9 Specifications

<table>
<thead>
<tr>
<th>Operating Data</th>
<th>RVO/U-L-1</th>
<th>RVO/U-L-2</th>
<th>RVO/U-L-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>PN 10 bar</td>
<td>PN 16 bar</td>
<td>PN 16 bar</td>
</tr>
<tr>
<td>Pressure drop</td>
<td>0.02 - 0.4 bar</td>
<td>0.02 - 0.3 bar</td>
<td>0.02 - 0.2 bar</td>
</tr>
<tr>
<td>Temperature max.</td>
<td>100°C (optional 160°C)</td>
<td>100°C (optional 160°C)</td>
<td>100°C (optional 160°C)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±10% of final value</td>
<td>±10% of final value</td>
<td>±10% of final value</td>
</tr>
</tbody>
</table>

Electrical Data:

<table>
<thead>
<tr>
<th>SPST</th>
<th>SPDT N.O.</th>
<th>SPST N.O.</th>
<th>SPST N.O.</th>
<th>SPDT N.O.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP65 (plug connection DIN43650 Form A or C)</td>
<td>max. 250V + 1,5A + 50VA(1)</td>
<td>max. 230V + 1,5A + 50VA(1)</td>
<td>max. 200V + 1A + 20VA</td>
<td>max. 200V + 1A + 20VA</td>
</tr>
<tr>
<td>IP67 (with 1m sealed in cable)</td>
<td>max. 125V + 3A + 60VA</td>
<td>max. 125V + 3A + 60VA</td>
<td>max. 125V + 3A + 60VA</td>
<td>max. 125V + 3A + 60VA</td>
</tr>
</tbody>
</table>

M M21 plug not available max. 125V + 3A + 60VA max. 125V + 3A + 60VA max. 125V + 3A + 60VA max. 125V + 3A + 60VA

Temperature max. 85°C

M 121 plug not available max. 125V + 3A + 60VA max. 125V + 3A + 60VA max. 125V + 3A + 60VA max. 125V + 3A + 60VA

Alex II 2G EEx m II T6 max. 80°C 2m (sealed in cable IP57)

| Max. 250V + 1,5A + 50VA(1) | max. 250V + 1,5A + 50VA(1) | max. 250V + 1A + 20VA | max. 200V + 1A + 20VA |

| Temperature max. 85°C | not available | not available | not available | not available |

Output signal:
The contact switches off, if minimum flow is below setpoint

Power supply:
not necessary (need contacts)

Grade of pollution:
2 (EN 61058-1)

Other plug types or cable lengths on request

<table>
<thead>
<tr>
<th>Materials</th>
<th>brass</th>
<th>stainl. st.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Wetted parts:</th>
<th>brass</th>
<th>1.4571 (316 l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring (wetted parts)</td>
<td>1.4571 (316 l)</td>
<td></td>
</tr>
<tr>
<td>Glass (wetted parts)</td>
<td>Duran 50</td>
<td></td>
</tr>
<tr>
<td>Magnets (wetted parts)</td>
<td>hard-ferrite</td>
<td></td>
</tr>
<tr>
<td>Housing (not wetted parts)</td>
<td>aluminium</td>
<td></td>
</tr>
</tbody>
</table>

Seals
NBR (other on request) | Viton (other on request)

(1) Minimum load 3VA

1 Preface

The flow monitors type RVO/U-L prove themselves through 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 operating this instrument, must have read and understand this operating instruction and specially the safety hints!

2 Safety hints

2.1 General hints

The instructions contained in the operating instructions must be followed to ensure a safe operation of the instrument. Further, 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 Application as directed

The instruments, type RVO/U-L, serve as monitors for continuous flow gaseous media. Any other use counts as nondirected. If not indicated otherwise, the sealing of the instruments refer to air. Special applications, where intermittent loads (e.g. cyclic operation) could occur, should be discussed and checked with our technical Staff.

With every start up it should be watched that the shut-off valves are opened slowly, this is to avoid line shock, which can damage the instrument.

