

**Operating Instructions
for
Plastic
Flow Meter and Monitor
(viscosity compensated)**

Model: VKP



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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

as per PED 2014/68/EU

In acc. with Article 4 Paragraph (3), "Sound Engineering Practice", of the PED 2014/68/EU no CE mark.

Diagram 8, Pipe, Group 1 dangerous fluids

3. Suggested Application

These units of type VKP are employed for flow measurement and monitoring of H₂O and viscous liquids in an economical way.

Only such liquids can be measured which are doped with impurities to a small extent, and can withstand against the material used for fabrication of housing. Significant errors in measurement may result if these devices are used for the measurement of high-viscous media. Large-size impurity-particles may lead to blockage of float element and thus are subjected to measurement-errors and error-indications. The same problem may arise if ferrite particles deposit on float element (with magnets).

These units are configured as follows:

Flow Measurement

The flow reading of the current value of flow is displayed on the scale stucked on the housing. The upper edge of the float indicates the flow value.

Limit-value contacts (Option)

For the monitoring of the flow value the flowmeter can be equipped with an adjustable limit switch.

N.O. function (increasing flow)

or N.C. function (increasing flow)

This contact is adjustable over the complete measuring range.

Materials

	Material	Remarks
Housing	Polysulfone	
Float	Polysulfone	
Spring	St. Steel 1.4310	
Metering ring	St. Steel 1.4310	
Flat-seal	NBR	brass connections + PVC
Flat-seal	FPM	st. st. connections
Flat-seal	Klingerit-Oilit	oil measuring range

4. Operating Principle

In the cylindrical housing is located a float with an orifice. This float element is raised by the medium flowing in, against the strength of a spring. Each float element position corresponds to a flow value, which can be read off from the scale mounted on the housing. Optionally, a float element with permanent magnet can be mounted which activate a reed-contact mounted outside the body of the unit. The operation of the contact succeeds contactlessly via magnetic force, i.e. the contact is hermetically separated from the flowing medium. The type VKP is equipped with a float element, which is provided with grooves on the exterior in order to protect it against contamination caused by deposited particles. Thus, the danger of clamping the float element is substantially reduced and measuring polluted liquids with a particle size of up to 400 µm is possible without problems.

5. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition. Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:

The standard delivery includes:

- Plastic Flow Meter and Monitor model: VKP
- Operating Instructions

6. Mechanical Connection

Before installation:

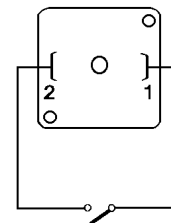
- Make sure that the permitted max. operating pressure and temperature of the device is not exceeded (see technical data).
- These devices are independent of mounting position. A readjustment on installation position is not necessary. The flow takes place from the float element to the spring.
- Remove all the transportation-safety locks etc. and ensure, that there exist no packing-material parts inside the unit.
- These units may not be installed in the proximity of induction field.
- If possible, after mechanical installation, check whether the sealing of connection-joints/piping is adequate. (see section on commissioning).

7. Electrical Connection

Reed-contact, bistable (Option)

- Ensure that the electrical power lines are not active.
- Loosen the stopping-screw of plug-cape and rotate the cap to draw it off from contact-foot.
- Assemble the power conductors inside the plug-cape, as shown in the adjoining figure.
- If contact is not yet adjusted, it is desirable to make the adjustment now (see section on commissioning).
- Place the plug on the contact-foot and secure it with safety-screws.

N/O contact

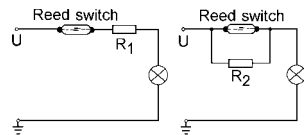


Attention! The given electrical values of protective-gas contact should not be overstepped even briefly. For higher switching power, we recommend a contact-protected relay (e.g. type MSR from KOBOLD) or adapt other contact-protection measures.

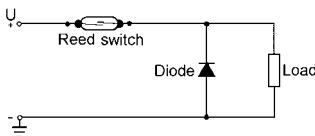
After connecting the external devices to be used (defined by user) with the limit contacts, and adjusting the desired switching point, device can be put now into operation.

Example: measures for contact-protection

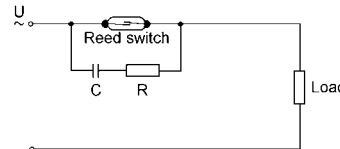
For capacitive and inductive loads (long conductors and relay/safeguard) we recommend following protective wiring scheme.



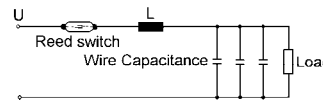
Lamp load with parallel or series resistance to the switch.



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



Protection with a RC snubber for a.c. current and inductive load



Protection against high discharge from condensers and load capacitances.

