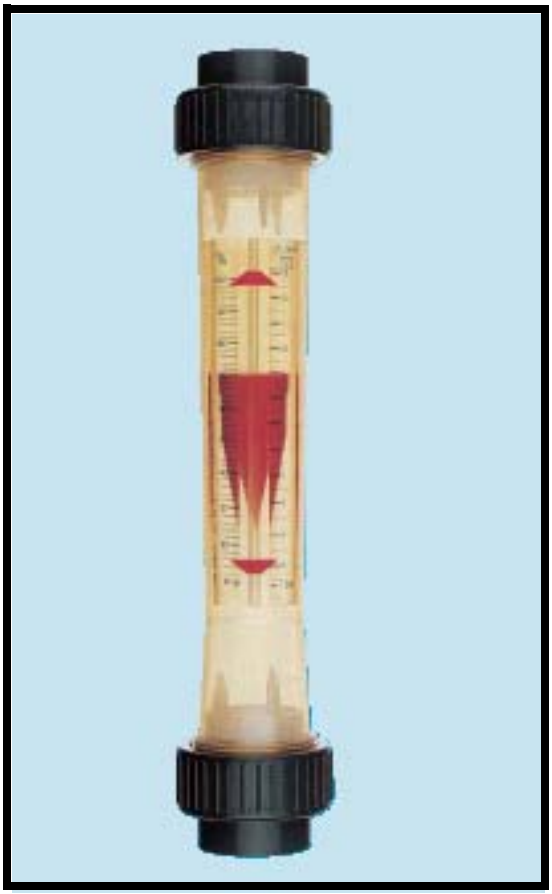
KOBOLD KSM FLOWMETER

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 KSM flowmeter is a high volume measuring device, intended for applications in which the corrosion resistance of synthetic materials (plastic) is required.

The KSM operates on the principle of the variable area flowmeter (float in a conical tube or rotameter).

The KSM may be outfitted with a setpoint switch (reed type - as many as fit on the rear rail) to allow control of external electronics by triggering on flow rate information.

2.0 Specifications

Table 2.1; Technical Data

Operating Principle:	Variable area orifice
Dimensions:	See Diagram 2.4
Display:	Directly read, calibrated for H_2O
Range:	See Diagram 2.4
Operating Temperature:	32° F to 140° F
Maximum Internal Pressure:	145 PSIG

Table 2.2; Material Construction

Body:	Trogamid-T or Polysulfone
Float: KSM X001 to KSM-X300	PVDF
KSM-X600	PVC
Float Stop:	PVDF
O Rings:	EPDM
Fittings:	PVC

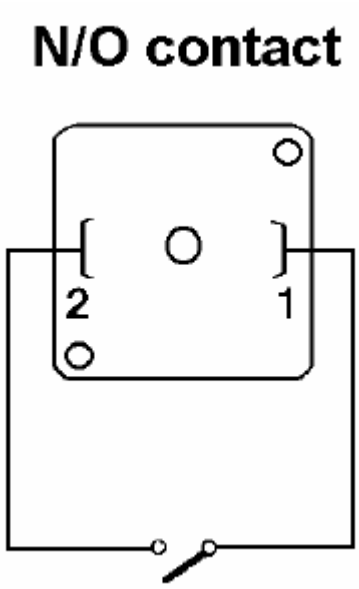

Diagram 2.4; Dimensions & Pressure Loss

Sizes (inches)				
da	L	L1	L2	b
1¼	13.2	13.4	15.2	2.36
1¼	13.2	13.4	15.2	2.36
1¼	13.2	13.4	15.2	2.36
2	13.2	13.4	15.9	3.27
2	13.2	13.4	15.9	3.27
2½	13.2	13.4	16.4	4.06
2½	13.2	13.4	16.4	4.06
3	13.2	13.5	18.0	4.80
3	13.2	13.5	18.0	4.80
3	13.2	13.5	18.0	4.80

Range water GPM	Nominal Size in Inches	Press. drop max. PSI
0.06– 0.66	1	0.26
0.22– 2.2	1	0.26
0.44– 4.4	1	0.26
0.88– 8.8	1½	0.36
1.32– 13.2	1½	0.36
2.64– 26.4	2	0.36
5.28– 52.8	2	0.36
8.8 – 88	2½	0.36
13.2 –132	2½	0.36
35 –264	2½	0.48

