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Operating Instructions

DM01

Magnetic inductive flow sensor

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1 General Information

PKP flow sensors are used for continuously measuring and dosing of liquids. The magnetic inductive flow sensor DM01 works without moving parts, is practically free of wear and tear and therefore suitable for a multitude of measuring applications. The output of the sensor is a flow proportional frequency signal.

The exact model number of the flow sensors is comprised of the characters DM01 plus the letter „D“ for the material (Delrin) plus the code for the measuring range.

Please study this instruction manual carefully before installation and adhere to the prescribed sequence of installation steps.

Especially the section „Safety“ in this manual must be adhered to..



2 Safety

The magnetic inductive flow sensors model are designed according to the current state of the art. This holds true for the accuracy, the function as well as for the safe operation of the sensor.

To ensure the safe operation, however, make sure that the sensor is only operated by competent personnel.

- To avoid damage to the flow sensor and the installation, the DM01 flow sensor must only be used for measuring the flow of liquids.
- The installation instructions must be followed exactly..
- Before installation, check whether the materials used in the flow sensor are suitable for your medium.
- To ensure reliable measurement, make sure that the medium has a minimum conductivity of 20 $\mu\text{S}/\text{cm}$.
- The max. operating pressure of the sensor must not be exceeded..
- Never remove a flow sensor from a pipe which is still under pressure.
- Make sure that the max. operating temperatures are not exceeded.
- Protect the flow sensor from electromagnetic fields in the vicinity which may affect the correct operation of the unit.
- Switch off the electrical system before connecting the flow sensor.

Attention: The max. electrical values of the flow sensor must not be exceeded as that may cause damage to the sensor electronic.

Should there be any further problems or questions, please contact your local supplier or:

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3 Material specification of wetted parts

Before installation, check whether the materials used in the flow sensor are suitable for your medium!

Measuring tube and process connection: Delrin®

Electrodes and ground rings: stainless steel 1.4571 (AISI 316 Ti)

4 Suitable media

All liquids with a minimum conductivity of 20 µS/cm are suitable for measurement.

5 Installation

- A. The DM01 may be installed anywhere in a pipe system, however, it is preferred to install the sensor in a straight section of the pipe as bends may affect the flow velocity of the liquid.
- B. The sensor may be installed in horizontal or vertical pipes. In horizontal pipes the sensor should be installed 90° from the standing-up position to ensure that the electrodes are always immersed in the medium. The sensor must only be operated with completely filled pipe systems.
- C. Please observe the flow direction of the unit, which is marked with an arrow on the sensor housing.
- D. To ensure maximum accuracy, make sure that the flow sensor is installed with min. 5 pipe diameters straight pipe run upstream and 2 pipe diameters downstream of the unit.
Example: DM01.D.02.0: The stainless steel measuring tube has a diameter of 8 mm. Therefore the straight pipe run upstream of the sensor must be min. $5 \times 8 = 40$ mm, downstream $2 \times 8 = 16$ mm.
- E. The straight pipe runs as well as the seals must have the same ID as the measuring tube to ensure max. accuracy.

6 Electrical connection

Depending of the version of the internal electronic unit different connection plugs exist, plug connector acc. to DIN 43650 or round plug M12x1. Also the impulse rate varies with different electronic units.!

Via plug connector acc. to DIN 43650, Form A / ISO 4400

- Switch off the electrical system before connecting the sensor.
- Loosen the central screw (pos. 6) M3x35 and remove the plug (pos. 2) from the socket (pos. 1) (fig. 6).
- By means of a screwdriver or a similar suitable tool remove the insert (pos. 8) from the plug (fig. 7).
- Loosen the PG9 cable gland (pos. 5, fig. 8).
- Pull the cable through the cable gland (pos. 5), the pressure ring (pos. 10) and the rubber insert (pos. 9) into the plug and connect the wires acc. To the wiring plan.
- Reassemble the plug (pos. 2).
- Tighten the PG9 cable gland (pos. 5, fig. 10).
- Connect the plug (pos. 2) with the socket (pos. 1) and tighten the central screw (pos. 6) an.

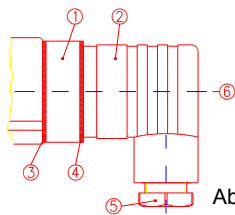


Abb. 6

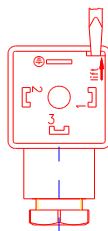


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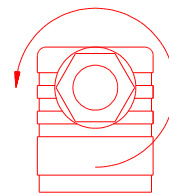


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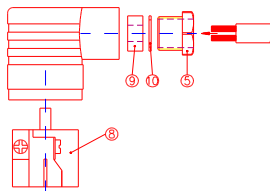


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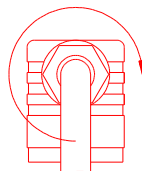


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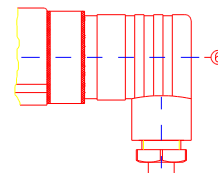