8. Commissioning

Adjustment of limit-values

- The contact is adjusted via the two red graduated stoppers for the desired switching point.
- Reference-edge for decreasing flow: Lower-edge of contact housing.
- Reference-edge for increasing flow: approx. 5 mm above the lower-edge.
- Push the switch-housing till the reference-edge stays on the desired scale value, where the contact should be switched.

Hysteresis

Hysteresis indicates the difference between switch-in and switch-off points of contacts. The Hysteresis amounts to approx. 5 mm of float-hub.

Overstepping of measuring range

With non-pulsating flow currents, the measuring range is essentially overstepped. Only an increase in pressure-loss would be detected.
(Permitted max. operating pressure must not be overstepped!)

9. Technical Information

Housing:	PSU
Connections:	G 1 external thread; 1 NPT external thread inserts G 1/2, G 3/4 PVC glue-in connection, soldering connection 18, 22 mm (Ms)
Float:	PSU
Spring:	stainless steel, 1.4310
Toothed ring:	stainless steel, 1.4310
Flat seal:	for model VKP-1... / 3... NBR for model VKP-2... Klingerit Oilit
Max. temperature:	120°C 85°C (with contact) 60°C (with PVC connection)
Max. pressure:	16 bar
Accuracy:	VKP-1...: ±5% f. s. VKP-2...: ±5% f. s. VKP-3...: ±7% f. s.
Installation position:	horizontal or vertical

Option (for VKP-1 and VKP-2 only)

Contact	
components:	1 N/O or N/C contact, bistable
Electr. connection:	connector DIN 43 650
Switch capacity:	max. 40 W / VA max. 230 V _{AC/DC} max. 2 A

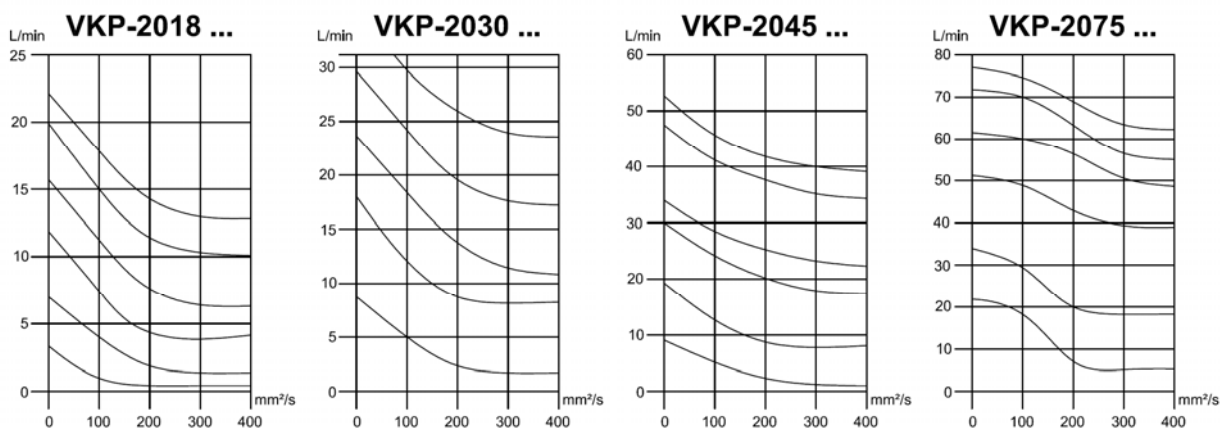
No single value is allowed to be exceeded.

9.1. Viscosity independent

By using a float with a sharp-edged orifice, the VKP series is relatively independent of viscosity.

A perfect viscosity compensation is not possible due to the existing, necessary annular gap between the housing and the float. The VKP scales with an orange nameplate are valid when using a flow medium with a viscosity of 100 cSt.

The resulting flow rates with different viscosity values can be found in the following diagram. If complete viscosity compensation is desired, we recommend our types VKM ... and VKG ...



10. Order Codes

Order Details USA (Example: VKP-5018 N115 R)

Flowmeter with Water Scale			Flowmeter with Oil Scale			Flowmeter for Contaminated Liquids (Particle Size < 400 µm)		
Range Water (GPM)	Press. Drop Max. (PSI)	Model	Range Oil (GPM)	Press. Drop Max. (PSI)	Model	Range Water (GPM)	Press. Drop Max. (PSI)	Model
0.5...5.0	2.76	VKP-4020	0.5...4.5	4.21	VKP-5018	2.0...8.0	3.77	VKP-6032
2.0...9.0	4.42	VKP-4035	0.5...8.0	9.57	VKP-5030	3.0...12	6.09	VKP-6045
2.0...13	6.09	VKP-4050	2.0...12	14.94	VKP-5045	4.0...18	11.46	VKP-6070
3.0...20	13.63	VKP-4080	3.0...20	24.36	VKP-5075	5.0...26	16.68	VKP-6100
5.0...26	15.66	VKP-4100						

