

# Resistance thermometer Model TR10-H, without thermowell

WIKA data sheet TE 60.08



for further approvals  
see page 9

## Applications

- For direct installation into the process
- Machine building
- Motors
- Bearing
- Pipelines and vessels

## Special features

- Application ranges from -200 ... +600 °C  
(-328 ... +1,112 °F)
- For insertion, screw-in with optional process connection
- Connection head form B or JS
- Explosion-protected versions

## Description

Resistance thermometers without thermowell are particularly suitable for those applications in which the metal sensor tip is mounted directly into bored holes (e.g. in machine components) or directly into the process for any application with no chemically aggressive media or abrasion.

For mounting into a thermowell, a spring-loaded compression fitting should be provided, since only this can press the sensor tip into the bottom of the thermowell. Otherwise a potentially critical force could be exerted on the measuring tip. Mounting is usually made directly into the process. Fastening elements such as threaded fittings, union nuts, etc. are available as options.

The flexible part of the sensor is a mineral-insulated cable (sheathed cable). It consists of a stainless steel outer sheath in which the internal lead is pressed and isolated within a high-density ceramic mass. The measuring resistance is connected directly to the internal leads of the sheathed cable and is, therefore, also suitable for use at higher temperatures.



**Resistance thermometer without thermowell,  
model TR10-H**

Due to their flexibility and the small possible diameters, sheathed resistance thermometers can also be used in locations that are not easily accessible, since, with the exception of the sensor tip and the transition of the connection cable, the sheath can be bent to a radius of three times the diameter of the cable.

### Please note:

The flexibility of the sheathed resistance thermometer must be considered, especially when the flow rates are relatively high.

Optionally we can fit analogue or digital transmitters from the WIKA range into the connection head.

## Sensor

The sensor is located in the sensor tip.

### Sensor connection method

- 2-wire
- 3-wire
- 4-wire

### Sensor tolerance value per DIN EN 60751

- Class B
- Class A
- Class AA

Combinations of 2-wire connection and class A or class AA are not allowed.

For detailed specifications for Pt100 sensors, see Technical information IN 00.17 at [www.wika.com](http://www.wika.com).

### Metal sensor

Material     Stainless steel  
Diameter    2, 3, 6 or 8 mm  
Length       selectable

Regardless of the design, the first 60 mm of the sensor tip must not be bent.

For temperature measurement in a solid body, the diameter of the bore into which the sensor should be inserted, should be no more than 1 mm larger than the sensor diameter.

## Maximum working temperatures

The maximum temperatures for this thermometer are limited by different parameters:

### ■ Sensor

The temperature range is limited by the sensor itself. Depending on the accuracy class and operating conditions the optimum can be chosen.

Outside of the defined measuring range the measurement is no longer accurate and the sensor can be damaged.

### ■ Connection head

Permissible ambient temperature of the connection head: 80 °C

### ■ Working temperature

If the temperature to be measured is higher than the permissible temperature at the connection head, the metal part of the sensor must be long enough to be outside of the hot zone.

## IP protection

Standard ingress protection: IP65

## Sensor tip designs

### ■ Standard version

In the standard version a sensor is fitted which is appropriate for the selected measuring range. This sensor can be operated with acceleration loads of up to 30 m/s<sup>2</sup>. (test in accordance with DIN EN 60751)

### ■ Peak response (thin-film sensor)

A special measuring resistor is connected directly to the sensor tip. Due to direct contact to the tip this version cannot be used as an intrinsically safe thermometer.

### ■ Vibration-resistant sensor tip (peak-to-peak, max. 20 g)

Special resistors are used for this extremely robust version. In addition special internal design is chosen which durably resists these high loads. (test based on DIN EN 60751)

## Process connections

The TR10-H sheathed resistance thermometers can be fitted optionally with the process connections shown below. The insertion length  $A$  ( $U_1$  or  $U_2$ ) can be customised. The neck length,  $N$  ( $M_H$ ), depends on the type of the process connection selected.

To minimise heat dissipation errors via the threaded connection, the insertion length,  $A$ , should be at least 25 mm long. The position of the threaded connection is specified by the dimension  $N$  ( $M_H$ ), and is not dependent on the connection type.

