



## Operating Instruction

### Flow meter / flow monitor RVO/U-L

Flow meter / flow monitor according to the float principle for monitoring gases

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#### 1. Introduction

The flow monitors of the RVO / U-L series are characterized by their reliable function and easy operation. To take full advantage of this device, please note the following:

Every person who has been commissioned with the commissioning or operation of this device must have read and understood the operating instructions and in particular the safety instructions!

#### 2. Safety instructions

##### 2.1. General information

To ensure safe operation, the device may only be operated in accordance with the instructions in the operating instructions. During use, the legal and safety regulations required for the respective application must be observed in addition. This also applies to the use of accessories.

##### 2.2. Intended Use

The RVO / U-L series devices are designed to monitor the continuous flow of gaseous media. Any other use is considered improper use. Unless otherwise indicated, the scales of the devices refer to air. In particular, applications in which shock loads occur (for example, pulsed operation) should be discussed and reviewed in advance with our technical staff.

Every time you start up, it is important to keep the shut-off valves open only slowly to avoid pressure surges that can damage the unit. In general, rapid changes in operating conditions (pressure, temperature, flow) must be avoided.

The RVO / U-L series devices must not be used as the sole means of averting dangerous conditions on machinery and equipment. Machines and systems must be designed so that faulty conditions can not lead to a dangerous situation for the operating personnel.

##### 2.3. Qualified personnel

The devices of the RVO / U-L series may only be installed by qualified personnel who are able to use the devices professionally. Qualified personnel are persons who are familiar with the installation, assembly, commissioning and operation of these devices and who have the appropriate qualifications for their job.



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### 3. Functional description

The devices of the series RVO / U-L operate on the principle of the variable area flowmeter. Due to the flow of the medium, a float is moved whose integrated magnets generate a magnetic field. The position of the float is determined by the switching contact. The float is returned to its original position by a spring. As a result, the installation position is arbitrary. The units are calibrated for installation with flow from bottom to top. Since the weight of the float influences the measurement result, deviations occur in other mounting positions.

### 4. Assembly

#### 4.1. process connection

Attention ! The following requirements must be strictly adhered to, otherwise the flow switch or the system will be damaged.

- On-site, a process connection suitable for the device must be available
- Check connection size
- Check screw-in depth
- Use suitable sealants (liquid sealants will damage the flow switch when they enter)
- Seal properly

#### 4.2. Environmental conditions

- The flow switch must not be used as a supporting part in pipe constructions.
- The medium must not carry any solid bodies with it. Magnetic particles accumulate on the magnetic float and impair its function.
- Check corrosion and antifreeze for compatibility before use.
- External magnetic fields affect the switching contact. Keep sufficient distance to magnetic fields (such as electric motors).
- Pipes, process connections or holders made of ferromagnetic material influence the magnetic field of the flow monitor. To such materials (for example steel) keep a distance of 100mm.
- Changes in the cross section, branches or bends in the piping influence the measuring accuracy. Provide a calming section of 10 x DN in front of the device, 5 x DN behind the device. Never reduce the pipe diameter directly in front of the device!
- In the case of liquid media, ensure that the device is vented by suitable measures!

Warning! The following requirements must be met, otherwise the function of the flow switch will be impaired or measurement results will be falsified.

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#### 5. Electrical connection

The switching contacts used in the devices are potential-free and require no power supply.

Attention! Switch contact and device are coordinated. After replacing a switching contact, it must be readjusted. Please request the corresponding assembly instructions!

Condition of contact on device without flow :

##### Wiring diagram normally open

DIN 43650

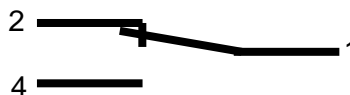
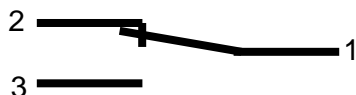
M 12x1



##### Wiring diagram change over

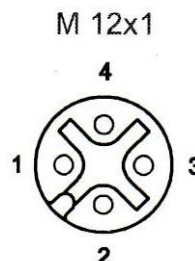
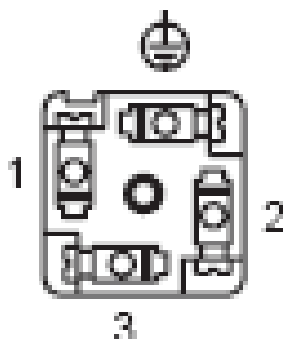
DIN 43650

M 12x1



#### 5.1. Standard switching contact

Connection diagram of the supplied socket (DIN 43650 Form A or C). The earth connection is not used.



