

Resistance thermometer

Model TR10-H without thermowell

WIKA data sheet TE 60.08



Applications

- For direct process connection
- Machine building
- Motors
- Storage
- Pipelines and vessels

Special features

- Application ranges from -200 ... +600 °C
- For insertion, screw-in with optional process connection
- Connection head form B or JS
- Explosion-protected versions Ex-i, Ex-n and NAMUR NE24

Description

Resistance thermometers without thermowells are particularly suitable for those applications in which the metallic 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 should be provided, since only this can press the sensor tip into the bottom of the thermowell. Mounting is usually made directly into the process. Fastening elements such as threaded fittings, union nuts etc. can also be used.

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 be used in locations that are not easily accessible, since, with the exception of the sensor tip and the pot seal 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 tip of the measuring insert.

Sensor connection method

- 2-wire The lead resistance is recorded as an error in the measurement.
- 3-wire With a cable length of approx. 30 m or longer, measuring errors can occur.
- 4-wire The internal lead resistance of the connecting wires is negligible.

Tolerance value of the sensor to DIN EN 60751

- Class B
- Class A
- Class AA

The combinations of a 2-wire connection with Class A / Class AA are not permissible, since the lead resistance of the measuring insert negates the higher sensor accuracy.

For detailed specifications for Pt100 sensors, see Technical Information IN 00.17 at www.wika.com.

Possible measuring ranges

- 50 ... +250 °C
- 50 ... +450 °C
- 200 ... +250 °C
- 50 ... +400 °C (only Class A)
- 200 ... +450 °C
- 200 ... +600 °C (from 450 °C Class B)
- 200 ... +400 °C
- 50 ... +600 °C (only Class B)

Metallic 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 in 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 for the connection head:
120 °C for versions without a transmitter,
85 °C for versions with a transmitter
- Working temperature
If the temperature to be measured is higher than the permissible temperature at the connection head, the metallic part of the sensor must be long enough to be outside of the hot zone.

IP protection

The standard protection class of the TR10-H is IP 65.

Sensor tip design

■ 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^2 . (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 (max. 10 g)

Special resistors are used for this extremely robust version. In addition special internal design is chosen which durably resists these high loads (100 m/s^2).
(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 mounting 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.

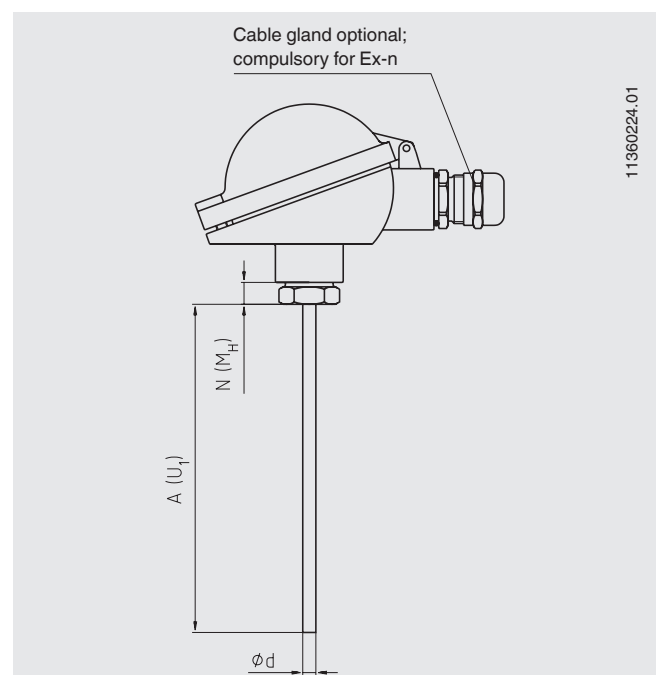
Please note:

- For parallel threads (e.g. $G \frac{1}{2}$) the dimensioning always refers to the sealing collar of the threaded connector nearest the process.
- For tapered threads the measurement plane is located approx. in the centre of the thread.

■ 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), in this case only specifies the height of the hexagon on the head of the thermowell.
 N (M_H) is always 10 mm.

