KOBOLD VKP FLOWMETER/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 VKP is a partially viscosity compensated flowmeter, scaled to be read directly with use of water or oil with a viscosity of 100 cSt based on model number. This partial compensation is achieved through the use of a spring in conjunction with our patented knife-edge orifice in the float. Since part of the medium flows past the periphery of the float, full compensation is unobtainable.

The basic theory of operation is that of the well-known float in a conical tube. The conical shape is obtained through use of an inverted cone in the base of the instrument - the guide tube is cylindrical.

The construction, being plastic, is such that fluids flow between the float and guide cylinder wall. This makes full viscosity compensation impossible. The advantage of this, however, is that by increasing the float-cylinder tolerance, dirty fluids may be passed through the special version of the instrument, the VKP-6 (particles up to 400µ in diameter).

2.0 Specifications

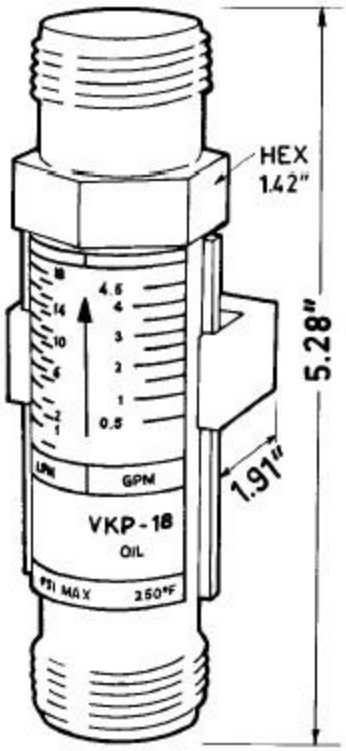
Table 2.1; Material Composition

	Standard	Options
Housing	Polysulfone	-
Float	Polysulfone	-
Spring	301 SS	-
Retaining Ring	PH 15-7 MO	-
1/2” and 3/4” connections		
Nut	-	Brass or SS
Internal Parts	-	Brass or SS
Seal	-	Buna-N®
Seals VKP-5000	-	Klingerit-Oilit™

Table 2.2; Operational Limits

Viscosity Range:	v = 1 - 100 cSt (mm²/s)
Maximum Medium Temperature:	250° F
Maximum Internal Pressure:	230 PSIG

Diagram 2.3; Dimensions



VKP-...
Dimensions

Diagram 2.4; Wiring of Reed Switch

N/O Contact, Bi-stable

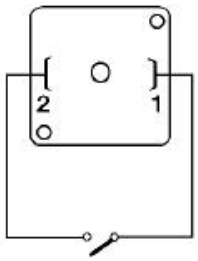


Table 2.5; Electrical Data and Operational Limits

Maximum Voltage:	200 V
Maximum Current:	0.5 A
Maximum Power Dissipation:	10 Watts
Environmental Protection:	IP 65 (IEC 259) (Equal to NEMA 4)

3.0 Principle of Operation

The KOBOLD VKP flowmeter has a spring-loaded float which slides within a cylindrical measuring tube. Our patented process for achieving viscosity compensation hinges on the use of the nonlinear behavior of the float spring in combination with a unique orifice integral to the float itself. A large amount of medium density compensation is provided simultaneously.

Should flow monitoring be desired, limit switches may be added to the device easily. Permanent magnets on the float actuate an electrically isolated, sealed contact (reed switch) mounted on the outside of the instrument housing. This arrangement guarantees hermetic separation of the medium and the electrical system. The contact is embedded within a plastic housing to prevent damage to the contacts by mechanical action or aggressive atmospheres. The contact housing is mounted in slides to enable set point changes to be effected.

The flowing media raises the float against the spring force. When the magnetic field reaches the contact reeds of the reed switch, the contact actuates. As the flow increases, the float rises until it reaches its stop. This prevents the float from going beyond the contact range of the magnetic switch, i.e., the contact remains activated. The result is bistable switching without a latching relay as normally required.

The magnetic field may be used to couple to an external (i.e., hermetically separated) indicator. This configuration provides clear indication, even with dark media.

