Operating Instruction Flowmonitor DUG

operating on the principle of the float type indicator for liquids

Content

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1. Preface

The flow monitors type DUG are characterized by reliability and simple handling. To use the advantages of the instrument to the full extent, please take notice of the following:

Every person, in charge of commissioning and operation of this instrument, must read and understand the operating instruction and specifically the safety information!

2. Safety hints

2.1. General information

The instructions contained in the operating manual must be followed to ensure a safe operation of the instrument. Furthermore, the additional legal- and safety-regulations for the individual application must be observed. Accordingly, this applies for the use of accessories as well.

2.2. Intended use

The instruments of type DUG serve as monitors for continuous flow of liquids. Any other use counts as improper. If not indicated otherwise, the scaling of the instruments refers to water. Special applications, where intermittent loads (e.g. cyclic operation) could occur, should be discussed and checked with our technical staff.

The instruments of type DUG should not be used as a single source to avoid dangerous situations on machinery and in plants.

Machinery and plants must be constructed so that faulty conditions do not lead to dangerous situations for the operator.

2.3. Qualified personnel

The instruments of type DUG must only be installed by qualified personnel, who are capable of using these instruments in a professional manner. Qualified personnel are such persons, who are familiar with the installation, assembly, commissioning and operation of these instruments and who hold a corresponding qualification for this function.

Operating Instruction Flowmonitor DUG

operating on the principle of the float type indicator for liquids

3. Principle of operation

Instruments of type DUG operate on the principle of the float type flow indicator. Through the flowing medium a float is set in motion, whose integrated magnets create a magnetic field. The position of the float is detected with the switch contact. The float is reset to the starting point by means of a spring, which allows the installation at any position in a system. The instruments are calibrated for the installation with flow from bottom to top. The weight of the float induces the measuring result, therefore a different mounting position will show discrepancies to the actual flow.

4. Installation

4.1. Process connection

Attention! To avoid damage of the flow monitor or the installation the following requirements must be fulfilled under any circumstances:

- Suitable process connection to be provided by the customer
- Connection size needs to be checked
- Thread depth needs to be checked
- Suitable sealing material to be used (liquid sealing material will damage the flow monitor if it gets inside)
- Professional sealing necessary

4.2. Environmental conditions

- The flow monitor must not be used as a supporting part in a pipe construction.
- The medium must not contain any solid particles. Magnetic particles will accumulate at the magnetic float and effect the function.
- Before application of anti-freeze and anti-corrosive agents check their compatibility.

Warning! The following requirements must be adhered to, otherwise the function of the flow meter will be affected or the measuring results will be falsified:

- External magnetic fields will influence the switch contact. Keep sufficient distance to magnetic fields (e.g. electric motors).
- Piping, process connections or supports made from ferromagnetic material influence the magnetic field of the flow monitor. Keep a distance of 100mm to those materials (e.g. steel).
- The accuracy is influenced by cross-section changes, branches or elbows in the piping. Provide a straightening section of 10x DN upstream and 5x DN downstream of the instrument. Never reduce the pipe diameter direct ahead of the instrument!
- With liquids take suitable steps for the de-aeration of the instrument.

Operating Instruction Flowmonitor DUG

operating on the principle of the float type indicator for liquids

5 Electrical connection

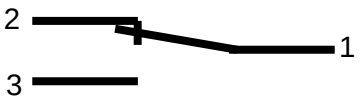
The switch contacts are potential-free and do not need any power supply.

Attention! Switch contact and unit are matched. After replacing a switch contact a readjustment must be made. Please request the corresponding assembly instructions!

Switch position under No flow condition:

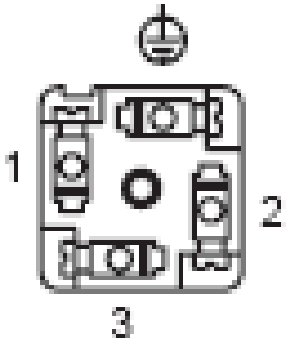
Connection: normally open

Connection: change-over



5.1. Standard switch contact

Pin-allocation of the supplied socket (DIN 43650 Form A or C). The Ground-pin is not used.



