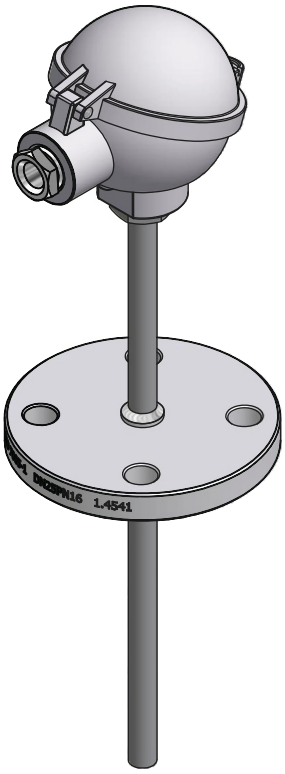
## Applications

- Measuring range: -200 .. +600°C
- Fine chemicals industry
- Light energy industry
- General industrial services
- Food industry

## Features

- Stainless Steel AISI321 / 1.4541 or AISI316L / 1.4404, AISI316Ti / 1.4571 upon request
- Spring-loaded measuring insert provides ideal contact with protective tube
- Temperature transmitter can be installed inside connection head of sensor
- Connection head with local LED display as an option (see model DANWdie-LED)


Sensor with connection head DANW. Thermowell with reduced tip.




Sensor with connection head NA

The sensor consists of an exchangeable measuring insert, outer protective tube (thermowell) with neck and aluminum connection head where mounting a temperature transmitter with 4-20 mA/HART® or Profibus®PA output signal is possible.

The measuring insert represents the replaceable element of the complete sensor which reduces time and costs of maintenance of the measuring apparatus installed in the object. Spring fixation of the measuring insert provides perfect pressure to the bottom of the protecting tube, reduces time of reaction to changes of temperature and increases accuracy of measurement as well as reduces natural vibration thus mechanical and electrical defects can be avoided.

Insertion length, type of connection flange, design of thermowell, connection head as well as type and number of sensors, accuracy and method of connection can be selected individually for the respective application.

## Temperature Transmitter (Option)

Transmitter is mounted inside the connection head of the sensor: directly on measuring inset or in the high cap of head.

The second method is advantageous as it allows changing standard measuring inset quickly without a need to disassemble the transmitter; it means reduction of time and costs of maintenance of the sensor and protecting wires against any damage possible.

Mounting of two transmitters inside the connection head available upon request.

## ATEX and 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 Economic Union).

| | |
|---|---|
| Intrinsically safe (Exi) | data sheet XI-TOPT |
| Flameproof (Exd) | data sheet XD-TOPT |

