EPIC® SENSORS

Temperature sensor & IoTKey® products and services
Thermocouples

Io

Industries

Bearing temperature sensor T-BTD / W-BTD (datasheet 20)
T-M-303 / W-M-303 or T-M-302 / W-M-302 (datasheet 10)
Mineral insulated thermocouple or resistance sensor with cable
Weldable temperature sensor T-D / W-D (datasheet 4)
Threaded temperature sensor with neck pipe and thermowell T-B-ØK / W-B-ØK (datasheet 2)
Threaded temperature sensor with neck pipe and sensing element T-H-12 / W-H-12 (datasheet 5)
Magnetic temperature sensor T-MAGN / W-MAGN, (datasheet 18)
Threaded temperature sensor with neck pipe and thermowell T-B-Ø / W-B-Ø (datasheet 2)
Acid proof temperature sensor for hygienic installation

PRODUCED EPIC® SENSORS TEMPERATURE SENSORS
• Pt100 (2xPt100, 3xPt100)
• Pt1000
• Thermocouples
• Flanged thermowells
• Pt100 with silicon well
• Cable probes
• Bayonet probes
• Ceramic sensors
• Coated thermowells
• Multi-point temperature sensors
• Ex-approved sensors
• Bearing temperature sensors
• Temperature sensors with magnet
• Immersible temperature sensors
• Customer specific solutions
• Materials used are stainless, acid-proof, and heat-resistant steel, titanium, Hastelloy and polyamids, among others.

OUR APPROVALS AND CERTIFICATES
• DNV ISO9001:2015 Management system certificate
• EESF 18 ATEX G 006 product quality assurance notification
• EESF 18 ATEX 092X product certificate for Ex db sensors
• IECEx quality assessment report
• ATEX product certificates for all Ex e sensors
• IECEx product certificates for specific Ex e sensors
• RU-T-Metrological - Russian metrological certificate for TC sensors
• RU-W-Metrological - Russian metrological certificate for RTD sensors
• EAC Russian certificate (Ex)
• Ex e Korean KCs certificate for thermocouple T-M 303 sensors
• Ex e Korean KCs certificate for Pt 100 W-M 303 sensors
• Ex e Korean KCs certificate for Pt 100 bayonet sensors
• Ex Korean KCs certificate for Pt 100 cable sensors.

5-YEAR WARRANTY
We rely on the craftsmanship and quality of our sensor manufacturing and want this to be beneficial to our customers in planning and maintaining their temperature measuring systems. That’s why we grant a five year product warranty for EPIC® SENSORS temperature sensors.
ENERGY AND PULP & PAPER INDUSTRIES
The long tradition of Finnish pulp & paper plants with their self-contained power production, has taught us to deal with extreme materials, temperatures and scale of machinery.
Even in the changing environment, this vast knowledge can be adapted to renewable energy applications and advanced, smart production automation.

OIL, GAS, AND PETROCHEMICAL INDUSTRIES
We have a long history in delivering and manufacturing temperature measurement solutions for oil refineries, bio-diesel plants and the petrochemical industry.
We have delivered temperature instrumentation solutions for:
• Columns
• Trace heating
• Reactor temperature measurements (inside reactors, single point, multi-point and surface)
• Furnaces
• Pipelines
• Laboratories
• Oil tanks
• Ethylene plants
• Underground oil reservoirs
• Bio-diesel manufacturing and pyrolysis processes
• Flare temperature measurement.

HYGIENIC INDUSTRY
EPIC® SENSORS temperature sensors can be used in areas where strict hygiene is required and extreme cleaning processes are used.
Our range of temperature sensors include many products designed specifically for hygienic applications.
The temperature sensors can be customized for all kinds of cleaning processes.
Hygienic solutions are used in the food & beverage, pharmaceutical, and medical equipment industries, and clean room solutions, for example.

MACHINE BUILDING INDUSTRY
We have a wide variety of solutions for the machine building applications.
When measuring temperature in machine building, it is essential to take into account vibration, thermal stability and screening. We have developed sensor variations, which specially suit the machine building designs; confined installation spaces, easy assembly and cost effective solutions.
We have accumulated experience in electric motor stators, different energy chain applications, circuit boards, gear oil & bearing, and transformer measurements, to name a few.
We design and manufacture temperature measurement sensors, no matter how big or small the application.

SENSORS FOR EX-AREAS
EPIC® SENSORS temperature sensors are also manufactured for different kind of potentially explosive areas and zones.
We have implemented temperature measurement applications related to potentially explosive areas for more than ten years. The risk of explosion can be caused by flammable liquids, gases or dust. Temperature measurements have been made for a variety of devices and applications used in Ex-areas. For example:
• Pipes/tanks
• Trace heating control
• Electrical equipment and components
• Gearboxes
• Pumps and pump/motor combinations.
Solutions can be executed according to the application requirements, with the following protection types:
• Flameproof enclosure Ex db ATEX-certified
• Increased safety Ex e ATEX-/ IECEx-certified
• Dust protection by housing Ex lb ATEX-/ IECEx-certified.
EPIC® SENSORS PT100 TEMPERATURE SENSORS

- The measurement is based on resistance principle
- The measurement element material is platinum and the resistance value is 100 ohm at 0 °C temperature
- Platinum has a positive resistance temperature factor so the resistance increases with rising temperature
- Resistance variation is according to IEC 60751

Long term stability is the main advantage compared to other temperature measuring methods. Change of measurement value is smaller than 0.2 Ω /0 °C

- Platinum has a positive resistance temperature factor so the resistance increases with rising temperature
- Resistance variation is according to IEC 60751
- Long term stability is the main advantage compared to other temperature measuring methods. Change of measurement value is smaller than 0.2 Ω /0 °C
- One sensor structure can include several Pt100 resistances: 1, 2 or 3 × Pt100 (the most common is 1 × Pt-100)

- For different measuring circuits the resistance element can be produced in different versions: 2-, 3- or 4-wire connection, most accurate version is 4-wire connection
- Standard version of the industrial Pt100 sensor is vibration proof, additionally it can be produced as an extra vibration proof version for extreme conditions.

