

Thermocouple Model TC10-H without thermowell

WIKA data sheet TE 65.08



for further approvals
see page 7

Applications

- For direct installation in the process
- Machine building
- Motors
- Storage
- Pipelines and vessels

Special features

- Application ranges from 0 ... 1,200 °C
- For insertion, screw-in with optional process connection
- Connection head form B or JS
- Explosion-protected versions Ex i



Thermocouples without thermowell, model TC10-H

Description

Thermocouples without thermowell 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 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. 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, which contains the insulated internal leads, embedded within a high-density ceramic compound and is also suitable for use at higher temperatures.

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

Sensor

Sensor types

| Type | Recommended max. operating temperature |
|------|----------------------------------------|
| K | 1,200 °C |
| J | 800 °C |
| E | 800 °C |
| T | 400 °C |
| N | 1,200 °C |

| Thermocouple Type | Class | |
|-------------------|------------------|-------------------|
| | IEC 60584-1:2013 | ASTM E230 |
| K | 1 and 2 | Standard, special |
| J | 1 and 2 | Standard, special |
| N | 1 and 2 | - |
| E | 1 and 2 | - |
| T | 1 and 2 | - |

Tolerance value

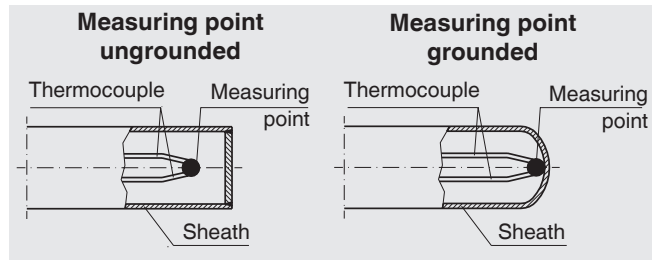
For the tolerance value of thermocouples, a cold junction temperature of 0 °C has been taken as the basis.

For detailed specifications for thermocouples, see Technical information IN 00.23 at www.wika.com.

Listed models are available both as single or dual thermocouples. The thermocouple will be delivered with an insulated measuring point, unless explicitly specified otherwise.

The actual application range of these thermometers is limited by the permissible maximum temperature of the thermocouple and of the thermowell material.

Sensor tip designs



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.

Sheathed thermocouples may be flexed with a radius 3-times of the sheath diameter.

Sheath diameter:

- 3.0 mm
- 4.5 mm
- 6.0 mm
- 8.0 mm

Others on request

Please note:

The flexibility of the sheathed thermocouple must be considered, especially when the flow rates are relatively high. Designs in which the process connection is not located directly at the connection head should be considered critical in applications where vibratory or oscillating stresses occur.

Sheath material

- Ni-alloy 2.4816 (Inconel 600)
 - up to 1,200 °C (air)
 - standard material for applications which require specific corrosion resistance properties under exposure to high temperatures, resistant to induced stress corrosion cracking and pitting in media containing chloride
 - resistant to corrosion caused by aqueous ammonia in all temperatures and concentrations
 - highly resistant to halogens, chlorine, hydrogen chloride
- Stainless steel
 - up to 850 °C (air)
 - good corrosion resistance with aggressive media as well as steam and flue gases in chemical media

Others on request

Permissible ambient temperature

-40 ... +80 °C

IP protection

Standard ingress protection: IP 65

Process connections

The model TC10-H sheathed thermocouples 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), in this case only specifies the height of the hexagon on the head of the thermowell. N (M_H) is always 10 mm.