##### Important NOTE:

The degree of protection IP65 when using the socket DIN 43650 is only guaranteed in combination with suitable cable diameters.

See page 9 for more information.



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#### 5.2. Switch contact with cable

The wires of the connection cable are numbered according to the connection diagram (page 4).

#### 5.3. special types

Switching contacts in special designs (plug, pre-assembled cable) are available on request.

#### 5.4. EEx approved switch contacts

Attention!

For the connection of EEx-tested switching units special regulations apply, which must be adhered to! Observe the notes in the separate operating instructions for EEx-tested switching contacts!

#### 5.5. Contact Precautions

Attention! The following requirements must be strictly adhered to, otherwise the switching contact will be destroyed!

The reed contacts used in the switch contacts are very sensitive to overload due to the design. None of the voltage, current or power values may be exceeded (not even for a short time).

There is a danger of overloading due to:

- Inductive loads
- Capacitive loads
- Ohmic loads

Inductive load

The form of loading is caused e.g. by

- Sagittarius, relays
- solenoid valves
- electric motors

Danger: voltage peaks when switching off (up to 10 times the rated voltage)

Protective measures: (examples)



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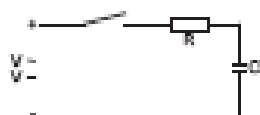
#### Capacitive load

This form of loading is caused e.g. by:

- Long connecting cables
- Capacitive consumers

**Danger:** High current peaks when the switching contact is switched on (exceeding the rated current)

#### Protective measure: (example)



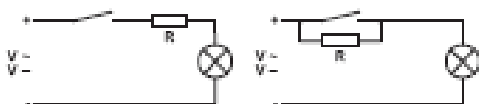
Limiting the current through a resistor

#### Ohmic load

- This form of loading is caused e.g. by
- lightbulbs
- Starting engines

**Danger:** High current peaks when switching on the switching contact, because the filament has a lower resistance at low temperatures.

#### Protective measure: (examples)



Limiting the current through a resistor or heating the filament

#### Connection to PLC

A protective circuit is not necessary for connection to high-impedance consumers (eg PLC).



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#### 6. Setting the switching point

- Release the locking screw of the switch contact and move the switch contact against the flow direction until it stops. The switch contact should now be closed.
- Specify the desired flow. If the flow switch is not installed, use a non-magnetic rod (such as a pencil) to align the float with the desired flow on the scale (upper edge of the float = reading edge).
- Move the switch contact in the flow direction until the contact opens.
- Tighten the locking screw of the switch contact.

#### Hints

- The set switching point corresponds to the switch-off point of the switching contact with falling flow.
- The current state of the switch contact may be e.g. be determined with a continuity tester.
- The states of the switching contact refer to the NO contact (N.O.).

#### 7. Maintenance and care

Due to the small number of moving parts, the devices are very low maintenance.

However, regular function checks and maintenance not only increase the service life and functional reliability of the device, but also the entire system.

The maintenance intervals depend on

- Pollution of the medium
- Environmental conditions (e.g., vibrations)

During maintenance at least the following points must be checked:

- Function of the switch contact
- Tightness of the device
- Mobility of the float

It is up to the operator, depending on the application, to define suitable maintenance intervals.

#### Hints

- The movement of the float and the function of the switch contact can be checked by changing the flow and monitoring the switching state of the switch contact.
- For cleaning, flushing with clean medium is sufficient in most cases. In persistent cases (such as limescale), it may be cleaned with commercially available cleaners, provided they do not attack the materials of the equipment.



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#### 8. Notes for troubleshooting

The switching contact does not switch.

