Operating Instructions

for

Viscosity Compensated Flowmeter / Monitor

Model: VKM-...

1. Note

Please read and take note of these operating instructions before unpacking and putting into operation.
The instruments may only be used, maintained and installed by personnel familiar with the Operating Instructions and the applicable Health and Safety Requirements.

2. Contents

3. Declaration of Conformance

We, KOBOLD-Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Flowmeter and switch Model VKM-...

to which this declaration relates is in conformity with the standards noted below:

DIN EN 61 010-1
Safety requirements for electr. equipment for measuring control and laboratory use.
EN 60529, DIN VDE 0470-1
Degrees of protection provided by enclosures (IP-code)

following the provision of European Directives:

73/23 EWG

Signed H.-D. Nemyczuk Date: 05.03.1997
H.D. Nemyczuk

Manufactured and sold by:

Kobold Messring GmbH ..... Tel.: 06192-2990
Nordring 22-24 ..... Fax: 06192-23398
D-65719 Hofheim

4. Regulation Usage

The models VKM are used for measuring and monitoring of viscous liquid flows (max. 760 mm^2/s). They are suitable for measuring clean and homogeneous fluids which have no effects on the instrument materials used.
If using higher viscosity media, large deviations will occur to the measured values.
Large dirt particles may lead to blocking of the float and cause false alarm conditions.
Ferritic particles deposited on the float (with magnet) may lead to the same effects.

The instruments are provided as follows:

Flow measurement (only for Model VKM-2.. and VKM-3..)

The actual flow rate may be read off the magnetically operated pointer indicator mounted on the instrument. The scale indicates the flow rate directly in liters per minute.

Limit Value Switches (only for Model VKM-1.. and VKM-3..)

The instrument is fitted with one or two adjustable limit value switches for the monitoring of flow throughput values.

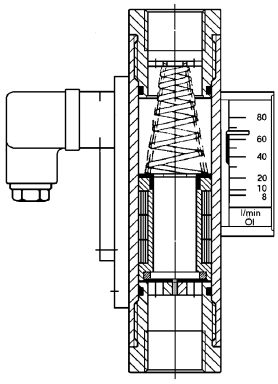
Standard design:	Normally open reed contact (for increasing flow)
Special design:	Changeover reed contact

The contact is adjustable over the full measuring range.

Standard Material Combinations

	Material: Brass	Material: Stainless steel
Housing	Nickel plated brass	Stainless steel 301
Spring	Stainless steel 301	Stainless steel 301
Orifice	301 / Brass	Stainless steel 301
Magnets	Ceramic oxide	Ceramic oxide
Connections	Nickel plated brass	Stainless steel 304
Float	Brass	Stainless steel 304
O-Rings	Perbunan	Viton
T_{max}	100 °C	100 °C
P_{max}	250 bar	350 bar

5. Operating Principles



A hollow float with a sharp-edged orifice is located within a cylindrical bored metal housing. The flowing medium raises the float against the spring force. Each position of the float corresponds to a particular flow rate which may be read off from the needle indicator mounted on the instrument. Permanent magnets are fitted around the float which operate reed contact switches external to the flowing medium.
The operation of the contacts is voltagefree and works by means of magnetic force. i.e.: the contact is hermetically sealed from the flowing medium.

6. Instrument Inspection

The instruments are inspected before dispatch and sent out in perfect condition. Should damage to the instrument be visible, we recommend close inspection of the delivery package. In cases of damage, please immediately inform the shippers as they are liable for any damage in transit.

Scope of Supply

All parts belonging to the standard scope of supply are attached to the instrument.

7. Mechanical Connection

Before installation:

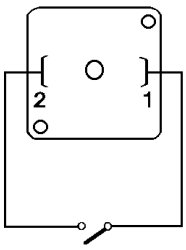
- It should be confirmed that the maximum allowed operating pressures and operating temperatures of the equipment are not exceeded (see table: standard material combinations).

- The instruments may be mounted in every flow direction . No recalibration is required when changing position. The flow must always take place in the direction of the arrow (see label).
- Remove all transport packing and ascertain that no packing material is left in the instrument.
  Sealing of the connection threads should be carried out with Teflon tape or similar.
- The instruments must not be installed within an induction field.
- Where possible after the mechanical installation it should be checked that the connection thread to pipe is fully sealed (see also Commissioning).