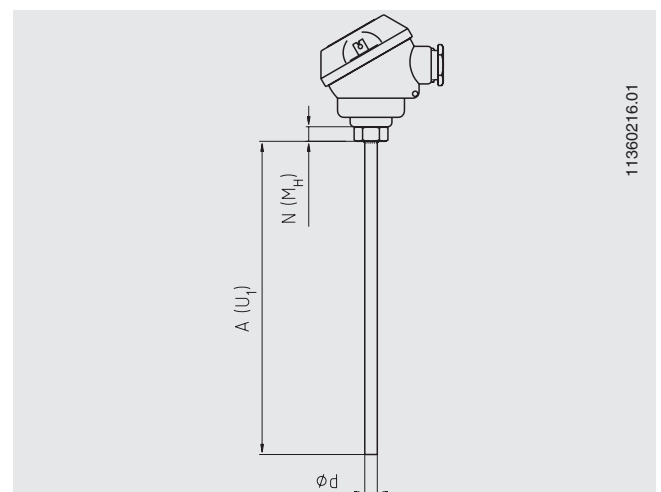
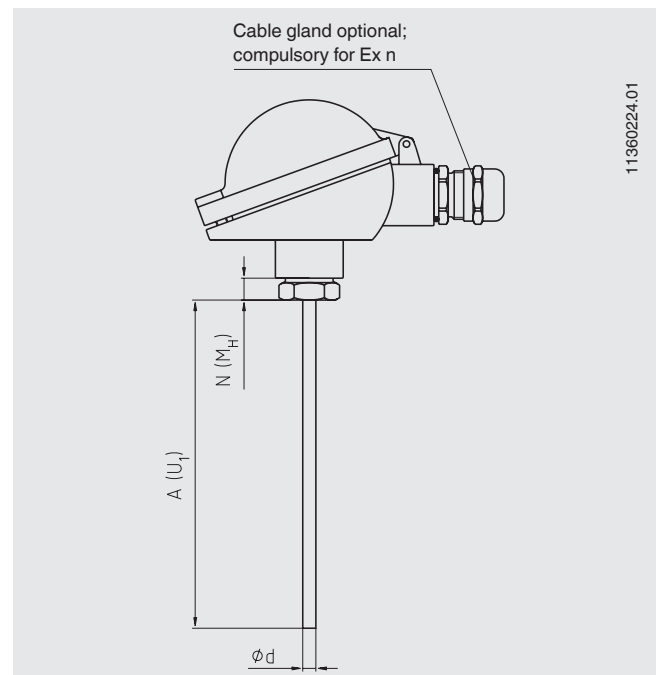
■ Without process connection (miniature version)

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), in this case only specifies the height of the hexagon on the head 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.

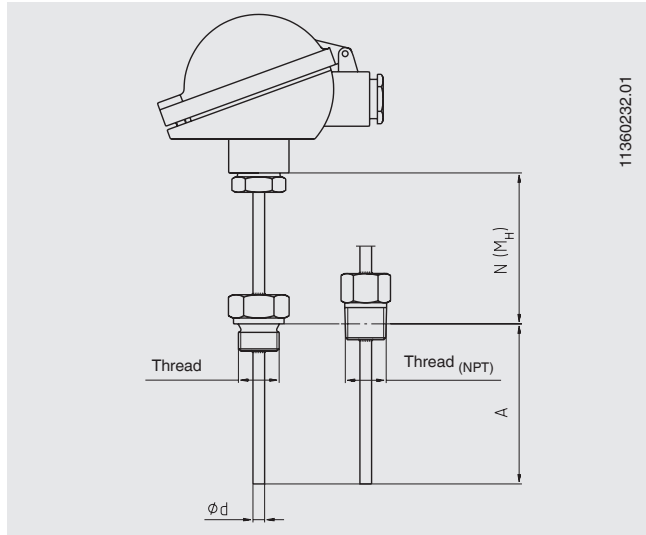


■ **Protruded fixed thread**

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

Insertion length A: to 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 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. 40 mm.

Material: stainless steel
 Sealing ring material: stainless steel or PTFE

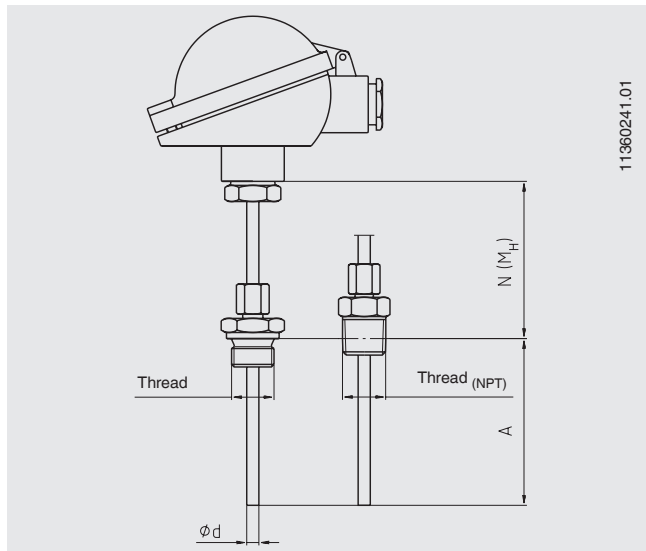
Stainless steel sealing rings can be adjusted once; once they have been unscrewed, sliding along the sheath is no longer possible.

