

# Gas-actuated temperature switch Stainless steel switch enclosure Model TWG

WIKA data sheet TV 31.60



## Process Performance Series

### 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



**Model TWG, remote mounting with capillary**

### 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.

### Ignition protection type (option)

- Ex ia I Ma (mines)
- Ex ia IIC T6/T4 <sup>1)</sup> Ga (gas)
- Ex ia IIC T85/T135 <sup>1)</sup> Da (dust)

<sup>1)</sup> 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)

Maximum values	
Voltage $U_i$	DC 30 V
Current $I_i$	100 mA
Power $P_i$	0.75 W
Internal capacitance $C_i$	0 $\mu$ F
Internal inductance $L_i$	0 mH

Contact version		Electrical rating (resistive load)		Suitable for Ex ia option
		AC	DC	
UN	1 x SPDT, silver	250 V, 15 A	24 V, 2 A, 125 V, 0.5 A, 220 V, 0.25 A	No
US	1 x SPDT, silver, hermetically sealed, argon gas filling <sup>2)</sup>	250 V, 15 A	24 V, 2 A, 220 V, 0.5 A	Yes
UO	1 x SPDT, gold-plated, hermetically sealed, argon gas filling <sup>2)</sup>	125 V, 1 A	24 V, 0.5 A	Yes
UG	1 x SPDT, gold-plated	125 V, 1 A	24 V, 0.5 A	No
UR	1 x SPDT, silver, adjustable dead band	250 V, 20 A	24 V, 2 A, 220 V, 0.5 A	Yes <sup>3)</sup>
DN	2 x SPDT or 1 x DPDT, silver	250 V, 15 A	24 V, 2 A, 125 V, 0.5 A, 220 V, 0.25 A	No
DS	2 x SPDT or 1 x DPDT, silver, hermetically sealed, argon gas filling <sup>2)</sup>	250 V, 15 A	24 V, 2 A, 220 V, 0.5 A	Yes
DO	2 x SPDT, or 1 x DPDT gold-plated, hermetically sealed, argon gas filling <sup>2)</sup>	125 V, 1 A	24 V, 0.5 A	Yes
DG	2 x SPDT or 1 x DPDT, gold-plated	125 V, 1 A	24 V, 0.5 A	No

<sup>2)</sup> Permissible ambient temperature range: -30 ... +70 °C

<sup>3)</sup> 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.

### 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.

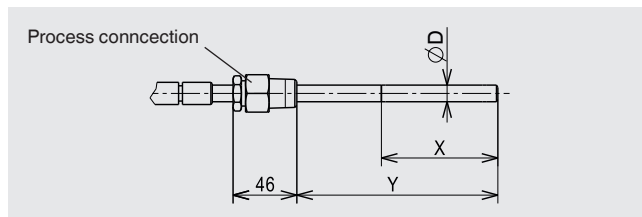
Falling temperature: Adjust set point between 0 ... 94.5 °C.

## Version

- Direct mounting
- Remote mounting with capillary

## Sensor dimensions

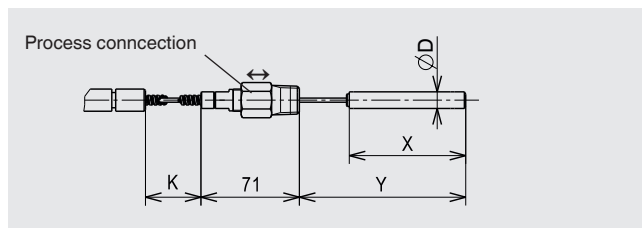
### Direct mounting



Stem diameter Ø D in mm	Active length X in mm	Insertion length Y in mm
<b>12 (standard)</b>	85	145 <sup>1)</sup>
<b>9.5 (option)</b>	135	195 <sup>1)</sup>

1) Other insertion length for direct mounting, ≤ 1 m

### Remote mounting with capillary



Bulb		Insertion length Y <sub>min</sub> in mm	Capillary length K in m
Stem diameter Ø D in mm	Active length X in mm		
<b>12 (standard)</b>	85 <sup>2)</sup>	≥ 145 <sup>2)</sup>	2, 4, 6, 8, 10
<b>9.5 (option)</b>	135	≥ 195	

2) X = 103 mm; Y = 163 mm for setting range 0 ... 600 °C

### 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<sub>min</sub> = see table above

Maximum insertion length Y<sub>max</sub> = capillary length (K) x 150

#### Example:

Capillary length K: 2 m

Setting range: 0 ... 100 °C

Stem diameter Ø D: 12 mm

Minimum insertion length Y<sub>min</sub> = 145 mm

Maximum insertion length Y<sub>max</sub> = 2 x 150 mm = 300 mm

Adjustable insertion length Y = 145 ... 300 mm

The capillary length is reduced accordingly.