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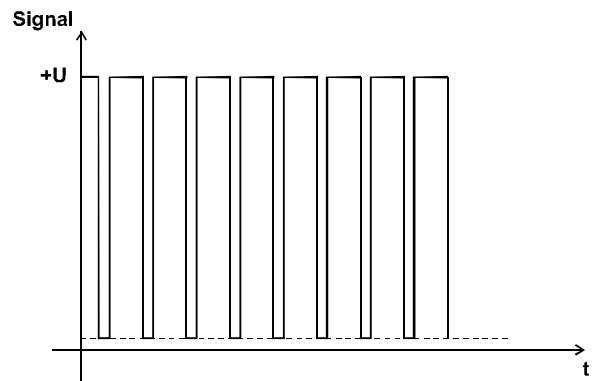
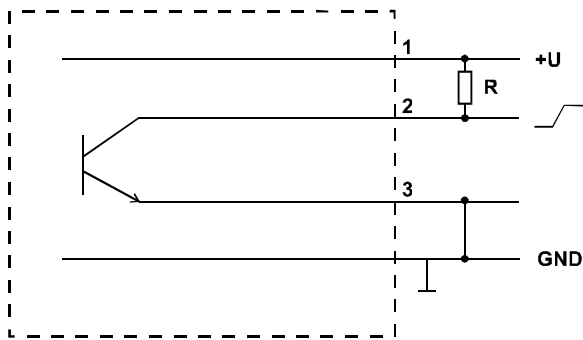
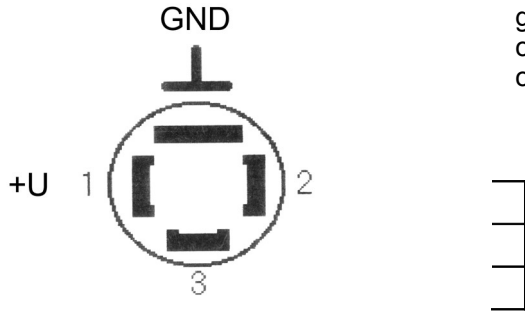
To ensure the electrical protection class IP 65 to EN 60529 the connection cable must have an outer diameter of 4.5 to 7 mm.

Also make sure that the seals in the plug are all installed correctly.

Output signal

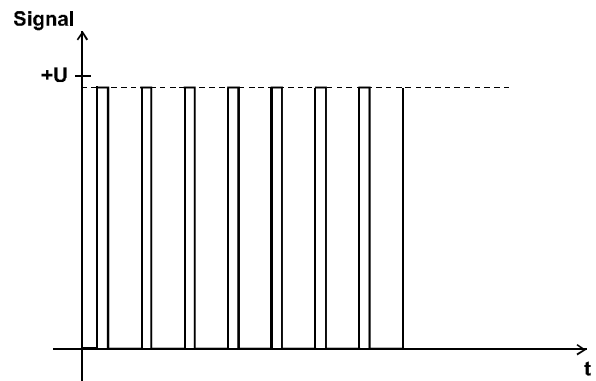
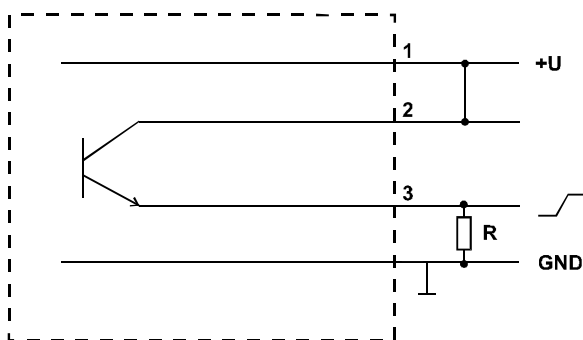
The output signal is a flow proportional frequency in form of a square wave with an amplitude which is nearly as high as the applied voltage.

The output is configured as open collector. There is no galvanic separation between the supplied voltage and the output signal. To different signal forms are possible, depending on the electrical connection.



Signal switching against ground (GND)

Resistor R	between	conn. 1 + 2
Bridge	between	conn. 3 + GND
Supply voltage	between	conn. 1 + GND
Signal output	between	conn. 2 + GND



Signal switching against supply voltage (+U)

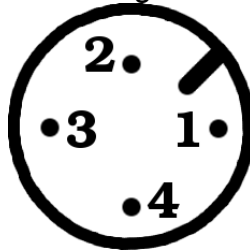
Resistor R	between	conn. 3 + GND
Bridge	between	conn. 1 + 2
Supply voltage	between	conn. 1 + GND
Signal output	between	conn. 3 + GND