- 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**

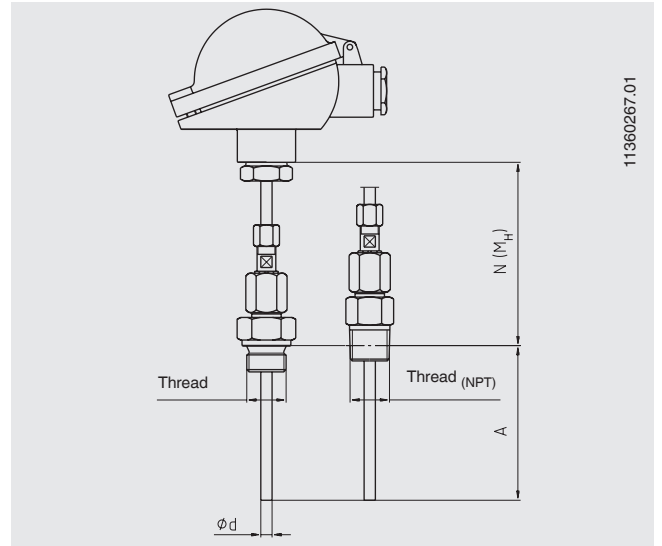
This version allows easy adjustment to the desired mounting length at the mounting point, while at the same time sustaining the spring pre-tension.

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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■ **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

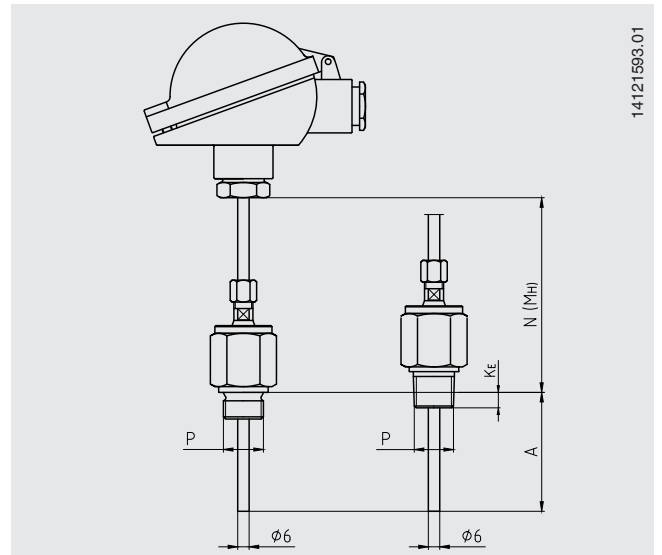
Since the compression fitting is movable on the sensor, the A and N (M_H) dimensions define the as-delivered condition. The length of the compression fitting determines the smallest possible neck length N (M_H) of approx. 80 mm.

Material: stainless steel
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.



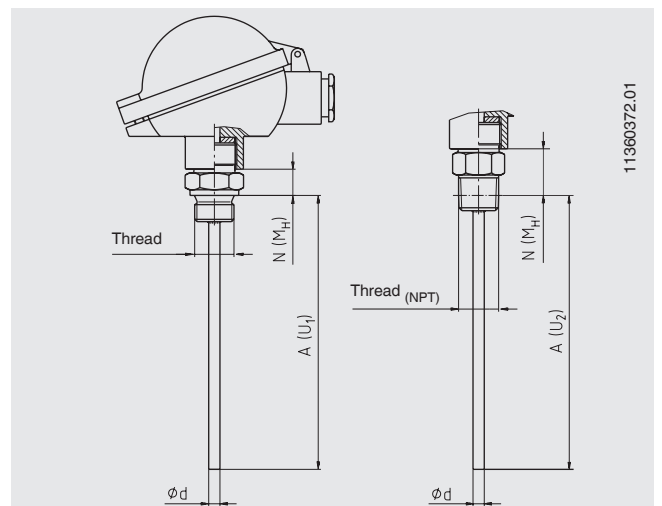
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■ **Double nipple version**

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.

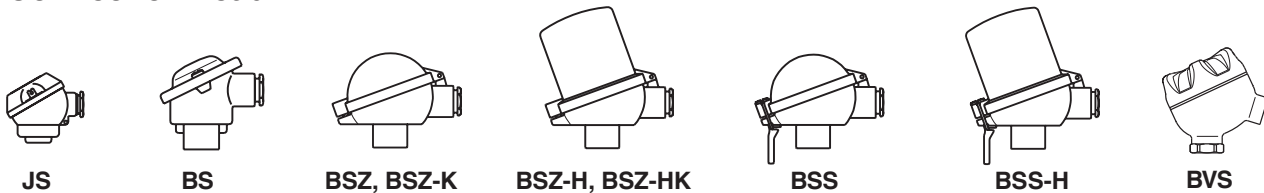
The neck length, N (M_H), for parallel threads depends on the height of the hexagon. This is 10 mm.