PT100 CONNECTIONS

<table>
<thead>
<tr>
<th>2-wire</th>
<th>3-wire</th>
<th>4-wire</th>
<th>2-wire, with compensation</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Connection Diagram 1" /></td>
<td><img src="image2" alt="Connection Diagram 2" /></td>
<td><img src="image3" alt="Connection Diagram 3" /></td>
<td><img src="image4" alt="Connection Diagram 4" /></td>
</tr>
</tbody>
</table>

VIBRATION PROOF RESISTANCE SENSING ELEMENTS, SHEATH CONSTRUCTION

- Standard sheath material AISI 316L
- Length according to specification
- Diameter 1.6...8 mm
- As Pt100 probes (1xPt100, 2xPt100, other norms on request)
- 2-, 3- and 4-wire connection + compensation loop
- Precision classes: Class A, B, 1/3 DIN and 1/10 DIN.

CABLE PROBES

- Diameter and length according to specification (AISI 316)
- Various cable options
- As thermocouples
- As Pt100 probes (1xPt100, 2xPt100, other norms on request)
- 2-, 3- and 4-wire connection (Pt100)
- Precision classes: Class A, B, 1/3 DIN, 1/10 DIN (Pt100) and Class 1 (TC)
- Various coupling options.

EXAMPLES OF PRECISION CLASSES FOR, WIRE WOUND RESISTORS AND THIN FILM RESISTORS


tolerance | temperature range of validity | tolerance value |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>wire wound resistors</td>
<td>film resistors</td>
<td></td>
</tr>
<tr>
<td>0.1</td>
<td>-100 to +350</td>
<td>F 0.1</td>
</tr>
<tr>
<td>0.15</td>
<td>-100 to +450</td>
<td>F 0.15</td>
</tr>
<tr>
<td>0.3</td>
<td>-196 to +660</td>
<td>F 0.3</td>
</tr>
<tr>
<td>0.6</td>
<td>-196 to +660</td>
<td>F 0.6</td>
</tr>
</tbody>
</table>

- a | t | = modulus of temperature in °C without regard to sign.

EPIC® SENSORS Pt100 sensors are usually manufactured with wire wound resistors of tolerance class A. Other classes and resistor types on request.

TOLERANCE CLASSES FOR PT100 THERMOMETERS ACCORDING TO STANDARD IEC 60751

<table>
<thead>
<tr>
<th>Tolerance class</th>
<th>Temperature range of validity °C</th>
<th>Tolerance value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>-50 to +250</td>
<td>±0.1</td>
</tr>
<tr>
<td>A</td>
<td>-100 to +450</td>
<td>±0.15</td>
</tr>
<tr>
<td>B</td>
<td>-196 to +600</td>
<td>±0.3</td>
</tr>
<tr>
<td>C</td>
<td>-196 to +600</td>
<td>±0.6</td>
</tr>
</tbody>
</table>

- a | t | = modulus of temperature in °C without regard to sign.

If the required precision exceeds the values given in precision class A, then class AA will be used or the fractions will be based on class B, for instance:

1/3 | 1/10 | DIN |
| -0.3 | -0.3 | 0°C |

The fractional values are not valid for the total measurement range, only at point 0 °C.
THERMOCOUPLES

EPIC® SENSORS thermocouple sensor produces an mV measuring signal, which is proportional to temperature depending on which TC type is used.

MEASURING PRINCIPLE

When two wires of different metals or metal alloys (thermowires) are joined together in one end (hot junction), a thermocouple is formed. The free ends of those wires form a reference point. If there is a temperature difference between hot junction T1 and reference point T2, a thermal electromotive force (voltage) is created in the thermocouple, the level of this voltage is proportional only to temperature difference T1-T2 and to materials, which the thermocouple is formed of (Seebeck effect).

COLD JUNCTION COMPENSATION (CJC)

A temperature transmitter or measuring system needs information from the reference point (cold junction) temperature T2. Variations in the reference point temperature are compensated with CJC measuring (Cold Junction Compensation). The temperature transmitters' CJC measurement can be done by internal measurement or with a resistance sensor (RTD) installed on the connector. If the reference point is far from the transmitter, a separate temperature measurement is required to measure and compensate the temperature at that point.

VIBRATION-PROOF THERMOCOUPLES, SHEATH CONSTRUCTION

- Diameter 0.5...8 mm
- Standard sheath material Inconel 600 or AISI 316
- Precision class 1
- Length according to specification.