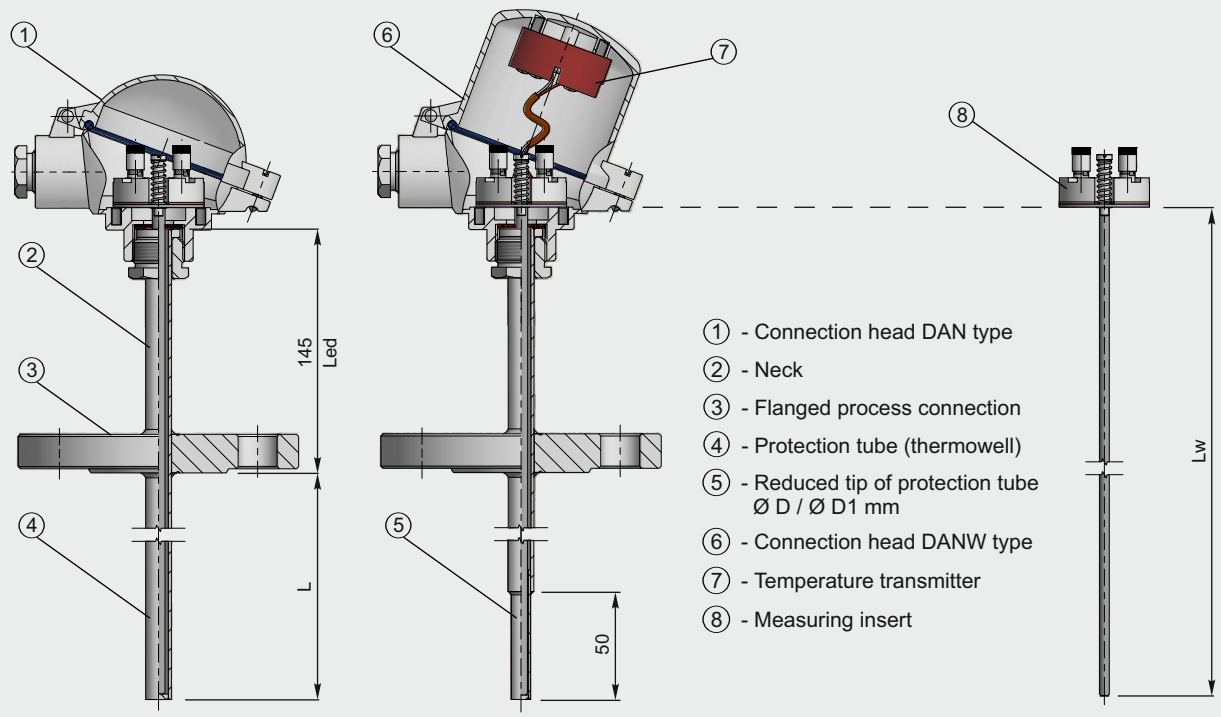
## Other versions

This data sheet contains only small part of our supplies program of resistance thermometers with exchangeable measuring insert. Upon the customer's request, other versions can also be delivered.

* other materials, see: "Thermowell materials"

# Type **TOPT**

## Designs




## Connection line

| Protection tube [ mm ] | Measuring insert [ mm ] | Connection line | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 x Pt 100 | | | 2 x Pt 100 | | |
| | | 2-wire | 3-wire | 4-wire | 2-wire | 3-wire | 4-wire |
| Ø 12 | Ø 6 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Ø 12 / 9 | Ø 6 | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |

## Tolerances

Basic values and limiting errors for the platinum measurement resistances are laid down in PN-EN 60751

| Class of tolerance | Tolerance °C |
|---|---|
| A | ± 0.15 + ( 0.002 x \| t \| ) |
| B | ± 0.30 + ( 0.005 x \| t \| ) |

## Max pressure (100°C)

Admissible pressure of application for max. speed of flow of steam 25 m/s and water 3 m/s.

| Length L | Max. pressure of application |
|---|---|
| 160 mm | 11.8 MPa |
| 250 mm | 6.9 MPa |
| < 400 mm | 4.4 MPa |

## Standard lengths

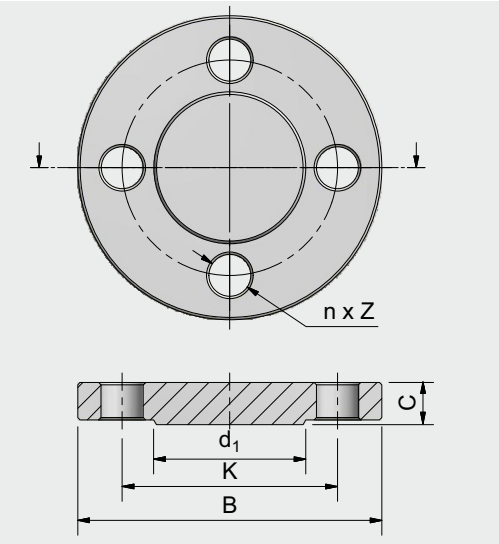
| Immersion length L | Measuring insert length Lw |
|---|---|
| 100 mm | 255 mm |
| 160 mm | 315 mm |
| 200 mm | 355 mm |
| 250 mm | 405 mm |
| 400 mm | 555 mm |

## Response time

Averange response time at mixed water 0.4 m/s ( acc. to DIN EN 60751 ), at temperature change from 23 to 33 C.

| Diameter of protection tube | Response time |
|---|---|
| Ø 12 mm | $t_{50}$ = 38 s |
| | $t_{90}$ = 125 s |
| Ø 12 / Ø 9 mm | $t_{50}$ = 18 s |
| | $t_{90}$ = 55 s |

## Flange (process connection) acc. to ISO 7005-1




Connection flanges can be made in accordance with standards PN-ISO 7005-1, EN 1092-1, DIN2527, ASME B16.5. Other types available upon request.