In general should fast changes of the operating conditions (pressure, temperature, flow) be avoided. The instruments type RVO/U-L must not be used as single source to avoid dangerous situations on machinery and in plants.

Machinery and plants must be constructed in that way, that faulty conditions do not lead the operators into dangerous situations.

2.3 Qualified personnel

The instruments, type RVO/U-L, must only be installed by qualified personnel, which is capable of using these instruments in a professional manner. Qualified personnel are such persons, which are familiar with the erection, installation, commissioning and operation of these instruments and which hold a corresponding qualification for this function.

4 Installation

4.1 Process connection

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

- suitable process connection has to be provided
- connection size to be checked
- thread depth to be checked
- suitable sealing material to be used (liquid sealing material will damage the flowmonitor if it gets inside)
- professional sealing

4.2 Environment conditions

- The flowmonitor 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 employment of anti-freeze and anti-corrosive check compatibility.

Warning! The following requirements must be adhered to, otherwise the function of the flowmonitor 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. Electromotors)
- Piping, process connections or supports made from ferromagnetic material influence the magnetic field of the flowmonitor. Keep a space of 100mm to those materials (e.a. 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 ensure through suitable steps the de-aeration of the instrument.

Operating instruction FWS-RVO/U-L
5 Electrical connection

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

Attention! Switch contact and unit are matched. After the exchange of a switch contact a readjustment must be made. Kindly request the relevant instruction.

Switch position under No flow condition:
- Connection: normally open
  - DIN 43650 M 12x1

Connection: change over
- DIN 43650 M 12x1

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

M 12x1

5.2 Switch contact with cable
The individual cores of the cable are marked according to the above connection diagram.

For infos on this subject please refer to page 4.

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

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 operating instruction for EEx-proof switch contacts!

5.5 Contact protection arrangement
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 fragile against over load. Non of the values voltage, current and wattage must be exceeded (Not even for a fractional moment).

The danger of overloads exist by means of:
- inductive loads
- capacitive loads
- resistive loads

Inductive load
This kind of load will be caused by:
- contactors, relais
- solenoid valves
- electric motors

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

Precautionary measure: (sample)
- Capacitive load
This kind of load will be caused by:
- long leads
- capacitive consumption

Danger:
- High current peaks during switch on of the switch contact (exceeding the nominal current)

Precautionary measure: (sample)
- 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 during switch on of the switch contact, because the filament has low resistance at low temperatures.

Precautionary measure: (sample)
- Limiting the current by means of a resistor or heating of the filament.

Attention!
Temperatures.

High current peaks during switch on of the switch contact (exceeding the nominal current)

Precautionary measure: (sample)
- Limiting the current by means of a resistor or heating of the filament.

8 Fault finding hints

The switch contact does not react:

1. No flow
   - check for medium flow
   - Adjust switch point to a lower flow
   - Use instrument with different range

2. Float got stuck (polluted)
   - Clean the instrument and ensure free movement of the float

3. Incorrect reduced (pipe diameter too small)
   - reduce according to section 4

4. Exchanger not cleaned
   -löducer for repair and calibration to manufacturer

5 Switch point adjustment

6 Switchpoint adjustment

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

- Loosen the lock screw of the switch contact and shift the switch contact against flow direction to the stop. 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.a. 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.

Hints:
- The adjusted switch point corresponds to the switch off point of the switch contact with decreasing flow.
- The actual switch position can be checked by means of an universal tester.
- The above description of the adjustment refers to the normally open contact.

7 Maintenance

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

The service intervals depend on
- the pollution of the media
- environmental conditions (e.a. 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 float

It is the obligation of the user to lay down appropriate service intervals depending on the application.

Hints:
- The free movement of the float and the operation of the switch contact can be checked by varying the flow and observing the switch contact status.
- In most cases a purification can be achieved by flushing the instrument with clean media. In obsolete cases (e.a. calcaeous deposits) cleaning can be done with commercial purifier, as long as the purifier is not aggressive against the material of the instrument.
- Return instrument for repair and calibration to manufacturer