Electronic flow switch
With display, for liquid media
Model FSD-3

Applications
- Control of cooling lubricant systems
- Monitoring of cooling circuits
- Control of filter units
- Dry run protection in pumps

Special features
- Reliable flow monitoring of liquid media
- Switching and analogue outputs for flow, temperature and diagnostics
- Easily parameterisable via the local display
- Free from wear, without any moving parts in the medium

Description

Award-winning in design and functionality
The successful design and the excellent functionality of the WIKA switch family were already confirmed by winning the “iF product design award” for the pressure switch model PSD-30.

The robust LED display has been designed using 9 mm high characters (the largest possible) and with a slight incline in order to make reading the flow as easy as possible from greater distances. The 3-key operation makes simple, intuitive menu navigation possible, with no need for additional assistance. The menu navigation conforms to the VDMA standard.

Free from wear
The FSD-3 operates on the basis of the calorimetric measuring principle. This guarantees a wear-free flow measurement without any moving parts in the medium.

Flow monitoring of liquid media
The FSD-3 enables the reliable and process-safe monitoring of the flow of liquid media. When the flow is above or below the set value, the switching output activates the downstream regulator or control. Damage and production losses through degradation of pumps, tools and spindles can thus be avoided.

Temperature monitoring
The medium temperature can be monitored by means of a temperature output, without the need for equipping another measuring location.

Diagnostic function
The optional diagnostic function reliably outputs a warning when a sensor defect is detected. The switching output can be used to trigger a downstream safety function.
Measuring ranges

Flow
- Water: 5 ... 150 cm/s
- Oil: 3 ... 300 cm/s

The in-factory adjustment is carried out with the medium water. It is recommended to carry out the adjustment, relative to the minimum/maximum flows of the system, via the menu.

Temperature (option)
-20 ... +85 °C (-4 ... +185 °F)

Display

14-segment LED, red, 4-digit, 9 mm (0.35 in) character size
Display can be turned electronically by 180°

Output signals

<table>
<thead>
<tr>
<th>Switching output</th>
<th>Analogue signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP1</td>
<td>SP2</td>
</tr>
<tr>
<td>Option 1</td>
<td>Flow</td>
</tr>
<tr>
<td>Option 2</td>
<td>Flow</td>
</tr>
<tr>
<td>Option 3</td>
<td>Flow</td>
</tr>
<tr>
<td>Option 4</td>
<td>Flow</td>
</tr>
<tr>
<td>Option 5</td>
<td>Flow</td>
</tr>
<tr>
<td>Option 6</td>
<td>Temperature</td>
</tr>
<tr>
<td>Option 7</td>
<td>Diagnostics 1)</td>
</tr>
</tbody>
</table>

1) Switching signal on sensor defect

Switching voltage
- Power supply - 1 V

Switching current
- max. 250 mA

Switch-on drift
- 10 s

Settling time
- Flow (0 ... 100 %, 100 ... 0 %): 6 s
- Flow (50 ... 100 %, 100 ... 50 %): 4 s
- Temperature t90: 4 s
- Temperature t63: 2 s

Load
- Analogue signal 4 ... 20 mA: ≤ 0.5 kΩ

Service life
- 100 million switching cycles

Scaling temperature (option)
- Zero point: -20 ... +5 °C (-4 ... +41 °F)
- End value: 60 ... 85 °C (140 ... 185 °F)

Switching thresholds
- Switch point 1 and switch point 2 are individually adjustable

Switching functions
- Normally open, normally closed, window, hysteresis
- Freely adjustable
Voltage supply

Power supply
DC 15 ... 35 V

Current consumption
- Switching outputs with analogue signal: 175 mA
- Switching outputs without analogue signal: 150 mA

Total current consumption
max. 650 mA including switching current

Operating conditions

Voltage

Power supply
DC 24 V

Load: 100 Ω

Operating conditions

Permissible temperature ranges
Medium: -20 ... +85 °C (-4 ... +185 °F)
Ambient: -20 ... +80 °C (-4 ... +176 °F)
Storage: -20 ... +80 °C (-4 ... +176 °F)

Humidity
45 ... 75 % r. h.

Max. operating pressure
40 bar (580 psi)
30 bar (435 psi) with process connection M18 x 1.5

Vibration resistance
6 g (IEC 60068-2-6, under resonance)

Shock resistance
50 g (IEC 60068-2-27, mechanical)

Ingress protection
IP65 and IP67

The stated ingress protection (per EN/IEC 60529) only applies when plugged in using mating connectors that have the appropriate ingress protection.