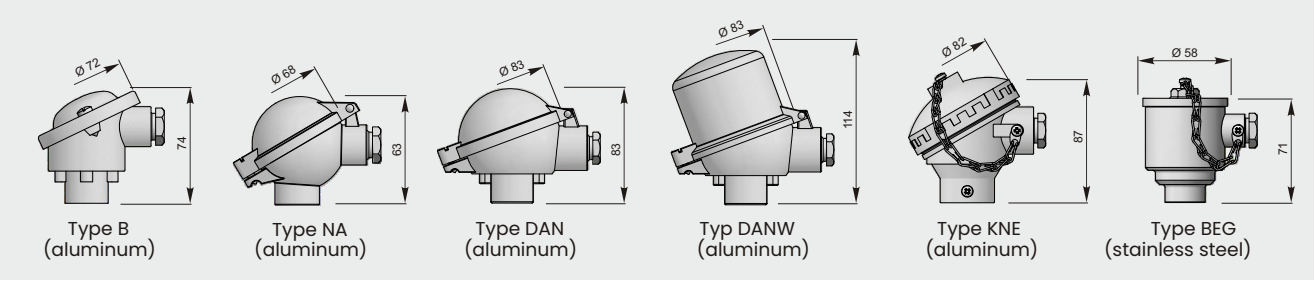
| DN20 PN16 05 B | | | | |
|---|---|---|---|---|
| **Diameter B** | **Diameter K** | **Diameter $d_1$** | **Height C** | **Dimension n x Z** |
| Ø105 mm | Ø75 mm | Ø58 mm | 18 mm | 4 x Ø14 mm |

| DN25 PN16 05 B | | | | |
|---|---|---|---|---|
| **Diameter B** | **Diameter K** | **Diameter $d_1$** | **Height C** | **Dimension n x Z** |
| Ø115 mm | Ø85 mm | Ø68 mm | 18 mm | 4 x Ø14 mm |

| DN50 PN16 05 B | | | | |
|---|---|---|---|---|
| **Diameter B** | **Diameter K** | **Diameter $d_1$** | **Height C** | **Dimension n x Z** |
| Ø165 mm | Ø125 mm | Ø102 mm | 20 mm | 4 x Ø18 mm |

## Connection heads

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

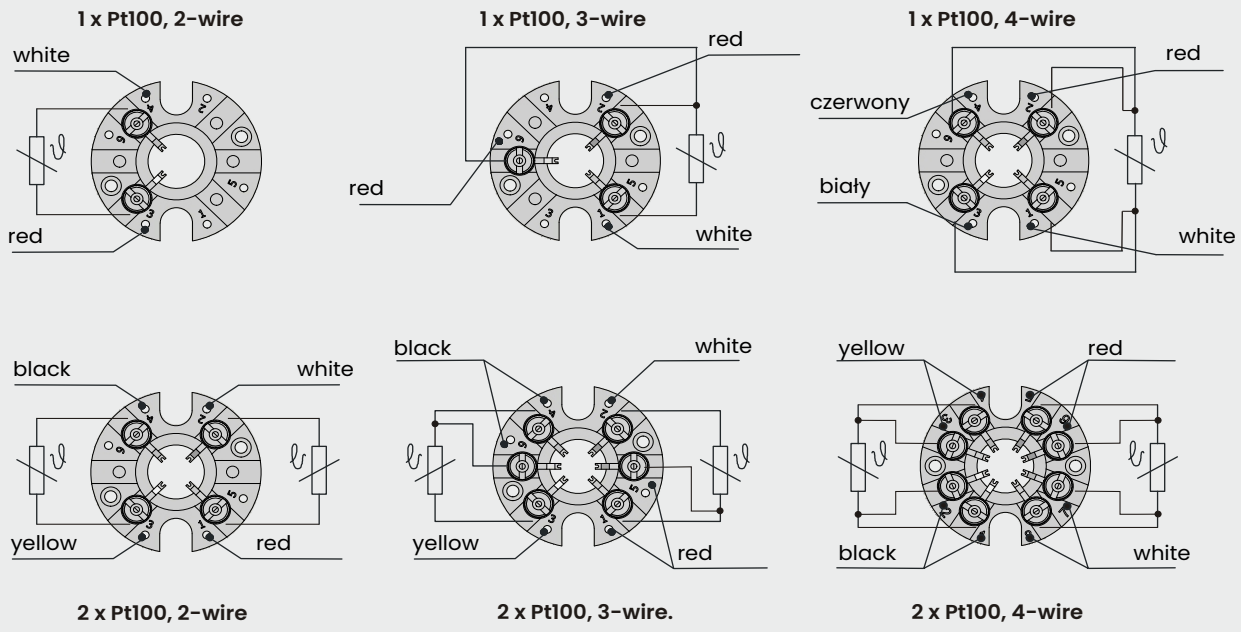



## Connection head DANWdie with local LED display

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..20 mA on measuring insert is necessary for proper use. It also works with temperature transmitters with HART® protocol.