Options (Add Suffix to Order Number)

Suffix ..R = Adjustable Switch Contact VKP-4..., VKP-5... only
Suffix ..D = Inverted Flow Direction (e.g. Top to Bottom Flow)
Suffix ..N115 = 1/2" NPT, Male, Brass Union Fittings
Suffix ..FN115 = 1/2" NPT, Female, Brass Union Fittings
Suffix ..N120 = 3/4" NPT, Male, Brass Union Fittings
Suffix ..N215 = 1/2" NPT, Male, SS Union Fittings
Suffix ..FN215 = 1/2" NPT, Female, SS Union Fittings
Suffix ..N220 = 3/4" NPT, Male, SS Union Fittings

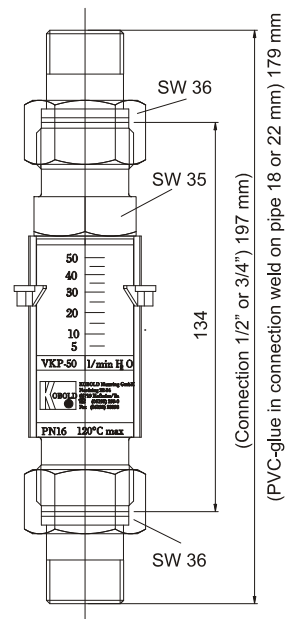
Order Details European (Example: VKP-1020 R25 S)

Standard version			For viscous media			For soiled media (particle size max. 400 µm)			Connection	Contacts (not for VKP-3..)
Water [l/min]	Pressure loss at FS [mbar]	Order no.	Oil at 100 cSt [l/min]	Pressure loss at FS [mbar]	Order no.	Water [l/min]	Pressure loss at FS [mbar]	Order no.		
2-20	190	VKP-1020...	1-18	290	VKP-2018...	7,5-32,5	260	VKP-3032...	..R25.. = G 1 AG (standard)	0 = without S = N/O C = N/C
5-35	305	VKP-1035...	2-30	660	VKP-2030...	10-45	420	VKP-3045...	..N25.. = 1 NPT AG	
5-50	420	VKP-1050...	5-45	1030	VKP-2045...	15-70	790	VKP-3070...	..L18.. = Sold. connection 18 mm	
10-80	940	VKP-1080...	10-75	1680	VKP-2075...	20-200	1150	VKP-3100...	..L22.. = Sold. connection 22 mm	
									..PVC.. = PVC - glue - in c. 20 mm	
									..IG1.. = G 1/2 IG, brass	
									..IG2.. = G 1/2 IG, st. steel	
									..AG1.. = G 1/2 AG, brass	
									..AG2.. = G 1/2 AG, st- steel	
									..AG3.. = G 3/4 AG, brass	
									..AG4.. = G 3/4 AG, st. steel	

11. Maintenance

In case the medium to be measured is free from contamination, VKP devices are almost maintenance-free. If lime or dirt deposits on the housing or inside the interior of device, then device needs to be cleaned on regular basis. By means of a proper fork-wrench, the device may be withdrawn from the piping. Clean the flow meter with a suitable cleaning-agent or use ultrasonic bath.

12. Dimensions



13. Recommended Spare-parts

Only the unit-parts and materials are listed.
Corresponding to the unit-type, parts are available in different sizes.
(while ordering, please mention the unit type).

- 1.1) Flat seal (NBR)
- 1.2) Flat seal (FPM)
- 1.3) Flat seal (Klingerit-Oilit)
- 2.1) Reed-contact (N.O. function)
- 2.2) Reed-contact (N.C. function)
- 3.1) Weld on pipe connection. Ms 18mm
- 3.2) Weld on pipe connection. Ms 22mm
- 3.3) PVC glue in connection. DN15
- 3.4) R $\frac{1}{2}$ brass female thread
- 3.5) R $\frac{1}{2}$ st. st. female thread
- 3.6) R $\frac{1}{2}$ brass male thread
- 3.7) R $\frac{1}{2}$ st. st. male thread
- 3.8) R $\frac{3}{4}$ brass male thread
- 3.9) R $\frac{3}{4}$ st. st. male thread

14. EU Declaration of Conformance

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

Plastic Flow Meter and Monitor, Model: VKP

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

EN 61010-1:2011

Safety requirements for electrical equipment for measurement, control and laboratory use

EN 60529:2014

Degrees of protection provided by enclosures (IP Code)

EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Also, the following EC guidelines are fulfilled:

2014/35/EU

Low Voltage Directive

2011/65/EU

RoHS (category 9)

2015/863/EU

Delegated Directive (RoHS III)



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Hofheim, 8. April 2020