DS01

Miniature Variable Area Flowmeter and Switch -with Sight Glass-

• for low viscosity liquids and gases
• small mounting dimensions
• brass (nickel plated) or stainless steel version
• scales burned into the sight glass
• universal installation position
• high switching accuracy
• optional Ex- version acc. to ATEX
• analogue transmitter 4...20 mA optional
• $P_{\text{max}}$: 16 bar, $T_{\text{max}}$: 160 °C

Description:
The flowmeter and switch model DS01 works according to a modified variable area principle. The float is guided in a cylindrical measuring glass by means of a spring. The flowing medium moves the float in the flow direction. The upper edge of the float shows the momentary flow via a burnt-in scale on the measuring glass. A Reed contact is mounted outside the meter in a sealed housing. When the float reaches the position of the Reed contact the switch will close. With higher flows the float moves further upward until it reaches a built-in float stop, still keeping the switch closed. This ensures a bistable switch function at any time. The Reed contact is adjustable over the full switching range of the meter.

Typical application:
The variable area flowmeters and monitors DS01 are used to measure and monitor continuous flow rates of low-viscosity liquids or gaseous media.

Areas of applications are:
• cooling systems
• engineering
• medical technology
• pharmaceutical and chemical industries
• research and development
### Models:

**Measuring ranges:**
- **Water:** 5...60 ml/min – 60...150 l/min (referenced to 1 bar abs, 20°C)
- **Air:** 0,2...1,3 Nl/min – 200...625 Nl/min

**Materials:** brass (nickel-plate) or stainless steel

### Technical Data:

**Max. pressure:**
- DS01.1 / DS01.2: 16 bar
- DS01.3 / DS01.4 / DS01.5: 10 bar

**Pressure loss:**
- DS01.1: 0,02–0,2 bar
- DS01.2: 0,02–0,3 bar
- DS01.3 / DS01.4 / DS01.5: 0,02–0,4 bar

**Max. media-temperature:**
- 100 °C (optional 160 °C)

**Electr. Connection:**
- **DS01.1 and DS01.2:**
  - angle plug acc. to EN 175301-803, form C (DIN 43650)
- **DS01.3, DS01.4 and DS01.5:**
  - angle plug nach EN 155301-803, form A (DIN 43650), Ex-contact 3S and 3U with 2 m cable
  - round plug M12 x 1 acc. to EN 50044, angle plug with LED or glow lamp

**Accuracy:**
- ± 10 % FS (for vertical installation)

### Materials:

**Protective housing:** (non-wetted parts)
- aluminium anodized

**Brass version (nickel-plated):**
- **Wetted parts:**
  - **Sight glass:** borosilicate glass
  - **Float:** stainless steel
  - **Gaskets:** NBR, optional FKM, EPDM
  - **Magnet:** ferrite
  - **Spring:** stainless steel 1.4571
- all other wetted parts: brass, nickel plated

**Stainless steel version (1.4571):**
- **Wetted parts:**
  - **Sight glass:** borosilicate glass
  - **Gaskets:** FKM, optional NBR, EPDM
  - **Magnet:** ferrite
- all other wetted parts: stainless steel 1.4571

