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# **Operating Instructions**

## **DM01**

*Magnetic inductive flow sensor*

# Operating Instructions

## Magnetic inductive flow sensor Model DM01

0	Content	Page
1	General information.....	1
2	Safety .....	2
3	Material specification of wetted parts .....	3
4	Suitable media.....	3
5	Installation .....	3
6	Electrical connectio .....	4
7	Technical data .....	6
8	Dimensions.....	6

### 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.

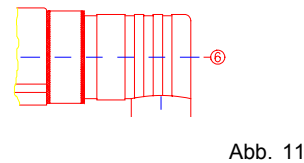
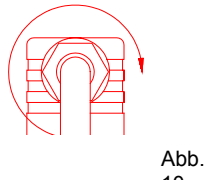
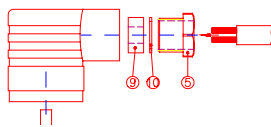
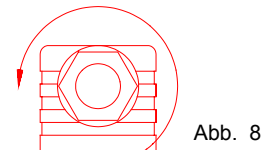
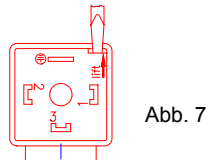
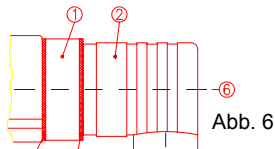
### 5 Installation

- 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

### 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.



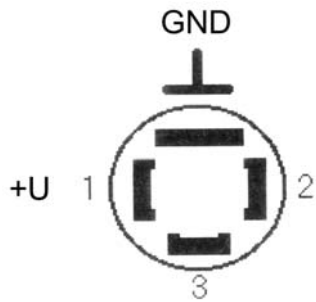
To ensure the electrical protection class IP 65 to EN 60529 the connection cable must have an outer diameter of 4.5 to 7 mm.  
Also make sure that the seals in the plug are all installed correctly.

### 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.

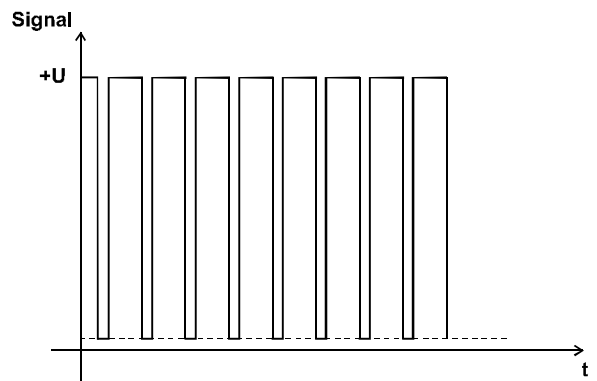
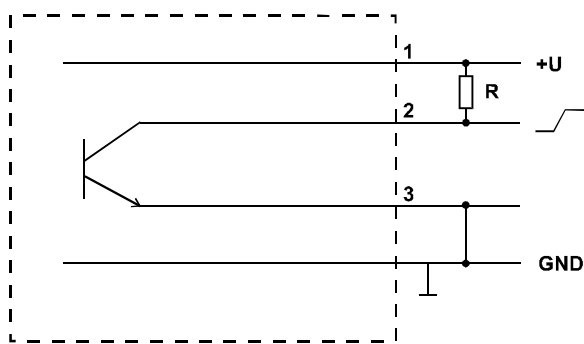
The output is configured as open collector. There is no galvanical separation between the supplied voltage and the output signal.

To different signal forms are possible, depending on the electrical connection.



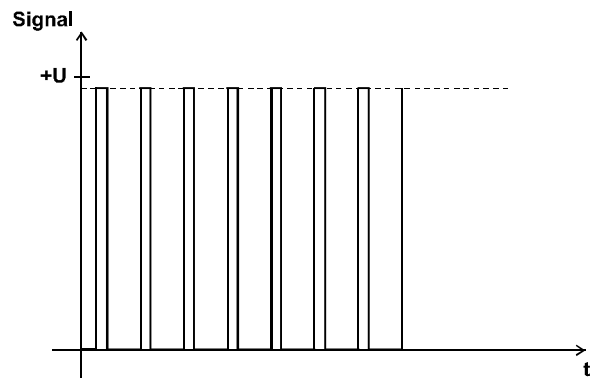
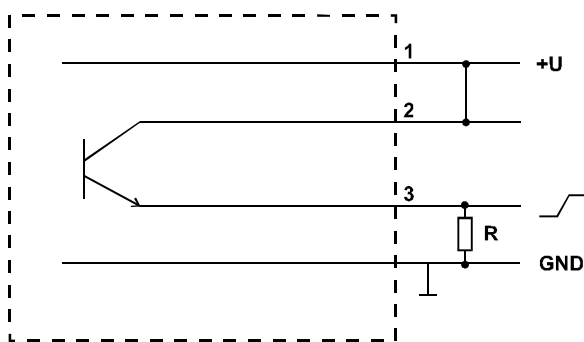
U <sub>cc</sub>	R
12 VDC	1 KΩ
24 VDC	2,2 KΩ

