Blue-White Industries, Ltd.

Technical Data Sheet

F-2000 Series - Digital Paddlewheel Flow Sensor

F-2000 Features:

- TTL/CMOS compatible, current sinking Hall Effect output signal. Optional AC sine wave output sensor available.
- One mile signal range without boosters.
- NEMA 4X rated.

F-2000 Specifications:

Max. Working Pressure ..... 300 psig (20 bar) @ 70° F (21° C)
Max. Fluid Temperature ..... 200° F (93° C) @ 0 PSI (Polypropylene in-line, PVDF saddle, 316SS Tee)
140° F (60° C) @ 0 PSI (PVC saddle and Tee fittings)
Note: *Temperature rating of sensor only. Actual pipe rating may vary.*
Power requirements..... 6-24 VDC, AC/DC transformer sold separately.
Full scale accuracy ..... +/- 1%
Sensor/Paddle/Axle material . PVDF
O-ring seals: ..... Viton
Approximate shipping weight. 2 lb. (0.9 kg)

SADDLE MOUNT
FHXX15K8

MOLDED IN-LINE M/NPT
FHXX10M1

MACHINED IN-LINE F/NPT
FHXX15P1

PVC SOLVENT WELD TEE
FHXX20AT

316 SS F/NPT TEE
FHXX10ST

Saddle mount - IPS Pipe

Pipe Size	Flow Range	SCH 40 Model Number	SCH 80 Model Number
1-1/2”	15 to 150	FHXX15K4	FHXX15K8
2”	30 to 300	FHXX20K4	FHXX20K8
3”	60 to 600	FHXX30K4	FHXX30K8
4”	100 to 1000	FHXX40A4	FHXX40A8
6”	250 to 2500	FHXX60A4	FHXX60A8
8”	400 to 4000	FHXX80A4	FHXX80A8
10”	600 to 6000	FHXX100A4	FHXX100A8
12”	800 to 8000	FHXX120A4	FHXX120A8

Tee mount

Pipe Size	GPM Flow Range	316 SS Tee Model Number	PVC Tee Model Number
1”	6 to 60	FHXX10ST	FHXX10AT
1-1/2”	15 to 150	FHXX15ST	FHXX15AT
2”	30 to 300	FHXX20ST	FHXX20AT

Molded In-Line - M/NPT

Pipe Size	G.P.M. Flow Range	POLYPROPYLENE Model Number	PVDF Model Number
3/8”	.8 to 8	FHXX38M1	FHXX38F1
3/8”	.4 to 4	FHXX38M2	FHXX38F2
1/2”	2 to 20	FHXX50M1	FHXX50F1
1/2”	.5 to 5	FHXX50M2	FHXX50F2
3/4”	3 to 30	FHXX75M1	FHXX75F1
3/4”	.8 to 8	FHXX75M2	FHXX75F2
1”	5 to 50	FHXX10M1	FHXX10F1
1”	2 to 20	FHXX10M2	FHXX10F2
1-1/2”	4 to 40	FHXX15M1	FHXX15F1
1-1/2”	6 to 60	FHXX15M2	FHXX15F2
1-1/2”	10 to 100	FHXX15M3	FHXX15F3
2”	4 to 40	FHXX20M1	FHXX20F1
2”	6 to 60	FHXX20M2	FHXX20F2
2”	10 to 100	FHXX20M3	FHXX20F3
2”	20 to 200	FHXX20M4	FHXX20F4

Machined In-Line - F/NPT

G.P.M. Flow Range	POLYPROPYLENE Model Number	PVDF Model Number
.8 to 8	FHXX38P1	FHXX38K1
.4 to 4	FHXX38P2	FHXX38K2
2 to 20	FHXX50P1	FHXX50K1
.5 to 5	FHXX50P2	FHXX50K2
4 to 40	FHXX75P1	FHXX75K1
.8 to 8	FHXX75P2	FHXX75K2
6 to 60	FHXX10P1	FHXX10K1
2 to 20	FHXX10P2	FHXX10K2
1 to 10	FHXX15P5	FHXX15K5
6 to 60	FHXX15P3	FHXX15K3
15 to 150	FHXX15P1	FHXX15K1
2 to 20	FHXX20P6	FHXX20K6
6 to 60	FHXX20P4	FHXX20K4
15 to 150	FHXX20P2	FHXX20K2
30 to 300	FHXX20P1	FHXX20K1

Power Supply for above F-2000 Sensors

Model Number	Description
90008-336	Power supply, 115VAC primary, 15VDC secondary (U.S. Style plug)
90008-337	Power supply, 220VAC primary, 15VDC secondary (European Style plug)
71000-310	Power supply, 230VAC primary, 15VDC secondary (IEC input plug and cord)