THERMOCOUPLES

<table>
<thead>
<tr>
<th>Type</th>
<th>Accuracy class</th>
<th>Temperature range °C</th>
<th>Constant value °C</th>
<th>Tolerances allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>1</td>
<td>-40...+350</td>
<td>± 0.5</td>
<td>± 0.004 °C</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-40...+350</td>
<td>± 1.0</td>
<td>± 0.0075 °C</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>-200...+40</td>
<td>± 1.0</td>
<td>± 0.015 °C</td>
</tr>
<tr>
<td>E</td>
<td>1</td>
<td>-40...+800</td>
<td>± 1.5</td>
<td>± 0.004 °C</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-40...+900</td>
<td>± 2.5</td>
<td>± 0.0075 °C</td>
</tr>
<tr>
<td>J</td>
<td>2</td>
<td>-40...+750</td>
<td>± 2.5</td>
<td>± 0.015 °C</td>
</tr>
<tr>
<td>K and N</td>
<td>1</td>
<td>-40...+1000</td>
<td>± 1.5</td>
<td>± 0.004 °C</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-40...+1200</td>
<td>± 2.5</td>
<td>± 0.0075 °C</td>
</tr>
<tr>
<td>R and S</td>
<td>1</td>
<td>0...+1600</td>
<td>± 1.0</td>
<td>± [1+(t-1 100) ×0.003] °C</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0...+1600</td>
<td>± 1.5</td>
<td>± 0.0025 °C</td>
</tr>
<tr>
<td>L</td>
<td>1</td>
<td>-200...+400</td>
<td>± 3.0 °C</td>
<td>± 0.75 %</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-400...+900</td>
<td>± 3.0 °C</td>
<td>± 0.75 %</td>
</tr>
</tbody>
</table>

* Type L is defined in standard DIN 43710, all other types in standard IEC 60584.
**Wireless for Industrial Applications**

- Industry grade turn-key solution for cost efficient wireless measurements
- Fast and simple setup also for retro-fit and temporary installations
- Reliable, long range, low power wireless data communication with excellent immunity to interference even in demanding conditions.

**Smarter Maintenance for Better Productivity**

- Prevent, detect, locate and diagnose problems and failures faster and more efficiently

**Application Examples**

- Problem diagnostics and preventive maintenance for bearings, pumps, gears, turbines, etc.
- Detection of efficiency drops and maintenance needs in heat exchangers
- Advanced and continuous oil quality monitoring for product maintenance, life cycle and cost optimization
- Environmental measurements and monitoring for warehouses and storage areas, laboratory space, etc.
- Remote monitoring for levels and temperatures in water supply and waste water networks
- Monitoring and improving energy efficiency in district heating systems
- Mobile measuring sets for temporary condition monitoring of machines and production facilities.

**IoTKey® Transmitter WLT 310**

- Encrypted wireless LoRa communication
- Long range, low power and excellent interference immunity
- 1–3 sensors per transmitter, e.g. temperature, humidity, pressure, vibration, oil quality
- Configurable measuring interval and alarms.

**IoTKey® Gateway & Monitoring**

- Data routing (4G/Ethernet) to IoTKey cloud or any other system
- Real time monitoring, alarms and history data anywhere with any web enabled device
- Configurable dashboard views and measuring parameters.

**TYPICAL INDUSTRY SECTORS**

- Manufacturing
- Water & Infrastructure
- Energy

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1 Threaded temperature sensor without neck pipe
T-B-Ø / W-B-Ø

