

# KOBOLD PPS FLOW SWITCH

## User Instructions



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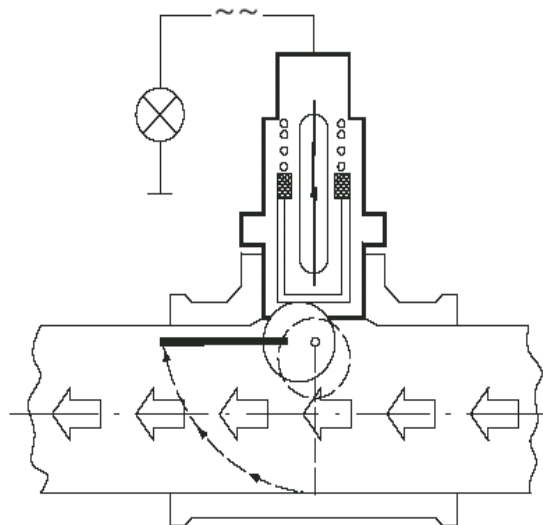
**CAUTION:** For safety reasons, please read the cautionary information located at the end of the manual, before attempting installation.

### 1.0 General

The KOBOLD PPS flow switch is intended for applications in which an electrical switching function is required once a specific flow rate is achieved. The PPS is delivered with either a normally-open (N/O) or normally-closed (N/C) switching function, depending upon ordering code. Switching is achieved through a magnetically-coupled reed switch which is hermetically isolated from the medium. The device operates through use of a paddle which is pivoted out of the fluid system by flow pressure. A cam attached to the top of the paddle then lifts internal magnets into a region near the reed switch. The magnetic field of the magnets then activates the reed contacts. A spring acts against the force of the paddle to force magnets out of reed switch proximity if flow volume decreases beyond a specific value (determined by pipe diameter & paddle length). (See Diagram 1.1)

Once the PPS has switched, the paddle is almost totally removed from the flow path. This guarantees minimal pressure loss across the instrument.

