

Operating Instructions for Flow Monitor

**Model: DF-...Hxx3K
DF-...IHxx3K
DF-...KLxxx
DF-...DLxxx
DF-...ZLxxx**



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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.

PED 2014/68/EU

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

	Pipe	
	Table 8 Group 1 dangerous fluids	Table 9 Group 2 no dangerous fluids
All DF-models except DF-xxG(H)R32 DF-xxG(H)R40	Art. 4, § 3	Art. 4, § 3
DF-xxGR32../DF-xxGR40	not deliverable	Art. 4, § 3
DF-xxHR32../DF-xxHR40..	Kat. II	Art. 4, § 3
DF-xxHF50..	Kat II	Art. 4, § 3

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:

- Sensor housing with mounted connection box or electronics
- Operating Instructions

4. Regulation Use

The units of model DF are used for measurement of liquid flow. Only low viscosity fluids which are chemically compatible with the materials used in the sensor housing are allowed to be measured. If using higher viscosity media, large measuring errors can occur. Long threads can lead to the seizure of the rotor. Likewise, ferritic particles can build up on the rotating vane and lead to faulty operation or destruction of the rotor. If in doubt, please contact the supplier.

Material Combinations

Standard version					High-pressure version	
Material combination	I	II	III	IV ¹⁾	VI ¹⁾	VII ¹⁾
Order code	..A..	..B..	..D..	..E..	..G..	..H..
Connection types	Pipe thread	Pipe thread	Pipe thread	Pipe thread flange	Pipe thread	Pipe thread flange
Case	Trogamide	Polysulfone	Brass nickel-plated	St.steel ⁴⁾	Brass nickel-plated	St.steel ⁴⁾
Cover	Trogamide	Polysulfone	Polysulfone	Polysulfone	Brass nickel-plated	St.steel ⁴⁾
Connection	Brass nickel-plated	St.steel ⁴⁾	Brass nickel-plated	St.steel ⁴⁾	Brass nickel-plated	St.steel ⁴⁾
Locking pins	Brass	Brass	Brass	-	-	-
O-rings	NBR	FPM	NBR	FPM	NBR	FPM
Vane	POM	PTFE	POM	PTFE	POM	PTFE
Axle ³⁾	St.steel ⁴⁾	St.steel ⁴⁾	St.steel ⁴⁾	St.steel ⁴⁾	St.steel ⁴⁾	St.steel ⁴⁾
Bearing ³⁾	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE
Screen	PTFE ²⁾	PTFE ²⁾	PTFE ²⁾	PTFE ²⁾	PTFE ²⁾	PTFE ²⁾
Max. operating pressure	10 bar	10 bar	16 bar	16 bar	100 bar	100 bar flange PN 40
Max. operating temperature	60 °C	80 °C	80 °C	80 °C	80 °C	80 °C

1) Connection cannot be rotated

2) Stainless St. for model DF 0.5

3) Special version upon request

4) Stainless St.1.4571, 1.4404

5. Operating Principle

KOBOLD measuring sensors are available with pipe thread or flange connections; standard or high-pressure versions are optional. The standard version is delivered with a standard front cover from solid, transparent plastic, which allows the flow to be optically inspected. The rotary motion of the shining red vane can be clearly seen. Faults such as power failure or rotor blockage can thus be quickly detected in situ. In addition to their use as measuring and monitoring systems, the devices can also be used as flow indicators.

The standard front cover is replaced by a metal plate on the high-pressure version (up to 100 bar with the threaded version). The devices can be installed in any position. However, the flow must always be in the direction of the arrow, and the front panel of the device must be arranged in the vertical plane. The fluidic housing must be full with liquid. Additional inlet or outlet pipes are not required. The large radial clearance between vane and housing wall renders the measuring sensor insensitive to dirt. Depending on the version, the connection fittings can be rotated and are bearing mounted. Switching electronics or vane front may be rotated at will for ease of viewing (while in service).

