/A	N/A	Opto-isolated
Analog Units			
Operating Voltage	N/A	8-35 VDC	N/A
Output Response Time	N/A	Varies with Programmable Filter	N/A

- 0.5 psi or less @ 10 ft/sec for all pipe sizes 1.5" dia. and up.

Accuracy:
- Standard: to +/- 1% of rate over optimum flow range
- Custom wet calibration: On request

Straight Pipe Requirement:
- Install sensor in straight pipe section with a minimum distance of 10 diameters upstream and 5 diameters downstream to any bend, transition, or obstruction.

Repeatability:
+/- 0.5%

Enclosure:
- Polypropylene with Viton® sealed acrylic cover. Meets NEMA 4X specifications

Wire Connections:
- All wire connections are made to screw type terminals within the electronics housing, ½" conduit thread provided

Programming:
- All programmable models utilize Badger Meter A301 connector cable and SDI Series software

Display: (optional)
- 8 character, 3/8" LCD
- STN (Super twisted Nematic) display
- Annunciators for: rate, total, input, output flow direction for Bi-directional models

Accessories:
- ASDI-20 Programming Kit contains software and A301 programming cable
- A1027 Hot Tap Adapter Nipple

SDI Series Hot Tap Ordering Matrix

SDI	0	H1	N	0	0	-	0	2	0	0
Material										
Stainless Steel/PPS Tip	0									
Stainless Steel/PEEK Tip	2									
Type										
Hot Tap for Pipe 1-1/2" thru 10" *		H1								
Hot Tap for Pipe 12" thru 36" *		H2								
Hot Tap for Pipe 36" and UP*		H3								
Electronic Housing										
NEMA 4X			N							
Output										
Standard Frequency Pulse				0						
Analog 4-20mA				1						
Scaled Pulse				2						
Bi-Directional, 4-20mA + Direction [PPS tip Only]				5						
Bi-Directional, Scaled Pulse [PPS tip Only]				6						
Display										
No Display					0					
LCD Option [not available with output option 0]					1					
O-Ring										
Viton®							0			
Shaft										
Tungsten Carbide [Standard]								2		
Hastelloy® C-276 [optional - consult factory]								1		
Zirconia Ceramic [optional - consult factory]								0		
Impeller										
Stainless Steel									0	
Bearing										
Torlon®										0

*Pipe size for reference only. Depending on pipe material, tapping saddle, or existing hardware, longer sensor length may be required.

For material details, consult the factory.

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