2 Threaded temperature sensor with neck pipe and thermowell
T-B-Ø / W-B-Ø

3 Flanged temperature sensor
T-F / W-F

4 Weldable temperature sensor
T-O / W-O

5 Threaded temperature sensor with neck pipe and sensing element
T-H-12 / W-H-12

6 Indoor/outdoor resistance temperature sensor
W-K-F / W-M-F

7 Enamelled temperature sensor
W-E-6-HST-S / W-E-6-HST-CLAMP

8 Immersion temperature sensor
W-E-6-HST-U-CLAMP / W-E-6-HST-U-SHIELD

9 Temperature transmitter
WLT 310

10 Mineral insulated temperature sensor
T-M-303 / W-M-303 or T-M-302 / W-M-302

11 Mineral insulated thermocouple insert with connector
T-M-313 or W-M-314

12 Mineral insulated insert with connection head
T-M-N / W-M-N

13 Acid proof temperature sensor
T-M-304 / W-M-304

14 Immersion temperature sensor
T-M-305 / W-M-305 or T-M-306 / W-M-306

15 Temperature transmitter
WLT 310

16 Temperature transmitter
WLT 310

17 Bayonet temperature sensor
T-BAJO / W-BAJO

18 Magnetic temperature sensor
T-MAGN / W-MAGN

19 Temperature sensor for food industry
T-106 / W-106

20 Bearing temperature sensor
T-BTD / W-BTD

21 Multi-point temperature sensor
T-MP / W-MP or T-MPT / W-MPT

22 Temperature sensor with cable
T-SCREW / W-SCREW

23 Trace heating sensor
T-SIL-PATCH / W-SIL-PATCH or 2xT-SIL-PATCH / 2xW-SIL-PATCH

24 Temperature transmitter
WLT 310

25 Mineral insulated temperature sensor
T-SIL-PATCH / W-SIL-PATCH or 2xT-SIL-PATCH / 2xW-SIL-PATCH

26 Temperature transmitter
WLT 310

27 Temperature sensor
T-RO / W-RO

28 Temperature sensor
T-M-P / W-M-P or T-P / W-P

29 Temperature sensor
T-CABLE / W-CABLE

30 Bayonet temperature sensor
T-BAJO / W-BAJO

31 Magnetic temperature sensor
T-MAGN / W-MAGN

32 Temperature sensor for food industry
T-106 / W-106

33 Bearing temperature sensor
T-BTD / W-BTD

34 Multi-point temperature sensor
T-MP / W-MP or T-MPT / W-MPT

35 Temperature sensor with cable
T-SCREW / W-SCREW

36 Temperature transmitter
WLT 310

37 Temperature sensor
T-RO / W-RO

38 Temperature sensor
T-M-P / W-M-P or T-P / W-P

39 Temperature sensor
T-CABLE / W-CABLE

40 Bayonet temperature sensor
T-BAJO / W-BAJO

41 Magnetic temperature sensor
T-MAGN / W-MAGN

42 Temperature sensor for food industry
T-106 / W-106

43 Bearing temperature sensor
T-BTD / W-BTD

44 Multi-point temperature sensor
T-MP / W-MP or T-MPT / W-MPT

45 Temperature sensor with cable
T-SCREW / W-SCREW

46 Temperature transmitter
WLT 310

47 Temperature sensor
T-RO / W-RO

48 Temperature sensor
T-M-P / W-M-P or T-P / W-P

49 Temperature sensor
T-CABLE / W-CABLE

50 Temperature sensor
T-RO / W-RO

51 Temperature sensor
T-M-P / W-M-P or T-P / W-P

52 Temperature sensor
T-CABLE / W-CABLE

53 Temperature sensor
T-RO / W-RO

54 Temperature sensor
T-M-P / W-M-P or T-P / W-P

55 Temperature sensor
T-CABLE / W-CABLE

56 Temperature sensor
T-RO / W-RO

57 Temperature sensor
T-M-P / W-M-P or T-P / W-P

58 Temperature sensor
T-CABLE / W-CABLE

59 Temperature sensor
T-RO / W-RO

60 Temperature sensor
T-M-P / W-M-P or T-P / W-P

61 Temperature sensor
T-CABLE / W-CABLE
EPIC® SENSORS T-B-ØK / W-B-ØK
Threaded temperature sensor without neck pipe

Features
- according to DIN 43772 form 2
- temperature range -40...+250 °C
- Pt100 or thermocouple as sensing element
- Pt100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- AISI 316L as standard delivery material, other materials on request
- MI cable structured sensor element
- internal sensor element replaceable on the fly
- tailored solutions according to customer specific needs
- ATEX compatible Ex db version available.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

<table>
<thead>
<tr>
<th>Materials</th>
<th>AISI 316L, maximum temperature +250 °C, temporarily +300 °C, other materials on request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thread</td>
<td>G, R, metric and NPT threads as standard delivery, other threads on request</td>
</tr>
<tr>
<td>Tolerances Pt100</td>
<td>A tolerance ±0.15 + 0.002 x t, operating temperature -100...+450 °C</td>
</tr>
<tr>
<td></td>
<td>B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C</td>
</tr>
<tr>
<td>Tolerances thermocouple</td>
<td>Type J tolerance class 1 = -40...375 °C ±1.5 °C, 375...750 °C ±0.004 x t</td>
</tr>
<tr>
<td></td>
<td>Type K and N tolerance class 1 = -40...375 °C ±1.5 °C, 375...1000 °C ±0.004 x t</td>
</tr>
<tr>
<td>Temperature range Pt100</td>
<td>-40...+250 °C</td>
</tr>
<tr>
<td>Approvals</td>
<td>ATEX, RU Ex, EAC, METROLOGICAL PATTERN APPROVAL</td>
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<tr>
<td>Quality certificate</td>
<td>ISO 9001:2015 issued by DNV</td>
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<tr>
<td>IP rating</td>
<td>IP65, higher IP rating on request</td>
</tr>
</tbody>
</table>


Installation examples
EPIC® SENSORS T-B-Ø / W-B-Ø
Threaded temperature sensor with neck pipe and thermowell

Features
- according to DIN 43772 form 2G
- temperature range -200...+1200 °C
- neck pipe for heat source clearance
- Pt100 or thermocouple as sensing element
- thermowell material according to the application
- Pt100 accuracy class A as a standard delivery
- thermocouple accuracy class 1 as standard delivery
- MI cable structured sensor element
- internal sensor element replaceable on the fly
- tailored solutions according to customer specific needs
- ATEX compatible Ex db version available
- neck pipe length 145 mm as standard delivery, other lengths on request.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

Materials
AISI 316L, maximum temperature +550 °C, temporarily +600 °C,
EN1.4841 heat-resistant steel, maximum temperature +1100 °C, temporarily +1200 °C
Other materials on request

Thread
G, R, metric and NPT threads as standard delivery, other threads on request

Tolerances Pt100
(IEC 60751)
A tolerance ±0.15 + 0.002 x t, operating temperature -100...+450 °C
B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C
B 1/3 DIN, tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C
B 1/10 DIN, tolerance ±1/10 x (0.3 + 0.005 x t), operating temperature -196...+600 °C

Tolerances thermocouple
(IEC 60584)
Type J tolerance class 1 = -40...375 °C ±1.5 °C, 375...750 °C ±0.004 x t
A tolerance class 1 = -40...375 °C ±1.5 °C, 375...1000 °C ±0.004 x t

Temperature range Pt100
-200...+1500 °C

Temperature range thermocouple
-200...+1200 °C depending on thermocouple type and cooling neck length

Neck pipe length = 250 mm → maximum temperature +750 °C
Neck pipe length = 350 mm → maximum temperature +1000 °C
Neck pipe length = 350 mm → maximum temperature +1200 °C