Diagram 1.1: PPS Operating Principle

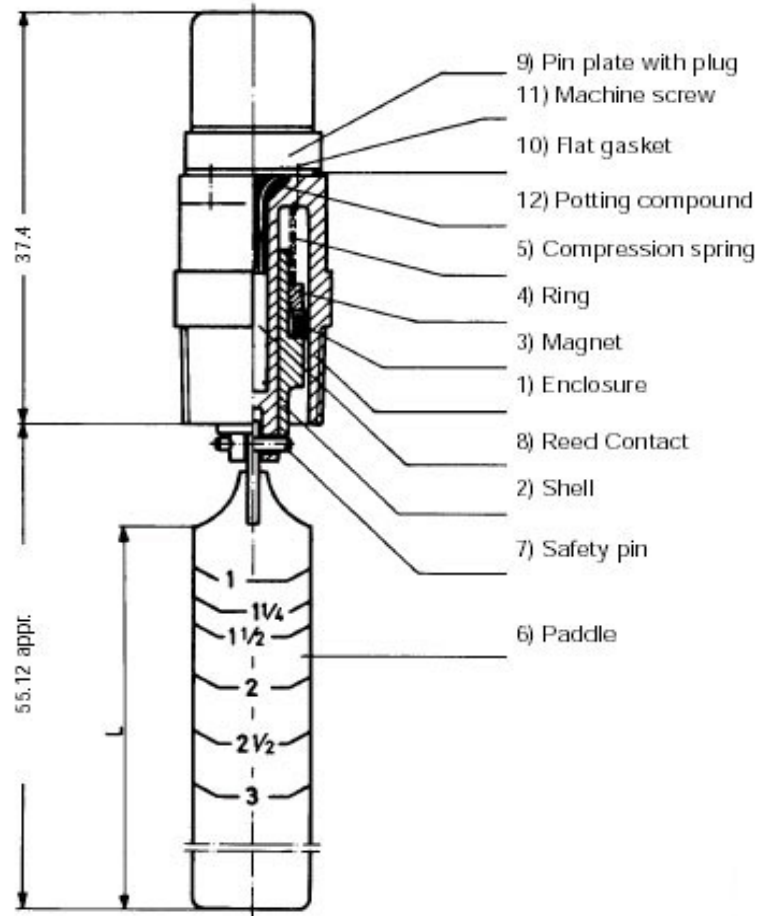


## 2.0 Specifications

Operating Principle:	Spring resisted paddle, cam assisted
Dimensions:	See Diagram 2.2
Switching Points:	See Table 2.4
Maximum Pressure:	145 PSIG
Maximum Media Temperature:	225° F
Maximum Induced Pressure Loss:	1.45 PSI
Switching Repeatability:	± 3%
Fitting:	1" MNPT or G1 (1" BSP) male
Electrical Connection:	DIN 43650 Plug/Socket

Table 2.1: Reed Switch Electrical Data

Maximum Voltage:	250 V
Maximum Current:	2.0 A
Maximum Load:	40 VA
Environmental Protection:	NEMA 4 / IP 65

Diagram 2.2: PPS Construction & DimensionsTable 2.3: Construction

	<u>Wetted Materials</u>
Body:	Polysulfone
Spring:	Stainless Steel
Magnet:	Ceramic
Pivot Pin:	Stainless Steel

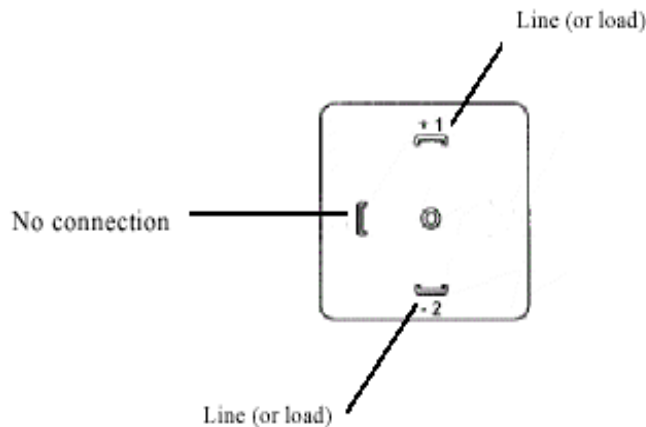
Table 2.4: Switching Point vs. Pipe Diameter

Pipe bore inches	Cut-off mark "L" appr.	Switching point GPM Water	
		Turn-on	Turn-off
1	0.9"	9.5	5.0
1 1/4	1.1"	9.5	5.0
1 1/2	1.4"	14.5	9.5
2	2.0"	19.0	9.5
2 1/2	2.4"	24.0	14.5
3	2.9"	28.5	19.0

3.0 - Installation

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

Electrical Connection:



The PPS is designed to be directly mounted into the top of pipes through the use of a 1" NPT fitting. Use PTFE sealing tape for proper sealing and ease of installation.

When installing, it is important to note the following:

1. The flat of the paddle faces into the fluid stream.
2. The paddle is trimmed to the appropriate length of the diameter of the pipe into which it is installed to achieve the design switchpoint (Table 2.4).
3. The PPS is not so deeply inserted into the pipe so that the paddle touches the bottom of the pipe.



## 4.0 Operation

The PPS comes with either a N/O or N/C switch (at no flow), as specified by order code. The switching function is factory set and is not user adjustable. The reed switch of the PPS may be used to switch loads directly as long as switch limits are not exceeded (Table 2.1). For DC circuits, we strongly suggest the use of a 1A, 1N4000 series diode wired in parallel with the load (e.g. band or cathode toward positive). For AC loads, use an RC circuit or MOV (metal oxide varistor) wired in parallel with the switch.

It is important to realize that large capacitive or inductive loads (such as relay coils, light bulbs, etc.) typically have momentary voltage/current requirements far exceeding any of the rated operating values of the reed switch. If in doubt, we suggest the use of a higher capacity isolation relay (such as the Kobold MSR or RL series) to protect your model PPS flow switch.