### Order Code:

**Order number:**
- **DS01:** 1.1. 1.
- **W13:** 1.1. 0.

**Miniature variable area flowmeter and switch – with sight glass -**

**Connection female thread:**
- 1 = G 1/4
- 2 = G 1/2
- 3 = G 3/4
- 4 = G 1
- 5 = G 1 1/4

**Material:**
- 1 = brass nickel-plated
- 2 = stainless steel 1.4571

**Scale:**
- 1 = for water
- 2 = for air (at 1 bar abs., 20 °C)

**Measuring ranges:**
- **Water (DS01.1 only):**
  - W101 = 5–60 ml/min
  - W102 = 25–130 ml/min
  - W103 = 0.06–0.3 l/min
  - W106 = 0.1–0.6 l/min
  - W11 = 0.2–1.2 l/min
  - W12 = 0.4–2 l/min
  - W13 = 0.5–3 l/min
  - W15 = 1.0–5 l/min
- **Air:**
  - L1001 = 0,2–1,3 Nl/min
  - L1002 = 0,5–2,0 Nl/min
  - L1003 = 0,8–3,0 Nl/min
  - L1005 = 1,5–5,0 Nl/min
  - L1006 = 2,0–6,0 Nl/min
  - L1008 = 2–8 Nl/min
  - L1012 = 3–12 Nl/min
  - L1014 = 3,5–14 Nl/min
  - L1020 = 5,5–20 Nl/min
  - L1024 = 7–24 Nl/min
  - L1035 = 10–35 Nl/min
- **W101:**
  - L1001 = 0,2–1,1 l/min
  - L1002 = 0,5–2,0 Nl/min
  - L1003 = 0,8–3,3 Nl/min
  - L1005 = 1,5–5,0 Nl/min
- **W102:**
  - L1006 = 2,0–6,0 Nl/min
  - L1008 = 2–8 Nl/min
  - L1012 = 3–12 Nl/min
  - L1014 = 3,5–14 Nl/min
  - L1020 = 5,5–20 Nl/min
  - L1024 = 7–24 Nl/min
  - L1035 = 10–35 Nl/min
- **W103:**
  - L1008 = 2–8 Nl/min
  - L1012 = 3–12 Nl/min
  - L1014 = 3,5–14 Nl/min
- **W106:**
  - L1020 = 5,5–20 Nl/min
  - L1024 = 7–24 Nl/min
  - L1035 = 10–35 Nl/min
- **W11:**
  - L1020 = 5,5–20 Nl/min
  - L1024 = 7–24 Nl/min
  - L1035 = 10–35 Nl/min
- **W12:**
  - L1020 = 5,5–20 Nl/min
  - L1024 = 7–24 Nl/min
  - L1035 = 10–35 Nl/min
- **W13:**
  - L1020 = 5,5–20 Nl/min
  - L1024 = 7–24 Nl/min
  - L1035 = 10–35 Nl/min
- **W15:**
  - L1020 = 5,5–20 Nl/min
  - L1024 = 7–24 Nl/min
  - L1035 = 10–35 Nl/min
- **DS01.2 only:**
  - W205 = 0.2–0.5 l/min
  - W21A = 0.3–1 l/min
  - W22A = 0.7–2 l/min
  - W24A = 1.6–4 l/min
  - W26A = 3.0–6.0 l/min
  - W28A = 4.5–12 l/min
  - W28A = 6.0–15 l/min
  - W28A = 8.0–20 l/min
  - W28A = 10.5–30 l/min
  - W28A = 12.5–50 l/min
- **DS01.3, DS01.4 and DS01.5:**
  - W3030 = 8–30 l/min
  - W3045 = 10–50 l/min
  - W3060 = 20–60 l/min
  - W3090 = 30–90 l/min
- **DS01.4 and DS01.5 only:**
  - W4120 = 40–120 l/min
  - W4150 = 60–150 l/min

**Addition S... = special scale**

**Number of contacts:**
- 0 = without contact
- 1 = 1 contact
- 2 = 2 contacts

**Contact function / analogue output:**
- 0 = without
- 1 = N/O
- 2 = SPDT
- 2X = SPDT for SPS application (for devices from 1/2“)

**Options:**
- 0 = without
- 1 = please specify in plain text
- HT = high temperature version 160 °C
- SX = cable version 1 m, 2 m, 5 m or 10 m

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### Dimensions:

<table>
<thead>
<tr>
<th>Type</th>
<th>Dimensions [mm]</th>
<th>Weight [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW D B G T L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DS01.1</td>
<td>17 20 49 G 1/4 10 90</td>
<td>140</td>
</tr>
<tr>
<td>DS01.2</td>
<td>27 32 53 G 1/2 14 114</td>
<td>300</td>
</tr>
<tr>
<td>DS01.3</td>
<td>41 50 77 G 3/4 15 144,5</td>
<td>850</td>
</tr>
<tr>
<td>DS01.4</td>
<td>41 50 77 G 1 17 158</td>
<td>900</td>
</tr>
<tr>
<td>DS01.5</td>
<td>50 50* 77 G 1 1/4 17 166</td>
<td>920</td>
</tr>
</tbody>
</table>

*Screwing D = 55

### Contacts:

The contact opens/changes, if the flow level has fallen under the adjusted value.

