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Instruction manual

DK04

Flap Flowmeter and Switch

Safety Information

General Instructions

The device should only be operated according to the specifications in the instruction manual. The requisite Health & Safety regulations for a given application must also be observed. This also applies to the use of accessories.

Proper Usage

Model DK04 devices are designed to measure and monitor the flow of low-viscosity liquids, which do not attack the device materials. All other usage is regarded as being improper and outside the scope of the device. Any applications in which shock loads (e.g. cyclic mode) occur, should be cleared first with PKP.

The series DK04 devices should not be deployed as the sole agents to prevent dangerous conditions occurring in plant or machinery. Machinery and plant need to be designed so that faulty conditions do not arise that could pose a safety risk for operators.

Qualified Personnel

DR04 devices may only be installed by trained, qualified personnel who are able to mount the devices correctly. Qualified personnel are persons, who are familiar with assembling, installation, placing in service and operating these devices and who are suitably trained and qualified.

General characteristics

- short response time
- high overload security
- measurement range 1:80
- low pressure loss
- compact dimensions

A thin springy orifice that covers the entire flow cross-section is displaced by the flow of the liquid and is pushed to a curved stop. A plastic encapsulated magnet is mounted on the orifice. Its magnetic field is moved by deflection of the orifice. The change of the field is detected by a sensor outside the flow cross-section. Bendable stainless steel orifice with plastic encapsulated magnet The integrated electronics put out analogue standard signals (20 mA, 10 V), switching or frequency signals. Intelligent electronics of the Flex or omni series may be used alternatively. Since the orifice is only bent without rotary bearing, there are almost no friction effects. The movement is therefore nearly free of hysteresis and the measurement respectively the switching value is highly reproducible.

The low mass of the orifice leads to a short response time. The nearly complete coverage of the flow cross-section in the rest position results in a high initial sensitivity. At smallest flow rates the orifice is inevitably deflected. The evaluation of the entire flow cross-section allows unproblematic pipeline routing. Minimum inlet or outlet distances are not necessary.

Due to the form of the stop and the spring properties the orifice withstands even strong water impacts without damage. The small number of wetted parts guarantees low pollution tendency and reliable operation. At the inlet and outlet flanged ports are used which are available in various sizes and materials. By removing the four screws of the flange in case of service the measuring unit is easily removable while the ports remain in the pipeline.

Mounting

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General Instruction:

Use the adapters to fit the sensor in the pipe. Before inserting them make sure that there are no foreign particles like rests of the packaging in the bore. Tighten carefully the adapters to the pipe. You do not need an inlet or outlet pipe section with these flow meters. You should make sure, however, that the flowmeters are always filled with liquid. They may be mounted in any position, however we encourage you to install them so they are easily vented (flow from left to right or from bottom to top).

Caution: air bubbles greatly impact measurements!

For filling processes install the valve downstream of the sensor. Ensure an approach time of approx. 0.5 s and an outlet time of approx. 3 s.

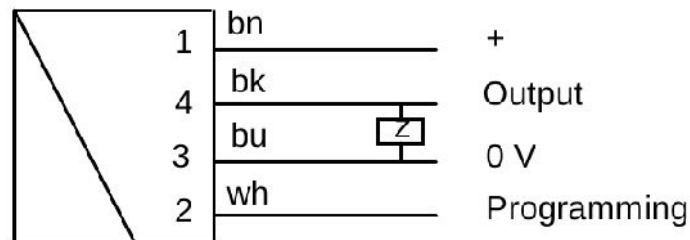
Programming

As a standard only for versions with switching output:

- set desired flow in the system
- Apply pulse of a duration between 0.5 to 2 sec. to pin 2 respectively the white wire of the cable (e.g. by connection to power supply or pulse from PLC)
- > actual flow value will become trip value of the switch

Immediately after the programming the sensor activates the alarm. The alarm is terminated when the flow is changed to a value above the trip value plus hysteresis for a minimum switch or below the trip value minus hysteresis for a maximum switch. After successful programming pin 2 (or the white wire) must be connected to 0 V.

Electrical connection



- 1 or brown: + power supply
- 2 or white: programming
- 3 or blue: ground
- 4 or black: output

Before carrying out the electrical installation, make sure that the supply voltage corresponds to the data provided!

The switching outputs can be connected as NPN or PNP without any hardware or software settings (push-pull-driver).

It is recommended to use shielded cable < 30 m,
supply lines < 10 m

DK04

Flap Flowmeter and Switch for Low Viscosity Media

- **robust design**
- **measuring ranges 0,4...6 l/min
up to 1...100 l/min**
- **output 4-20 mA, 0-10 V,
frequency output or switching output**
- **highly resistant to overload**
- **low pressure loss**
- **all metal version of brass or stainless steel
optional (max. pressure 100 bar)**
- **high temperature version up to 150 °C
optional**



Description:

The DK04 flap type flowmeter consists of a thin flexible flap which covers the complete cross section of the flow. This flap is moved by the liquid changing the position of a magnet. The magnet's position is detected by a Hall-sensor and the attached electronic unit generates a linearised electrical signal proportional to the flow. Due to the flexible flap and a special designed thrust bearing even heavy hydraulic shocks will not damage the device. Because of the small number of wetted parts the DK04 flowmeter assures high reliable operation and it is very insensitive to particles in the flow.