Accuracy specifications

Non-repeatability
Flow (5 ... 100 cm/s): ≤ 2 cm/s
Temperature: ≤ 0.5 K

Accuracy at reference conditions
Flow (5 ... ≤ 100 cm/s): ≤ ±5 % of end value of measuring range
Flow (> 100 ... 175 cm/s): ≤ ±10 % of end value of measuring range
Temperature: ≤ ±1.5 K

Including non-linearity, hysteresis, zero offset and end value deviation (corresponds to measuring deviation per IEC 61298-2).

The accuracy of the flow sensor is dependent on the thermal conductivity and the contamination of the probe.

The flow switch serves for reliable monitoring of the flow losses and of dry running. Also with analogue signal it should only be used as a trend indicator, in order to monitor process changes, such as filter blocking.

Temperature error at -20 ... +85 °C (-4 ... +185 °F)
Flow: ≤ ±0.4 cm/s per K

Reference conditions

Temperature: 15 ... 25 °C (59 ... 77 °F)
Atmospheric pressure: 860 ... 1,060 mbar (12.47 ... 15.38 psi)
Humidity: 45 ... 75 % r. h.
Medium: Water
Nominal position: Process connection M18 x 1.5 downwards
Inner diameter of pipe 26 mm
Upstream/Downstream pipe 1 m/0.5 m
Marking towards the inflow side twist of ±5°

Power supply: DC 24 V
Load: 100 Ω
Materials

Wetted parts
Process connection, probe: Stainless steel 316Ti
Sealing: See table under “Process connections”

Non-wetted parts
Case: Stainless steel 304
Keyboard: TPE-E
Display window: PC
Display head: PC+ABS blend

Process connections

<table>
<thead>
<tr>
<th>Process connection</th>
<th>Standard</th>
<th>Thread</th>
<th>Probe length F</th>
<th>Insertion length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN EN ISO 1179-2 (formerly DIN 3852-E)</td>
<td>ISO 225-1</td>
<td>M18 x 1.5</td>
<td>45 mm (1.77 in)</td>
<td>52 mm (2.05 in)</td>
</tr>
<tr>
<td>DIN EN ISO 1179-2 (formerly DIN 3852-E)</td>
<td>G ¼ A</td>
<td>16 mm (0.63 in)</td>
<td>28 mm (1.10 in)</td>
<td></td>
</tr>
<tr>
<td>DIN EN ISO 1179-2 (formerly DIN 3852-E)</td>
<td>G ½ A</td>
<td>16 mm (0.63 in)</td>
<td>30 mm (1.18 in)</td>
<td></td>
</tr>
<tr>
<td>DIN EN ISO 1179-2 (formerly DIN 3852-E)</td>
<td>G ½ A</td>
<td>35 mm (1.38 in)</td>
<td>49 mm (1.93 in)</td>
<td></td>
</tr>
<tr>
<td>DIN EN ISO 1179-2 (formerly DIN 3852-E)</td>
<td>G ½ A</td>
<td>65 mm (2.65 in)</td>
<td>79 mm (3.11 in)</td>
<td></td>
</tr>
<tr>
<td>ANSI/ASME B1.20.1</td>
<td>ISO 225-1</td>
<td>¼ NPT</td>
<td>16 mm (0.63 in)</td>
<td>22 mm (0.87 in)</td>
</tr>
<tr>
<td>ANSI/ASME B1.20.1</td>
<td>ISO 225-1</td>
<td>½ NPT</td>
<td>30 mm (1.18 in)</td>
<td>38 mm (1.50 in)</td>
</tr>
</tbody>
</table>

Sealings

<table>
<thead>
<tr>
<th>Process connection</th>
<th>Standard</th>
<th>DIN EN ISO 1179-2 (formerly DIN 3852-E)</th>
<th>ISO 225-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>NBR</td>
<td>FPM/FKM</td>
<td>FPM/FKM</td>
</tr>
<tr>
<td>Option 1</td>
<td>FPM/FKM</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Option 2</td>
<td>without</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Electrical connection

Connection
Circular connector M12 x 1 (4-pin)

Electrical safety
Short-circuit resistance: S+ / SP1 / SP2 vs. U-
Reverse polarity protection: U+ vs. U-
Insulation voltage: DC 500 V
Overvoltage protection: DC 40 V

Connection diagram

<table>
<thead>
<tr>
<th>Circular connector M12 x 1 (4-pin)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U+ 1</td>
</tr>
<tr>
<td>U- 3</td>
</tr>
<tr>
<td>S+ 2</td>
</tr>
<tr>
<td>SP1 4</td>
</tr>
<tr>
<td>SP2 2</td>
</tr>
</tbody>
</table>

Legend:
U+ Positive power supply terminal
U- Negative power supply terminal
SP1 Switching output 1
SP2 Switching output 2
S+ Analogue output