Important instruction:
When using the socket DIN 43650, the ingress protection IP65 is only warranted in connection with a suitable cable diameter.
For information please refer to page 10.

5.2. Switch contact with cable

The individual cores of the cable are marked according to the above connection diagram.

5.3. Special design

On request special designed switch contacts (socket, ready-made cable) can be supplied.

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Operating Instruction Flowmonitor DUG

operating on the principle of the float type indicator for liquids

5.4. EEx-proof switch contacts

Attention!
For the connection of Eex-proof switch units special instructions apply, which must be followed! Pay attention to the hints in the separate operation instruction for Eex-proof switch contacts!

5.5. Contact precaution

Attention!
The following requirements must be adhered to under any circumstances, otherwise the switch contact will be destroyed!
The reed contacts employed in the switch contacts are, due to their construction, very sensitive against overload. None of the values of voltage, current and wattage may exceed/overshoot (not even for a fractional moment).
The danger of overloads exists by means of:

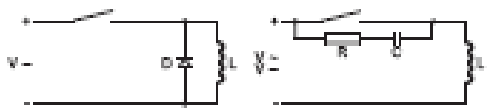
- Inductive loads
- Capacitive loads
- Resistive loads

Inductive load
The kind of load will be caused by:

- Contactors, relays
- Solenoid valves
- Electric motors

Danger:
Voltage peaks during switch off (up to 10 times of the nominal voltage)

Precautionary measure (examples):



Capacitive load
This kind of load will be caused by:

- Extreme long connection cables
- Capacitive consumption

Danger:
High current peaks when turning on the switch contact (exceeding the nominal current)

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Operating Instruction Flowmonitor DUG

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Precautionary measure (example):

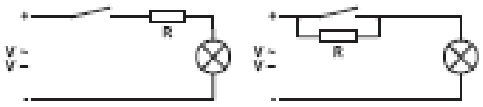
Limiting the current by means of a resistor

Resistive load

This kind of load will be caused by:
- Incandescent bulbs
- Motor start up

Danger: High current peaks when turning on the switch contact, as the glow filament has a lower resistance at low temperatures.

Precautionary measure (examples):



Limiting the current by means of a resistor or heating of the glow filament.

Connection to SPS
For the connection to high resistance devices (like SPS) a protection circuit is not necessary..

6. Switch point adjustment

- Loosen the lock screw of the switch contact and shift the switch contact up to the stopper against the direction of the flow. The switch contact should be closed.
- Adjust the desired flow rate. In case the flow monitor is not installed, use a non-magnetic rod (e.g. pencil) to shift the float in flow direction to achieve a congruence with the graduation of the desired flow rate on the scale (upper edge of float = reference point).
- Shift the switch contact in flow direction until the contact opens.
- Tighten the lock screw of the switch contact.

Operating Instruction Flowmonitor DUG

operating on the principle of the float type indicator for liquids

Notes

- The adjusted switch point corresponds to the switch off point of the switch contact with decreasing flow.
- The actual switch position can be determined by a continuity tester.
- The above description of the adjustment refers to the normally open contact.

7. Maintenance

Due to the few movable parts, the instruments do not require much service. A functional check and service on a regular base will not only increase the life time and reliability of the instrument, but also that of the entire plant.

The service intervals depend on

- The pollution of the media
- Environmental conditions (e.g. vibrations)

During maintenance at least the following points should be checked:

- Operation of the switch contact
- Leakage test of the instrument
- Free movement of the flow

Depending on the application, it is up to the operator to determine the appropriate maintenance intervals.

Notes

- The free movement of the float and the operation of the switching contact can be checked by varying the flow rate and observing the state of the switching contact.
- In most cases purification can be achieved by flushing the instrument with clean media. In obstinate cases (e.g. calcareous deposits) cleaning of the instrument can be done with commercial cleaners, provided that these do not attack the materials of the device.