### ■ Without process connection

This version is designed mainly for mounting in one of the available compression fittings. All heads of the size form B and KN can be used.

The neck length  $N$  ( $M_H$ ) here is only the height of the hexagon at the top of the thermowell.

$N$  ( $M_H$ ) is always 10 mm.

### ■ Without process connection (miniature version)

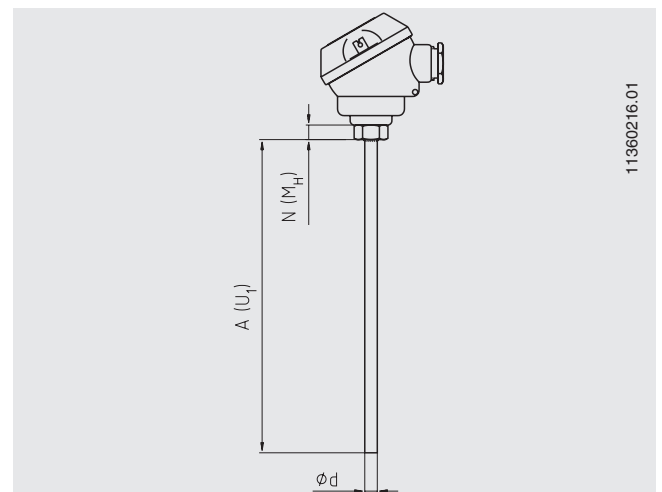
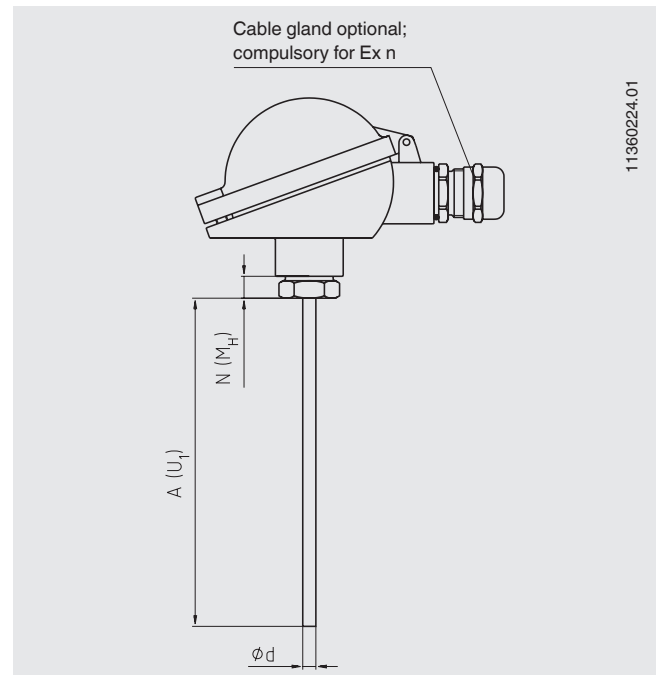
This version is designed mainly for mounting in one of the available compression fittings. Only connection heads of the JS design can be used.

The neck length  $N$  ( $M_H$ ) here is only the height of the hexagon at the top of the thermowell.

$N$  ( $M_H$ ) is always 7 mm.

### Please note:

- For parallel threads (e.g. G ½) the dimensioning always refers to the sealing collar of the threaded connector nearest the process.
- For tapered threads (e.g. NPT) the measurement plane is located approx. in the centre of the thread.

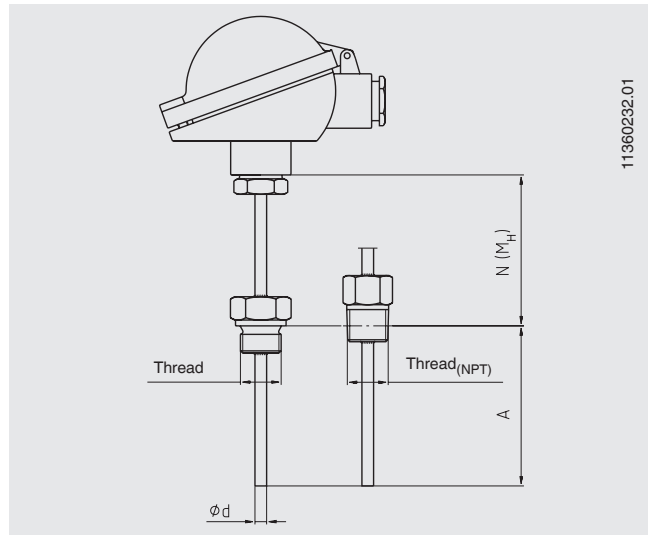


### ■ Protruded fixed thread

This version is used for the mounting of thermometers into threaded couplings with female threads.