Approvals

<table>
<thead>
<tr>
<th>Logo</th>
<th>Description</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="#" alt="CE" /></td>
<td>EU declaration of conformity</td>
<td></td>
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<tr>
<td><img src="#" alt="UL" /></td>
<td>UL Safety (e.g. electr. safety, overpressure, ...)</td>
<td></td>
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<tr>
<td></td>
<td>EMC directive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EN 61326 emission (group 1, class B) and interference immunity (industrial application)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RoHS directive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>European union</td>
<td></td>
</tr>
<tr>
<td></td>
<td>USA and Canada</td>
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</tbody>
</table>

Manufacturer’s information and certificates

<table>
<thead>
<tr>
<th>Logo</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><img src="#" alt="China RoHS directive" /></td>
<td>China RoHS directive</td>
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</tbody>
</table>

Approvals and certificates, see website
### Dimensions in mm (in)

![Diagram of the product dimensions](image)

**Weight:** approx. 0.3 kg (10.58 oz)

### Accessories and spare parts

#### Sealings

<table>
<thead>
<tr>
<th>Description</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBR profile sealing G ¼ A DIN EN ISO 1179-2 (formerly DIN 3852-E)</td>
<td>1537857</td>
</tr>
<tr>
<td>FPM/FKM profile sealing G ¼ A DIN EN ISO 1179-2 (formerly DIN 3852-E)</td>
<td>1576534</td>
</tr>
<tr>
<td>NBR profile sealing G ½ A DIN EN ISO 1179-2 (formerly DIN 3852-E)</td>
<td>1039067</td>
</tr>
<tr>
<td>FPM/FKM profile sealing G ½ A DIN EN ISO 1179-2 (formerly DIN 3852-E)</td>
<td>1039075</td>
</tr>
</tbody>
</table>

#### Circular connector M12 x 1 with moulded cable

<table>
<thead>
<tr>
<th>Description</th>
<th>Temperature range</th>
<th>Cable diameter</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight version, cut to length, 4-pin, 2 m (6.6 ft) PUR cable, UL listed, IP67</td>
<td>-20 ... +80 °C (-4 ... +176 °F)</td>
<td>4.5 mm (0.18 in)</td>
<td>14086880</td>
</tr>
<tr>
<td>Straight version, cut to length, 4-pin, 5 m (16.4 ft) PUR cable, UL listed, IP67</td>
<td>-20 ... +80 °C (-4 ... +176 °F)</td>
<td>4.5 mm (0.18 in)</td>
<td>14086883</td>
</tr>
<tr>
<td>Straight version, cut to length, 4-pin, 10 m (32.8 ft) PUR cable, UL listed, IP67</td>
<td>-20 ... +80 °C (-4 ... +176 °F)</td>
<td>4.5 mm (0.18 in)</td>
<td>14086884</td>
</tr>
<tr>
<td>Angled version, cut to length, 4-pin, 2 m (6.6 ft) PUR cable, UL listed, IP67</td>
<td>-20 ... +80 °C (-4 ... +176 °F)</td>
<td>4.5 mm (0.18 in)</td>
<td>14086889</td>
</tr>
<tr>
<td>Angled version, cut to length, 4-pin, 5 m (16.4 ft) PUR cable, UL listed, IP67</td>
<td>-20 ... +80 °C (-4 ... +176 °F)</td>
<td>4.5 mm (0.18 in)</td>
<td>14086891</td>
</tr>
<tr>
<td>Angled version, cut to length, 4-pin, 10 m (32.8 ft) PUR cable, UL listed, IP67</td>
<td>-20 ... +80 °C (-4 ... +176 °F)</td>
<td>4.5 mm (0.18 in)</td>
<td>14086892</td>
</tr>
</tbody>
</table>
### Adapter

<table>
<thead>
<tr>
<th>Description</th>
<th>Recommended for pipe Ø</th>
<th>B</th>
<th>A</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>From M18 x 1.5 to G ¼</td>
<td>22 ... 50 mm (0.86 ... 0.97 in)</td>
<td>28 mm (1.10 in)</td>
<td>16 mm (0.63 in)</td>
<td>14242761</td>
</tr>
<tr>
<td>From M18 x 1.5 to G ½ long</td>
<td>25 ... 60 mm (0.98 ... 2.36 in)</td>
<td>31 mm (1.22 in)</td>
<td>17 mm (0.67 in)</td>
<td>14242759</td>
</tr>
<tr>
<td>From M18 x 1.5 to G ½ short</td>
<td>32 ... 100 mm (1.26 ... 3.93 in)</td>
<td>36 mm (1.41 in)</td>
<td>22 mm (0.86 in)</td>
<td>14242760</td>
</tr>
</tbody>
</table>

**Legend:**
- A Maximum probe immersion depth
- B Distance sealing face to probe tip

### Ordering information

Model / Output signal / Probe length / Process connection / Sealing / Accessories