Electronic temperature switch with display
Model TSD-30

Applications

- Machine tools
- Hydraulic power packs
- Cooling and lubrication systems
- Machine building

Special features

- Easily readable, robust display
- Intuitive and fast setup
- Easy and flexible mounting configurations

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 model PSD-30 pressure switch.

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 temperature as easy as possible from a long way off. The use of a 14-segment display ensures a clear display and readability of letters.

The 3-key operation makes simple, intuitive menu navigation possible, with no need for additional assistance. The menu navigation is designed in accordance with the latest VDMA standard. The VDMA standard for fluid sensors (24574-2, part 2 temperature switches) has the aim of considerably simplifying the use of temperature switches by standardising menu navigation and display.

The control keys have been designed as large as possible and are arranged ergonomically to ensure fast and easy adjustments. Operation without any additional assistance is made easier through the tactile feedback.

Customised installation
The installation of the model TSD-30 temperature switch can be flexibly adapted to the individual mounting situation. Due to the almost unlimited rotation of the display and case by more than 300°, the display can be adjusted independently of the electrical connection. The display can thus always be aligned to face the operator, and the M12 x 1 connection positioned to suit the desired cable routing.

IO-Link
With the optional output signal in accordance with the IO-Link communication standard, the TSD-30 allows a fast integration into modern automation systems. IO-Link offers an even faster installation, parameterisation and higher functionality of the TSD-30.

Data sheets showing similar products:
Electronic pressure switch with display; model PSD-4; data sheet PE 81.86
Electronic level switch with display; model LSD-30; data sheet LM 40.01
Electronic flow switch with display; model FSD-30; data sheet FL 80.01
Measuring ranges

<table>
<thead>
<tr>
<th>Selectable versions</th>
<th>Temperature °C</th>
<th>°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>-20 ... +80</td>
<td>-4 ... +176</td>
</tr>
<tr>
<td>Option 1 1) 2)</td>
<td>-20 ... +120</td>
<td>-4 ... +248</td>
</tr>
<tr>
<td>Option 2 1) 2)</td>
<td>0 ... +150</td>
<td>+32 ... +302</td>
</tr>
</tbody>
</table>

1) Only for process connections with compression fitting.
2) Installation instructions under “Operating conditions” must be observed.

Display

14-segment LED, red, 4-digit, 9 mm [0.35 in] character size
Display can be rotated electronically through 180°
Update: 200 ms

Output signal

<table>
<thead>
<tr>
<th>Selectable versions</th>
<th>Switching output</th>
<th>Analogue signal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SP1</td>
<td>SP2</td>
</tr>
<tr>
<td>Option 1</td>
<td>PNP</td>
<td>-</td>
</tr>
<tr>
<td>Option 2</td>
<td>PNP</td>
<td>-</td>
</tr>
<tr>
<td>Option 3</td>
<td>PNP</td>
<td>PNP</td>
</tr>
<tr>
<td>Option 4</td>
<td>PNP</td>
<td>PNP</td>
</tr>
</tbody>
</table>

Optionally also available with an NPN instead of a PNP switching output.

IO-Link, revision 1.1 (option)
IO-Link is optionally available for all output signals. With the IO-Link option, switching output SP1 is always PNP

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

Switching functions
Normally open, normally closed, window, hysteresis (freely adjustable)

Switching voltage
Supply voltage - 1 V

Switching current
- without IO-Link: max. 250 mA
- with IO-Link: SP1 max. 100 mA  
  SP2 max. 250 mA

Adjustment accuracy
≤ 0.5 % of span

Adjustment of zero point offset
±3 % of span

Scaling
Zero point: 0 ... 25 % of span
Full scale: 75 ... 100 % of span

Load
Analogue signal 4 ... 20 mA: ≤ 0.5 kΩ
Analogue signal DC 0 ... 10 V: > 10 kΩ

Service life
100 million switching cycles

Voltage supply

Supply voltage U+, DC 15 ... 35 V

Current consumption
Switching outputs with
- Analogue signal 4 ... 20 mA: 70 mA
- Analogue signal DC 0 ... 10 V: 45 mA
- without analogue signal: 45 mA

IO-Link option causes a deviating current consumption

Total current consumption
- without IO-Link: max. 600 mA including switching current
- with IO-Link: max. 450 mA including switching current

Accuracy specifications

Analogue signal
≤ ±0.5 % of span + temperature sensor error

Switching output
≤ ±0.8 % of span + temperature sensor error

Display
≤ ±(0.8 % of span + temperature sensor error) ±1 digit

Temperature sensor error
For °C: ±(0.15 K + 0.002 | t |)
For °F: ± [1.8*(0.15 + 0.002 (t - 32) / 1.8)]

| t | is the numerical value of the temperature without consideration of the sign.