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Installation Guidelines

F-2000 Series - Digital Paddlewheel Flow Sensor

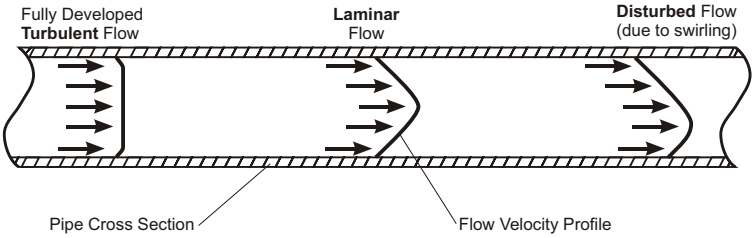
Fluid Flow Stream Requirements

Measuring accuracy requires a fully developed ***turbulent*** flow profile. Pulsating, swirling and other disruptions in the flow stream will effect accuracy. Flow conditions with a ***Reynolds Number*** greater than 4000 will result in a fully developed ***turbulent*** flow. A Reynolds Number less than 2000 is ***laminar*** flow and may result in inaccurate readings.

REYNOLDS NUMBER EQUATION:

$$\text{REYNOLDS NUMBER} = \frac{3160 \times Q \times G}{D \times V}$$

Where:
Flow rate of the fluid in GPM = Q
Specific gravity of the fluid = G
Pipe inside diameter in inches = D
Fluid viscocity in centepoise = V



Minimum Straight Pipe Length Requirements

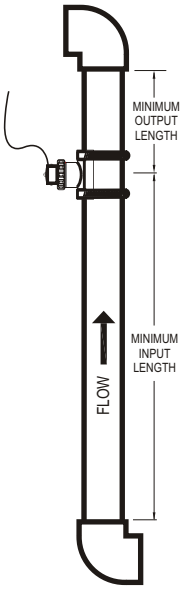
The sensor's accuracy is affected by disturbances such as pumps, elbows, tees, valves, etc., in the flow stream. Install the sensor in a straight run of pipe **as far as possible** from any disturbances. The distance required for accuracy will depend on the type of disturbance.

Type Of Disturbance	Minimum Inlet Pipe Length	Minimum Outlet Pipe Length
Flange	10 X Pipe Inside Diameter	5 X Pipe Inside Diameter
Reducer	15 X Pipe Inside Diameter	5 X Pipe Inside Diameter
90° Elbow	20 X Pipe Inside Diameter	5 X Pipe Inside Diameter
Two 90° Elbows -1 Direction	25 X Pipe Inside Diameter	5 X Pipe Inside Diameter
Two 90° Elbows -2 Directions	40 X Pipe Inside Diameter	5 X Pipe Inside Diameter
Pump Or Gate Valves	50 X Pipe Inside Diameter	5 X Pipe Inside Diameter

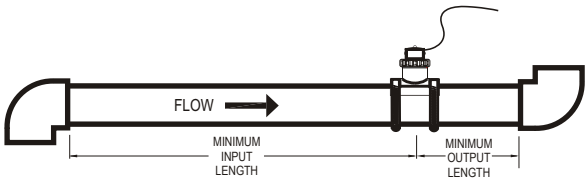
Mounting location and pressure/temperature requirements

- The sensor is designed to withstand outdoor conditions. A cool, dry location, where the unit can be easily serviced is recommended.
- The sensor can be mounted on horizontal or vertical runs of pipe. Mounting at the vertical (twelve o'clock) position on horizontal pipe is recommended. Mounting anywhere around the diameter of vertical pipe is acceptable, however, the pipe must be completely full of water at all times. Back pressure is essential on downward flows. See the minimum straight length of pipe requirement chart above.
- The sensor can accurately measure flow from either direction.

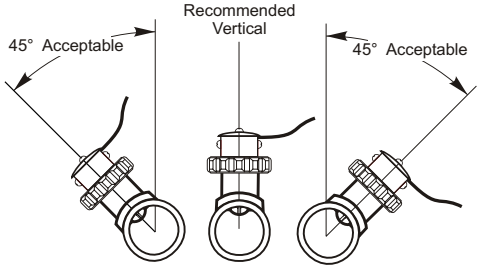
Vertical Mount



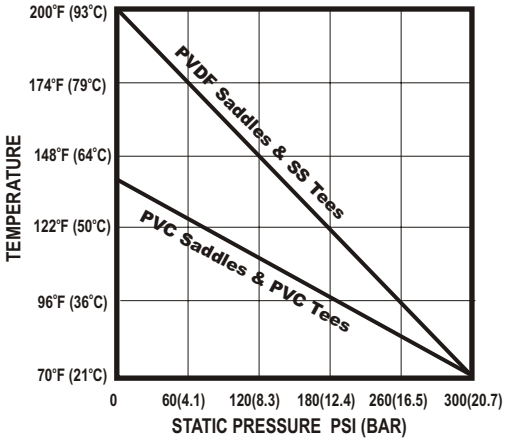
Horizontal Mount



Angle Mount on Horizontal Pipe



Maximum Temperature vs. Pressure



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