

**Operating Instructions
for
Flow Meter / Monitor
for very Low Flows**

Model: KDF-2../KDG-2...



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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 instruction manuals on our website www.kobold.com are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email (info.de@kobold.com) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

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.

3. 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:

- Flow meter / Monitor model: KDF-2.../KDG-2...

4. Regulation Use

The model KDF serve to measure and monitor liquid flow, models KDG serve to measure and monitor gas flow.

Only clean, low viscosity and homogeneous liquids, which are compatible with the materials of construction, should be measured. Dirt particles may block the float and thus cause erroneous signals and measurements.

Standard Material Combinations

	Material combination stainless steel
Measuring cone	Borosilicate glass
Float	stainless steel 1.4401
Float stop	Hostaflon ET
Valve stem	st. steel 1.4404
Valve seat	PTFE 25% C (carbon fibre)
Gaskets	FPM (standard) FFKM (option).
Fitting (head and base part)	st. steel 1.4404
Hose nozzle	Polyamid

5. Operating Principle

The flow meters and switches for very low flows model KDF and KDG for liquids and air operate on the suspended float principle: that is, the installation position is vertical and the direction of flow is from bottom to top.

The instruments have been designed as simple and thus economical measuring systems. The float is a ball, whereby the indication point is the upper edge of the ball. A needle valve is fitted as standard.

6. Installation

Installation in the Pipeline

- The rotameter flow meter **must be installed vertically** (float measuring system). Direction of flow from bottom to top.
- Clean the pipeline to the device, before connecting, by blowing out or rinsing.
- The connection is made with unions suited for the model. The pipes should be connected to the ports of the measuring instrument, centric and as free of stress as possible. The piping should be supported, if necessary, to prevent the transmission of vibrations to the measuring instrument.

Panel Mounting

- The panel cut-out should be prepared for panel mounting according to the drawing (see section 15. Dimensions).
- Installation in the control panel: Both screws (1) on the front panel of the measuring instrument are loosened a bit, the device is inserted in the panel cut-out from the front, aligned and fixed with both screws (1).

7. Commissioning

- The actual operating pressure and measuring temperature of the plant should not exceed the specified maximum values.
- Ensure material compatibility.
- Close needle valve on flow meter.
- Open shutoff valve upstream and downstream of measuring instrument.
- The pipeline should be carefully vented **for liquids**.
- Allow the operating pressure to increase slowly **for gases**. Avoid sudden bursts (danger of glass breaking).
- Open needle valve and set the desired flow rate.
- Should the operating parameters deviate from the calibration data (flow range, measured medium, pressure, density and temperature), the measuring instrument can be adapted to the actual conditions. Use the conversion of the flow rate according to VDI/VDE guideline 3513.

8. Limit Switches

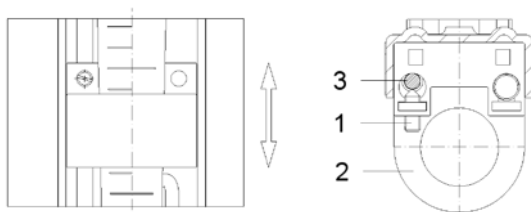
To signal particular flow rates the low volume flow meters can be fitted with limit switches that initiate an electrical signal when the set value is reached. The float in the flow meter must be made of stainless steel. One signal transmitter is required for each limit value.

The following limit switch models are available:

- Bistable annular initiators RC 10-14-N3 or N7R29A (up to KDF-2220 and KDG-2224) and RC 15-14-N3 or N7R31A (from KDF-2225 and KDG-2229) .
Bistable limit switches detect the direction of movement of the float when it passes by. The device can thus determine whether the float is above or below the annular initiator block. Bistable limit switches are delivered with connection box and built-in filter EMC-Y 38132 or EMC-Y38133.
- Monostable annular initiators RC 10-14-NO or N7R28A (up to KDF-2220 and KDG-2224) and RC 15-14-NO or N7R30A (from KDF-2225 and KDG-2229) .
The annular initiator is actuated when the metal float passes the annular initiator (wiper effect). No EMV filter is required for monostable limit monitors.

A transistor relay should be connected on the load side for each switching circuit for operation.

Adjusting the limit switch type RC10/15-14-N0/N3



The limit switch (ring form) can be adjusted alongside of the measuring tube. It is fixed via a screw (1) at a guiding rod (3).