The magnetic field and the indicator are so designed that response to sudden surges in flow is almost immediate.

4.0 Installation Instructions

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

4.1 - Mounting

1. The VKP may be mounted in any orientation without affecting accuracy.

2. The medium must flow through the instrument in the direction indicated by the arrow on the housing.

3. The medium must not contain any solids which would interfere with proper operation of the device. It is advisable to provide filters with built-in magnetic separators upstream of the VKP. (KOBOLD's MF filters or equivalent will suffice.)

4. Make mechanical connections according to the directions in the cautionary

attachment to this manual.

4.2 - Use of Set Point Contact

If you choose a device with option "-R", your VKP is equipped with a bistable reed contact. The position of this contact is adjusted by sliding the switch housing (white rectangular structure) up and down the slide rails on the side of your unit. The contact is engaged by a magnet in the float. This means that there is a given amount of hysteresis built into the switching function, resulting in different turn-on and turn-off points.

4.3 - Connecting to the Contact

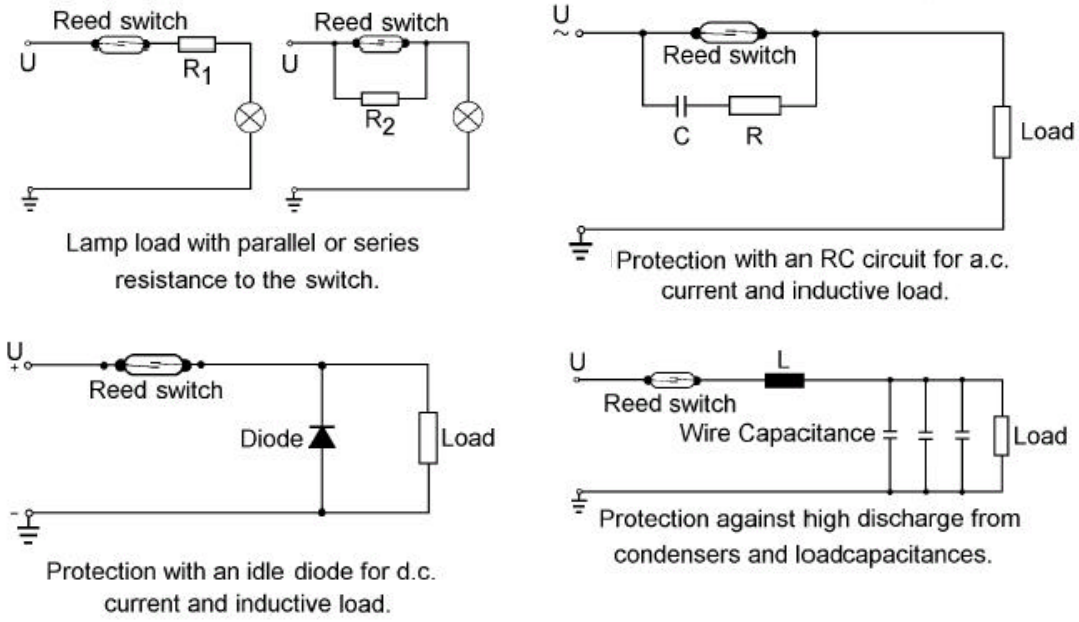
Connect wiring between Terminals 1 and 2 as shown in Diagram 2.4 (page 4).

Do not install the meter in areas where strong electric fields are present, as this will hamper proper operation of the reed contact.

4.2 - Contact Protection

Maximum values of current and voltage must not be exceeded on the reed contact. When driving inductive or capacitive loads, we recommend protecting the contact as diagrammed below. If continuous load values exceed contact rating, we recommend the use of an isolation relay. KOBOLD provides a line of relays for such instances.

Diagram 2.6; Contact Protection



5.0 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.

6.0 Need help with your VKP?

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 designed to be immersed.

- 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 device 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 by holding the device housing to provide counter-torque to the pipe fitting.

c. Use an appropriate amount of teflon 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 flowmeters 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 flowmeter 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 flowmeter and make it unsafe for use.

e. 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.