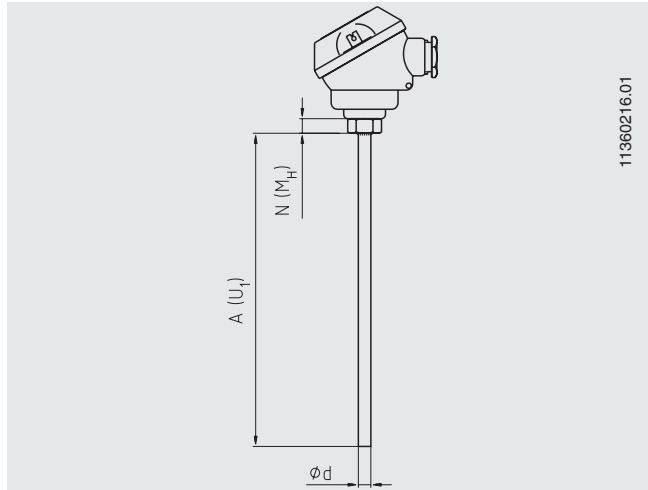


■ **Without process connection (basic version)**

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 tube, $N(M_H)$, in this case only specifies the height of the hexagon on the head of the thermowell. $N(M_H)$ is always 7 mm.



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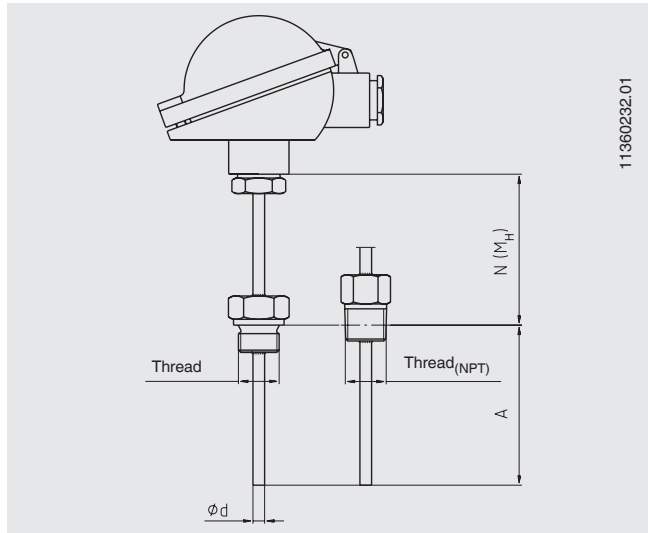
■ **Protruded fixed thread**

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.



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■ **Compression fitting**

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

Since the compression fitting can be slid along the sensor, the A and $N(M_H)$ dimensions specify the as-delivered condition. The length of the compression fitting determines the smallest possible neck length, $N(M_H)$, of approx. 40 mm.

Material: stainless steel

Sealing ring material: stainless steel or PTFE

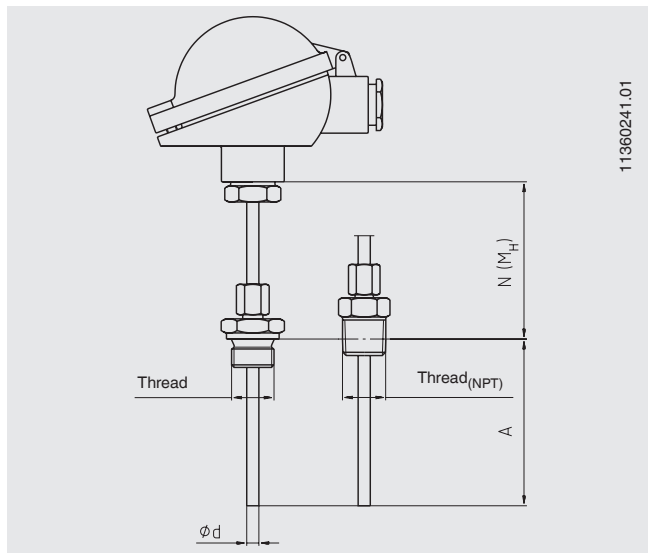
Stainless steel sealing rings can be adjusted once; once they have been unscrewed, sliding along the sheath is no longer possible.

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

PTFE sealing rings 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 ϕ of 2 mm, only PTFE sealing rings are approved.



