Instruction Manual

DR56

Plastic Paddle Wheel Flow Meter

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Safety Information

General Instructions

To ensure safe operation, 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 statement also applies to the use of accessories.
Every person who is commissioned with the initiation or operation of this device must have read and understood the operating instructions and in particular the safety instructions!

The liability of the manufacturer expires in the event of damage due to improper use, non-observance of this operating manual, use of insufficiently qualified personnel and unauthorized modification of the device.

Proper Usage

Series DR56 paddle wheel flow meters are designed to meassure continuous flow rates of liquids which do not attack the device materials. All other usage is regarded as being improper and outside the scope of the device.

In particular, applications in which shock loads occur (for example, pulsed operation) should be discussed and checked in advance with our technical staff.

The series DR56 flow meter 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 in such a manner that faulty conditions and malfunctions do not arise that could pose a safety risk for operators.

Dangerous substances

For dangerous media such as e.g. Oxygen, Acetylene, flammable or toxic substances as well as refrigeration systems, compressors, etc. must comply with the relevant regulations beyond the general rules.

Qualified Personnel

The DR56 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.

Inward Monitoring

Please check directly after delivery the device for any transport damages and deficiencies. Additional with reference to the accompanying delivery note the number of parts must be checked.
Claims for replacement or goods which relate to transport damage can only be considered valid if the delivery company is notified without delay.

Installation

The following requirements must be strictly observed, otherwise the flow meter and/or the system may be damaged:

Installation position:

The flow sensor can be installed in any position, but we recommend horizontal installation for best ventilation. If it is installed in vertical pipes, the direction of flow from bottom to top is preferred.

The direction of flow must correspond to the marking on the body.

Process connection:

- A process connector matched to the device must be provided on-site
- Check connector size
- Check screw engagement depth
- Use a suitable sealant (N.B. fluid sealant can damage the flowmeter if it enters the measurement chamber)
- Seal correctly

Ambient conditions:

- Do not use the flowmeter as a load-bearing component in pipe structures.
- The medium must not contain solid particles. Magnetic particles gather on the magnets and impair the function.
- The formation of gas bubbles in the medium, and cavitation must be avoided
- Check the compatibility of corrosion protection and anti-freeze agents before use.
- Durability of the specified materials with regard to the chemicals you use must be guaranteed.

Installation

- External magnetic fields influence the flowmeter. Ensure sufficient distance from magnetic fields (e.g. electric motors).
- Ferro-magnetic tubes, process connectors or supports influence the magnetic field of the flowmeter. Keep a minimum clearance of 100 mm from such materials (e.g. steel).
- Ensure ventilation of the device.
- Cross-section changes, branches or bends in the piping influence the measurement accuracy. Use the following stabilizing sections (extract from DIN 1952) (d = nominal internal pipe diameter)

Electrical connection

Attention: We recommend using only shielded connection cables.

Prior to the electrical connection of the device, it must be ensured that the supply voltage matches that required:

Pulse output: 4,5...24 VDC (Push-Pull)
Analogue output: 15...24 VDC (4...20 mA-Output)
limit relays: 15...24 VDC, 1 x MAX-contact, potential free

The supply voltage must be switched off before the device is electrically connected.

Pin assignment

The 4...20 mA analogue output is a 2-wire circuit, therefore no connection to ground (GND) is required for all connection variants.

1. Cable connection:

white: Power supply

green: Signal (Push Pull or 4...20 mA)

brown: Ground (GND) (only for Push Pull)

2. M12-Plug connection

PIN 1: Power supply

PIN 3: Ground (GND) (only for Push Pull)

PIN 4: Signal (Push Pull or 4...20 mA)

3. Angle plug (EN 175301-803A)

PIN 1: Power supply

PIN 2: Signal (Push Pull or 4...20 mA)

PIN 3: Ground (GND) (only for Push Pull)

Determination of the K-factor

K-Factor for H_2O at 21 °C at continuous flow:

Measuring range [l/min]	**Connection (G or NPT female)**	**Pulse / l (K-factor) (approx.)**
5…250	1“	54
10…400	1 1/4"	32
15…600	1 1/2"	20
20…1000	2"	10

If a medium other than H_2O and/or other temperatures or discontinuous flow is used, then it is necessary to determine the individual K-factor.