Insertion length A: in accordance with customer specification  
Material: stainless steel, others on request

The sensor must be rotated in order to screw it into the process. Therefore, this design must first be mounted mechanically and it can then be electrically connected.



### ■ Compression fitting

This version allows simple adjustment to the required insertion length at the installation point.

Since the compression fitting is movable on the sensor, the A and N (M<sub>H</sub>) dimensions define the as-delivered condition. The length of the compression fitting determines the smallest possible neck length N (M<sub>H</sub>) of approx. 40 mm.

Material: stainless steel

Ferrule material: stainless steel or PTFE

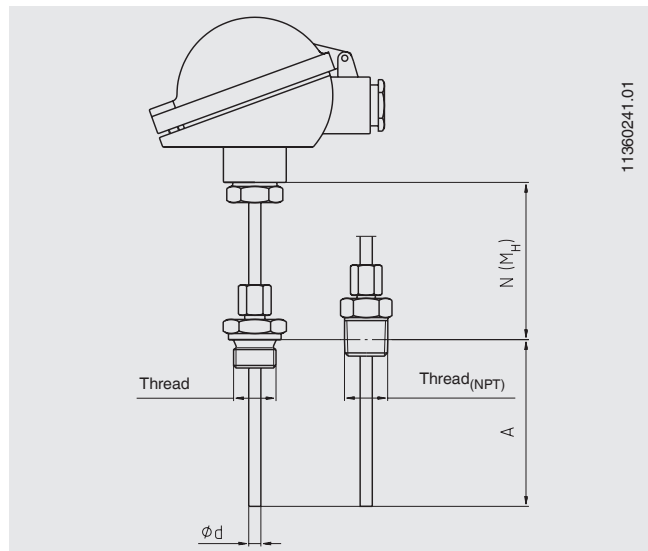
Stainless steel ferrules can be adjusted once; once they have been unscrewed, sliding along the sheath is no longer possible.

- Max. temperature at process connection 500 °C
- Max. pressure load 40 bar

PTFE ferrules can be adjusted several times, after unscrewing, repeated sliding along the sheath is still possible.

- Max. temperature at process connection 150 °C
- Max. pressure load 25 bar

For sheathed resistance thermometers with a Ø of 2 mm, only PTFE ferrules are approved.



■ **Spring-loaded compression fitting**

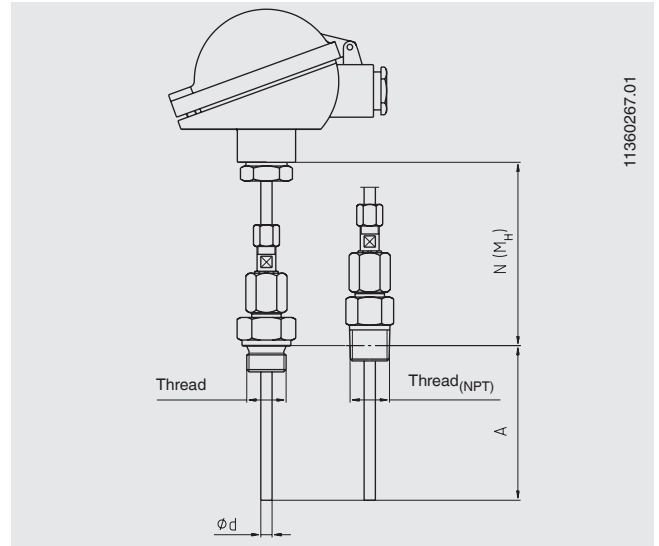
This version allows easy adjustment to the desired mounting length at the mounting point, while at the same time sustaining the spring pre-tension

Since the compression fitting is movable on the sensor, the A and N (M<sub>H</sub>) dimensions define the as-delivered condition. The length of the compression fitting determines the smallest possible neck length N (M<sub>H</sub>) of approx. 80 mm.