2. Connection via round plug M12x1

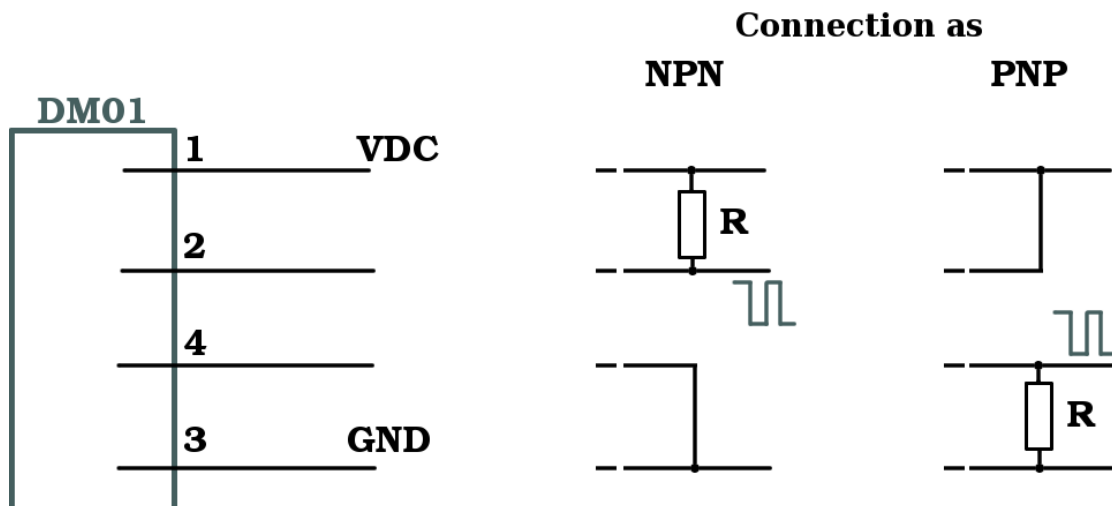
The electrical connection is made by a 4-pin round plug M12x1 on the top cover of the flow sensor. Suitable preconfigured cable with different length are available as accessories from the manufacturer.

Put the cable box of the connection cable onto the round plug of the DM01. Tighten the knurled nut with max. 1Nm. Make electrical connections according to the following schemes.

Pin assignment



Pin	Assignment
1	Power supply + 24 VDC
2	Electronic pulse switch (NPN)
3	0 Volt Ground
4	Electronic pulse switch (PNP)

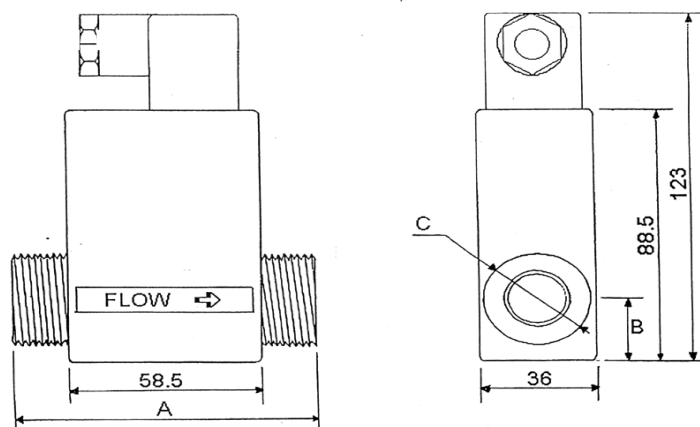


The resistor R should have 1 k Ω in the case of a supply voltage of 12 V and a value of 2,2 k Ω in the case of 24 VDC supply. The thermal power loss must have at least 0,25 W. Please note that a maximum current of 25 mA at the signal outputs should not be exceeded.

7 Technical Data

Model	DM01.D.01	DM01.D.02	DM01.D.03	DM01.D.04	DM01.D.05
Range (l/min)	0,1...5	1...20	2...50	5...100	10...200
K-Factor (pulses / Liter)	1000	800	400	200	100
K-Faktor ROUND PLUG	4000	1000	400	200	100
Accuracy	± 1.5% of measured value				
Max. pressure	6 bar				
Temperature range (medium)	-10 to + 40°C				
Process connection	G½ male thread		G¾ male thread	G1 male thread	
Min. conductivity of mediums	20 µS/cm				
Electrical protection (sensor plug connector installed)	IP 65				
Electrical connection	4 pin plug to DIN 43650 Form A / ISO4400				
Materials					
wetted	Electrodes and ground rings: stainless steel 1.4571 (AISI 316 Ti) Measuring tube and process connection: Delrin®				
Electrical connection					
Supply voltage	12 V DC ±10%* or 24 V DC ±10%*				
Current consumption	max. 50 mA				
Output signal	Square wave signal, open collector (opto-coupled)				
Pulse output	Max. current 50 mA				

8 Dimensions:



Dimension	A	B	∅ Measuring tube	C Process conn.
DM01.D.01	84,5 mm	18,5 mm	8 mm	G½
DM01.D.02	84,5 mm	18,5 mm	8 mm	G½
DM01.D.03	90 mm	20 mm	14 mm	G¾
DM01.D.04	90 mm	22 mm	18 mm	G1
DM01.D.05	90 mm	22 mm	18 mm	G1

Technical specifications may be changed without prior notice