The KOBOLD measuring sensors are also available without a compact electronic. The linear flow proportional pulse signal provided by the sensor can be controlled by customer own electronics. The customer is able to integrate the sensor directly into the electronics with the OEM-version (implement EMC-immunity) and can therefore save costs and material.

6. Mechanical Connection

Before installation

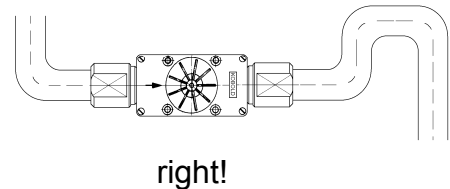
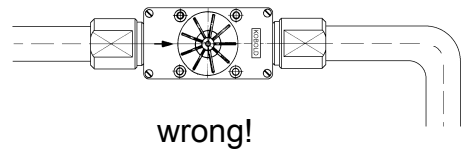
- Please make sure that the actual flow throughput matches the flow range of the instrument. The flow range may be read from the label.



Warning! If the measuring range is exceeded by more than 20%, bearing damage may occur.

- Please make sure that the allowable maximum operating pressure and operating temperature of the instruments are not exceeded.
- Make sure that the electrical supply to the instrument conforms to the equipment operating data (see label).
- Remove all transport packing and make sure that no packing material is left in the instrument.
- The instrument may be installed in any position. However, the flow must always take place in the direction of the arrow, while the front face of the instrument must always be in the vertical plane.

- It must be ensured that the instrument housing is continuously filled with the flow medium, especially for flows from top to bottom. No straight runs are necessary at inlet and outlet.
- Sealing of the connection threads should be carried out with PTFE tape or similar.
- During installation of the instrument, it must be checked that no stress is applied to the connections. We recommend that the inlet and outlet pipes are mechanically fixed approximately 50 mm from each instrument connection.
- When using Material Combination V (PTFE) the instrument connections may not be rotated.
- Check that the connection thread to pipe is fully sealed.



Warning! The threaded connections of the instrument must be tightened with a suitable sized open ended spanner. Otherwise, the housing may be stressed which could lead to breakage of the equipment.

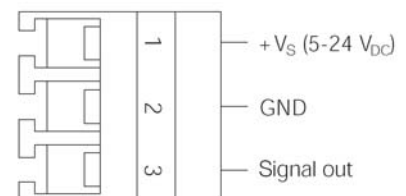
7. Electrical Connection

7.1 DF-...Hxx3K, DF-...IHxx3K



Attention! Make sure that the voltage value of your instrument is between 5 and 24 V_{DC}.

- Make sure that the supply wires are de-energised.
- Connect the 3-pole connection clamp in accordance with the wiring diagram.



Cable Connection

red = +V_S
blue = GND
yellow = Signal out



Attention! Incorrect wiring will lead to damage of the unit's electronics.

7.2 DF-...KLxxx, DF-...ZLxxx, DF-...DLxxx



Attention! Make sure that the voltage value of your instrument is 24 V_{DC}.

- Make sure that the supply wires are de-energised.
- Connect the wires in accordance with the wiring diagram.

Wire number	DF-...KLxxx	DF-...ZLxxx	DF-...DLxxx
1	+24 V _{DC}	+24 V _{DC}	+24 V _{DC}
2	GND	GND	GND
3	4-20 mA	4-20 mA	4-20 mA
4	GND	GND	GND
5	d.c. *)	d.c. *)	Ctrl 1 *)
6	d.c. *)	Reset TM *)	Ctrl 2 *)
7	relay S1 N/O	relay S1 N/O	relay S1 N/O
8	relay S1 COM	relay S1 COM	relay S1 COM
9	relay S2 N/O	relay S2 N/O	relay S2 N/O
10	relay S2 COM	relay S2 COM	relay S2 COM

*) d.c. = Don't connect wire!

Reset TM = Reset part quantity

Ctrl 1 -- GND => Start

Ctrl 2 -- GND => Stop

Ctrl 1 -- Ctrl 2 -- GND => Reset dosage



Attention! Incorrect wiring will lead to damage of the unit's electronics.

8. Mechanical Commissioning

To avoid pressure surges, the flow medium should be slowly introduced into the instrument.