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■ 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

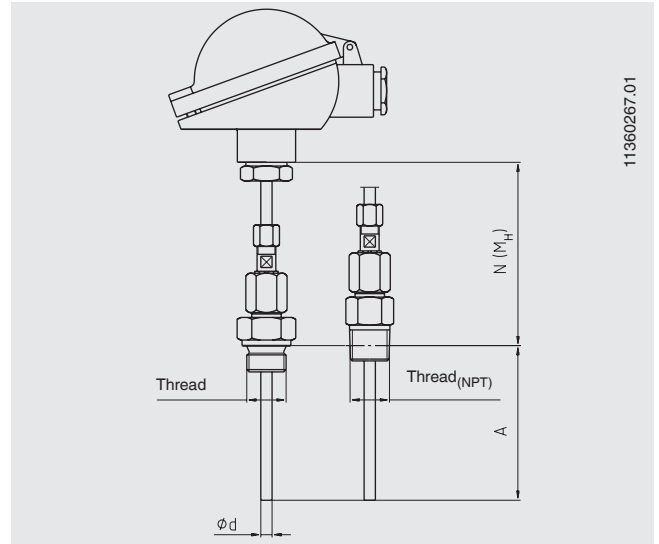
Since the compression fitting is movable on the sensor, the A and N(M_H) dimensions define the as-delivered condition. The length of the compression fitting determines the smallest possible neck length N(M_H) of approx. 80 mm.

Material: stainless steel

Sealing ring material: stainless steel

Stainless steel sealing rings 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



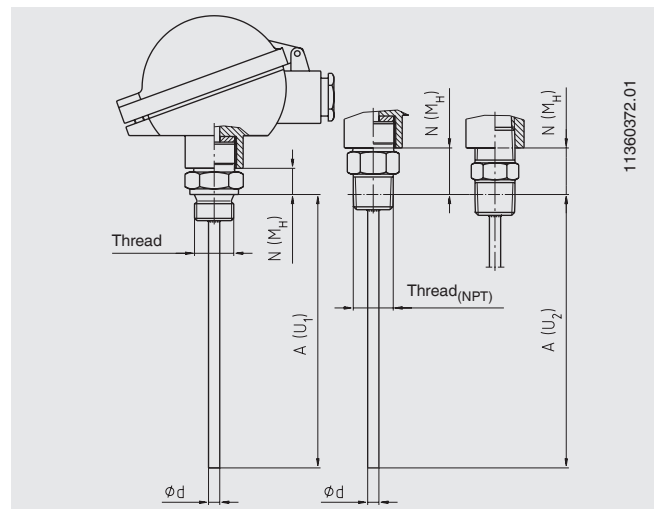
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■ Double nipple

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.

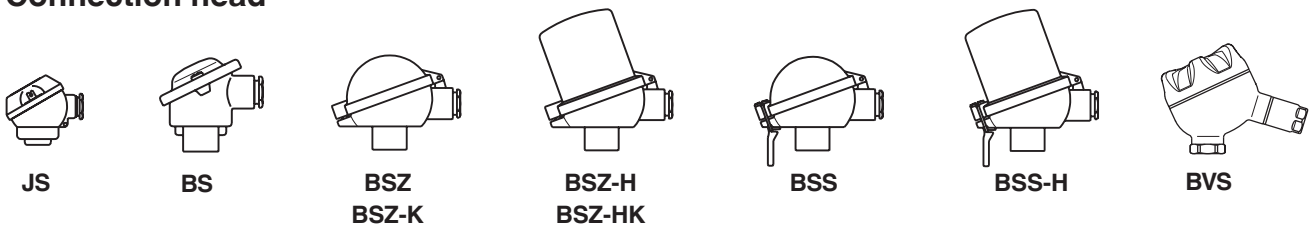
The neck length, N(M_H), for parallel threads depends on the height of the hexagon. This is 10 mm.

The neck length, N(M_H), of NPT threads not only includes the hexagon height but also half of the thread height. This gives us a neck length, N(M_H), of approx. 19 mm.



