Gas-actuated temperature switch
Stainless steel switch enclosure
Model TWG

Applications
- Temperature monitoring and direct switching of electrical loads
- General process instrumentation in the chemical and petrochemical industries, oil and gas industries, power generation, water/wastewater industries, mining

Special features
- No power supply needed for switching of electrical loads
- Setting ranges from -30 ... +70 to 0 ... 600 °C
- Ex ia version available
- 1 or 2 independent set points, SPDT or DPDT, high switching power up to AC 250 V, 20 A
- Direct mounting or remote mounting with capillary ≤ 10 m

Description
These high-quality and robust temperature switches have been developed especially for safety-critical applications. The high quality of the products and manufacturing in accordance with ISO 9001 ensure reliable monitoring of your plant. In production, the switches are traced by quality assurance software at every step and subsequently are 100 % tested.

In order to ensure as flexible operation as possible, the temperature switches are fitted with micro switches, which enable the switching of an electrical load of up to AC 250 V, 20 A directly.

For lower switching power ratings, such as for PLC applications, argon gas-filled micro switches with gold-plated contacts can be selected as an option.

The measuring element is a gas-actuated system with a Bourdon tube element. This system allows wide setting range up to 0 ... 600 °C.

The measuring system parts and the flexible spiral armour are made of stainless steel.

The model TWG temperature switch is extremely robust and guarantees optimal operating characteristics and the highest measuring performances with repeatability lower than 0.5 % of span.
Standard version

Measuring system
Gas-actuated temperature system (SAMA class III B)

Switch enclosure
Stainless steel 316L, case cover with bayonet lock, protection against unauthorised access, lead sealing by customer possible. Laser-engraved product label from stainless steel

Ingress protection
IP66 per EN 60529 / IEC 60529, NEMA 4X

Permissible ambient temperature
-40 ... +85 °C

Switch contact
- Micro switches with fixed dead band
- 1 x or 2 x SPDT (single pole double throw)
- 1 x DPDT (double pole double throw)

- Micro switches with adjustable dead band
- 1 x SPDT (single pole double throw)

The DPDT function is realised with 2 simultaneously triggering SPDT micro switches within 0.2 % of the span.

<table>
<thead>
<tr>
<th>Contact version</th>
<th>Electrical rating (resistive load)</th>
<th>Suitable for Ex ia option</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN 1 x SPDT, silver</td>
<td>250 V, 15 A</td>
<td>No</td>
</tr>
<tr>
<td>US 1 x SPDT, silver, hermetically sealed, argon gas filling 2)</td>
<td>250 V, 15 A</td>
<td>Yes</td>
</tr>
<tr>
<td>USO 1 x SPDT, gold-plated, hermetically sealed, argon gas filling 2)</td>
<td>125 V, 1 A</td>
<td>Yes</td>
</tr>
<tr>
<td>UG 1 x SPDT, gold-plated</td>
<td>125 V, 1 A</td>
<td>No</td>
</tr>
<tr>
<td>UR 1 x SPDT, silver, adjustable dead band</td>
<td>250 V, 20 A</td>
<td>Yes 3)</td>
</tr>
<tr>
<td>DN 2 x SPDT or 1 x DPDT, silver</td>
<td>250 V, 15 A</td>
<td>No</td>
</tr>
<tr>
<td>DS 2 x SPDT or 1 x DPDT, silver, hermetically sealed, argon gas filling 2)</td>
<td>250 V, 15 A</td>
<td>Yes</td>
</tr>
<tr>
<td>DO 2 x SPDT, or 1 x DPDT gold-plated, hermetically sealed, argon gas filling 2)</td>
<td>125 V, 1 A</td>
<td>Yes</td>
</tr>
<tr>
<td>DG 2 x SPDT or 1 x DPDT, gold-plated</td>
<td>125 V, 1 A</td>
<td>No</td>
</tr>
</tbody>
</table>

2) Permissible ambient temperature range: -30 ... +70 °C
3) WIKA recommends argon gas-filled contact versions, use of adjustable dead band allowed

Set point adjustment
The set point can be specified by the customer or factory set within the setting range. Subsequent adjustment of the set point on site is made using the adjustment screw, which is fastened to the switch and thus secured against loss.