Approvals
ATEX, RU Ex, EAC, METROLOGICAL PATTERN APPROVAL

Quality certificate
ISO 9001:2015 issued by DNV

IP rating
IP65, higher IP rating on request

Product code key

Example code: W = Pt100 resistance thermometer
T = thermocouple
B = threaded sensor type (constant in code)
1, 2, 3 = thermocouple type
4, 3, 2 = Pt100 wire count
K, N, J = thermocouple type
A, B = Pt100 accuracy class,
1, 2, 3 = thermocouple accuracy class,
(standard delivery)
HST = acid proof connection head
N = connection head N
L = length, L [mm]
G½" = thread size (all available, also NPT)
W = thread size (all available, also NPT)

Installation examples

Drawing

Installation examples
**EPIC® SENSORS T-F / W-F**

**Flanged temperature sensor**

**Features**
- according to DIN 43772 form 2F
- temperature range -200...+1200 °C
- neck pipe for heat source clearance
- AISI 316L as standard delivery material, other materials on request
- Pt 100 or thermocouple as sensing element
- Pt 100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- M20x1,5 cable gland for max Ø14 mm
- connection head D/H
- joint hinge

**Typical applications**
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

**Technical data**

**Thermowell materials**
- AISI 316L, maximum temperature +550 °C, temporarily +600 °C,
  - EN1.4841 heat-resistant steel, maximum temperature +1100 °C, temporarily +1200°C
- Other materials on request

**Flange**
- Flat face DIN EN 1092-1, type 05A, other flange types on request

**Tolerances Pt100**
- (IEC 60751)
  - A tolerance ±0.015 + 0.002 x t, operating temperature -100...+450 °C
  - B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C
  - B 1/3 DIN, tolerance ±1/3 x (0.3 + 0.005 x t), operating temperature -196...+600 °C
  - B 1/10 DIN, tolerance ±1/10 x (0.3 + 0.005 x t), operating temperature -196...+600 °C

**Tolerances thermocouple**
- (IEC 60584)
  - Type J tolerance class 1 = -40...375 °C ±1.5 °C, 375...750 °C ±0.004 x t
  - Type K and N tolerance class 1 = -40...375 °C ±1.5 °C, 375...1000 °C ±0.004 x t

**Temperature range Pt100**
- -200...+1200 °C

**Temperature range thermocouple**
- -200...+1200 °C, depending on thermocouple type and cooling neck length

**Neck pipe length**
- ±250 mm = temp. max. +750 °C
- ±300 mm = temp. max. +1000 °C
- ±350 mm = temp. max. +1200 °C

**Approvals**
- ATEX, RU Ex, EAC, METROLOGICAL PATTERN APPROVAL

**Quality certificate**
- ISO 9001:2015 issued by DNV

**IP rating**
- IP65, higher IP rating on request

**Drawing**

**Product code key**

- W = Pt100 resistance thermometer
- 2xW = 2 x Pt100 resistance thermometer
- T = thermocouple
- 2xT = 2 x thermocouple
- F = sensor with flange (constant in code)
- 11, 15, 22 = thermowell outer diameter (ØOD) [mm] (other diameters on request)
- L typically 145 mm
- ØOD = thermowell outer diameter (ØOD) [mm]
- Ø12 = neck pipe Ø12
- D/H = connection head D/H
- B = connection head B
- D/W/H = connection head with snap lock
- D/W/D = connection head with snap lock and double barrel (2x cable gland)
- D/W/M/H = high cover connection head with snap lock and double barrel (2x cable gland)
- EXD = ATEX compatible connection head
- HST = acid proof connection head
- N = connection head N

**Example code:**

**Installation examples**
EPIC® SENSORS T-D / W-D
Weldable temperature sensor

Features
- according to DIN 43772 form 4
- temperature range -200...+1200 °C
- neck pipe for heat source clearance
- with weldable thermowell
- AISI 316L as standard delivery material, other materials on request
- Pt 100 or thermocouple as sensing element
- Pt 100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- M14 cable structured sensor element
- internal sensor element replaceable on the fly
- tailored solutions according to customer specific needs
- ATEX compatible Ex db version also available
- neck pipe length 165 mm as standard delivery, other lengths on request.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

Materials
AISI 316L, max. temperature +550 °C, temporarily +600 °C
16CrMo44/1.7335, max. temperature +550 °C
10CrMo910/1.7380, max. temperature +580 °C
16Mo3/1.5415, max. temperature +480 °C
Other materials available on request, for example:
AISI S31803/1.4462, SMO254/1.4547, AISI304L/1.4307, TiGr2/3.7035, etc.

Thermowell types
D1, D2, D3, D4, D5, D6 with M18x1.5 thread or
D1/S, D2/S, D4/S, D5/S with M14x1.5 thread
According to standard DIN 43772 form 4, other thermowell types on request

Tolerances Pt100
(AEC 60751)
A tolerance ±0.15 ± 0.002 x t, operating temperature -100...+450 °C
B tolerance ±0.3 ± 0.005 x t, operating temperature -196...+600 °C
B 1/3 DIN, tolerance ±1/3 (0.3 ± 0.005 x t), operating temperature -196...+600 °C
B 1/10 DIN, tolerance ±1/10 (0.3 ± 0.005 x t), operating temperature -196...+600 °C

Tolerances thermocouple
(AEC 60584)
Type J tolerance class 1 = -40...375 °C ± 1.5 °C, 375...750 °C ±0.004 x t
Type K and N tolerance class 1 = -40...375 °C ± 1.5 °C, 375...1000 °C ±0.004 x t

