THERMOCOUPLE



WITH EXCHANGEABLE MEASURING INSERT, TYPE TT..G

- Measuring range: -40 .. +800°C
- Equipment/tank design
- Technological process installations in all branches of industry
- Machine design
- Heating systems, air conditioning and ventilation systems

Features

- Stainless Steel AISI321 / 1.4541 or AISI316L / 1.4404, AISI316Ti / 1.4571 upon request
- Spring-loaded measuring insert provides ideal contact with the thermowell
- Temperature transmitter can be installed in the sensor head
- Optionally the head can be installed with a local temperature display (see models TWR01H, DANWdie-LED)

The sensor consists of a replaceable insert, a welded protective tube (thermowell) with threaded process connection and an aluminium connection head where a programmable temperature transmitter with a 4-20 mA output signal can be installed.

The measuring insert is a replaceable element of the complete sensor, which significantly reduces the time and cost of maintenance of measuring instruments on site.

Thanks to the spring-loaded fastening of the measuring insert it is perfectly pressed against the bottom of the protective tube, which reduces the time of reaction to temperature changes, increases accuracy of measurement and reduces natural vibrations, thus mechanical and electrical damages can be avoided.

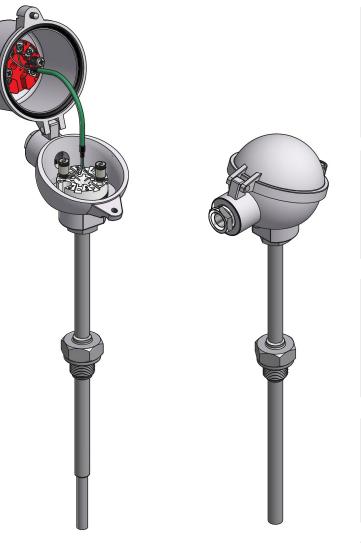
Immersion length, process connection thread, length of the thermowell, connection head, shape and material of the sheath can be selected depending on the requirements of the application.

| Temperature Transmitter (Option)

Transmitter is mounted inside the connection head of the sensor. There are two ways of installation: directly on the measuring insert or in the higher cap of the head.

The advantage of the second solution is that replacing the standard insert with a terminal block is easy without having to dismantle the transmitter, which significantly shortens the time and lowers the cost of sensor maintenance and protects the connection cables.

Mounting two transmitters is possible upon customer's request.



Sensor with connection head DANW. Thermowell with reduced tip. Sensor with connection head NA

ATEX, EAC Ex versions 😥 [][[🗽

Intrinsically safe and Flameproof designs are available for applications in hazardous areas. These models are provided with certificate for "intrinsically safe" and "flameproof" type of protection according to Directive 2014/34/UE (ATEX) and EAC Ex TR-CU 012/2011 (Eurasian EconomicUnion).

Intrinsically safe (Exi) Flameproof (Exd)

data sheet XI-TT..G data sheet XD-TT..G

Other versions

This data sheet contains only a small portion of our program of supplying thermocouple thermometer with a replaceable measuring insert.

Other versions can be supplied upon customer's request.

* inne materiały, patrz: "Materiały osłon"

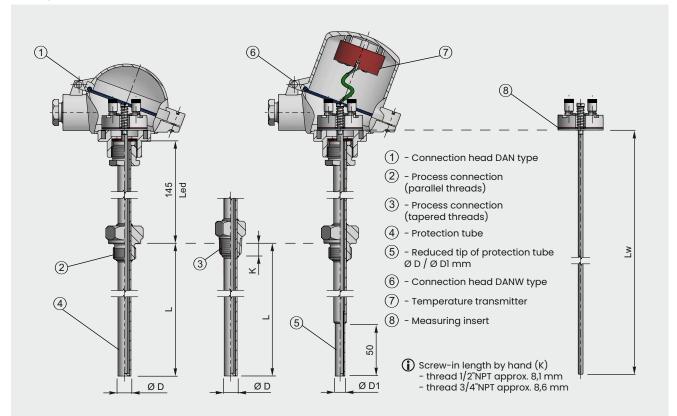
with connection cable

Sensors

Type **TT..G**



Designs



Basic values of thermocouples type J, K, N according to PN-EN 60584 / IEC 584

| Temperat | ure | °C | 100 | 200 | 300 | 400 | 500 | 600 | 700 |
|-----------|---------|----|------|-------|-------|-------|-------|-------|-------|
| Nominal | Туре Ј | mV | 5.27 | 10.78 | 16.33 | 21.85 | 27.39 | 33.10 | 39.13 |
| value | Туре К | mV | 4.10 | 8.14 | 12.21 | 16.40 | 20.64 | 24.91 | 29.13 |
| | Туре N | mV | 2.77 | 5.91 | 9.34 | 12.97 | 16.75 | 20.61 | 24.53 |
| Tolerance | Class 1 | °C | ±1.5 | ±1.5 | ±1.5 | ±1.6 | ±2.0 | ±2.4 | ±2.8 |
| | Class 2 | °C | ±2.5 | ±2.5 | ±2.5 | ±3.0 | ±3.7 | ±4.5 | ±5.2 |

Tolerance

The PN-EN 60584 Standard defines the formulas for calculating acceptable measure tolerance. More information available in the general thermocouple thermometer sheet.

