



## ***Instruction Manual***

### ***TFK02***

***Compact Resistance temperature sensor (Pt100)***



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## **Safety Information**

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### **General Instructions**

To ensure safe operation, the device should only be operated according to the specifications in the instruction manual. The requisite Health & Safety regulations for a given application must also be observed. This statement also applies to the use of accessories.

Every person who is commissioned with the initiation or operation of this device must have read and understood the operating instructions and in particular the safety instructions!

The liability of the manufacturer expires in the event of damage due to improper use, non-observance of this operating manual, use of insufficiently qualified personnel and unauthorized modification of the device.

### **Proper Usage**

The temperature measuring instruments of the TFK02 series are used for monitoring temperatures of gaseous and liquid media which do not attack the device materials. Any other use of the device is not permitted and is outside the scope of application..

In particular, applications in which shock loads occur (for example, pulsed operation) should be discussed and checked in advance with our technical staff.

The devices of the TFK02 series should not be used as sole monitoring devices in order to detect or even avoid dangerous operating states in plants or machines. Machinery and plant need to be designed in such a manner that faulty conditions and malfunctions do not arise that could pose a safety risk for operators.

### **Dangerous substances**

For dangerous media such as e.g. Oxygen, Acetylene, flammable or toxic substances as well as refrigeration systems, compressors, etc. must comply with the relevant regulations beyond the general rules.

## **Qualified Personnel**

The TFK02 devices may only be installed by trained, qualified personnel who are able to mount the devices correctly. Qualified personnel are persons, who are familiar with assembling, installation, placing in service and operating these devices and who are suitably trained and qualified.

## **Inward Monitoring**

Please check directly after delivery the device for any transport damages and deficiencies. Additional with reference to the accompanying delivery note the number of parts must be checked.

Claims for replacement or goods which relate to transport damage can only be considered valid if the delivery company is notified without delay.

## **Norms**

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Resistance thermometers generally comply with the DIN IEC 751 standard.  
Thermocouples generally comply with the DIN IEC 584 standard.

## **Installation and Commissioning**

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- The temperature measuring point should be prepared according to the indications for screw-in holes. For more information, please see of VDE/VDI directive 3511 and 3512 page 3.
- For sealing purposes, please use gaskets according to DIN 7603A.
- If the sensor is smooth, compression fittings can be used.
- The correct torque depends on material and design of the sealing used. It should not exceed 80 Nm.
- The mounting location should be free from strong vibration.
- The mounting location should be at a characteristic point in the process.
- The active length (the temperature-sensitive part) of a resistance thermometers is max. 30 mm at the lower end of the immersion tube. In media with a temperature stratification, only the temperature at the height of the immersion tube end is measured. If the average temperature is to be measured, special designs are required – please inquire.
- The smaller the probe dimension, the faster it will respond to temperature changes. The response speed improves most by reducing the probe diameter.

# Electrical Connection

**Attention:** Before the electrical connection of the device, it must be ensured that the supply voltage corresponds to the required one and that the supply voltage is switched off.

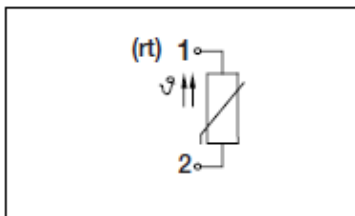
- The electrical connection is made via the terminals in the connection head.
- The exact pin assignment can be found in the drawings.
- The measuring current for resistance thermometers Pt100 is 0,3 – 1,0 mA. These values must not be exceeded.
- Commercially available copper cables with preferably 1.5 mm<sup>2</sup> cross-section are recommended as connections for resistance thermometers. We recommend twisted and shielded cables against magnetic or electrical interference.
- When connecting transmitters, the installation, connection and test specifications of the version to be used must be observed.

## Terminal Assignment for Resistance Thermometer Pt100

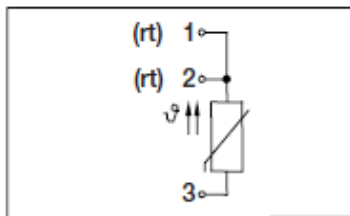
### 1. Connection for resistance output:

The type of connection has a considerable influence on the measuring accuracy.