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



| Type | Material | Cable outlet | Ingress protection | Cap | Surface |
|--------|-----------------|-------------------------|--------------------|---------------------------------------|------------------------------------|
| JS | Aluminium | M16 x 1.5 ¹⁾ | IP 65 | Cap with 2 screws | Blue, lacquered ²⁾ |
| BS | Aluminium | M20 x 1.5 ¹⁾ | IP 65 | Cap with 2 screws | Blue, lacquered ²⁾ |
| BSZ | Aluminium | M20 x 1.5 ¹⁾ | IP 65 | Hinged cover with cylinder head screw | Blue, lacquered 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, lacquered 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, lacquered ²⁾ |
| BSS-H | Aluminium | M20 x 1.5 ¹⁾ | IP 65 | Hinged cover with clip | Blue, lacquered ²⁾ |
| BVS | Stainless steel | M20 x 1.5 ¹⁾ | IP 65 | 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



Connection head with digital indicator, model DIH10

Transmitter (option)

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

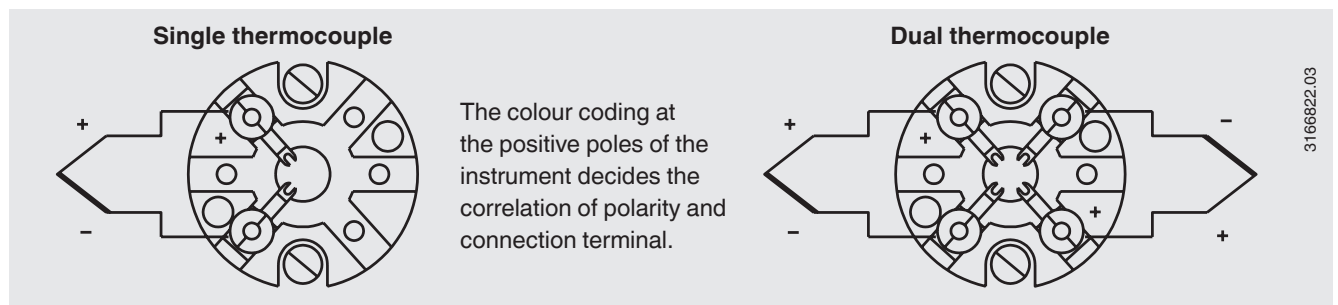
- Mounted instead of terminal block
- Mounted within the cap of the connection head
- Mounting not possible

Mounting of 2 transmitters on request.

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

| Type | Description | Explosion protection | Data sheet |
|--------|-----------------------------------------------------------|----------------------|------------|
| T91.20 | Analogue transmitter, fixed measuring range | Without | TE 91.01 |
| 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 |

Electrical connection



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

Explosion protection (optional)

Thermocouples of the TC10-H series are available with an 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.

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.

CE conformity

EMC directive ¹⁾

2004/108/EC, EN 61326 emission (group 1, class B) and interference immunity (industrial application)

ATEX directive (option)

94/9/EC, EN 60079-0, EN 60079-11, EN 60079-26, EN 61241-11

1) Only for built-in transmitter

Approvals (option)

- **IECEx**, ignition protection type “i” - intrinsic safety, ignition protection type “iD” - dust protection through intrinsic safety, international certification for the Ex area
- **NEPSI**, ignition protection type “i” - intrinsic safety, ignition protection type “iD” - dust protection through intrinsic safety, ignition protection type “n”, China
- **EAC**, import certificate, ignition protection type “i” - intrinsic safety, ignition protection type “iD” - dust protection through intrinsic safety, ignition protection type “n”, customs union Russia/Belarus/Kazakhstan
- **GOST**, metrology/measurement technology, Russia
- **INMETRO**, Institute of Metrology, ignition protection type “i” - intrinsic safety, ignition protection type “iD” - dust protection through intrinsic safety, Brazil
- **KOSHA**, ignition protection type “i” - intrinsic safety, ignition protection type “iD” - dust protection through intrinsic safety, South Korea
- **PESO (CCOE)**, ignition protection type “i” - intrinsic safety, ignition protection type “iD” - dust protection through intrinsic safety, India

Certificates (option)

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

The different certifications can be combined with each other.

Approvals and certificates, see website

Ordering information

Model / Explosion protection / Connection head / Cable outlet / Terminal block, transmitter / Version of the threaded connection / Measuring element / Temperature range / Sensor diameter / Materials / Thread size / Neck length / Insertion length / Certificates / Options

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