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Connection head



Model	Material	Cable entry	Ingress protection	Cap	Surface finish
JS	Aluminium	M16 x 1.5 ¹⁾	IP 65	Cap with 2 screws	blue, painted ²⁾
BS	Aluminium	M20 x 1.5 ¹⁾	IP 65	Cap with 2 screws	blue, painted ²⁾
BSZ	Aluminium	M20 x 1.5 ¹⁾	IP 65	Hinged cover with cylinder head screw	blue, painted ²⁾
BSZ-K	Plastic	M20 x 1.5 ¹⁾	IP 65	Hinged cover with cylinder head screw	black
BSZ-H	Aluminium	M20 x 1.5 ¹⁾	IP 65	Hinged cover with cylinder head screw	blue, painted ²⁾
BSZ-HK	Plastic	M20 x 1.5 ¹⁾	IP 65	Hinged cover with cylinder head screw	black
BSS	Aluminium	M20 x 1.5 ¹⁾	IP 65	Hinged cover with clip	blue, painted ²⁾
BSS-H	Aluminium	M20 x 1.5 ¹⁾	IP 65	Hinged cover with clip	blue, painted ²⁾
BVS	Stainless steel	M20 x 1.5 ¹⁾	IP 65	Screw cover	precision casting, electropolished

1) Standard

2) RAL5022, polyester paint saltwater-resistant

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 scale range of the indicator is configured identically to the measuring range of the transmitter.

Designs with ignition protection type "intrinsically safe", Ex-i, 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 ordering options:

- with a compression fitting or
- without a 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 two transmitters on request.

Connection head	Transmitter model					
	T12	T19	T24	T32	T53	T91.20
JS	-	-	-	-	-	○
BS	-	○	○	-	○	-
BSZ / BSZ-K	○	○	○	○	○	-
BSZ-H / BSZ-HK	●	●	●	●	●	-
BSS	○	○	○	○	○	-
BSS-H	●	●	●	●	●	-
BVS	○	○	○	○	○	-

Model	Description	Explosion protection	Data sheet
T19	Analogue transmitter, configurable	without	TE 19.03
T91.20	Analogue transmitter, fixed measuring range	without	TE 91.01
T24	Analogue transmitter, PC configurable	optional	TE 24.01
T12	Digital transmitter, PC configurable	optional	TE 12.03
T32	Digital transmitter, HART® protocol	optional	TE 32.04
T53	Digital transmitter FOUNDATION™ Fieldbus and PROFIBUS® PA	standard	TE 53.01

Explosion protection (option)