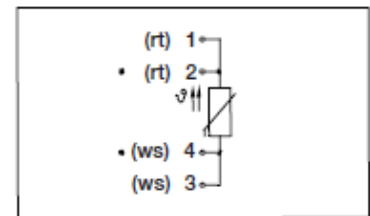
- The **2-wire** circuit, together with a balancing resistor, compensates 1 static lead resistance. Temperature-induced changes in the lead resistance are not compensated.
- The **3-wire** circuit compensates the lead resistance and its changes with a high accuracy. The prerequisite for the type of connection is three identical connecting cables, preferably three cores of the same cable.
- The **4-wire** circuit compensates all errors that can occur due to lead resistance.



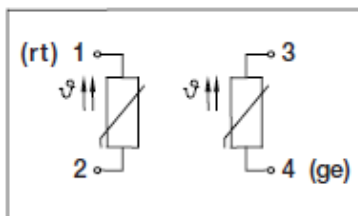
1 x Pt100 / 2-wire



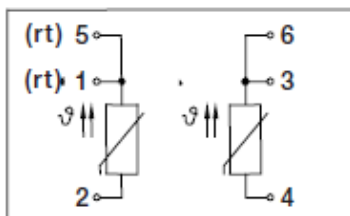
1 x Pt100 / 3-wire



1 x Pt100 / 4-wire



2 x Pt100 / 2-wire



2 x Pt100 / 3-wire

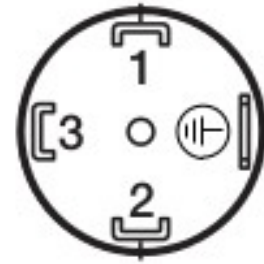
**Legende**  
 rt = red  
 ws = white  
 sw = black  
 ge = yellow

## **2. Connection for current analogue output 4...20 mA:**

2-wire: Pin 1 = +U<sub>B</sub>  
Pin 2 = GND / signal

## **3. Connection for voltage analogue output 0...10 V:**

3-wire: Pin 1 = +U<sub>B</sub>  
Pin 2 = GND  
Pin 3 = signal



## **Maintenance and Care**

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The resistance thermometers described here are maintenance-free. They do not contain any components that have to be repaired or replaced on site. Repairs are only carried out at the manufacturer's works.

## **Calibration**

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We recommend an inspection interval of 2 years. The calibration period is determined individually by the user and depends on the intensity of use.

If inadmissible deviations (defined by the customer) occur during recalibration, the recalibration period must be shortened.

# TFK02

## Compact Resistance Temperature Sensor (Pt100)

- with angle plug acc. to DIN EN 175301-803 form A
- small design
- interchangeable insert
- integrated transmitter optional
- resistance, current and voltage output
- wetted parts made of stainless steel 1.4571
- measuring range from -200 °C to 600 °C
- short response time
- easy to service
- max. pressure: 25 bar (40 bar on request)



### Description:

A temperature-dependent electrical resistance is integrated in a stainless steel protective tube. This changes its ohmic resistance depending on the temperature of the medium. In the version with built-in transmitter, this value is converted into a 4...20 mA current signal or a 0-10 V voltage signal and provided at the terminals of the cubic plug. In the version without transmitter, the pure resistance value can be tapped at the connector. To achieve short response times, there is a version with a rejuvenated immersion shaft. The use of the angle plug according to DIN EN 175301-803 is advantageous.

### Typical applications:

The resistance thermometers are very well suited for use in general machine, apparatus, plant, container and pipeline construction, as well as in the chemical and process engineering and food industries, where they are preferably used for detecting the temperature in liquid and gaseous media. Their compact design makes them particularly suitable for installation in places with limited space.