Adjusting of the contact:

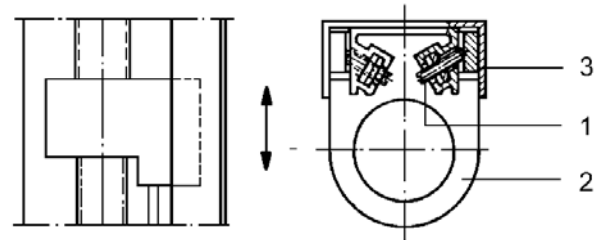
- unscrew the fixing screw (1)
- move contact (2) to bottom or top
- lock fixing screw (1)



ATTENTION: (limited switching range)
For the measuring tubes / glasses N° 40,41,61,64 and 68 the contact cannot be moved to the max. flow range.

Adjusting the limit switch type N7R**A

- The limit switch is adjusted for the desired flow rate by moving it. The limit switch (2) is fixed to the back track (3) of the measuring instrument with the two retaining screws (1).

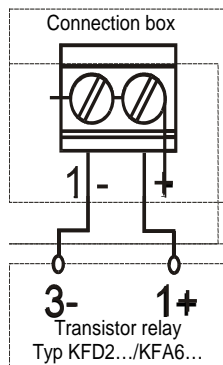


- Please note that limit switches for model numbers KDF-2239 to KDF-2241 and KDG-2257 to KDG-2268 can only be used to approximately 50% of the max. measuring range because of the cone-shaped measuring glasses.
- Replace plexiglass protective cover after adjustment.

9. Electrical Connection

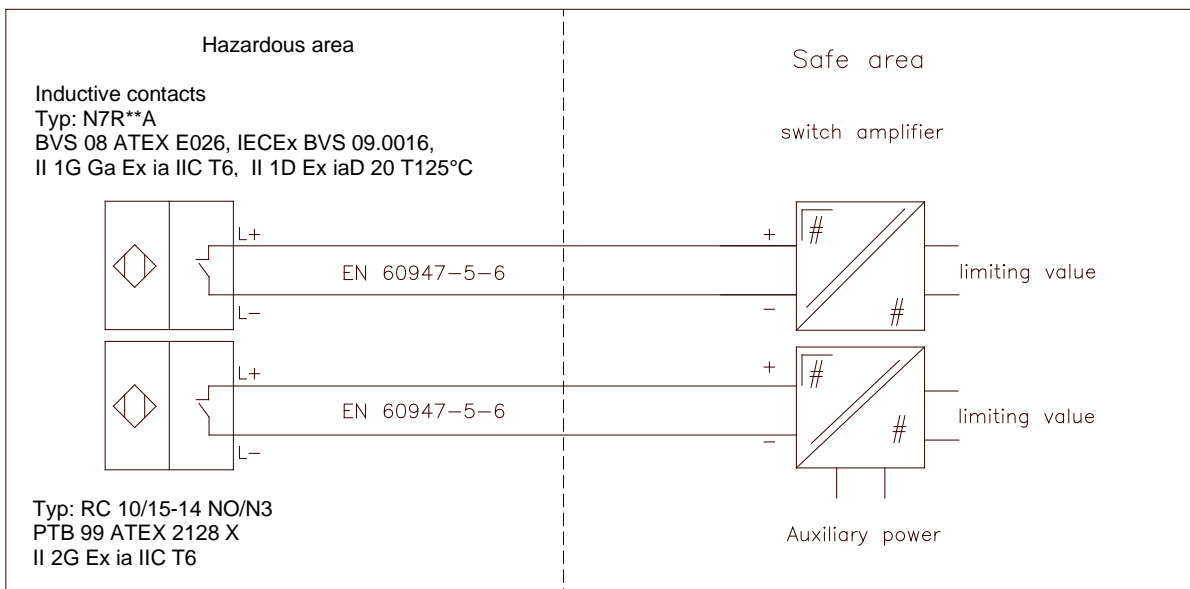
Adjusting the limit switch

- Make sure that the electrical supply lines are not active.
- Connect the supply line to the transistor relay according to the wiring diagram. The wiring diagram shown here is only valid for the transistor relay recommended by us. We cannot provide any details here for connecting the limit switch to a transistor relay from a different manufacturer.
- If the contact has not been adjusted yet, do so at this stage



Connect limit value controller (+) brown cable (-) blue cable with transistor relay for devices without terminal box.

Wiring diagram for 2 limit transducers



When using two switch contacts the distance between both contacts must be minimum 16 mm.

10. Maintenance

Replacing the Measuring Cone'

- Close valve upstream and downstream of device!
- Devices, fitted in a control panel, must be removed. Close device valve!



Attention! The measuring instrument must be pressure free and free from aggressive and caustic media!

If necessary, rinse device thoroughly and neutralise before removal.