Typical application:

The flowmeters type DK04 are applied to monitor and supervise water or liquids similar to water up to a viscosity of 20 cSt. All applications where a high reproducibility is required the DK04 flowmeters can be applied with success.

Models:

DK04.x.x.1:	voltage output 0–10 V
DK04.x.x.2:	current output 0(4)–20 mA
DK04.x.x.3:	frequency output 10...2000 Hz
DK04.x.x.4:	programmable switch PNP and NPN
DK04.x.x.5:	counting pulse

Electrical Data:

Supply:	10...30 V DC
Connection:	round plug M12 x 1, 4-wire
Prot. class:	IP67

Current -/ and voltage output:

Standby-current:	100 mA
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Frequency output / programmable switch

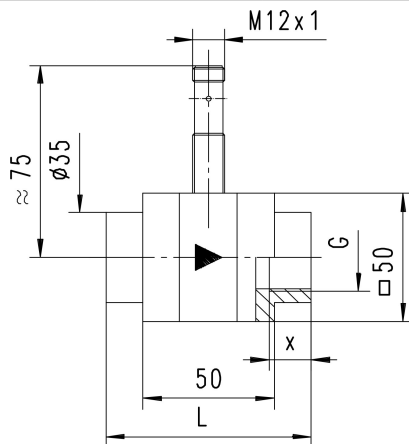
Standby-current:	< 20 mA (without load)
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Order Code Connection Size / Measuring Range:

Measuring range	Connection size				
	DN 8	DN 10	DN 15	DN 20	DN 25
A: 0,4...6,0 l/min	08A	10A	15A	20A	25A
B: 1,0...15 l/min	08B	10B	15B	20B	25B
C: 1,0...25 l/min	/	10C	15C	20C	25C
D: 1,0...50 l/min	/	/	15D	20D	25D
E: 1,0...80 l/min	/	/	/	20E	25E
F: 1,0...100 l/min	/	/	/	/	25F

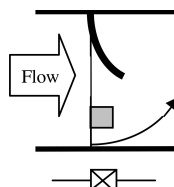
Dimensions and Q_{max} Values:

Connection	Size L [mm]	Size X [mm]	Q _{max} l [min]
G 1/4	74	12	20
G 3/8	74	12	40
G 1/2	78	14	80
G 3/4	82	16	100
G 1	82	18	100



For high temperature version (housing 5+6) electronics and housing are separated by a 30 cm cable

Operating Principle:



Order Code:

Order number: **DK04. 10. A. 1. 0. 0. 0.**

Flap flowmeter and switch for low viscosity media

Process connection*:

08 = DN 8, G 1/4	
10 = DN 10, G 3/8	
15 = DN 15, G 1/2	
20 = DN 20, G 3/4	
25 = DN 25, G 1	*see table on the left

Measuring ranges*:

A = 0,4–6,0 l/min (with PPS-housing only)
B = 1–15 l/min
C = 1–25 l/min (not for process connection 08)
D = 1–50 l/min (not for process connection 08, 10)
E = 1–80 l/min (only for process connection. 20, 25)
F = 1–100 l/min (only for process connection. 25)

Measuring ranges can be changed downwards at the factory

Output:

1 = analogue output 0...10 V
2 = analogue output 4...20 mA
3 = frequency output (please indicate f_{max})
4 = programmable switching output (Push Pull, PNP and NPN) (please indicate switch point)
5 = counting pulse

Electrical connection:

0 = plug (M12x1) 4-wire. without mating connector

Housing version:

0 = housing PPS, connection brass, standard
1 = housing PPS, connection POM
2 = housing PPS, connection stainless steel
3 = housing + connection brass (P _{max.} = 100 bar)
4 = housing + connection st. steel (P _{max.} = 100 bar)
5 = housing + connection brass (P _{max.} = 100 bar, high temperature version up to 150 °C)
6 = housing + connection st. steel (P _{max.} = 100 bar, high temperature version up to 150 °C)

Options:

0 = without
1 = please specify in plain text

Technical Data:

Max. pressure:	16 bar (100 bar for all metal-version, housing 3–6)
Max. media temp.:	70 °C (150 °C for housing 5+6)
Accuracy:	3 % from meas. value, mind. 0,25 l/min
Pressure loss:	max. 0,5 bar at end of measuring range

Materials:

Housing:	PPS (optional brass nickel plated or stainless steel 1.4404)
Connection:	brass nickel plated (optional POM or st. steel 1.4404)
Flap (orifice):	stainless steel 1.4031 k
Magnetic mount:	PPS
Gasket:	FKM
Glue:	epoxy resin

Accessory:

M12 plug connector with PVC-cable
SM12.4 (4-wire)