Attention! Pressure surges from solenoid valves, ball valves or similar may result in damage to the instrument (water hammer). In the operating condition it must be checked that the instrument housing is continuously filled with the flow medium.

Large air bubbles in the instrument housing can lead to measuring errors or destruction of the bearings.

9. Operation

DF-...KLxxx

See Operating Instructions ZED-K

DF-...ZLxxx

See Operating Instructions ZED-Z

DF-...DLxxx

See Operating Instructions ZED-D

10. Maintenance

The DF-..HN.. and DF-..HP.. instrument is maintenance-free for measured media without contamination,. Since the paddlewheel contains magnets, any ferritic particles present in the medium may lead to problems. In order to avoid such problems, we recommend the installation of a magnet filter (e.g. the magnet filter, model MF-R). Should cleaning of the instrument become necessary, the housing cover may easily be removed to provide access to the interior. Any work on the electronics may only be undertaken by the supplier; otherwise the warranty will become invalid.

11. Technical Information

Measuring accuracy: 2.5% of f. s.
Medium temperature: -20 to +80 °C (0...60 °C Material Comb.: I)
Protection type: IP 65

Frequency output (OEM) no CE (DF-...IHO3K, DF-...IHP3K)

Power supply: 5-24 V_{DC}
Supply current: approx. 5 mA
Signal amplitude high: approx. power supply
Signal amplitude low: = 0.2 V
Output loss: max. 2.5 mW
Electrical connection: approx. 80 mm cable
Pulse output: NPN, open collector, max. 15 mA, not symmetric

Frequency output (DF-...Hxx3K)

Power supply: 5-24 V_{DC}
Supply current: approx. 5 mA
Signal amplitude high: approx. power supply
Signal amplitude low: = 0.2 V
Output loss: max. 2.5 mW
Electrical connection: PC-connection box with cable connection
Pulse output: NPN or PNP, open collector, max. 15 mA, not symmetric

Special versions: high temperature version, DIN-plug connection

K-Electronics

Display: double-spaced display, illuminated
flow value with selectable units
and bargraph display

Power supply: 24 V_{DC} ±20 %
Current consumption: approx. 100 mA
Electrical connection: 10 wire cable connection
Analogue output: (0)4...20 mA selectable
Load: 0...500 Ω
or 0-10 V_{DC}, Load: >100 kΩ

Switching output: 2 relays, max. 30 V / 2 A
Control elements: via 3 keys
Functions: MIN/MAX memory, flow monitor,
language settings, password protection

Counter-Electronics

Display:	2 x 8-digit LCD module, illuminated, total, part and flow quantity; units of measurement selectable
Quantity meter:	8-digit
Power supply:	24 V _{DC} ±20%
Current consumption:	approx. 100 mA
Electrical connection:	10-pole cable connection
Analogue output:	0(4)...20 mA selectable Load: 0...500 Ω or 0-10 V _{DC} , Load: >100 kΩ
Relay outputs:	2 relays, max. 30 V / 2 A
Control elements:	via 4 keys
Functions:	Reset, MIN/MAX-memory, flow monitor, monitoring of part and total quantities, language

Dosage-Electronics

Display:	2 x 8-digit LCD module, illuminated dosage, total and flow quantity, units of measurement are selectable
Quantity meter:	8-digit
Dosage:	5-digit
Power supply:	24 V _{DC} ±20 %
Current consumption:	approx. 100 mA
Electrical connection:	10-pole cable connection
Analogue output:	0(4)...20 mA selectable Load: 0...500 Ω or 0...10 VDC, Load >100 kΩ
Relay outputs:	2 relays, max. 30 V / 2 A
Control elements:	via 4 keys
Function:	dosage (relay S2), start, stop, reset, fine dosage, correction quantity, flow monitor, total volume monitoring, language