- Push plexiglass protective cover upwards and remove to the front.
- Rotate spanner in base of device counter-clockwise to loosen the measuring glass; then remove the glass.
- Install in reverse order. To avoid breaking the glass in the measuring cone when clamping, the measuring glass must be installed centric between the gaskets.

11. Technical Information

Installation position:	vertical, flow from bottom
Accuracy:	$\pm 2,5\%$ q_G 50 (acc. VDI/VDE 3513, Bl.2) $\pm 3\%$ v. ME (inlet pressure regulator) $\pm 5\%$ v. ME (outlet pressure regulator) (10-100% of range)
Max. pressure:	PN 16
Medium temperature:	-20 °C...+100 °C -20 °C ...+70 °C (with contact)
Ambient temperature:	-20 °C...+100 °C -20 °C ...+70 °C (with contact)
Connection:	¼ NPT, G1/4 female hose nozzle for 8 mm hose
Weight:	approx. 0.4 kg approx. 0.8 kg with pressure regulator

Materials (in contact with the media)

Fitting:	stainless steel 1.4404
Measuring tube:	borosilicate glass
Float stop:	Hostaflon ET
Float:	stainless steel 1.4401
Gasket:	FPM, option FFKM
Valve stem:	stainless steel 1.4404
Valve seat:	PTFE 25% C (carbon fibre)
Hose nozzle (option):	Polyamid

12. Pressure losses

Range water L/h	Order No.	Valve seat (mm)	Pressure drop (mbar)	Range air** L/h	Order No.	Valve seat (mm)	Pressure drop (mbar)
0,25 – 2,5	KDF-2217...	1,2	10	0,5 – 5	KDF-2207...	1,2	15
0,5 – 5	KDF-2220...	1,2	20	0,8 – 8	KDF-2209...	1,2	15
1,2 – 12	KDF-2225...	2,8	10	1,6 – 16	KDF-2213...	1,2	15
2,5 – 25	KDF-2228...	2,8	20	4 – 40	KDF-2221...	1,2	20
4 – 40	KDF-2230...	2,8	30	6 – 60	KDF-2224...	1,2	25
6 – 60	KDF-2235...	2,8	80	10 – 100	KDF-2228...	2,8	15
10 – 100	KDF-2239...	2,8	125	25 – 250	KDF-2232...	2,8	15
12 – 120	KDF-2240...	3,4	200	50 – 500	KDF-2237...	2,8	15
16 – 160	KDF-2241...	3,4	200	80 – 800	KDF-2242...	2,8	20
others	KDF-22YY...	on request	on request	100 – 1000	KDF-2246...	2,8	25*
				180 – 1800	KDF-2251...	2,8	80
				240 – 2400	KDF-2257...	2,8	125
				300 – 3000	KDF-2261...	2,8	150
				400 – 4000	KDF-2264...	3,4	200
				500 – 5000	KDF-2268...	3,4	200
				others	KDF-22YY...	on request	on request

13. Order Codes

Liquids. Order Details (Example: KDF-2217 NV 0 M10)

Measuring range water L/h	Order no. stainless steel	Connection	Gasket option	Panel installation kit	Contact option	Miscellaneous options
0,25 – 2,5	KDF-2217...	N = ¼ NPT R ⁴⁾ = G ¼ W = hose connector angular, 90° S = hose connector straight Y = special	V = FPM T = FFKM	0 = without S ⁵⁾ = with	00 = without contact	0 = without E = pressure regulator for variable inlet pressure, FPM-membrane A = pressure regulator for variable outlet pressure, FPM-membrane F = pressure regulator for variable inlet pressure, FFKM-membrane B = pressure regulator for variable outlet pressure, FFKM-membrane Y = e.g. without valve. Please specify in writing.
0,5 – 5	KDF-2220...				Up to model KDF-2220 with 2 m cable M1 =1 monostable contact M2 =2 monostable contacts N1 =1 bistable contact N1 =2 bistable contact	
1,2 – 12	KDF-2225...				with junction box ³⁾ A1 =1 monostable contact A2 =2 monostable contacts B1 =1 bistable contact B2 =2 bistable contacts	
2,5 – 25	KDF-2228...				KDF-2225...KDF-2241	
4 – 40	KDF-2230...				with 2m cable M3 =1 monostable contact M4 =2 monostable contacts N3 =1 bistable contact N4 =2 bistable contact	
6 – 60	KDF-2235...				with junction box ³⁾ A3 =1 monostable contact A4 =2 monostable contacts B3 =1 bistable contact B4 =2 bistable contacts	
10 – 100	KDF-2239... ¹⁾					
12 – 120	KDF-2240... ¹⁾					
16 – 160	KDF-2241... ¹⁾					
other liquids	KDF-22YY...					