Material: stainless steel  
 Ferrule material: stainless steel

Stainless steel ferrules can be adjusted once; once they have been unscrewed, sliding along the sheath is no longer possible.

- Max. temperature at process connection 500 °C
- Pressure load is not provided for



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■ **Spring-loaded compression fitting, can work with pressures up to max. 8 bar**

allows easy adjustment to the desired insertion length at the mounting point, while at the same time maintaining the spring pre-tension, intended for use with hydraulic oil

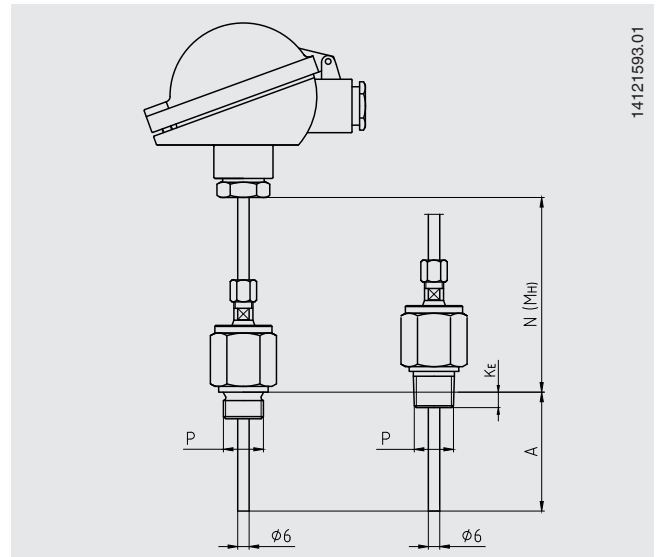
Since the compression fitting is movable on the sensor, the A and N (M<sub>H</sub>) dimensions define the as-delivered condition. The length of the compression fitting determines the smallest possible neck length N (M<sub>H</sub>) of approx. 80 mm.

Material: stainless steel  
 Ferrule material: stainless steel

Stainless steel ferrules can be adjusted once; once they have been unscrewed, sliding along the sheath is no longer possible.

- Permissible temperature at process connection -30 ... +100 °C

A pressure load on the spring-loaded compression fitting is permissible up to a max. 8 bar.



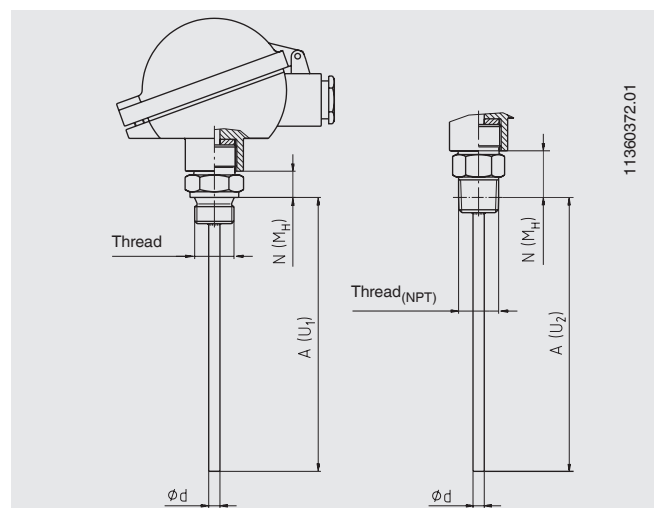
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■ **Double nipple**

Using a double-sided threaded nipple, the thermometer can be screwed directly into the process. In this case the permissible temperature ranges must be observed.

