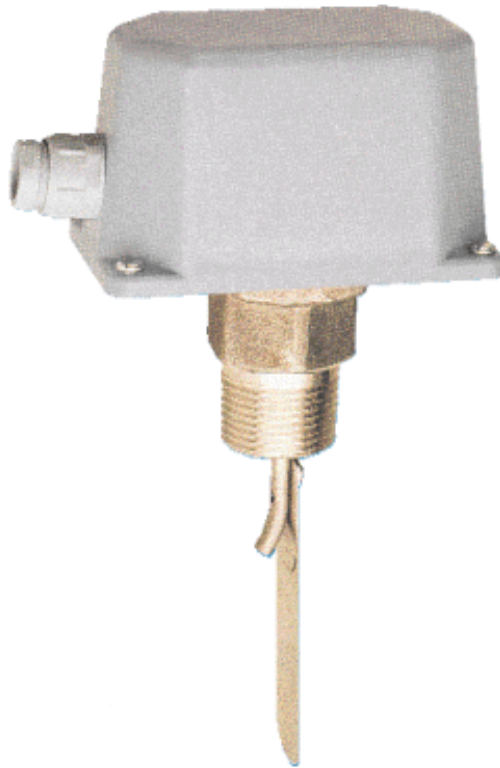


KOBOLD FPS FLUID FLOW MONITOR

User Instructions



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KOBOLD FPS FLUID FLOW MONITOR User Instructions

CAUTION: For safety reasons, please read the cautionary information located at the end of the manual, before attempting installation.

1.0 General

The KOBOLD FPS flow monitor is designed for installation in pipes 1 to 8 inches in diameter. These are the pipe sizes for which a calibration exists - installation in larger pipes is possible, but the user must calibrate the unit themselves.

The principle of operation is quite simple. The FPS has a lever, hinged in the housing, which extends into a paddle for insertion into the flowing medium. The movement (rotation) of the paddle is transmitted to a microswitch via a metal bellows. The bellows serves to isolate the fluid from the microswitch and the movement in the housing. Since the motion of the lever is resisted by a spring in the housing, the degree of paddle rotation is an indication of fluid flow rate. By positioning a microswitch in the lever's path, it can be made to switch at some specified flow rate.

Since a bellows is used for isolation purposes, the setpoint will also be dependent on pressure in the system. This is a result of the bellows' spring constant being pressure sensitive.

2.0 Specifications

Operating Principle:	Paddle/bellows arrangement
Dimensions:	See Diagram 2.3
Range:	See Table 2.4
Maximum Pressure:	150 PSI (Bronze bellows) 450 PSI (SS bellows)
Maximum Temperature:	
Medium:	250 Degrees F
Ambient:	185 Degrees F

Table 2.: Construction

Standard Version:	Brass fitting Brass lever SS paddle Bronze Bellows
SS Version:	SS fitting SS lever SS paddle SS bellows