The actually achievable accuracy is significantly determined by the mounting situation (immersion depth, probe length, operating conditions). This is especially the case for large temperature gradients between the environment and the medium.
Operating conditions

Permissible temperature ranges
Medium: see measuring ranges
Ambient: -20 ... +80 °C [-4 ... +176 °F] ¹
Storage: -20 ... +80 °C [-4 ... +176 °F]

1) At medium temperatures above 80 °C [176 °F] the permissible ambient temperature is limited to -20 ... +40 °C [-4 ... +104 °F]. In this case, the process connection has to be designed with a compression fitting.

At high medium or ambient temperatures, ensure by suitable measures that the instrument case temperature does not exceed 80 °C [176 °F] in continuous operation (the temperature is measured at the hexagon of the process connection).

Air humidity
45 ... 75 % r. h.

Vibration resistance
Probe length F ≤ 150 mm [5.91 in]:
6 g (IEC 60068-2-6, under resonance)
Probe length F ≥ 250 mm [9.84 in]:
2 g (IEC 60068-2-6, under resonance)

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

Ingress protection per IEC/EN 60529
IP65 and IP67
The stated ingress protection only applies when plugged in using mating connectors that have the appropriate ingress protection.

Mounting position
as required

 Probe

<table>
<thead>
<tr>
<th>Probe length (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
</tr>
<tr>
<td>mm</td>
</tr>
<tr>
<td>in</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compression fitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
</tr>
<tr>
<td>mm</td>
</tr>
<tr>
<td>in</td>
</tr>
</tbody>
</table>

Response time
T05 < 5 s (per DIN EN 60751)
T09 < 10 s (per DIN EN 60751)

Static operating pressure
max. 150 bar [2,175 psi]
When using a compression fitting:
max. 50 bar [max. 725 psi]
Reference conditions

Temperature: 15 ... 25 °C [59 ... 77 °F]
Atmospheric pressure: 950 ... 1,050 mbar [13.78 ... 15.23 psi]
Air humidity: 45 ... 75 % r. h.
Nominal position: Process connection lower mount
Supply voltage: DC 24 V
Load: see "Output signal"

Materials

Wetted parts
Probe: Stainless steel 1.4571

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

Process connections

Selectable versions

<table>
<thead>
<tr>
<th>Standard</th>
<th>Thread</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN EN ISO 1179-2 (parallel thread)</td>
<td>G ¼ A</td>
</tr>
<tr>
<td>DIN 3852-A (parallel thread)</td>
<td>G ½ A</td>
</tr>
<tr>
<td>ANSI / ASME B1.20.1 (tapered thread)</td>
<td>G ¼ A with compression fitting</td>
</tr>
<tr>
<td></td>
<td>G ½ A with compression fitting</td>
</tr>
<tr>
<td></td>
<td>¼ NPT</td>
</tr>
<tr>
<td></td>
<td>¼ NPT with compression fitting</td>
</tr>
<tr>
<td></td>
<td>½ NPT</td>
</tr>
<tr>
<td></td>
<td>½ NPT with compression fitting</td>
</tr>
</tbody>
</table>

Sealings

Selectable versions

<table>
<thead>
<tr>
<th>Connection per</th>
<th>Sealing material</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN EN ISO 1179-2 (parallel thread)</td>
<td>Standard NBR</td>
</tr>
<tr>
<td>DIN 3852-A (parallel thread)</td>
<td>Standard Copper</td>
</tr>
</tbody>
</table>

Electrical connections

Connections

- Circular connector M12 x 1 (4-pin)
- Circular connector M12 x 1 (5-pin) ¹)

1) Only for version with two switching outputs and additional analogue signal

Electrical safety

Short-circuit resistance: S₁ / SP1 / SP2 vs. U-
Reverse polarity protection: U+ vs. U-
Insulation voltage: DC 500 V
Overvoltage protection: DC 40 V

Connection diagrams

Circular connector M12 x 1 (4-pin)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U+</td>
<td>1</td>
</tr>
<tr>
<td>U-</td>
<td>3</td>
</tr>
<tr>
<td>S+</td>
<td>2</td>
</tr>
<tr>
<td>SP1 / C</td>
<td>4</td>
</tr>
<tr>
<td>SP2</td>
<td>2</td>
</tr>
</tbody>
</table>

Legend:

U+ Positive supply voltage
U- Reference potential
SP1 Switching output 1
SP2 Switching output 2
C Communication with IO-Link
S+ Analogue output
Dimensions in mm [in]

Temperature switch with circular connector M12 x 1 (4- and 5-pin)

Weight: approx. 0.3 kg [10.58 oz]