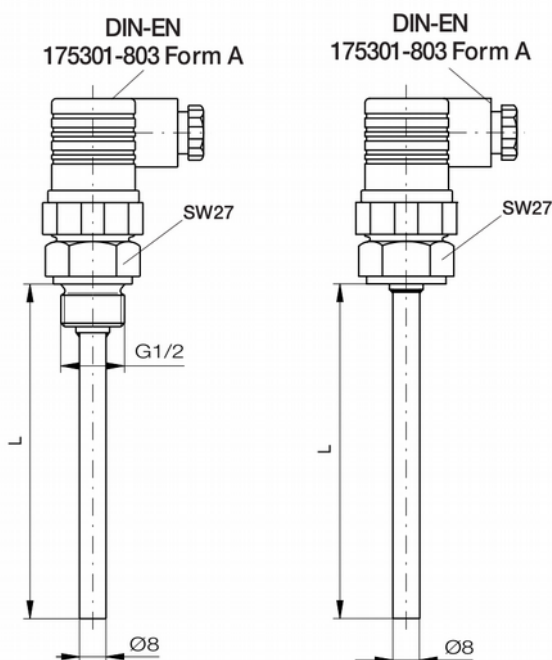
## Models:

TFK02.xPx:	output Pt100, 2-,3 or 4-wire single or double element
TFK02.A04:	output 4–20 mA, 2-wire
TFK02.V10:	output 0–10 V, 3-wire

## Technical Data:

<b>Sensor:</b>	Pt100 acc. to DIN IEC 751, class A
<b>Measuring ranges:</b>	-50...200 °C w/o neck tube -50...400 °C with neck tube 50 mm 0...600 °C with neck tube -200...+100 °C with neck tube 50 mm
<b>Electr. connection:</b>	angle plug form A acc. to DIN EN 175301-803, IP65
<b>Thermowell:</b>	
Diameter	6 or 8 mm
Material:	stainless steel 1.4571
<b>Process connection:</b>	fix screw connection or movable compression fitting others (e.g. Clamp) on request
<b>Max. pressure:</b>	PN 25 (PN 40 on request)
<b>Transmitter:</b>	
<b>Power supply:</b>	depend on output
<b>Output:</b>	4–20 mA, 2-wire, 10...35 VDC 0–10 V, 3-wire, 15...35 VDC
<b>Min. turn down ratio:</b>	20 Kelvin
<b>Max. turn down ratio:</b>	800 Kelvin
<b>Accuracy:</b>	0,3 % of full scale

## Dimensions:



## Order Code:

Order number: TFK02. 1P2. 6. 08F. 0050. 200. 0

### Compact resistance temperature sensor

#### Sensor:

1P2 = 1 x Pt100, 2-wire  
1P3 = 1 x Pt100, 3 wire  
1P4 = 1 x Pt100, 4 wire  
2P2 = 2 x Pt100, 2-wire  
A04 = 4–20 mA\*  
V10 = 0–10 V\*

\*please specify measuring range preferably 0...50 °C, 0...100 °C, 0...120 °C)

#### Diameter of immersion shaft:

6 = 6 mm  
8 = 8 mm

#### Process connection:

0 = without screw conn., only immersion shaft  
(compression fitting see accessories)

08F = G 1/4 A fix  
10F = G 3/8 A fix  
15F = G 1/2 A fix  
2NF = 1/2" NPT fix

#### other connections on request

#### Installation length L:\*\*

0025 = 25 mm (only with fix screw connection)  
0050 = 50 mm (only with fix screw connection)  
0075 = 75 mm (only with fix screw connection)  
0100 = 100 mm \*\*  
0160 = 160 mm \*\*  
0200 = 200 mm \*\*  
0250 = 250 mm \*\*  
0500 = 500 mm \*\*  
xxxx = please specify in plain text

#### Temperature range:

200 = -50...200 °C without neck tube  
400 = -50...400 °C with neck tube 50 mm  
600 = 0...600 °C with neck tube  
    a) w/o transmitter 50 mm  
    b) with transmitter 100 mm, also fix measuring insert  
100 = -200...+100 °C with neck tube 50 mm (special design)

#### Options:

0 = without  
VR = rejuvenated immersion shaft (description see "Options")

\*\* with fix screw connection: measured from sealing edge of screw connection; with removable connection: entire shaft length

## Accessories:

Order number: SVQ. V.08. 06

### Compression fitting (installation length min. 100 mm)

#### Process connection:

V.08 = G 1/4 male  
V.10 = G 3/8 male  
V.15 = G 1/2 male  
V.08N = 1/4" NPT  
V.15N = 1/2" NPT

#### Diameter of immersion shaft:

06 = 6 mm  
08 = 8 mm

## Options:

Thermowell reduced to 3 mm diameter for faster response times. Only for versions with fixed screw connection and thermowell diameter 6 mm.