Diagram 2.2: Electrical Connections

Maximum Current:	8 A
Maximum Voltage: @ 8 A	220 VAC
Max Power Diss.:	1760 VA

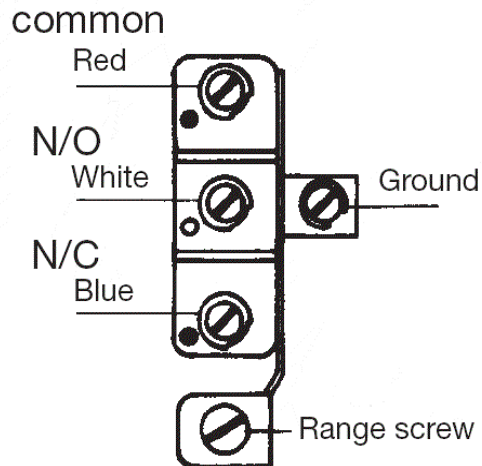


Diagram 2.3: Dimensions

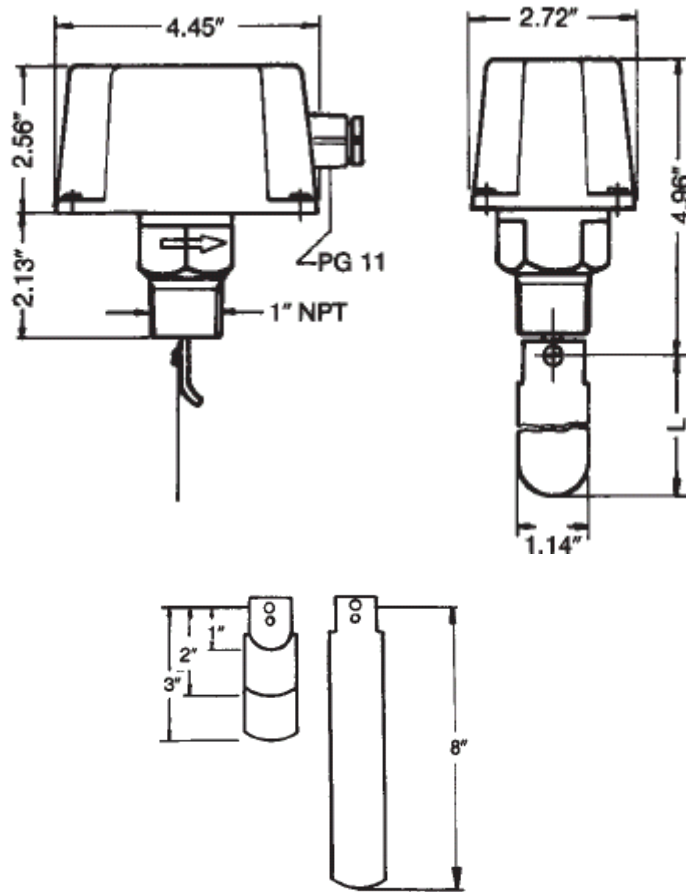


Table 2.: Switching Points vs. Pipe Diameter

Pipe Size	Switching ranges Model FPS-5000 GPM water		Switching ranges Model FPS-6000 GPM water		Model FPS-5000		Model FPS-6000	
	De-Actuating	Actuating	De-Actuating	Actuating	Brass	SS	Brass	SS
1"	2.6- 8.8	4.4- 9.3	0.9- 4.4	2.6- 4.8	FPS-5100	FPS-5200	FPS-6100	FPS-6200
1 1/2"	3.5- 12.3	5.7- 13.2	1.1- 6.2	4.0- 7.0				
1 1/2"	4.8- 16.3	7.5- 17.6	2.2- 8.4	5.3- 9.7				
2"	9.7- 25.1	13.7- 26.9	4.0- 15.9	10.1- 17.6				
2 1/2"	11.9- 28.6	17.6- 30.2	5.3- 21.6	13.7- 24.2				
3"	18.9- 47.1	27.3- 50.2	9.3- 32.6	21.6- 36.1				
4"	50.2-122.0 (41.0-111.0)	64.7-127.7 (56.8-118.0)	21.6- 75.3 (22.0- 77.0)	49.8- 84.1 (50.6- 86.3)				
5"	100.8-234.7 (41.0-111.0)	125.1-244.8 (56.8-118.0)	16.3-149.7 (22.0- 77.0)	98.6-166.9 (50.6- 86.3)				
6"	158.1-360.0 (54.2-134.7)	189.8-385 (74.0-144.0)	59.9-209.6 (26.9- 94.2)	138.7-233.8 (62.1-105.2)				
8"	319.7-729.6 (170 -400)	374.7-759.5 (204.7-414.8)	113.2-396.7 (95.6-243.5)	262.4-443.4 (160.7-272.1)				

3.0 Installation Instructions

CAUTION: For safety reasons, please read the cautionary information located at the end of the manual, before attempting installation.

The FPS is screwed directly into piping using the 1" NPT Brass or Stainless Steel fitting on its base. There are two things to observe:

1. The paddle length must be appropriate for the diameter of the pipe to which the FPS is connected. Ensure also that the FPS is not screwed too deeply into its fitting, as this may cause the paddle to contact the bottom of the pipe. The paddle must be completely free to move.
2. To ensure the stability, the shorter paddle should always be left on.
3. The FPS must be installed so that the arrow on its housing is aligned with the medium flow in the pipe.

Connect to the internal microswitch by removing the housing, leading cable through the housing inlet, and connecting according to Diagram 2.2.

Though the FPS may be installed in any orientation, we recommend that you do not install with the housing more than 90 degrees out of a vertical "up" position. This suggestion is strictly to avoid accumulation of sediment in the bellows and subsequent seizure of the paddle-lever mechanism.