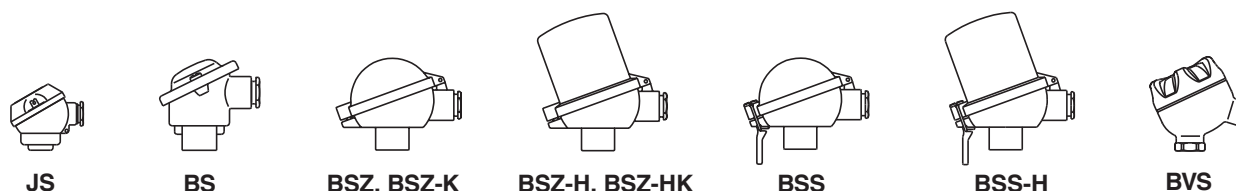
The neck length, N (M<sub>H</sub>), for parallel threads depends on the height of the hexagon. This is 13 mm.

The neck length, N (M<sub>H</sub>), of NPT threads not only includes the hexagon height but also half of the thread height. This gives us a neck length, N (M<sub>H</sub>), of approx. 25 mm.



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## Connection head



Model	Material	Cable outlet	Ingress protection	Cap	Surface
JS	Aluminium	M16 x 1.5 <sup>1)</sup>	IP65	Cap with 2 screws	Blue, lacquered <sup>2)</sup>
BS	Aluminium	M20 x 1.5 <sup>1)</sup>	IP65 (IP68)	Cap with 2 screws	Blue, lacquered <sup>2)</sup>
BSZ	Aluminium	M20 x 1.5 <sup>1)</sup>	IP65 (IP68)	Hinged cover with cylinder head screw	Blue, lacquered <sup>2)</sup>
BSZ-K	Plastic	M20 x 1.5 <sup>1)</sup>	IP65	Hinged cover with cylinder head screw	Black
BSZ-H	Aluminium	M20 x 1.5 <sup>1)</sup>	IP65 (IP68)	Hinged cover with cylinder head screw	Blue, lacquered <sup>2)</sup>
BSZ-HK	Plastic	M20 x 1.5 <sup>1)</sup>	IP65	Hinged cover with cylinder head screw	Black
BSS	Aluminium	M20 x 1.5 <sup>1)</sup>	IP65	Hinged cover with clamping lever	Blue, lacquered <sup>2)</sup>
BSS-H	Aluminium	M20 x 1.5 <sup>1)</sup>	IP65	Hinged cover with clamping lever	Blue, lacquered <sup>2)</sup>
BVS	Stainless steel	M20 x 1.5 <sup>1)</sup>	IP65	Screw cap	Precision casting, electropolished

1) Standard  
2) RAL 5022

## Connection head with digital indicator (option)

As an alternative to the standard connection head the thermometer can be fitted with an optional DIH10 digital indicator. The connection head used for this is similar to the model BSZ-H head. For operation, a 4 ... 20 mA transmitter is needed, which is mounted to the measuring insert. The indication range is configured identically to the measuring range of the transmitter. Designs with ignition protection type "intrinsically safe", Ex i (gas), are also available.

For the fixed protruded thread and double nipple versions, final orientation cannot be predicted when screwing the connection head on. Therefore, the alignment of the digital indicator cannot be predefined.

In order to ensure safe readability of the display the DIH10 can only be delivered with the following ordering options:

- with compression fitting
- without process connection



Fig. connection head with digital indicator, model DIH10

## Transmitter (option)

Depending on the connection head used, a transmitter can be mounted within the thermometer.

- Mounted instead of terminal block
- Mounted within the cap of the connection head
- Mounting not possible

Mounting of 2 transmitters on request.