Repeatability of the set point
≤ 0.5 % of span

Distance between set points
For versions with 2 x SPDT the distance between the set points must be > 5 % of the respective span.

Ignition protection type (option)
- Ex ia I Ma (mines)
- Ex ia IIIC T6/T4 1) Ga (gas)
- Ex ia III C T85/T135 1) Da (dust)

1) The temperature class is related to the ambient temperature range. See the type examination certificate for further details.

Safety-related maximum values
(only for Ex ia version)

<table>
<thead>
<tr>
<th>Maximum values</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage $U_i$</td>
<td>DC 30 V</td>
</tr>
<tr>
<td>Current $I_i$</td>
<td>100 mA</td>
</tr>
<tr>
<td>Power $P_i$</td>
<td>0.75 W</td>
</tr>
<tr>
<td>Internal capacitance $C_i$</td>
<td>0 μF</td>
</tr>
<tr>
<td>Internal inductance $L_i$</td>
<td>0 mH</td>
</tr>
</tbody>
</table>

Please specify:
Set point, switching direction for each contact, e.g.:
Set point 1: 30 °C, falling, set point 2: 60 °C, rising.
With two micro switches, the set points can be set independently of each other.
For optimal performance we suggest to adjust the set point between 25 ... 75 % of the span.

Example:
Setting range: 0 ... 100 °C with one switch contact
Repeatability: 0.5 % of 100 °C = 0.5 °C
Dead band: 4.5 °C (see table setting ranges)
2 x repeatability + dead band = 2 x 0.5 °C + 4.5 °C = 5.5 °C
Rising temperature: Adjust set point between 5.5 ... 100 °C.
Falling temperature: Adjust set point between 0 ... 94.5 °C.
Version
- Direct mounting
- Remote mounting with capillary

Sensor dimensions

Direct mounting

Remote mounting with capillary

Adjustable insertion length Y for remote mounting with capillary

Due to the flexibility of the spiral armour, the insertion length (Y) can be adjusted during installation with the sliding compression fitting. The values are calculated as per the following equation:

- Minimum insertion length \( Y_{\text{min}} \) = see table above
- Maximum insertion length \( Y_{\text{max}} \) = capillary length (K) \( \times \) 150

Example:
- Capillary length K: 2 m
- Setting range: 0 ... 100 °C
- Stem diameter \( \varnothing \) D: 12 mm

Minimum insertion length \( Y_{\text{min}} \) = 145 mm
Maximum insertion length \( Y_{\text{max}} \) = 2 \( \times \) 150 mm = 300 mm

Adjustable insertion length \( Y = 145 \ldots 300 \) mm
The capillary length is reduced accordingly.
Maximum capillary reduction \( K = Y_{\text{max}} - Y_{\text{min}} = 300 - 145 = 155 \) mm

Minimum capillary length \( K_{\text{min}} = K - K_{\text{max}} = 2,000 - 155 = 1,845 \) mm

Due to the adjustable insertion length (Y) of 145 ... 300 mm, the resulting capillary length (K) varies between 2.0 ... 1,845 m.

Process connection

Stainless steel compression fitting, sliding on capillary or stem
- \( \frac{1}{2} \) NPT male (standard)
- \( \frac{3}{4} \) NPT, male
- G \( \frac{1}{2} \), male
- G \( \frac{3}{4} \), male

Electrical connection

- \( \frac{1}{2} \) NPT female (standard)
- \( \frac{3}{4} \) NPT, M 20 \( \times \) 1.5, G \( \frac{1}{2} \), G \( \frac{3}{4} \) female
- Cable gland non-armoured, nickel-plated brass
- Cable gland non-armoured, stainless steel (AISI 304)
- Cable gland armoured, nickel-plated brass
- Cable gland armoured, stainless steel (AISI 304)
- MIL connector, 7-pin, DTL 5015

For cable connections to the internal terminal block use wire cross-sections between 0.5 ... 2.5 mm².
For the internal and external grounding cable connection to the protective conductor screws use wire cross-sections ≤ 4 mm².