- The switch contact is constantly at rest.
  1. No flow
    - ▶ Check if media is actually flowing.
  2. Flow too low or switching contact set too high
    - ▶ Set the switch contact to lower flow.
    - ▶ Use a device with a different measuring range.
  3. Wrong reduced (too small cable cross-section)
    - ▶ Reduce according to section 4
  4. Float stuck (pollution)
    - ▶ Clean the device and make the float practicable.
  5. Switch contact defective
    - ▶ Eliminate the cause of the defect (short circuit, overload)
    - ▶ Replace the switching contact, s. point 5
- The switching contact is constantly switched.
  1. Flow too high or switching contact too low
    - ▶ Reduce the flow
    - ▶ Set the switching contact to a higher flow
  2. Float stuck (pollution)
    - ▶ Clean the device and make the float practicable
  3. Switch contact defective
    - ▶ Eliminate the cause of the defect (short circuit, overload)
    - ▶ Replace the switching contact, s. point 5
- The switching point does not match the actual flow.
  1. No media-specific scale
    - ▶ Request a conversion table or a media-specific scale
  2. Wrong reduced
    - ▶ Reduce according to section 4
  3. Device dirty
    - ▶ Clean the device
  4. Device defective
    - ▶ Return the instrument for repair / calibration






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## 9. Specifications

Operating data	RVO/U-L-1		RVO/U-L-2		RVO/U-L-4	
Operating pressure	PN 10 bar		PN 16 bar		PN 16 bar	
Pressure drop	0,02 – 0,4 bar		0,02 – 0,3 bar		0,02 – 0,2 bar	
Temperature max.	100°C (optional 160°C)					
Measurement accuracy	±10% of final value					
Electrical data	NOC	COC	NOC	COC	NOC	COC
IP65 (connector DIN43650 Form A oder C)	Max. 250V • 3A	Max. 250V • 1,5A	Max. 230V • 3A	Max. 250V • 1,5A	Max. 200V • 1A	Max. 200V • 1A
IP67 (1m molded cable)	• 100VA	• 50VA <sup>(1)</sup>	• 60VA	• 50VA <sup>(1)</sup>	• 20VA	• 20VA
M 12x1 plug connection temperature max. 85°C	Not available		Max. 125V • 3A • 60VA	Max. 125V • 1,5A • 50VA	Max. 125V • 1A • 20VA	Max. 125V • 1A • 20VA
 Atex II 2G EEx m II T6 max. 80°C (2m molded cable IP67)	Max. 250V • 2A • 60VA	Max. 250V • 1A • 30VA	Not available			
EEx m II T6 max. 80°C	Max. 250V • 2A • 60VA	Max. 250V • 1A • 30VA	Not available			
Output signal	The switching contact shuts off when the set flow is fallen below.					
Power supply	Not mandatory					
Cable diameter for IP65	6 – 8 mm		4 – 6,5 mm			
pPollution degree	2 (EN 61058-1)					
Other connector types or cable lengths on request						

(1) Minimum load:3VA



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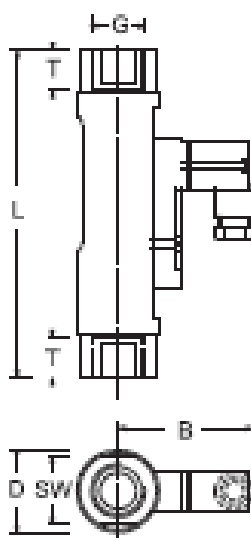
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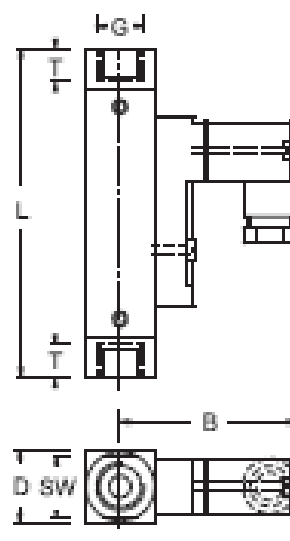
Werkstoffe	Messing	Edelstahl
Wetted parts	brass	1.4571
Spring (wetted part)	1.4571	
Sight glass (wetted part)	Duran 50	
Magnets (wetted parts)	Hard ferrite	
Housing (non wetted part)	Aluminium, anodized	
Gaskets	NBR (others on request)	Viton (others on request)



RVO/U-L-1



RVO/U-L-2



RVO/U-L-4

	SW	D	B	G	DN	T	L
RVO/U-L-4	17	20	49	1/4"	8	10	90
RVO/U-L-2	27	32	53	1/2"	15	14	114
RVO/U-L-1	41	50	77	3/4" 1"	20 25	18	139 158

Dimensions in mm

Subject to errors and technical changes