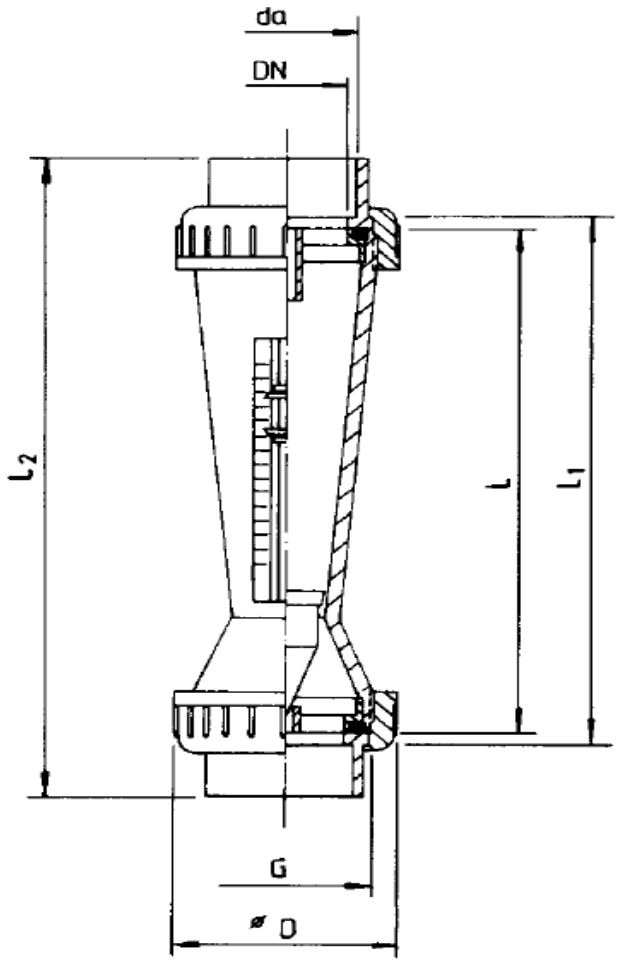

Table 2.5; Reed (SPDT) Contacts - Technical Data

Maximum Voltage:	230 VAC
Maximum Current:	1.5 A (SPDT; 0.8A)
Maximum Power:	50 W/50 VA (SPDT; 30 VA)
Switch Hysteresis:	3-12 mm
Dimensions:	49 x 30 x 47 mm
Weight:	70 gm (0.15 lb)
Maximum Ambient Temperature:	32° F to 130° F

3.0 Installation Instructions

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

3.1 - Mounting

The KSM comes supplied with PVC connectors and screw caps. To install the instrument, simply:

1. Remove PVC fittings from your KSM.
2. Place nut over pipe to which you wish to connect.
3. Per manufacturer's instructions, use a PVC adhesive/solvent to glue fittings in place. Let cure.
4. Fasten connectors to KSM* with PVC nuts. Take care not to overtighten the nuts. If necessary, use a strap wrench on the nuts. Do **NOT** use a pipe wrench, pliers, or any other sharp instrument on the fittings, as this may compromise the strength, and eventual safety, of the instrument.

Alternately, the KSM can be ordered with an optional NPT threaded fitting; alter the installation procedure accordingly.

NOTE: The KSM must be installed vertically (long axis), with the inlet at the bottom.

4.0 Operation

We recommend that, if possible, the medium be introduced to the instrument in gradually increasing amounts. This procedure serves two basic functions:

1. It prevents oscillation of the float upon sudden introduction of media (particularlygases).

2. It prevents possible damage to the instrument caused by pressure surges (as described in the cautionary section).

4.1 - Reading the Flow Rate

Flow rates measured by float type devices are typically read at the largest float diameter. In the case of the KSM, this is the top edge of the float.

4.2 - Adjusting the Setpoints; KSM...-R

All setpoints are adjusted in identical fashion. To adjust a setpoint:

1. Loosen the holding screw found on the setpoint indicator body, near the V-groove.

2. Slide the switch to the desired setpoint value.

3. Tighten the holding screw once more, taking care not to overtighten.

4.3 - Operating the Setpoints; KSM...-R

This description is valid for the reed-type - or SPDT - setpoint switches.

The setpoint switch is actuated by the motion of the magnet-containing float past the relay position. The behavior of the switch is bistable - that is, the switch toggles from one position to the other whenever the float passes, and remains in that state until the float passes in the reverse direction again. Since a reed switch is a switch in the purest sense, external electronics may be driven directly through it, provided that the electrical current/power loads are not too demanding. (See Table 2.4 for reed switch performance data.)

Should switching of current/voltage in excess of the abilities of the reed - or SPDT - switch be required, an isolation relay must be installed.

5.0 Maintenance

The major enemy of float-type flowmeters is dirt. We recommend that clean or filtered media only, be passed through the device. If using the setpoint switch, it is particularly important to guard from contamination by ferritic (metal) materials. To protect from these, we suggest the installation of a magnetic filter, such as a KOBOLD MF.., or equivalent.

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 KSM?

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.

- 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.)

- 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.