3.1 Upstream and downstream straight pipe run requirements

To switch at the values specified in Table 2.4, straight runs of pipe are needed before and after the FPS installation point. These should be at least 5 interior pipe diameters in length.

4.0 Operation

After installation, the switch point may be adjusted. Note that the switch point is slightly dependent on the orientation of the FPS. This is because the weight of the paddle acts differently in different positions. If you have reoriented your FPS, it may be necessary to reset the switch point.

4.1 Adjusting the Setpoint

Diagram 2.2 shows the placement of the setpoint adjustment screw. Turning this screw clockwise will increase the flow rate required to activate the switch.

4.1.1 Activating the Setpoint on Rising Flow

To adjust the microswitch to trigger on rising flow, do as follows:

1. Establish desired setpoint flow rate in the system.
2. Turn setpoint screw fully clockwise.
3. Slowly turn setpoint screw counterclockwise until microswitch activates
4. Replace housing cover.

4.1.2 Activating the Setpoint on Falling Flow

To adjust the microswitch to trigger on falling flow, do as follows:

1. Establish desired setpoint flow rate in the system.
2. Turn the setpoint screw fully counterclockwise.
3. Slowly turn setpoint screw clockwise until the microswitch activates.
4. Replace housing cover.

5.0 Maintenance

Due to its construction, a paddle type flow monitor, such as the FPS, is virtually maintenance-free. There are only two areas that could (potentially) be a source of concern if the medium contains minerals which could precipitate out onto the instrument.

1. If enough material deposits on the paddle, its area may be increased. This will lead to erroneous flow rate switching of the flow monitor.
2. In extremely severe cases, it may be possible that sufficient materials will deposit inside the bellows to alter the bellows' spring constant. This will lead to higher flow rate readings (stiffening of the bellows).

6.0 Arrival of Damaged Equipment

Your instrument was inspected prior to shipment and found to be defect-free. If damage is visible on the unit, we advise that you carefully inspect the packing in which it was delivered. If damage is visible, notify your local carrier at once, since the carrier is liable for a replacement under these circumstances. If your claim is refused, please contact KOBOLD Instruments for further advisement.

7.0 Need help with your FPS?

Call one of our friendly engineers at 412-788-2830.

Caution

PLEASE READ THE FOLLOWING GENERAL FLOW METER/ MONITOR WARNINGS BEFORE ATTEMPTING INSTALLATION OF YOUR NEW DEVICE. FAILURE TO HEED THE INFORMATION HEREIN MAY RESULT IN EQUIPMENT FAILURE AND POSSIBLE SUBSEQUENT PERSONAL INJURY.

- **User's Responsibility for Safety:** KOBOLD manufactures a wide range of process sensors and technologies. While each of these technologies are designed to operate in a wide variety of applications, it is the user's responsibility to select a technology that is appropriate for the application, to install it per these installation instructions, to perform tests of the installed system, and to maintain all components. The failure to do so could result in property damage or serious injury.
- **Proper Installation and Handling:** Use a proper sealant with all installations. Never overtighten the unit within the fitting. **Never use the housing to thread the unit into its fitting.** Always use only an appropriate sized wrench on the hex portion of the probe. Always check for leaks prior to system start-up.
- **Wiring and Electrical:** The electrical connection specifications for the FPS are contained in Diagram 2.2. The sensor system should never exceed these ratings. Electrical wiring of the sensor should be performed in accordance with all applicable national, state, and local codes.
- **Temperature and Pressure:** The FPS is designed for use in application temperatures from 0 to 250°F, and for use at pressures up to 160 PSIG for brass units and up to 450 PSIG for stainless steel units. Operation outside these limitations will cause damage to the unit and possible personal injury.
- **Material Compatibility:** The FPS is made of either 321 stainless steel or brass with bronze bellows. The housing is ABS plastic. Check the model number from Table 2 with the wetted materials specification in Table 2.2 of this manual. Make sure that the model which you have selected is chemically compatible with the application liquids. While the switch housing is liquid resistant when installed properly, it is not designed to be immersed. It should be mounted in such a way that it does not normally come into contact with fluid.
- **Flammable, Explosive and Hazardous Applications:** The FPS is not of an explosion proof design. The FPS models should not be used in areas where an explosion proof design is required.
- **Make a Fail-Safe System:** Design a fail-safe system that accommodates the possibility of switch or power failure as well as operator error. In critical applications, KOBOLD recommends the use of redundant backup systems and alarms in addition to the primary system.