<u>Type J (Fe-CuNi)</u>

| Class | Temperature range | Tolerance |
|-------|-------------------|----------------|
| 1 | -40 °C +375 °C | ± 1.5 °C |
| I | +375 °C +750 °C | ± 0.0040 x t |
| 2 | -40 °C +333 °C | ± 2.5 °C |
| | +333 °C +750 °C | ± 0.0075 x t |

Туре К (NiCr-Ni), Тур N (NiCrSi-NiSi)

| Class | Temperature range | Tolerance |
|-------|-------------------|----------------|
| 1 | -40 °C +375 °C | ± 1.5 °C |
| I | +375 °C +1000 °C | ± 0.0040 x t |
| 2 | -40 °C +333 °C | ± 2.5 °C |
| | +333 °C +1200 °C | ± 0.0075 x t |

Standard lengths

| Immersion length L | Measuring insert length Lw |
|-----------------------|-------------------------------|
| 100 mm | 255 mm |
| 160 mm | 315 mm |
| 200 mm | 355 mm |
| 250 mm | 405 mm |
| 400 mm | 555 mm |

Response time

Test in mixed water 0,4 m/s (in accordance with DIN EN 60751), at temperature change from $23 \text{ to } 33^{\circ}\text{C}$.

| Protection tube diameter D / D1 | Response time | | |
|------------------------------------|------------------------|--|--|
| Ø 12 mm | t50 = 38 s | | |
| | t90 = 125 s | | |
| Ø 12 / Ø 9 mm | t50 = 18 s | | |
| 012/0911111 | t ₉₀ = 55 s | | |



Type TT..G

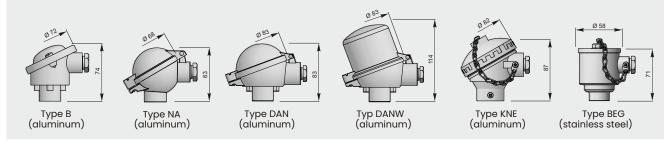
| Maximum operating pressure (100°C)

Calculated for maximum flow of steam 25 m/s and of water 3 m/s.

| Length L | Maximum operating pressure | | |
|----------|-------------------------------|--|--|
| 160 mm | 11.8 MPa | | |
| 250 mm | 6.9 MPa | | |
| < 400 mm | 4.4 MPa | | |

Connection heads

This sensor can be fitted with one of the following connection heads. For more information about the connection heads see section "Accessories".



Connection head DANWdie with local LED display

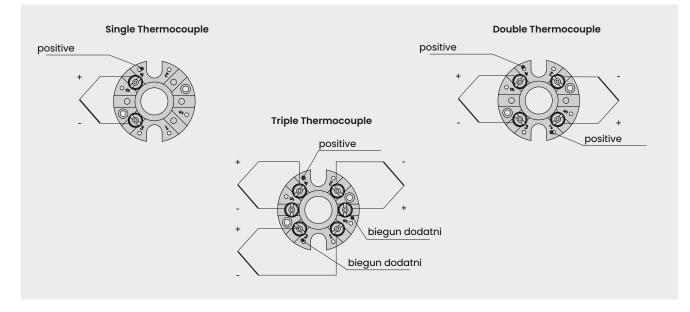
The display is mounted in connection head cover with glass window which allows preview of measuring temperature. 4 digits with a height of 9.5 milimeter ensure clear reading of values.

Programming of measure range can be performed via three buttons placed on the back of display panel.

Mounted temperature transmitter 4..20mAon measuring insert is necessary for proper use. It also works with temperature transmitters with HART® protocol.



Electrical connection on ceramic block



Type TT..G



Ordering code

| 2 | 3 4 5 6 7 8 9 10 | 11 12 |
|----------|--|-------------------------------|
| | | |
| | | |
| | Version | |
| 1 | | |
| | AP Single thermocouple AP Single thermocouple, with 420 mA temperatur | ro transmittor |
| | APW Single thermocouple, 420 mA temperature tra | |
| | 2 Double thermocouple | |
| | 3 Triple thermocouple | |
| | | * only with connection head D |
| | Thermocouple type | |
| 2 | J Type J (Fe-CuNi) | |
| | K Type K (NiCr-Ni) | |
| | xxx other, please specify | |
| | Neck length Led | |
| 3 | 1 neck Led=145 mm | |
| <u> </u> | 2 neck Led=80 mm | |
| | 3 neck Led=250 mm | |
| | Closing method of connection head | |
| 4 | 1 closing by screw | |
| | 3 closing by clamp | |
| | Connection head | |
| 5 | | gland: M20x1.5 IP65 |
| 0 | | gland: M20x1.5 IP65 |
| | xxx other, please specify | 5 |
| | Length L [mm] | |
| 6 | 100 100 mm | |
| 0 | 160 160 mm | |
| | 200 200 mm | |
| | xxx other, please specify | |
| | Thermowell diameter [mm] | |
| 7 | 12 Ø 12 mm | |
| | 15 Ø 15 mm | |
| | 12/9 Ø 12 mm with reduced tip to Ø 9 mm | |
| | xxx other, please specify | |
| | Process connection | |
| 8 | M20x1.5 M20x1.5 | |
| - | G1/2" G1/2" | |
| | xxx other, please specify | |
| | Measuring junction | |
| 9 | SO Junction isolated | |
| 5 | SP Junction grounded | |
| | SOB Junctions isolated (double and triple thermoc | ouples) |
| | Tolerance | |
| 10 | 1 Class 1 according to PN-EN 60584-2 | |
| | 2 Class 2 according to PN-EN 60584-2 | |
| | Measuring range of temperature transmitter | |
| 11 | | |
| 11 | | |
| | xxx other, please specify | |
| 10 | Type of temperature transmitter | |
| 12 | PR5334A3B Output signal 420 mA | |
| | PR5335A Output signal 420 mA, with HART® protocol | |
| | PR5350A Output signal Profibus® PA / Foundation Fieldbu | R |
| | xxx other, please specify | |

Example

Temperature sensor TTKG11-DAN-200-12-G1/2-SO-1

(sensor 1xK, connection head type DAN closed by screw, length L=200mm, thread G1/2", junction isolated, class 1).