Compression fittings

For probe lengths, see page 3.
### Approvals

<table>
<thead>
<tr>
<th>Logo</th>
<th>Description</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU declaration of conformity</td>
<td>■ EMC directive, EN 61326 emission (group 1, class B) and immunity (industrial application)  ■ RoHS directive</td>
<td>European Union</td>
</tr>
<tr>
<td>UL</td>
<td>Safety (e.g. electr. safety, overpressure, ...)</td>
<td>USA</td>
</tr>
<tr>
<td>EAC</td>
<td>EMC directive</td>
<td>Eurasian Economic Community</td>
</tr>
<tr>
<td>GOST</td>
<td>Metrology, measurement technology</td>
<td>Russia</td>
</tr>
<tr>
<td>KazInMetr</td>
<td>Metrology, measurement technology</td>
<td>Kazakhstan</td>
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<td>-</td>
<td>MTSCHS</td>
<td>Kazakhstan</td>
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<tr>
<td>-</td>
<td>UkrSEPRO</td>
<td>Ukraine</td>
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<tr>
<td>-</td>
<td>CRN</td>
<td>Canada</td>
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</tbody>
</table>

### Accessories and spare parts

#### Compression fittings

<table>
<thead>
<tr>
<th>Description</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>G ¼ A per DIN 3852-A, stainless steel</td>
<td>11160136</td>
</tr>
<tr>
<td>G ½ A per DIN 3852-A, stainless steel</td>
<td>3221555</td>
</tr>
<tr>
<td>¼ NPT, stainless steel</td>
<td>3232905</td>
</tr>
<tr>
<td>½ NPT, stainless steel</td>
<td>14043934</td>
</tr>
</tbody>
</table>

When using compression fittings, a limited static operating pressure of max. 50 bar (max. 725 psi) applies.

#### 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</td>
<td>1537857</td>
</tr>
<tr>
<td>FPM/FKM profile sealing G ¼ A DIN EN ISO 1179-2</td>
<td>1576534</td>
</tr>
<tr>
<td>NBR profile sealing G ½ A DIN EN ISO 1179-2</td>
<td>1039067</td>
</tr>
<tr>
<td>FPM/FKM profile sealing G ½ A DIN EN ISO 1179-2</td>
<td>1039075</td>
</tr>
</tbody>
</table>
## Connectors with moulded cable

<table>
<thead>
<tr>
<th>Description</th>
<th>Temperature range</th>
<th>Cable diameter</th>
<th>Order number</th>
</tr>
</thead>
</table>
| Straight version, cut to length, 4-pin, 2 m [6.6 ft] PUR cable, UL listed, IP67 | -20 ... +80 °C  
[-4 ... +176 °F] | 4.5 mm [0.18 in] | 14086880     |
| Straight version, cut to length, 4-pin, 5 m [16.4 ft] PUR cable, UL listed, IP67 | -20 ... +80 °C  
[-4 ... +176 °F] | 4.5 mm [0.18 in] | 14086883     |
| Straight version, cut to length, 4-pin, 10 m [32.8 ft] PUR cable, UL listed, IP67 | -20 ... +80 °C  
[-4 ... +176 °F] | 4.5 mm [0.18 in] | 14086884     |
| Straight version, cut to length, 5-pin, 2 m [6.6 ft] PUR cable, UL listed, IP67 | -20 ... +80 °C  
[-4 ... +176 °F] | 5.5 mm [0.22 in] | 14086886     |
| Straight version, cut to length, 5-pin, 5 m [16.4 ft] PUR cable, UL listed, IP67 | -20 ... +80 °C  
[-4 ... +176 °F] | 5.5 mm [0.22 in] | 14086887     |
| Straight version, cut to length, 5-pin, 10 m [32.8 ft] PUR cable, UL listed, IP67 | -20 ... +80 °C  
[-4 ... +176 °F] | 5.5 mm [0.22 in] | 14086888     |
| Angled version, cut to length, 4-pin, 2 m [6.6 ft] PUR cable, UL listed, IP67  | -20 ... +80 °C  
[-4 ... +176 °F] | 4.5 mm [0.18 in] | 14086889     |
| Angled version, cut to length, 4-pin, 5 m [16.4 ft] PUR cable, UL listed, IP67  | -20 ... +80 °C  
[-4 ... +176 °F] | 4.5 mm [0.18 in] | 14086891     |
| Angled version, cut to length, 4-pin, 10 m [32.8 ft] PUR cable, UL listed, IP67 | -20 ... +80 °C  
[-4 ... +176 °F] | 4.5 mm [0.18 in] | 14086892     |
| Angled version, cut to length, 5-pin, 2 m [6.6 ft] PUR cable, UL listed, IP67  | -20 ... +80 °C  
[-4 ... +176 °F] | 5.5 mm [0.22 in] | 14086893     |
| Angled version, cut to length, 5-pin, 5 m [16.4 ft] PUR cable, UL listed, IP67  | -20 ... +80 °C  
[-4 ... +176 °F] | 5.5 mm [0.22 in] | 14086894     |
| Angled version, cut to length, 5-pin, 10 m [32.8 ft] PUR cable, UL listed, IP67 | -20 ... +80 °C  
[-4 ... +176 °F] | 5.5 mm [0.22 in] | 14086896     |

### Ordering information

Model / Measuring range / Output signal / Probe length / Process connection / Sealing / Accessories and spare parts

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