Maximum capillary reduction

$$K^- = Y_{\max} - Y_{\min} = 300 - 145 = 155 \text{ mm}$$

Minimum capillary length

$$K_{\min} = K - K^- = 2,000 - 155 = 1,845 \text{ mm}$$

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

- ½ NPT male (standard)
- ¾ NPT, male
- G ½ A, male
- G ¾ A, male

### Electrical connection

- ½ NPT female (standard)
- ¾ NPT, M 20 x 1.5, G ½, G ¾ 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

Setting range	Working range	Proof temperature	Fixed dead band		Adjustable dead band
in °C	in °C	in °C	1 contact, UN, US, UO, UG in °C	2 contacts, DN, DS, DO, DG in °C	1 contact, UR in °C
-30 ... +70	-40 ... +70	120	≤ 4.5	≤ 4.5	15 ... 35
0 ... 100	-40 ... +100	120	≤ 4.5	≤ 4.5	15 ... 35
0 ... 160	-40 ... +160	190	≤ 5	≤ 5	18 ... 35
0 ... 250	-40 ... +250	300	≤ 6	≤ 6	21 ... 45
0 ... 400 <sup>1)</sup>	-40 ... +400	500	≤ 10	≤ 10	33 ... 77
0 ... 600 <sup>2)</sup>	-40 ... +600	600	≤ 17	≤ 17	50 ... 115

1) For direct mounting version maximum working range ≤ 250 °C

2) Not available for direct mounting

## 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.





## Options

- Other process connection, also with adapter
- Capillary length to customer specification
- Permissible ambient temperature -60 ... +85 °C <sup>1)</sup>
- 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 <sup>2)</sup>
- NACE version <sup>2)</sup>

1) Only available for contacts without hermetic sealing

2) Wika recommends argon gas-filled contact versions, allowed use of adjustable dead band.


## Approvals

Logo	Description	Country
	<b>EC declaration of conformity</b> ■ Low voltage directive 2006/95/EC, EN 60730-1 ■ ATEX <sup>1)</sup> directive 94/9/EC; annex III, IV (option) I M 1 II 1 GD	European Community
	<b>IECEx</b> <sup>1)</sup> per IEC 60079-0, IEC 60079-11, IEC 60079-26 (option) Ex ia I Ma Ex ia IIC T6/T4 <sup>2)</sup> Ga Ex ia IIIC T85/T135 <sup>2)</sup> Da	IECEx member states
	<b>EAC (option)</b> Hazardous areas (option)	Eurasian Economic Community
	<b>KOSHA (option)</b> Hazardous areas	South Korea

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

Logo	Description
	<b>SIL 2 rating (option)</b> , per IEC 61508 Functional safety The electrical rating for DC applications is limited to 30 V ... 100 mA

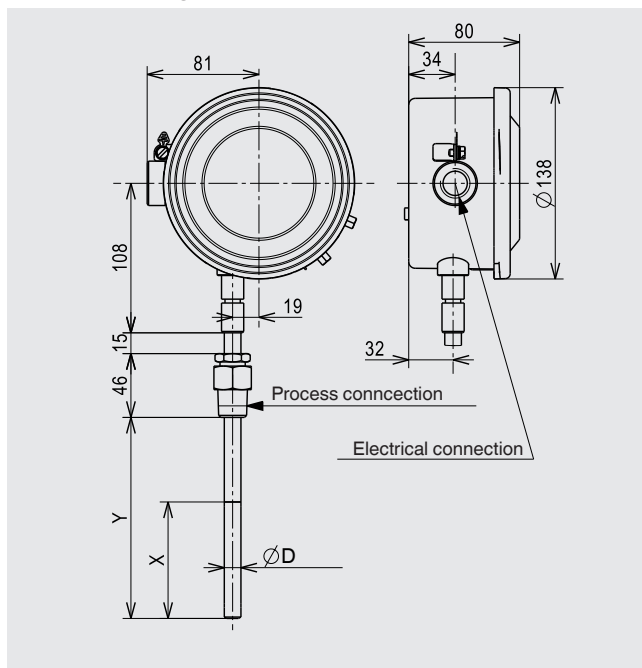
## Certificates (option)

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

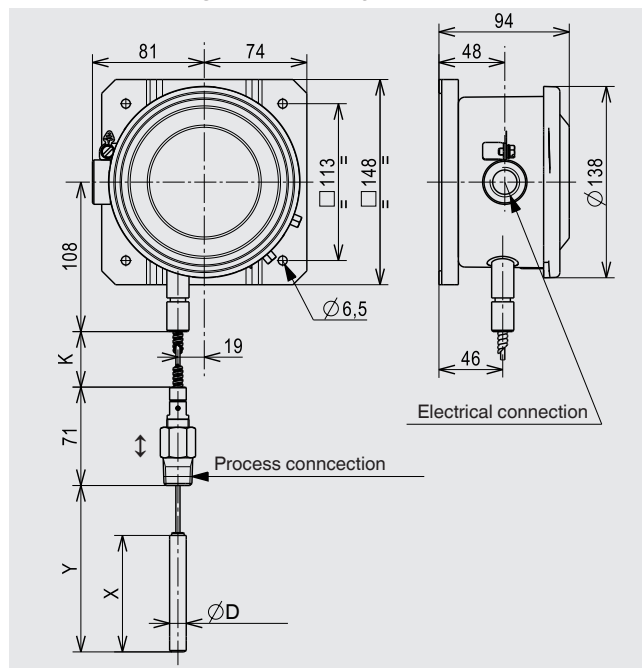
Approvals and certificates, see website

## 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

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WIKA data sheet TV 31.60 · 02/2016

Page 5 of 5