Temperature range Pt100
-200...+1550 °C

Temperature range thermocouple
-200...+1200 °C depending on thermoelement, thermowell material and cooling neck length
Neck pipe length = 250 mm – temp. max. +750 °C
Neck pipe length = 300 mm – temp. max. +1000 °C
Neck pipe length = 350 mm – temp. max. +1200 °C

Approvals
ATEX, RU Ex, EAC, METROLOGICAL PATTERN APPROVAL

Quality certificate
ISO 9001:2015 issued by DNV

IP rating
IP65, higher IP rating on request
EPIC® SENSORS T-H-12 / W-H-12
Threaded temperature sensor with neck pipe and sensing element

Features
- temperature range -200...+1200 °C
- neck pipe for heat source clearance
- thread attachable to thermowell or process
- Pt100 or thermocouple as sensing element
- Pt100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- MI cable structured sensor element
- internal sensor element replaceable on the fly
- standard delivery length for sensor element is 315, 375 or 435mm, other lengths available on request
- neck pipe length 165 mm as standard delivery, other lengths on request
- tailored solutions according to customer specific needs
- ATEX compatible Ex db version also available.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data
Thread
M14x1.5 or M18x1.5 thread as standard delivery, other threads on request

Internal sensor element diameter
3, 6 or 8 mm

Tolerances Pt100 (IEC 60751)
A tolerance ±0.5 + 0.002 x t, operating temperature -100...+450 °C
B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C

B 1/3 DIN, tolerance ±1/3 x (0.3 + 0.005 x t), operating temperature -196...+600 °C
B 1/10 DIN, tolerance ±1/10 x (0.3 + 0.005 x t), operating temperature -196...+600 °C

Tolerances thermocouple (IEC 60584)
Type J tolerance class 1 = -40...375 °C ±1.5 °C, 375...750 °C ±0.004 x t
Type K and N tolerance class 1 = -40...375 °C ±1.5 °C, 375...1000 °C ±0.004 x t

Temperature range Pt100
-200...+1550 °C

Temperature range thermocouple
-200...+1200 °C depending on thermocouple type, thermowell materials and cooling neck length
Neck pipe length = 250 mm → temp. max. +750 °C
Neck pipe length = 300 mm → temp. max. +1000 °C
Neck pipe length = 350 mm → temp. max. +1200 °C

Approvals
ATEX, RU Ex, EAC, METROLOGICAL PATTERN APPROVAL

Quality certificate
ISO 9001:2015 issued by DNV

IP rating
IP65, higher IP rating on request

Example code:
W = Pt100 resistance thermometer
2xW = 2 x Pt100 resistance thermometer
T = thermocouple
2xT = 2 x thermocouple
M = sensor with cooling neck (constant in code)
12 = external diameter of neck pipe [mm]
B = connection head B
D/H = connection head with snap lock
D/H/W = connection head with snap lock and double barrel (2x cable gland)
D/H/W/D = high cover connection head with snap lock and double barrel (2x cable gland)
EXD = ATEX-compatible connection head
HST = acid proof connection head
N = connection head N
W1/10” = thread size (all available, also NPT)
3, 6, 8 = outer diameter of sensor element [mm] (X = L + 175 mm, except for EXD enclosure)
375 = length of the sensor element, X [mm] (X = L + 175 mm, except for EXD enclosure) (for EXD enclosure use: X = L + 187 mm)
200 = length, L [mm]
4,3,2 = Pt100 wire count
K,N,J = thermocouple type
A,B = Pt100 accuracy class, class A as standard delivery
1,2,3 = thermocouple accuracy class, class 1 as standard delivery
TR = sensor for transmitter connection
CB = with ceramic terminal block
X = additional details on the text line

Installation examples
EPIC® SENSORS W-K-F / W-M-F
Indoor/outdoor resistance temperature sensor

Features
- temperature range -40...+80 °C
- Pt100 as sensing element
- Pt100 accuracy class A as standard delivery
- fast response time
- can be supplied with mA transmitter
- available with plastic or metal housing
- tailored solutions according to customer specific needs
- thermocouple versions available on request
- ATEX compatible Ex db-version also available.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

<table>
<thead>
<tr>
<th>Enclosure</th>
<th>Plastic enclosure dimensions 120x80x58 mm (W x H x D), Metal enclosure dimensions 80x75x58 mm (W x H x D)</th>
</tr>
</thead>
</table>
| Tolerances Pt100 (IEC 60751) | A tolerance ±0.15 + 0.002 x t, operating temperature -100...+450 °C  
B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C  
B 1/3 DIN, tolerance ±1/3 x (0.3 + 0.005 x t), operating temperature -196...+600 °C  
B 1/10 DIN, tolerance ±1/10 x (0.3 + 0.005 x t), operating temperature -196...+600 °C |
| Temperature range Pt100   | -40...+80 °C, other measurement ranges on request                                                 |
| Approvals                  | ATEX, RU Ex, EAC, METROLOGICAL PATTERN APPROVAL                                                  |
| Quality certificate        | ISO 9001:2015 issued by DNV                                                                   |
| IP rating                  | IP65, higher IP rating on request                                                              |


Installation examples
EPIC® SENSORS T-M-Ø / W-M-Ø
Mineral insulated element

Features
- similar to DIN 43762
- temperature range -200...+1200 °C
- Pt 100 or thermocouple as sensing element
- AISI 316L or INCONEL 600 as standard delivery material, other materials on request
- Pt 100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- MI cable structured sensor element
- bendable
- tailored solutions according to customer specific needs.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Special applications
- for very high temperature solutions we can offer special thermocouple inserts with ceramic tubing and platinum wiring up to +1600 °C
- for this type of insert please contact our sales.