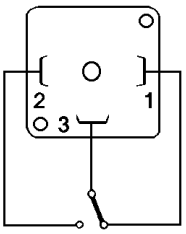
8. Electrical Connection

(Only for Model VKM-1.. and VKM-3..)

N/O contact



Changeover contact



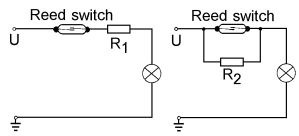
- Check that electrical supply voltage is switched off.
- Loosen the mounting screw from the plug cap and remove the cap from the plug.
- Connect the power supply cable to the plug as shown in the connection diagram.
- If the contact has not yet been adjusted, it should be done so at this stage (see Commissioning of the Instruments).
- Place the plug on the contact and fasten it with the mounting screw.

Warning! The given electrical values of the reed contacts must not be exceeded , not even singly or for short durations. For increased switch values we recommend a contact protection relay or other contact protection measures.

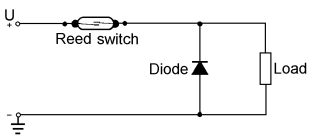
After connection of your external equipment at the connection points, and after adjustment of the chosen switch points, the external power supply to the instrument may be switched on.

Examples for contact protection measures

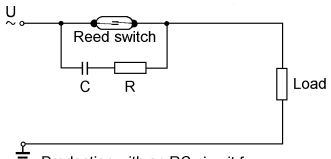
For capacitive and inductive loads (long cables and relay/protection) we recommend relay switching.



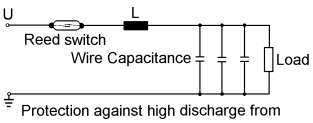
Lamp load with parallel or series resistance to the switch.



Protection with an idle diode for d.c. current and inductive load.

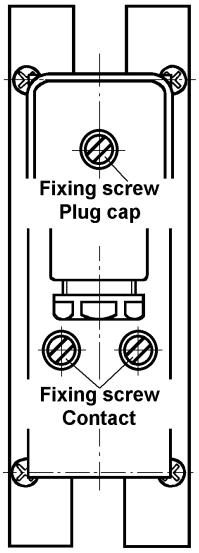


Prodection with an RC circuit for a.c. current and inductive load.



Protection against high discharge from condensers and loadcapacitances.

9. Commissioning of the Instruments



Adjustment of the Limit Values (for Instruments With Indicator)

- With a screwdriver, loosen both mounting screws at the contact.
- Move the switch housing to the lowest position.
- After loosening the screws, remove the plug cap from the contact.
- Connect a suitable multimeter to PIN 1 & 2 (changeover contact PIN 2 & 3).
- When the instrument is already installed, open the inlet pipe and slowly allow the medium to flow until the pointer indicator shows the required minimum flow throughput. The Reed switch is then closed (electrical continuity).
- Move the switch housing upwards until the Reed switch just opens (no electrical continuity).
- At this position tighten the mounting screws. Replace the plug cap. The instrument is now ready for operation.
- By correct adjustment of the limit switch, a bi-stable switch condition is achieved, i.e.: even when exceeding the adjusted limit value, the contact remains closed (PIN 1 + 2 or PIN 2 + 3 for changeover contact option).

Adjustment of the Limit Value (for Instruments Without Indicator)

- Loosen the mounting screws on the contact.
- Position the marking on the contact in line with the required value on the housing scale.
- Tighten the mounting screws at this position.

Hysteresis

Hysteresis is characterised by the difference between the switching on and switching off points of the contact. By matching the magnet and reed contact strength(AW Number) a hysteresis of approx. 3.5 mm of float movement is achieved. At the same time it may be assured that the contacts have a bi-stable switching characteristic.

Exceeding measuring range

The flow range may be exceeded by a large margin with a non-pulsating flow. Only a certain increase in pressure loss is experienced. (The permissible maximum operating pressure must not be exceeded).

Viscosity range

The instrument scale is suitable for a viscosity range of 1 - 760 mm^2/s. Within this range there is no need for recalibration.