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

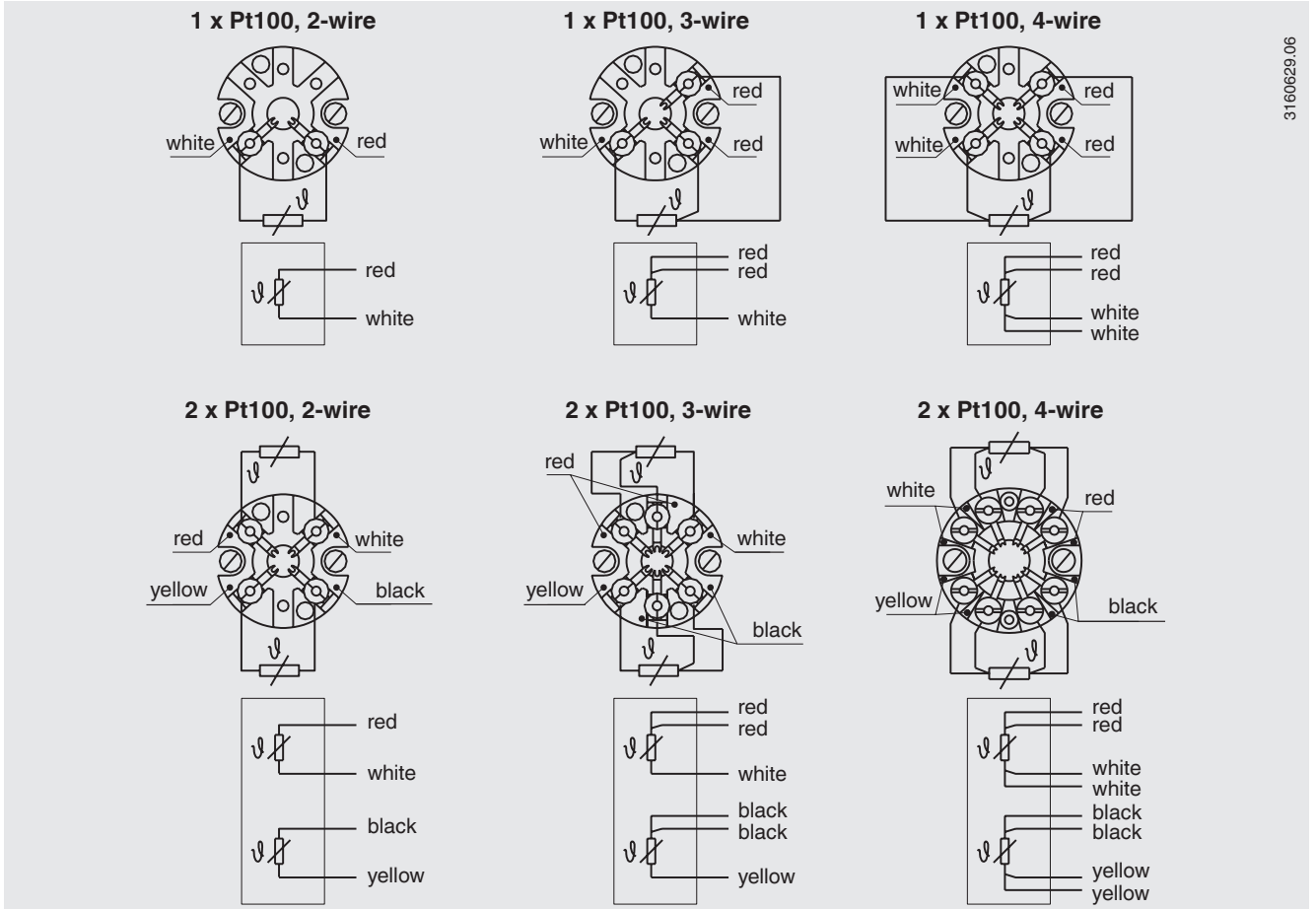
These instruments comply with the requirements of 94/9/EC (ATEX) directive for gas and dust. Manufacturer's declarations in accordance with NAMUR NE24 are also available.

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.

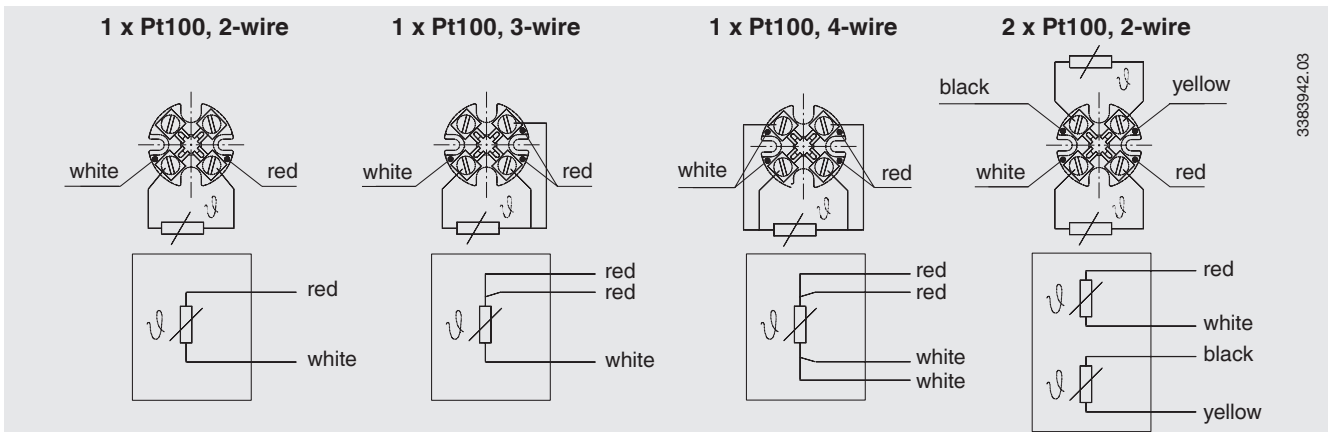
Electrical connection

Connection head form B



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Connection head model JS



3383942.03

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

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