Technical data

| Materials | AISI 316L, max. temperature +550 °C, temporarily +600 °C
| Other materials on request |
| Tolerances Pt100 (IEC 60751) | A tolerance ±0.15 ± 0.002 x t, operating temperature -100...+450 °C
| B tolerance ±0.3 ± 0.005 x t, operating temperature -196...+600 °C
| B 1/3 DIN, tolerance ±0.3 ± 0.005 x t, operating temperature -196...+600 °C
| Standard model |
| ØOD 40 |
| W — M — 6 —       / 315 — 4 — A — TR — X |

Product code key

W = Pt100 resistance thermometer
2xW = 2 x Pt100 resistance thermometer
T = thermocouple
2xT = 2 x thermocouple
M = mineral insulated sensor [constant in code]
3, 6, 8 = outer diameter of MI cable (ØOD) [mm]
emly = even thickness (as standard delivery)
SV = thick wall in measure end
315 = length, L [mm]
3, 2, 3 = Pt100 wire count
K,N,J,A,B = thermocouple type
1,2,3 = thermocouple accuracy class, (class 1 as standard delivery)
TR = wires for transmitter connection
CB = with ceramic terminal block
X = additional details on the text line

W-M-Ø/315-3-A-CB
Pt100 resistance thermometer for 3 wire measurement, Pt100 with accuracy class A, mineral insulated element with diameter 6 mm and length 315 mm, ceramic block for cable connection.

T-M-6-SV/1500-K-1-TR
Thermocouple type K with accuracy class 1, mineral insulated element with diameter 6 mm and length 1500 mm, reinforced structure, connection head has space for housing, mA current transmitter block.
Immersible temperature sensor

Features
- according to DIN 43772 form 1
- temperature range -200...+1200 °C
- AISI 316L/EN1.4044 or heat-resistant steel AISI 446-1/EN1.4749 as typical material, other materials on request
- available with solid tip
- 200 mm as typical length for the solid tip
- Pt 100 or thermocouple as sensing element
- Pt 100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- MI cable structured sensor element
- internal sensor element replaceable on the fly
- tailored solutions according to customer specific needs
- ATEX compatible Ex db version also available.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data
Thermowell material
- AISI 316L/EN1.4044 max. temperature +550 °C, temporarily +600 °C
- AISI 446-1/EN1.4749 max. temperature +1100 °C, temporarily +1200 °C
- Other materials on request

Thermowell tip material
- AISI 316L/EN1.4044 max. temperature +550 °C, temporarily +600 °C
- AISI 446-1/EN1.4749 max. temperature +1100 °C, temporarily +1200 °C
- Other materials on request

Tolerances Pt100
- (IEC 60751)
  A tolerance ±0.15 x 0.002 x t, operating temperature -100...+450 °C
  B tolerance ±0.3 x 0.005 x t, operating temperature -196...+600 °C
  B 1/3 DIN, tolerance ±1/3 x (0.3 x 0.005 x t), operating temperature -196...+600 °C
  B 1/10 DIN, tolerance ±1/10 x (0.3 x 0.005 x t), operating temperature -196...+600 °C

Tolerances thermocouple
- (IEC 60584)
  Type J tolerance class 1 = -40...+375 °C ±0.75 °C ±0.004 x t
  Type K and N tolerance class 1 = -40...+375 °C ±1.5 °C ±0.004 x t

Temperature range Pt100
- -200...+1550 °C, depending on housing and thermowell materials

Temperature range thermocouple
- -200...+1200 °C, depending on thermocouple type and thermowell materials

Approvals
- ATEX, RU Ex, EAC, METROLOGICAL PATTERN APPROVAL

Quality certificate
- ISO 9001:2015 issued by DNV

IP rating
- IP65, higher IP rating on request

Product code key

W = Pt100 resistance thermometer
2xW = 2 x Pt100 resistance thermometer
2xT = 2 x thermocouple
A = immersible sensor type (constant in code)
10, 22 = outer diameter of sensor element (ØOD) [mm]
(Other diameters available on request)
B = connection head B
D/H = connection head with snap lock
D/H/D = connection head with snap lock and double barrel (2x cable gland)
D/H/W/H/D = high cover connection head with snap lock and double barrel (2x cable gland)
EXD = ATEX-compatible connection head
HST = acid proof connection head
N = connection head N
empty = without solid tip
U = with solid tip (tip length typically 200 mm)
1000 = length L [mm]
1.4404, 1.4749 = thermowell or tip material
(Other materials on request)
4, 5, 2 = Pt100 wire count
K, N = thermocouple type
A, B = Pt100 accuracy class
1, 2, 3 = thermocouple accuracy class
(Other materials on request)
TR = wires for transmitter connection
CB = with ceramic terminal block
X = additional details on the text line

Installation examples
- W-A-22-EXD-500/1.4404-4-A-CB
  Pt100 resistance thermometer for 4 wire measurement, Pt 100 with accuracy class A, immersible sensor type, 22 mm diameter for sensor element, ATEX compatible housing, without solid tip, sensor length 500 mm, materials AISI316L/EN1.4404, with ceramic block for cable connection.
EPIC® SENSORS T-K / T-AK / T-AKK
Immersible thermocouple sensor

Features
- similar to DIN 43733
- temperature range -200...+1600 °C
- thermocouple as sensing element
- thermocouple accuracy class 1 as standard delivery
- ceramic thermowell with C610 or C799 as typical material, other materials on request
- ceramic C610 and C799 are gas-tight materials
- typical neckpipe materials AISI304/316L
- thermo-cement filling in between neckpipe and ceramic
- installation recommendation with weldable flange, adjustable flange or with gas tight compression fitting
- tailored solutions according to customer specific needs
- ATEX compatible Ex db version also available.