10. Technical Specifications

Measurement and switch accuracy:	± 4 % of full scale value
Max. operating pressure:	See table: Standard Material Combination
Max. medium temperature:	See table: Standard Material Combination
Protection type:	IP 65
Approvals:	VDE, SEV, UC, CSA
Viscosity range:	1-760 mm^2/s

Elektrical Switch Values

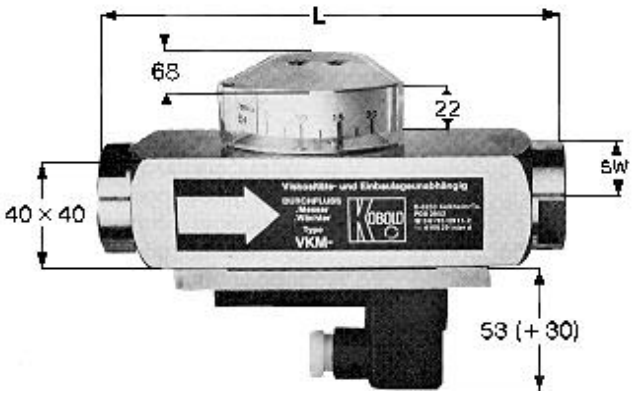
N/O:	240 VAC, 100 VA, 1.5 A (SEV, CSA)
SPDT:	240 VAC, 60 VA, 1 A (SEV, CSA)
N/O, EEx d IIC T6:	250 VAC, 2 A, 80 VA
SPDT EEx d IIC T6:	250 VAC, 1 A, 60 VA
N/O EEx ia I BVS:	250 VAC, 1 ,5 A, 100 VA (underground mining appl.)
SPDT EEx ia I BVS:	220 VAC, 1 A, 60 VA (underground mining appl.)

For instruments with UL-approval, see switch values on contact housing.

11. Maintenance

In cases where the medium to be measured is uncontaminated, the models VKM are almost maintenance-free. However where calcium or dirt deposits form in the housing or other internal parts, the instruments should be regularly cleaned.
With a suitable open-ended spanner, remove the instrument from the pipe. After removal of the uppermost threaded connection, the internal parts may be removed for cleaning. The internal parts can be cleaned with a suitable brush. After cleaning reassemble the instrument in the correct order of assembly.
Please note that the spring must be installed into the nipple of the upper threaded connection and onto the float body. The lower end of the float with the inserted orifice is found at the fluid inlet side.

12. Dimensions and Pressure Losses



	HEX	G	L (mm)	4 Sided	Weight (kg)*	Δp min	Δp max
VKM-..01	36	1/4	162	40 x 40	1,7	0,02	1
VKM-..02	36	1/4	162	40 x 40	1,7	0,03	0,8
VKM-..03	36	1/4 (1/2)	162	40 x 40	1,7 (1,6)	0,05	1,1
VKM-..04	36	1/4 (1/2)	162	40 x 40	1,7 (1,6)	0,07	1,2
VKM-..05	36	1/4 (1/2)	162	40 x 40	1,7 (1,6)	0,05	0,9
VKM-..06	36	1/4 (1/2)	162	40 x 40	1,7 (1,6)	0,05	0,8
VKM-..07	36	1/2 (3/4)	162	40 x 40	1,6 (1,5)	0,08	1,1
VKM-..08	36	1/2 (3/4)	162	40 x 40	1,6 (1,5)	0,05	1,1
VKM-..09	36 (41)	3/4 (1)	162 (186,5)	40 x 40	1,5 (1,7)	0,1	0,4
VKM-..10	36 (41)	3/4 (1)	162 (186,5)	40 x 40	1,5 (1,7)	0,15	1,1
VKM-..11	36 (41)	3/4 (1)	162 (186,5)	40 x 40	1,5 (1,7)	0,15	1,1
VKM-..12	41	1	186,5	40 x 40	1,7	0,15	1,1

* valid for model VKM-1.. and VKM-2... for model VKM-3.. + approx. 0.1 kg.

13. Recommended Spare Parts

Only the instrument parts and material are listed. Depending on the instrument type the parts are available in various sizes (when ordering please indicate instrument type).

1.1) Float brass
1.2) Float Stainless Steel
2.1) Spring
3.1) O Ring set Perbunan
3.2) O Ring set Viton
4.1) Contact (Normally Open)
4.2) Contact (Changeover switch)