## Electrical connection on Ceramic Block



## Ordering code

| 1 | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ☐ | **TOPT** | ☐ | - ☐ | - ☐ | - ☐ | - ☐ | - ☐ | - ☐ | - ☐ | - ☐ | - ☐ | - ☐ |

**Resistance element**

| 1 | | |
|---|---|---|
| | | 1 x Pt100 |
| | AP | 1 x Pt100, with installed transmitter 4..20 mA |
| | APW | 1 x Pt100, with installed transmitter 4..20 mA and local LED display* |
| | 2 | 2 x Pt100 |

**Length of neck Led**

* available only with connection head DANWdie

| 2 | | |
|---|---|---|
| | 1 | Neck length Led=145 mm |
| | 2 | Neck length Led=80 mm |
| | 3 | Neck length Led=275 mm |

**Closing method of connection head**

| 3 | | |
|---|---|---|
| | 1 | closing by screw |
| | 3 | closing by clamp |

**Connection head**

| 4 | | | | | |
|---|---|---|---|---|---|
| | NA | Type NA | Aluminum | Cable gland: M20x1.5 | IP65 |
| | DAN | Type DAN | Aluminum | Cable gland: M20x1.5 | IP65 |
| | DANW | Type DANW | Aluminum | Cable gland: M20x1.5 | IP65 |
| | B | Type B | Aluminum | Cable gland: M20x1.5 | IP65 |
| | BEG | Type BEG | Stainless steel | Cable gland: M20x1.5 | IP65 |
| | xxx | other, please specify | | | |

**Length L [mm]**

| 5 | | |
|---|---|---|
| | 100 | 100 mm |
| | 160 | 160 mm |
| | 200 | 200 mm |
| | 250 | 250 mm |
| | 400 | 400 mm |
| | xxx | other, please specify |

**Protection tube (thermowell) diameter D [mm]**

| 6 | | |
|---|---|---|
| | 12 | Ø 12 mm |
| | 9 | Ø 9 mm |
| | 12/9 | Ø 12 mm with reduced tip Ø 9 mm |
| | xxx | other, please specify |

**Process connection**

| 7 | | |
|---|---|---|
| | DN20PN16 | Flange DN20PN16 in accordance with ISO 7005-1 |
| | DN25PN16 | Flange DN25PN16 in accordance with ISO 7005-1 |
| | xxx | other, please specify |

**Thermowell material**

| 8 | | |
|---|---|---|
| | 1.4541 | Stainless Steel 1H18N9T ( 1.4541 ) |
| | 1.4571 | Stainless Steel H17N13M2T ( 1.4571 ) |
| | xxx | other, please specify |

**Tolerance**

| 9 | | |
|---|---|---|
| | A | Class A according to PN-EN 60751 |
| | B | Class B according to PN-EN 60751 |
| | 1/3B | Class 1/3B DIN |
| | xxx | other, please specify |

**Connection line**

| 10 | | |
|---|---|---|
| | 2 | 2-wire |
| | 3 | 3-wire |
| | 4 | 4-wire |

**Measuring range of temperature transmitter**

| 11 | | |
|---|---|---|
| | 0..100 | input signal for 4..20mA: 0..100°C |
| | xxx | other, please specify |

**Type of temperature transmitter**

| 12 | | |
|---|---|---|
| | PR5333A | Output 4..20 mA |
| | PR5335A | Output 4..20 mA, with HART® communication protocol |
| | PR5350A | Output Profibus® PA / Foundation Fieldbus |
| | xxx | other, please specify |

## Example

Temperature sensor TOPT11-DAN-200-12-DN20PN16-1.4541-A-4
( sensor 1xPt100, connection head DAN closing by screw, length L=200mm, process connection DN20PN16, thermowell material 1.4541, class A 4-wire ).