12. Ordering Codes

Flow rate L/min	Model	Material combination (see transducer)	Connection ¹⁾	Connection sizes (see measuring sensor for recommended size)	Electronics	Power supply
0,08...0,5 0,2...1,4 0,2...2,5 0,3...2,6 0,4...5,0 0,25...6,0 0,5...12,0 1,00...12,5 1,00...24,0 2,00...48,0 2,5...60,0 5,00...120 40,0...160	DF-05 DF-14 DF-25 DF-26 DF-50 DF-06 DF-12 DF-13 DF-24 DF-48 DF-60 DF-H2 DF-H6	A = Trogamide/ brass B = PSO/ VA D = Brass E = St. St. G = Brass, 100 bar H = St. St., 100 bar	R = G female N³⁾ = NPT female F²⁾ = Flange DIN 2527, PN 40	06 = G ⅛ 08 = G ¼ 10 = G ⅜ 15 = G ½, DN15 20 = G ¾ 25 = G 1, DN25 32 = G 1¼ 40 = G 1½ 50 = DN50	KLK3 = Digital display, switching and analogue output, 24 V _{DC} 1.5 m cable connection KLL3 = Digital display, switching and analogue output, 24 V _{DC} cable connection (Please specify length in clear text.) ZLK3 = Counter electronic, digital display, 24 V _{DC} , 1.5 m cable connection ZLL3 = Counter electronic, 24 V _{DC} , cable connection (Please specify length in clear text.) DLK3 = Dosing electronics, 24 V _{DC} , 1.5 m cable connection DLL3 = Dosing electronic, 24 V _{DC} , cable connection (Please specify length in clear text.)	4 = (0)4-20 mA 1 = 0-10 V
					Pulse output	Auxiliary power
					IHO = approx. 80 mm cable, NPN, OEM, without calibration certificate IHP = approx. 80 mm cable, NPN, OEM, with calibration certificate HNO = PC-connection box, NPN without calibration certificate HNP = PC-connection box, NPN with calibration certificate HPP = PC-connection box, PNP with calibration certificate	3K = 5...24 V _{DC}

¹⁾ Recommended size, see transducer

²⁾ Flange connection with material combination stainless steel E or H only

³⁾ Not with pulse output

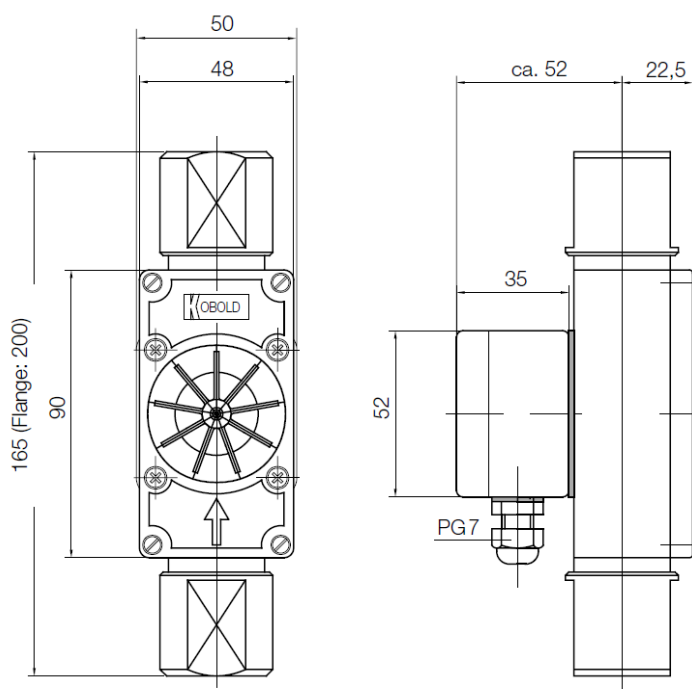
13. Recommended Spare Parts

Rotating vane	1.1) PTFE	1.2) POM	1.3) PTFE with sapphire bearing
Axle / bearing	2.1) St. St./PTFE	2.2) Ceramic/PTFE	2.3) Sapphire/Sapphire (only for 1.3)
Cover for sensor housing	3.1) Trogamide	3.2) Polysulfone	
Cover for electronic housing.	4.1) NBR		
O-rings	5.1) NBR	5.2) FPM	