Determine the K-factor as follows:

1. Ensure that the flow meter is connected properly.
2. Ensure that sufficient medium is present.
3. Ensure that the system is free of air.
4. Place a sufficiently large, empty measuring beaker under the outlet (recommended measuring period of the K-factor > 60 seconds).
5. Start the measuring process and count the pulses (e.g. using a pulse counter).
6. Stop the measuring process and divide the number of pulses counted by the volume (converted to litres) of the drained medium:

$$\text{K - factor} = \frac{\text{counted\_pulses}}{\text{measured\_quantity\_[liters]}}$$

7. Repeat this process at least three times.
8. Calculate the average value from the results obtained under Point 6 (do not use runaway values).

Maintenance and care

The flowmeters require little maintenance due to the small number of moving parts. A regular function check and maintenance increases the service life and functional safety not only of the device, but also of the whole plant.

The maintenance intervals depend on:

- Contamination of the medium
- Ambient conditions (e.g. vibration)

At least the following points must be inspected during maintenance:

For maintenance please proof at least following items:

- signal output and free movement of paddle wheel:
  Free movement of the paddle wheel and the output of the output signal can be tested by changing the flow and observing the signal (signal change is directly proportion to the flow).
- Leakages in the device

It is the responsibility of the operator to define suitable maintenance intervals depending on the application.

Remarks:
Flushing with clean medium provides sufficient cleaning in most cases. Commercially available cleaning agents can be used in stubborn cases (e.g. lime deposits) insofar as these materials do not attack the materials in the device.

Attention!!!: The guarantee becomes void if the device is opened.

Troubleshooting

No signal output:

1. No flow
   ► Check that medium is flowing
2. Flowless than measurement range
   ► Use flowmeter with different measuring range
3. Incorrectly installed or connected
   ► Install according to Section Installation
4. Paddle wheel or oval wheel pair blocked (dirt)
   ► Clean flowmeter according to Section Maintenance
5. Electronics defective
   ► Remove the cause of the defect (e.g. short-circuit, overload)
   ► Exchange flowmeter
6. Device defective
   ► Send flowmeter to manufacturer for repair or calibration

Measured quantity does not agree with the actual flow:

1. Wrong K-factor
   ► Determination of the K-factor
2. Paddlewheel or oval wheel pair contaminated
   ► Clean flowmeter according to Section Maintenance
3. Device defective
   ► Send flowmeter to manufacturer for repair or calibration

DR56

Plastic Paddle Wheel Flowmeter

- **for liquids**
- **measuring range 20...1000 l/h**
- **process connection G 3/8 male**
- **housing made of POM or ECTFE**
- **independent of position**
- **no inlet and outlet pipe runs needed**
- **max. pressure: 10 bar**
- **max. temperature: 80 °C**

Description:

The plastic paddle wheel flow meter of the DR56 series measure the flow of water and water-like (low viscous) media. They consist of a sensor and an optional transmitter.
The sensor has a paddle wheel which is mounted in a housing made of POM or ECTFE and is rotated by the flowing medium. This rotary motion is picked up by a Hall sensor system and emitted as a flow-proportional frequency signal. A convenient control unit with display is available as an option, which can also be mounted on the flow meter.

Typical applications:

The DR54 impeller flow meters are very resistant to many process media due to their design made of insensitive plastics. Almost all low-viscosity liquids can be measured reliably and cost-effectively with this device.