### ATEX-designations:

- **Contacts 3SM and 3UM for DS01.1/2.**:
  - ATEX II 2 G Ex ib IIC
  - for connection to a certified intrinsically safe circuit,
  - temperature range -5 °C ≤ T < 45 °C, L = 0, C = 0

- **Contacts 3ST5, 3ST6, 3UT5, 3UT6 for DS01.3/4/5.**:
  - ATEX II 2 G Ex mb IIC T6 Gb
  - ATEX II 2 D Ex tb IIC T80 °C Db
  - ATEX II 2 G Ex mb IIC T5 Gb
  - ATEX II 2 D Ex tb IIC T100 °C Db
  - (with cable connection, Standard 2 m only)

### Switching capacity

<table>
<thead>
<tr>
<th>Type</th>
<th>Contact function</th>
<th>Size</th>
<th>Contact function</th>
<th>Angle plug IP65</th>
<th>M12x1 plug IP67**</th>
<th>Cable connection (1 m) IP67</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS01.1</td>
<td>1 = N/O</td>
<td>1/4&quot;</td>
<td>2 = SPDT</td>
<td>140 VAC / 0,7 A / 20 VA</td>
<td>125 VAC / 0,7 A / 20 VA</td>
<td>140 VAC / 0,7 A / 20 VA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>200 VDC / 1 A / 20 VA</td>
<td>125 VDC / 1 A / 20 VA</td>
<td>200 VDC / 1 A / 20 VA</td>
</tr>
<tr>
<td></td>
<td>3SM = Ex-N/O*</td>
<td></td>
<td>3UM = Ex-SPDT*</td>
<td>gas: &lt; 30 V / 0,101 A / 0,76 W</td>
<td>gas: &lt; 30 V / 0,101 A / 0,76 W</td>
<td>gas: &lt; 30 V / 0,101 A / 0,76 W</td>
</tr>
<tr>
<td></td>
<td>3SM = Ex-N/O*</td>
<td></td>
<td></td>
<td>dust: &lt; 30 V / 0,25 A / 0,75 W</td>
<td>dust: &lt; 30 V / 0,25 A / 0,75 W</td>
<td>dust: &lt; 30 V / 0,25 A / 0,75 W</td>
</tr>
<tr>
<td>DS01.2</td>
<td>1/2&quot;</td>
<td></td>
<td>2 = SPDT</td>
<td>230 V / 3 A / 60 VA</td>
<td>125 V / 3 A / 60 VA</td>
<td>230 V / 3 A / 60 VA</td>
</tr>
<tr>
<td></td>
<td>2X = SPDT for SPS</td>
<td></td>
<td>3SM = Ex-N/O*</td>
<td>gas: &lt; 30 V / 0,101 A / 0,76 W</td>
<td>gas: &lt; 30 V / 0,101 A / 0,76 W</td>
<td>gas: &lt; 30 V / 0,101 A / 0,76 W</td>
</tr>
<tr>
<td></td>
<td>3SM = Ex-N/O*</td>
<td></td>
<td></td>
<td>dust: &lt; 30 V / 0,25 A / 0,75 W</td>
<td>dust: &lt; 30 V / 0,25 A / 0,75 W</td>
<td>dust: &lt; 30 V / 0,25 A / 0,75 W</td>
</tr>
<tr>
<td>DS01.3</td>
<td>3/4&quot;</td>
<td></td>
<td>2 = SPDT</td>
<td>250 V / 1,5 A / 50 VA, min load: 3 VA</td>
<td>125 V / 1,5 A / 50 VA, min load: 3 VA</td>
<td>125 V / 1,5 A / 50 VA, min load: 3 VA</td>
</tr>
<tr>
<td>DS01.4</td>
<td>1&quot;</td>
<td></td>
<td>2X = SPDT for SPS</td>
<td>250 V / 1 A / 60 VA</td>
<td>125 V / 1 A / 60 VA</td>
<td>125 V / 1 A / 60 VA</td>
</tr>
<tr>
<td>DS01.5</td>
<td>1 1/4&quot;</td>
<td></td>
<td>2 = SPDT</td>
<td>250 V / 1 A / 60 VA</td>
<td>125 V / 1 A / 60 VA</td>
<td>125 V / 1 A / 60 VA</td>
</tr>
<tr>
<td></td>
<td>2X = SPDT for SPS</td>
<td></td>
<td>3ST5 = Ex-N/O, T5*</td>
<td>250 V / 1 A / 60 VA</td>
<td>125 V / 1 A / 60 VA</td>
<td>125 V / 1 A / 60 VA</td>
</tr>
<tr>
<td></td>
<td>3ST6 = Ex-N/O, T6*</td>
<td></td>
<td>3UT5 = Ex-SPDT, T5*</td>
<td>250 V / 1 A / 60 VA</td>
<td>125 V / 1 A / 60 VA</td>
<td>125 V / 1 A / 60 VA</td>
</tr>
<tr>
<td></td>
<td>3UT6 = Ex-SPDT, T6*</td>
<td></td>
<td></td>
<td>250 V / 1 A / 60 VA</td>
<td>125 V / 1 A / 60 VA</td>
<td>125 V / 1 A / 60 VA</td>
</tr>
</tbody>
</table>