**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)**

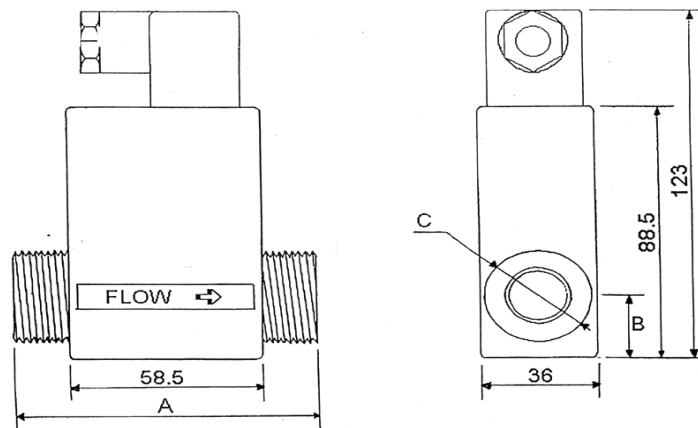


Resistor R	between	conn. 3 + GND
Bridge	between	conn. 1 + 2
Supply voltage	between	conn. 1 + GND
Signal output	between	conn. 3 + GND

## 7 Technical Data

Model	DM01.D.01	DM01.D.02	DM01.D.03	DM01.D.04	DM01.D.05
Range (l/min)	1.0...5	1...20	2...50	5...100	10...200
K-Factor (pulses / Liter)	1000	800	160	160	80
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				
<b>Materials</b>					
wetted	Electrodes and ground rings: stainless steel 1.4571 (AISI 316 Ti) Measuring tube and process connection: Delrin®				
<b>Electrical connection</b>					
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	Ø 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

# DM01

## Compact Magnetic Inductive Flowmeter

- independent of viscosity, density, pressure or temperature of medium
- maintenance free
- practically no pressure drop
- high measurement accuracy
- turndown ration 1:50
- smallest dimensions



### Description

The compact magnetic inductive flowmeter DM01 works without moving parts. It is designed especially for low flow rates and tight mounting conditions. Ranges from 0.1 l/min to 200 l/min are available.

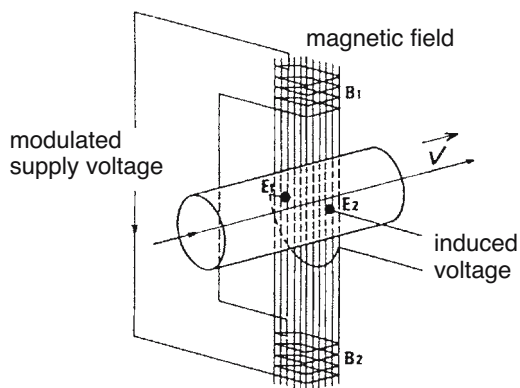
### Advantages

- no moving parts, therefore no maintenance and no wear and tear.
- no parts obstructing the flow in the measuring pipe.
- under normal operating conditions no influence of temperature, viscosity, concentration or pressure changes.
- the high turndown ratio makes the unit universally suitable.
- particles in the medium and viscous or polluted media may be measured without problems.
- the compact design and the low price allows the use for OEM applications.

## Operating principle:

The magnetic inductive flow meter works according to Faradays law of induction. The liquid to be measured (which must be electrically conductive) flows perpendicular to a magnetic field.

This induces a voltage in the liquid. This voltage is picked up by means of two electrodes located in the measuring tube and fed into an electronic which converts it into a flow proportional output frequency.



## Order Code:

Order no. **DM01. 1. D. 01 0**

### Compact Magnetic Inductive Flowmeter

#### power supply:

1 = 24 VDC  
2 = 12 VDC

#### Materials:

D = st. steel / Delrin  
P = st. steel / PVDF

#### Ranges:

01 = 0.1...5 l/min  
02 = 1...20 l/min  
03 = 2...50 l/min  
04 = 5...100 l/min  
05 = 10...200 l/min

#### special version:

0 = without  
1 = please describe

## Versions:

**DM01.D:** wetted parts:  
measuring tube and electrodes:  
st. steel 1.4435  
process connections: Delrin

**DM01.P:** wetted parts:  
measuring tube and electrodes:  
st. steel 1.4435  
process connections: PVDF

## Ranges and Dimensions

measuring range (lpm)	width x height (mm)	diameter of measuring tube (mm)	process connection	K-factor (pulses per litre)
0.1...5	84,5 x 123	8	G 1/2 AG	1000
1...20	84,5 x 123	8	G 1/2 AG	800
2...50	90 x 123	14	G 3/4 AG	160
5...100	90 x 123	18	G 1 AG	160
10...200	90 x 123	18	G 1 AG	80

## technical specifications:

**max. pressure:** 6 bar

**medium temperature:** -10...+40 °C

**wetted parts:** st. steel, Delrin®  
st. steel, PVDF

**max. inaccuracy:** ± 1,5% of actual value  
for range 0.1...5 l/min ± 10%  
to 1l/min, ±1,5% ex 1l/min

**min. conductivity:** 20 µS/cm

**supply voltage:** 24 VDC +/- 10%  
12 VDC +/- 10%

**max. current consumption:** max. 50 mA

**output signal:** flow proportional frequency,  
square wave

**electrical protection:** IP 65

**response time:** 50ms