Dielectric strength

Safety class I (IEC 61298-2: 2008)

Mounting

- Direct (only for direct mounting)
- Wall mounting (only for remote mounting with capillary)
  - Standard: Mounting fixture from stainless steel (AISI 304)
  - Option: Mounting bracket for 2” pipe mounting

Weight

approx. 2.2 kg (with 2 m capillary)
### Setting range

<table>
<thead>
<tr>
<th>Setting range</th>
<th>Working range</th>
<th>Proof temperature</th>
<th>Fixed dead band</th>
<th>Adjustable dead band</th>
</tr>
</thead>
<tbody>
<tr>
<td>In °C</td>
<td>In °C</td>
<td>In °C</td>
<td>1 contact, UN, US, UO, UG in °C</td>
<td>2 contacts, DN, DS, DO, DG in °C</td>
</tr>
<tr>
<td>-30 ... +70</td>
<td>-40 ... +70</td>
<td>120</td>
<td>≤ 4.5</td>
<td>≤ 4.5</td>
</tr>
<tr>
<td>0 ... 100</td>
<td>-40 ... +100</td>
<td>120</td>
<td>≤ 4.5</td>
<td>≤ 4.5</td>
</tr>
<tr>
<td>0 ... 160</td>
<td>-40 ... +160</td>
<td>190</td>
<td>≤ 5</td>
<td>≤ 5</td>
</tr>
<tr>
<td>0 ... 250</td>
<td>-40 ... +250</td>
<td>300</td>
<td>≤ 6</td>
<td>≤ 6</td>
</tr>
<tr>
<td>0 ... 400 1)</td>
<td>-40 ... +400</td>
<td>500</td>
<td>≤ 10</td>
<td>≤ 10</td>
</tr>
<tr>
<td>0 ... 600 2)</td>
<td>-40 ... +600</td>
<td>600</td>
<td>≤ 17</td>
<td>≤ 17</td>
</tr>
</tbody>
</table>

1) For direct mounting version maximum working range ≤ 250 °C
2) Not available for direct mounting

### Options
- Other process connection, also with adapter
- Capillary length to customer specification
- Permissible ambient temperature -60 ... +85 °C 1)
- Helical bulb (ambient temperature: -30 ... +70 °C)
- Contact bulb, to measure surface temperatures on flat surfaces or pipes
- Other insertion length for direct mounting, ≤ 1 m
- Offshore version 2)
- NACE version 2)

1) Only available for contacts without hermetic sealing
2) WIKA recommends argon gas-filled contact versions, allowed use of adjustable dead band.

### Thermowell

In principle, the operation of a temperature switch without a thermowell is possible with low process-side loading (low pressure, low viscosity and low flow velocities). However, in order to enable exchanging the temperature switch during operation (e.g. instrument replacement or calibration) and to ensure a better protection of the instrument and also the plant and the environment, it is advisable to use a thermowell from the extensive WIKA thermowell portfolio. For further information on the calculation of the thermowell, see Technical information IN 00.15.

### Approvals

<table>
<thead>
<tr>
<th>Logo</th>
<th>Description</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC declaration of conformity</td>
<td>Low voltage directive 2006/95/EC, EN 60730-1</td>
<td>European Community</td>
</tr>
<tr>
<td>IECEx 1) per IEC 60079-0, IEC 60079-11, IEC 60079-26 (option)</td>
<td>Ex ia I Ma Ex ia IIIC T6/T4 2) Ga Ex ia IIIC T85/T135 2) Da</td>
<td>IECEx member states</td>
</tr>
<tr>
<td>EAC (option)</td>
<td>Hazardous areas (option)</td>
<td>Eurasian Economic Community</td>
</tr>
<tr>
<td>KOSHA (option)</td>
<td>Hazardous areas</td>
<td>South Korea</td>
</tr>
</tbody>
</table>

1) Double marking ATEX and IECEx on the same product label.
2) The temperature class is related to the ambient temperature range.

### Manufacturer’s information and certifications

<table>
<thead>
<tr>
<th>Logo</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIL 2 rating (option), per IEC 61508 Functional safety</td>
<td>The electrical rating for DC applications is limited to 30 V ... 100 mA</td>
</tr>
</tbody>
</table>
Certificates (option)

- 2.2 test report per EN 10204
- 3.1 inspection certificate per EN 10204

Approvals and certificates, see website

Dimensions in mm

Direct mounting

Remote mounting with capillary

For sensor dimensions D, X and Y see page 3

Ordering information

Model / Mounting / Number of switches / Contact type / Capillary length / Setting range / Process connection / Electrical connection / Options