¹⁾ The limit switch is only available as a min. contact. ²⁾ At 1.2 bar absolute and 20 °C ³⁾ Not with panel installation kit

⁴⁾ Not with differential pressure controller ⁵⁾ Not with junction box

KDF-2/KDG-2

Measuring range air ²⁾ L/h	Order no. stainless steel	Connection	Gasket option	Panel installation kit	Contact option	Miscellaneous options
0,5 – 5	KDG-2207...	N = ¼ NPT R ⁴⁾ = G ¼ W = hose connector angular, 90° S = hose connector straight Y = special	V = FPM T = FFKM	0 = without S ⁴⁾⁵⁾ = with	00 = without Contact	0 = without
0,8 - 8	KDG-2209...				up to model KDG-2224 with 2 m cable M1 =1 monostable contact M2 =2 monostable contacts N1 =1 bistable contact N1 =2 bistable contact with junction box ³⁾ A1 =1 monostable contact A2 =2 monostable contacts B1 =1 bistable contact B2 =2 bistable contacts KDG-2229...KDG-2268 with 2 m cable M3 =1 monostable contact M4 =2 monostable contacts N3 =1 bistable contact N4 =2 bistable contact with junction box ³⁾ A3 =1 monostable contact A4 =2 monostable contacts B3 =1 bistable contact B4 =2 bistable contacts	E = pressure regulator for variable inlet pressure, FPM-membrane
1,6 – 16	KDG-2213..					A = pressure regulator for variable outlet pressure, FPM-membrane
4 – 40	KDG-2221...					F = pressure regulator for variable inlet pressure, FFKM-membrane
6 – 60	KDG-2124...					B = pressure regulator for variable outlet pressure, FFKM-membrane
10 –100	KDG-2229...					Y = e.g. without valve. Please specify in writing.
25 – 250	KDG-2232...					
50 - 500	KDG-2237...					
80 - 800	KDG-2242...					
100 – 1000	KDG-2246...					
180 – 1800	KDG-2251...					
240 – 2400	KDG-2257... ¹⁾					
300 – 3000	KDG-2261... ¹⁾					
400 – 4000	KDG-2264... ¹⁾					
500 – 5000	KDG-2268... ¹⁾					
other gases	KDG-22YY...					

¹⁾ The limit switch is only available as a min. contact. ²⁾ At 1.2 bar absolute and 20 °C ³⁾ Not with panel installation kit

⁴⁾ Not with differential pressure controller ⁵⁾ Not with junction box

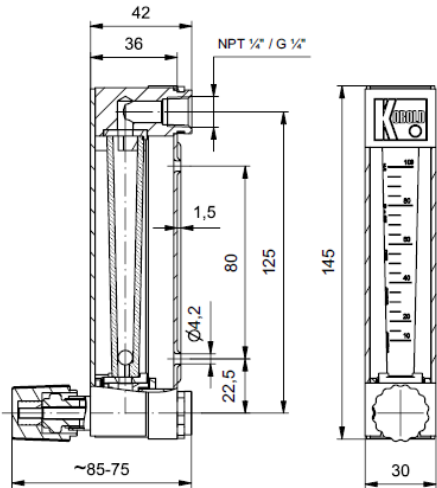
14. Recommended Spare Parts

- 1) Measuring glass (specify measuring range, medium, service conditions)
- 2.1) FPM set of gaskets for measuring glass
- 2.2) FFKM set of gaskets for measuring glass
- 3) Protective cover
- 4.1) Limit switch RC-10-14 NO
- 4.2) Limit switch RC-15-14-NO
- 4.3) Limit switch RC-10-14-N3
- 4.4) Limit switch RC-15-14-N3

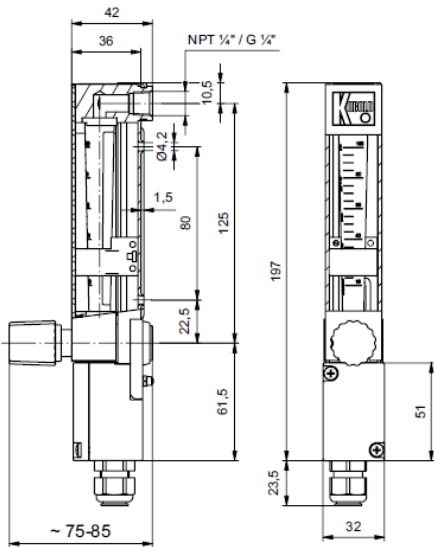
15. Dimensions

Dimensions [mm]