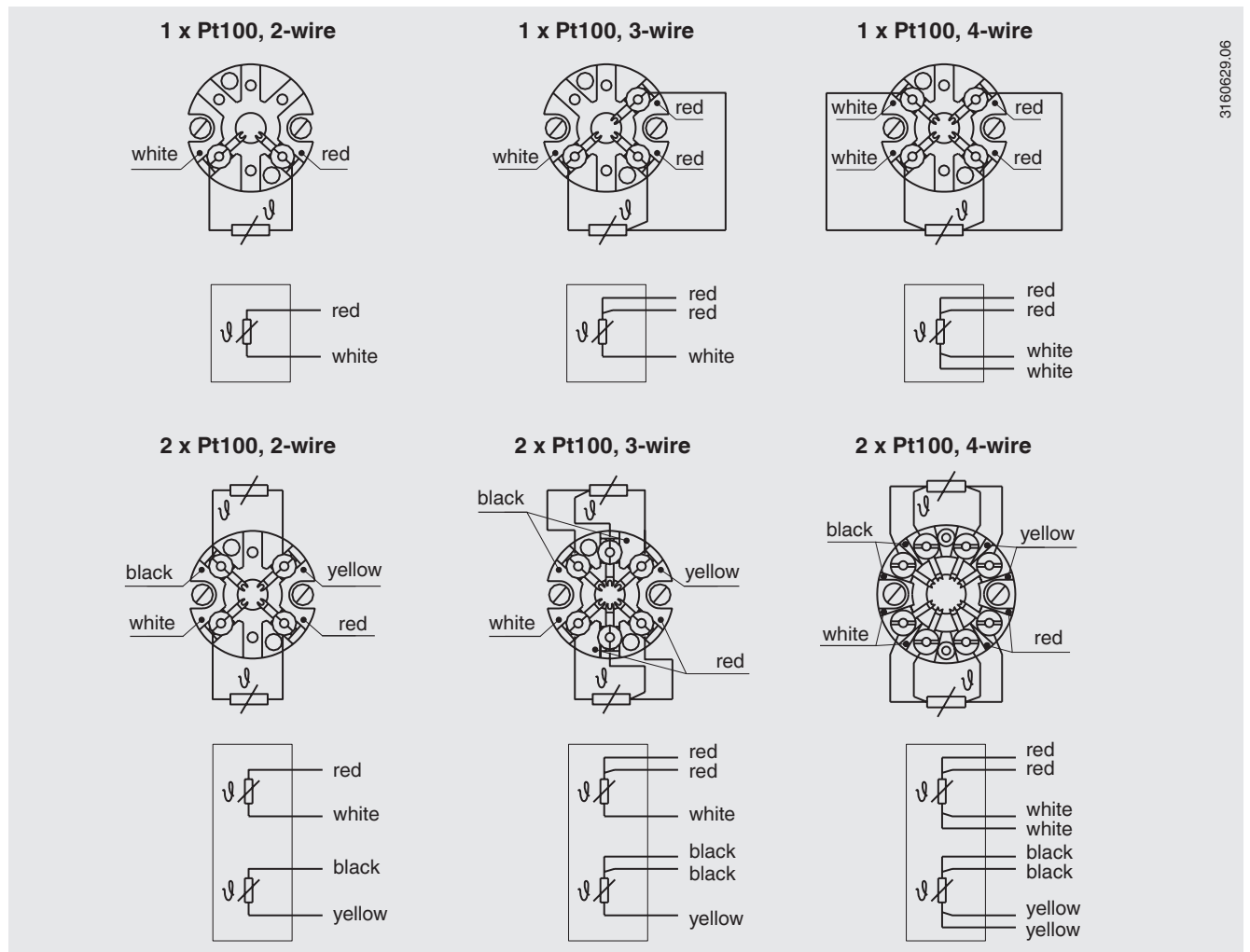
Connection head	Transmitter model				
	T12	T15	T32	T53	T91.20
JS	-	-	-	-	○
BS	-	-	-	○	-
BSZ / BSZ-K	○	○	○	○	-
BSZ-H / BSZ-HK	●	●	●	●	-
BSS	○	○	○	○	-
BSS-H	●	●	●	●	-
BVS	○	○	○	○	-

Model	Description	Explosion protection	Data sheet
T12	Digital transmitter, PC configurable	Optional	TE 12.03
T15	Digital transmitter, PC configurable	Optional	TE 15.01
T32	Digital transmitter, HART® protocol	Optional	TE 32.04
T53	Digital transmitter FOUNDATION™ Fieldbus and PROFIBUS® PA	Standard	TE 53.01
T91.20	Analogue transmitter, configurable	Without	TE 91.01