- cooling circuits
- osmosis plants
- electroplating / photo industry
- agriculture / gardening
- filling plants / washing plants

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Models:

- plastic housing POM
- plastic housing ECTFE

Technical Data:

Measuring range:	20...1000 l/h
Accuracy:	+/- 2,5 % of average value
Repeatability:	+/- 1 %
Serial dispersion:	Max. +/-2 %
Max. process pressure:	10 bar
Max. process temp.:	-10...60 °C (output 4...20 mA or control unit) -10...80 °C (output Push-Pull) (higher on request)
Bearing:	pivot bearing
Power supply:	4,5...24 VDC (Push-Pull) 8...24 VDC (4...20 mA output)
Process connection:	G 3/8 male thread
Paddle wheel:	6 paddles (1 or 3 pulses/turn)
Materials:	
housing:	POM or ECTFE
bearing:	POM, ECTFE, ruby or Al_2O_3
pivot:	stainless steel, sapphire or Al_2O_3
gaskets:	FKM, EPDM, FFKM (Kalrez)
Output signal:	
Push-Pull pulse output:	146 pulses/l at 1 pulses/turn or 438 pulses/l at 3 pulses/turn
analogue output:	4...20 mA (2-wire)
Electrical connection:	PVC cable, free cable ends M12 plug an PVC cable cubic plug acc. to EN 175301-803A
Mounting position:	any, horizontal in direction of arrow, best ventilation
Protection class:	IP65

Order Code:

Order number:	DR56.	P.	1.	A.	1.	A.	F.	P.	1.	0

Plastic turbine flowmeter

Housing material:
P = plastic POM
E = plastic ECTFE

Measuring ranges:
1: 20...1000 l/h

Process connection:
A = G 3/8 male thread

Pulses / number of magnets:
1 = 1 pulses/turn, 146 pulses/l (1 magnet)
3 = 3 pulses/turn, 438 pulses/l (3 magnets)
(increase of pulse frequency on request)

Material bearing / pivot*:
A = housing material (POM or EPDM) / stainless steel
B = ruby / stainless steel
C = ruby / sapphire (can be used only up to 500 l/h)
D = Al_2O_3 / Al_2O_3 (can only be used from 80 l/h)

Gaskets:
F = FKM
E = EPDM
K = FFKM (Kalrez)

Output signal:
P = Push-Pull pulse output
A = 4...20 mA (2-wire)
9 = without (only in combination with control unit AZ50)

Electrical connection:
1 = 1 m PVC cable (3-wire)
2 = 1,9 m PVC cable (3-wire)
3 = 3 m PVC cable (3-wire)
4 = M12 plug an PVC cable 1,9 m
5 = cubic plug acc. to EN 175301-803A
6 = prepared for control unit AZ50

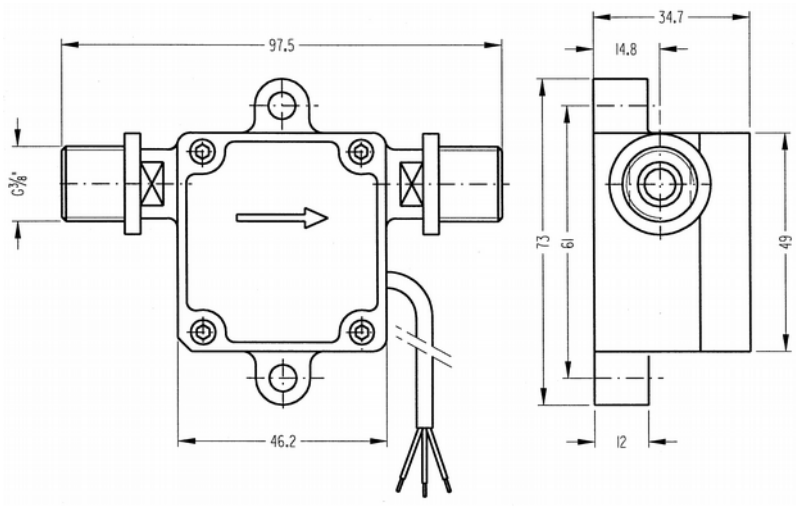
Options:
0 = without
9 = please specify in plain text

***For optimum selection of materials, please specify medium, measuring range, operating pressure and temperature.**

Accessory:

AZ50 control unit with comfortable display, analogue output switching points, etc.

Dimensions:



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