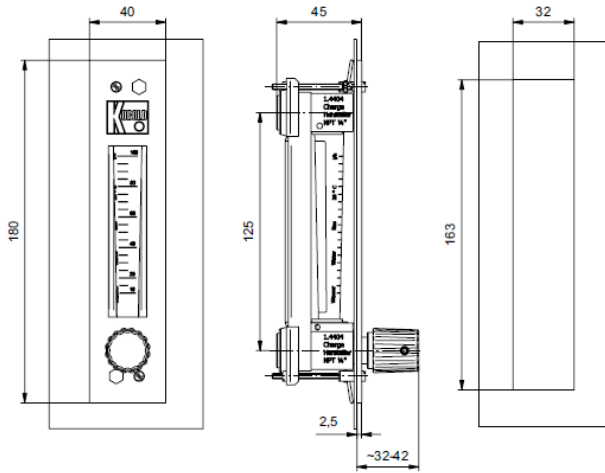
Standard with needle valve



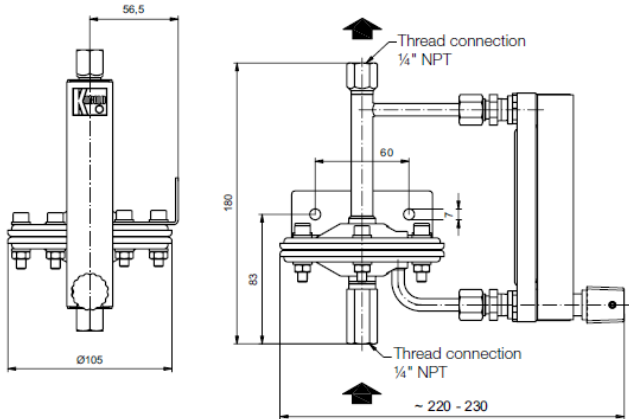
with contacts and junction box



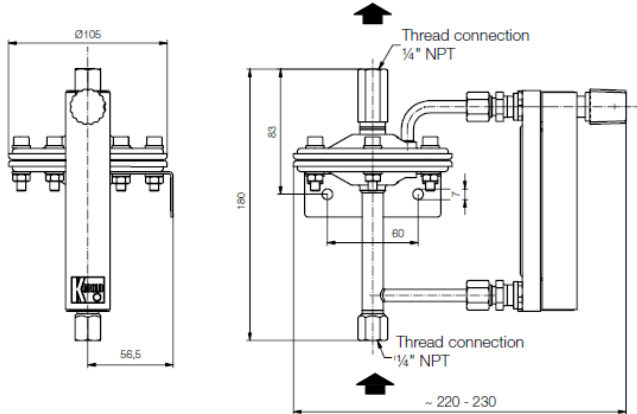
with panel installation kit



with differential pressure controller with constant outlet pressure



with differential pressure controller with constant inlet pressure



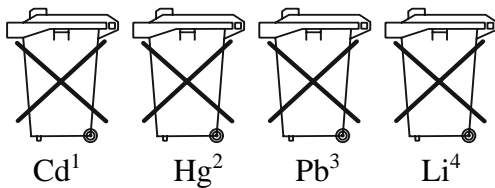
16. Disposal

Note!

- Avoid environmental damage caused by media-contaminated parts
- Dispose of the device and packaging in an environmentally friendly manner
- Comply with applicable national and international disposal regulations and environmental regulations.

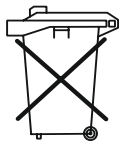
Batteries

Batteries containing pollutants are marked with a sign consisting of a crossed-out garbage can and the chemical symbol (Cd, Hg, Li or Pb) of the heavy metal that is decisive for the classification as containing pollutants:



1. „Cd" stands for cadmium
2. „Hg" stands for mercury
3. „Pb" stands for lead
4. „Li" stands for lithium

Electrical and electronic equipment



17. EU Declaration of Conformance

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

**Flow Meter/ Monitor for very Low Flows Model: KDF-2... / KDG-2...
with Limit Switches Model: RC-10..., RC-15...**

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

EN 61000-6-2:2011

Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

EN 61000-6-3:2012

Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments

EN 55011:2011

Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement

EN 61326-1:2011

Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

EN 50581:2012

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


Also the following EU guidelines are fulfilled:

**2014/30/EU
2011/65/EU**

**EMC Directive
RoHS (category 9)**



H. Peters
General Manager



M. Wenzel
Proxy Holder

Hofheim, Oct. 31, 2018