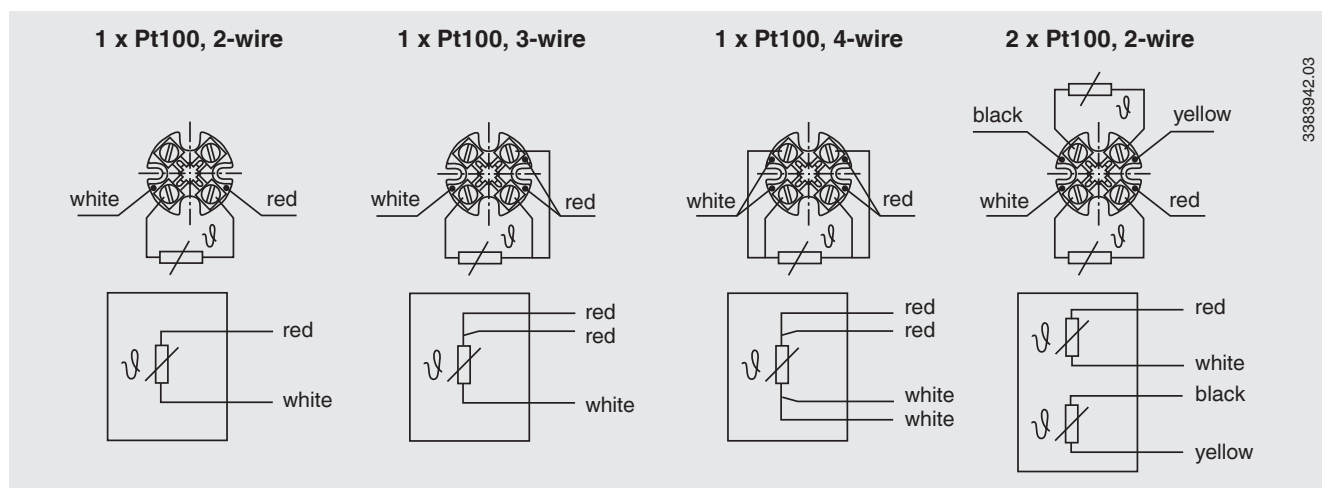
## Electrical connection

(colour code per EN/IEC 60751)

### Connection head form B



## Connection head model JS



For the electrical connections of built-in temperature transmitters see the corresponding data sheets or operating instructions.

## Explosion protection (option)

Resistance thermometers of the TR10-H series are available with an EC-type examination certificate for "intrinsically safe", Ex i, ignition protection.








These instruments comply with the requirements of the ATEX directive for gases and dusts.

The classification/suitability of the instrument (permissible power  $P_{max}$  as well as the permissible ambient temperature) for the respective category can be seen on the EC-type examination certificate and in the operating instructions.

Built-in transmitters have their own EC-type examination certificate. The permissible ambient temperature ranges of the built-in transmitters can be taken from the corresponding transmitter approval. The system operator is responsible for using suitable thermowells.



## Approvals

Logo	Description	Country
	<b>EC declaration of conformity</b> <ul style="list-style-type: none"> <li>■ EMC directive <sup>1)</sup></li> <li>EN 61326 emission (group 1, class B) and interference immunity (industrial application)</li> <li>■ ATEX directive (option)</li> </ul>	European Community
	<b>IECEx (option)</b> Hazardous areas	IECEx member states
	<b>EAC (option)</b> <ul style="list-style-type: none"> <li>■ Import certificate</li> <li>■ Hazardous areas</li> </ul>	Eurasian Economic Community
	<b>GOST (option)</b> Metrology, measurement technology	Russia
	<b>INMETRO (option)</b> <ul style="list-style-type: none"> <li>■ Metrology, measurement technology</li> <li>■ Hazardous areas</li> </ul>	Brasil
	<b>NEPSI (option)</b> Hazardous areas	China
	<b>KOSHA (option)</b> Hazardous areas	South Korea
-	<b>PESO (option)</b> Hazardous areas	India

1) Only for built-in transmitter

## Certificates (option)

Certification type	Measuring accuracy	Material certificate
<b>2.2 test report</b>	x	x
<b>3.1 inspection certificate</b>	x	-
<b>DKD/DAkkS calibration certificate</b>	x	-

The different certifications can be combined with each other.

Approvals and certificates, see website

## Ordering information

Model / Explosion protection / Connection head / Cable outlet or connection head / Terminal block, transmitter / Process connection / Measuring element / Connection method / Temperature range / Sensor diameter / Insertion length / Neck length / Certificates / Options

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