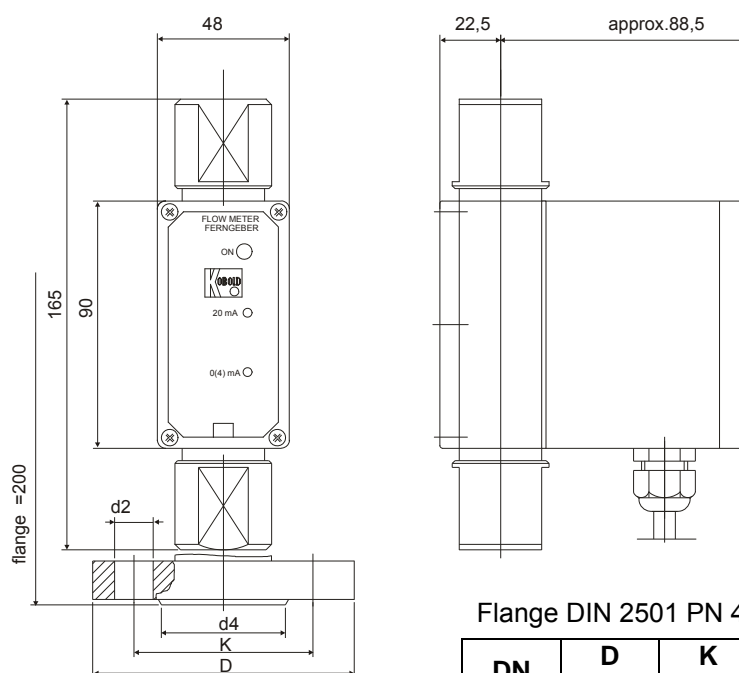
Please specify serial number when ordering spare parts.

14. Dimensions

14.1 DF-...IHx3K, DF-...Hxx3K



14.2 DF-...KLxxx, DF-...ZLxxx, DF-...DLxxx



Flange DIN 2501 PN 40

DN	D [mm]	K [mm]	d4 [mm]	d2 [mm]	Screw quantity
15	95	65	45	14	4
25	115	85	68	14	4
40	150	110	88	18	4
50	165	125	102	18	4

15. EU Declaration of Conformance

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

Flow Transmitter Model: DF-..HN.. and DF-..HP..

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

EN 61000-6-4:2011-09

Electromagnetic compatibility (EMC) - Emission standard for industrial environments

EN 61000-4-2:2009-12

Electromagnetic compatibility (EMC) - Testing and measurement techniques - Electrostatic discharge immunity test - Level 2

EN 61000-4-4:2013-04

Electromagnetic compatibility (EMC) - Testing and measurement techniques - Electrical fast transient/burst immunity test – Level 2

EN 61010-1:2011-07

Safety requirements for electrical equipment for measuring control and laboratory use

Also the following EC guidelines are satisfied:

2014/30/EU Electromagnetic Compatibility

2014/35/EU Low Voltage Directive

2011/65/EU RoHS

2014/68/EU **PED**

Category II, Table 8, pipe, liquids

Group 1 dangerous fluids

Module D, mark CE0098

notified body: Germanischer Lloyd Germany



H. Peters
General Manager



M. Wenzel
Proxy Holder

Hofheim, 17. May 2016

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

Flow Meter	Model: DF-...KLxxx
Flow Counter	Model: DF-...ZLxxx
Dosing Unit	Model: DF-...DLxxx

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

EN 61326:2013-07

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

EN 61010-1:2011-07

Safety requirements for electrical equipment for measuring control and laboratory use – Part 1: General requirements

Also the following EEC guidelines are satisfied:

2014/30/EU Electromagnetic Compability

2014/35/EU Low Voltage Directive

2011/65/EU RoHS

2014/68/EU PED

Category II, Table 8, pipe, liquids

Group 1 dangerous fluids

Module D, mark CE0098

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Hofheim, 17. May 2016



H. Peters
General Manager



M. Wenzel
Proxy Holder