### 4.1 Adjustment of the Setpoint

The switch setpoint is adjustable only via the paddle length. If a higher switchpoint is desired, paddle length may be changed by additional trimming of the paddle. There is no specified procedure for this, but in general, for a given pipe diameter:

1. Longer Paddle:            Lower switch point
2. Shorter Paddle:         Higher switch point

## 5.0 Maintenance

The simplicity of the device ensures that it is nearly maintenance free. If the media is dirty, it is possible that the dirt will deposit in the switch body and impede the motion of the ceramic magnet. In this case, remove the device and clean as appropriate. Do not use sharp objects to scrape away dirt as this may damage the PPS. After cleaning, reinstall as per the installation instructions.

## 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 PPS

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.**

- 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 properly, 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.
- Inspect instrument for damage upon arrival. Cracked, fractured, bent, or otherwise damaged instruments must not be put into use, since the device is weakened to an unknown extent. (The operations and installation guide will explain how to make a claim on damaged instruments.)
- Make sure that the model which you have selected is chemically compatible with the application liquids. While the meter is liquid and spray resistant when installed properly, it is not to be submerged in liquids.
- Under NO circumstances must the maximum tolerances (temperature and pressure) be exceeded.
- The maximum tolerances of the device have been determined using water, air and/or oil. If using other media, especially corrosive ones, it is critically important that the user determine chemical compatibility with our instruments. A list, detailing material composition of our instruments, is available from KOBOLD Instruments Inc. upon request. KOBOLD Instruments Inc. cannot accept responsibility for failure and consequences resulting from use of media other than water, mineral oil, air, and nitrogen.
- Install the devices in a fully supported position within your flow system. This avoids excessive stresses which may damage the instrument. In particular:
  - a. Ensure that the plumbing leading to and from the instrument is fully supported and that the instrument does not perform the physical function of a joint.
  - b. When calculating stress on the device caused by plumbing, the weight of the medium in the pipes must be considered as well.
  - c. Misaligned runs of rigid piping can cause large stresses when connected to the instrument. Do not connect in such a fashion.
- During installation, avoid stresses on the instrument by following guidelines given below:
  - a. When connecting fittings, hold the instrument fittings rigid with a correctly sized wrench. Do not install by twisting the instrument into the pipe fittings.
  - b. Do NOT install holding the device housing to provide counter-torque to the pipe fitting.

- c. Use an appropriate amount of PTFE tape on male threads of fitting. This reduces the twisting stresses produced by tightening the fittings into each other.
  - d. Do not use pliers or wrenches on the housing, as this may damage it.
  - e. Do not overtighten, as this may fracture the fittings.
- During operation, there are a number of situations to avoid:
    - a. The sudden cessation of fluid flow causes what is typically referred to as “water hammer”. Most people are familiar with this phenomenon from their home experience - it is the cause behind the loud clank of water pipes which occurs when faucets are turned off too suddenly. The cause behind this “water hammer” is quite easy to visualize. Water is fairly massive. The amount of water in long runs of pipe is quite substantial. When the faucets are turned off suddenly, especially from a full on condition, the water has considerable momentum and does not want to stop flowing. The situation is similar to stopping a car by running into a wall, rather than by applying brakes. Both are sudden rather than gradual. The damage to the wall can be substantial (not to mention the car).  
The “water hammer” causes surges in fluid pressure which could cause the measurement instrument’s pressure limit to be exceeded, resulting in failure and possible personal injury.
    - b. Fluid surges, as well as the water hammer, can be particularly damaging to empty flow meters since there is no back pressure in the device. The damage is caused, once again, by momentary excess pressure. To avoid these surges, fluid lines should remain full (if possible) and water flow should be introduced to the device slowly.
    - c. If the instrument is isolated with inlet and outlet valves, the flow meter must be completely drained when said valves are both closed. Failure to do so could result in damage to the device caused by thermal expansion of fluid.
    - d. Freezing of water in the instrument must be avoided since the resultant expansion will damage the flow meter and make it unsafe for use.
  - Design a fail-safe system
    - a. Design a fail-safe system that accommodates the possibility of switch or power failure. In critical applications, KOBOLD recommends the use of redundant backup systems and alarms in addition to the primary system.