*Exact max. switching capacity: see ATEX documents

**Protection class M12x1 plug for DS01.1 and DS01.2: IP67**
Analogue Transmitter SU20:

The position of a magnetic float / piston is detected by means of Hall sensors and converted into an analogue signal.

- analogue signal 4...20 mA and 0...10 V
- operating temperature: -20...+70 °C
- accuracy: +/- 10 % of full scale
- Aluminium housing, anodized

Technical Data:

Accuracy*: +/- 1 % of full scale
Operating temperature: -20...+70 °C
Storage temperature: -20...+80 °C
Repeatability: tbd.
Housing material: Aluminium, blue anodized
Protection class: IP67

* The actual accuracy depends on the flow sensor used. On request the accuracy of the flow sensor used can be significantly increased by a customized calibration.

Electrical Data:

Analogue output: 4...20 mA and 0...10 V
Power supply: 24 Vcd (19...30 Vdc)
Power consumption: < 1 W
Current output: max. load 600 Ohm
Voltage output: max. current 10 mA
Connection: round plug M12x1, 5-pole

Notes:

Flowmeter and analogue transmitter SU20 have been optimally adjusted to each other and may not be exchanged.

Electrical Connection:

1 brown
2 white
3 blue
4 black Out 2 (0 ... 10 V)
5 gray Test

Attention: Pin 5 must not be electrically connected! We strongly recommend use of a four core cable.

Dimensions:

Characteristics:

Current-Flow characteristic:

Voltage-Flow characteristic:

 LL: lower limit of measuring range
 UL: upper limit of measuring range

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Accessories (see separate data sheets):

- Needle valves SNV01, SNV02
- Ball valves SKG01, SKG02
- Dirt traps SF00, SF01
- Protection relay MSR01
- M12 Plug connector PVC-cable SM12

Notes:

The specified measuring/switching ranges apply when the instrument is installed vertically and the flow rate is from bottom to top. Other installation positions or operating densities deviating from the specified specifications increase the specified measuring error.

Special scales for different media and operating conditions are available on request.

The specified switching points are shut-off points at falling flow rates. Please note that the switch-on points are higher due to the hysteresis.

For applications where pressure surges are to be expected, please contact PKP!