Operating Instruction Flowmonitor DUG

operating on the principle of the float type indicator for liquids

8. Troubleshooting guide

The switch contact does not react:

- The switch contact is permanent in idle position.
  1. No flow
     - ▶ Verify, that medium flows
  2. Flow too low or switch contact adjusted too high
     - ▶ Adjust switch point to a lower point.
     - ▶ Use instrument with different measuring range.
  3. Incorrect reduced (pipe diameter too small)
     - ▶ Reduce according to section 4
  4. Float got stuck (polluted)
     - ▶ Clean the instrument and ensure free movement of the float.
  5. Switch contact faulty
     - ▶ Eliminate the reason for the fault (short circuit, overload)
     - ▶ Replace switch contact, refer to section 5

- The switch contact is permanent in position.
  1. Flow too high and switch contact adjusted too low
     - ▶ Reduce flow
     - ▶ Adjust switch contact to a higher flow
  2. Float got stuck (polluted)
     - ▶ Clean the instrument and ensure free movement of the float
  3. Switch contact faulty
     - ▶ Eliminate the reason for the fault (short circuit, overload)
     - ▶ Replace switch contact, refer to section 5

- Switch point does not coincide with actual flow.
  1. No media-specific scale
     - ▶ Request a correction table or media-specific scale
  2. Incorrect reduced
     - ▶ Reduce according to section 4
  3. Instrument polluted
     - ▶ Clean the instrument
  4. Device defect
     - ▶ Return instrument for repair and calibration to manufacturer.

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9. Specifications

Operating data	**DUG**	
Pressure	PN 10 bar	
Pressure drop	0,02 – 0,5 bar	
Temperature max.	100°C	
Accuracy	±5% of final value	
Electrical data	SPST N.O.	SPDT
IP65 (Plug connection DIN43650 Form A or C)	Max. 250V • 3A • 100VA	Max. 250V • 1,5A • 50VA (1)
IP67 (with 1m sealed in cable)		
Ⓔx Atex II 2G EEx m II T6 max. 80°C (2m sealed in cable IP67)	Max. 250V • 2A • 60VA	Max. 250V • 1A • 30VA
EEx m II T6 max. 80°C	Max. 250V • 2A • 60VA	Max. 250V • 1A • 30VA
Output signal	The contact switches off, id minimum flow is below setpoint.	
Power supply	Not necessary (reed contacts)	
Cable diameter for IP65	6 – 8 mm	
Grade of pollution	2 (EN 61058-1)	
Other plug types or cable lengths on request.		
Materials	**Brass**	**Stainless steel**
Wetted parts	brass	1.4571
Spring (wetted parts)	1.4571	
Glass (wetted parts)	Duran 50	
Seals	NBR (other on request)	Viton (other on request)
Housing (not wetted parts)	aluminum	

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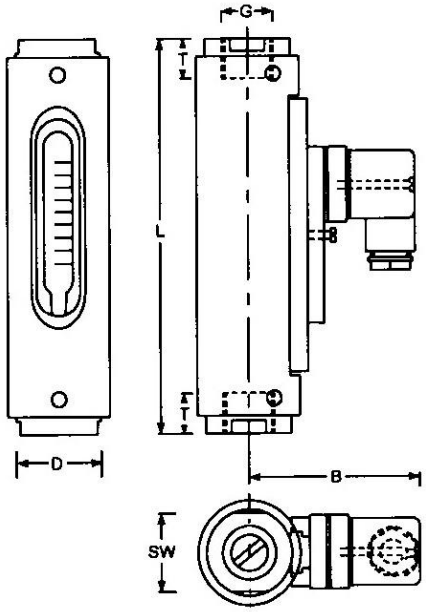

	SW	D	B	G	DN	T	L
DUG- 4-14	32	42	67	¼” ½”	8 15	14 15	132 135
DUG- 28	32	42	67	½”	15	15	135
DUG- 45	32	42	67	¾”	20	18	167
DUG- 80-90	41	50	75	¾” 1”	20 25	18 19	164 184
DUG- 110	41	50	75	1”	25	19	184
DUG- 150	50	55	77	1¼”	32	21	222
DUG- 220	55	60	80	1¼”	32	21	210
DUG- 250	50	55	77	1¼”	32	21	222

Overall dimensions mm