Typical applications
- very high temperature applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

Thermowell material
Ceramic C610 max. temperature +1500 °C, gas-tight, medium to good thermal shock resistance
Ceramic C799 max. temperature +1600 °C, gas-tight, medium thermal shock resistance
Other materials on request

Tolerances thermocouple
Type J tolerance class 1 = -40...+375 °C ±1.5 °C, +375...+750 °C ±0.004 x t
Type K and N tolerance class 1 = -40...+375 °C ±1.5 °C, +375...1000 °C ±0.004 x t
Type R and S tolerance class 1 = 0...+1100 °C ±1 °C, 1100...1600 °C ±[1+0.003(t-1100)] °C

Temperature range
-200...+1700 °C, depending on thermocouple type, thermowell material and neck pipe length

Approvals
ATEX, RU Ex, EAC, METROLOGICAL PATTERN APPROVAL

Quality certificate
ISO 9001:2015 issued by DNV

IP rating
IP65, higher IP rating on request

Installation examples
EPIC® SENSORS T-M-303 / W-M-303 or T-M-302 / W-M-302
Mineral insulated thermocouple or resistance sensor with cable

Features
- according to DIN 43721
- temperature range -200...+1200 °C
- Pt 100 or thermocouple as sensing element
- AISI 316L or INCONEL 600 as standard delivery material, other materials on request
- Pt100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- MI cable structured sensor element
- bendable
- vibration proof
- ATEX compatible Ex e version also available.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

Materials
AISI 316L, max. temperature +550 °C, temporarily +600 °C, INCONEL 600, max. temperature +1100 °C, temporarily +1200 °C

(Note. max. safe temperature +100 °C for the sealant tube in cable to sensor element transition)

Cable materials
- SIL = silicone, max. +180 °C
- FEP = Teflon®, max. +205 °C
- GDD = glass silk cable/metal braid jacket, max. +350 °C
- FDF = FEP wire insulation/braid shield/FEP jacket, max. +205 °C
- SDS = silicone wire insulation/braid shield/silicone jacket, only available as 2 wire cable, max. +180 °C
- TDF = Teflon® wire insulation/braid jacket, max. +205 °C
- SDS = silicone wire insulation/braid shield/silicone jacket, only available as 2 wire cable, max. +180 °C
- FS = FEP wire insulation/silicone jacket, max. +180 °C

(Tolerances Pt100
IEC 60751)
- A tolerance ±0.15 + 0.002 x t, operating temperature -100...+450 °C
- B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C
- B 1/3 DIN, tolerance ±1/3 x (0.3 + 0.005 x t), operating temperature -196...+600 °C
- B 1/10 DIN, tolerance ±1/10 x (0.3 + 0.005 x t), operating temperature -196...+600 °C

(Tolerances thermocouple
IEC 60584)
- Type J tolerance class 1 = -40...375 °C ±1.5 °C, 375...750 °C ±0.004 x t
- Type K and N tolerance class 1 = -40...375 °C ±1.5 °C, 375...1000 °C ±0.004 x t

Temperature range Pt100
-200...+550 °C, depending on sensor element and cable material
(Note. max. safe temperature +100 °C for the sealant tube in cable to sensor element transition)

Temperature range thermocouple
-200...+1200 °C, depending on thermocouple type and other sensor materials

Approvals
ATEX, RU Ex, EAC, IECEx, METROLOGICAL PATTERN APPROVAL

Quality certificate
ISO 9001:2015 issued by DNV

IP rating
IP65, higher IP rating on request
EPIC® SENSORS T-M-313 or T-M-314
Mineral insulated thermocouple insert with connector

Features
- according to DIN 43721
- temperature range -200...+1200 °C
- thermocouple as sensing element
- thermocouple accuracy class 1 as standard delivery
- available with standard STD or mini-plug
- AISI 316L and INCONEL 600 as standard materials, other materials on request
- MI cable structured sensor element
- bendable
- vibration proof
- tailored solutions according to customer specific needs.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

| Materials | AISI 316L, maximum temperature +550 °C, temporarily +600 °C, INCONEL 600, maximum temperature +1100 °C, temporarily +1200 °C Other materials on request |
| Connectors | Construction “313” = connector with round pins, STD Construction “314” = connector with flat pins, mini |
| Diameter | 0.5 / 1.0 / 1.5 / 2.0 / 3.0 / 4.5 / 6.0 mm (Note: mini connector up to 4.5 mm element diameter) |
| Color | According to EN 60584 |
| Tolerances thermocouple (IEC 60584) | Type J tolerance class I = -40...375 °C ±1.5 °C, 375...750 °C ±0.004 x t Type K and N tolerance class I = -40...375 °C ±1.5 °C, 375...1000 °C ±0.004 x t |
| Temperature range thermocouple | -200...+1200 °C, depending on thermocouple type and sensor element material |
| Approvals | METROLOGICAL PATTERN APPROVAL |
| Quality certificate | ISO 9001:2015 issued by DNV |

Example code: T — M — 313 — 3 / 1000 — K — 1 — X

T = thermocouple
2xT = 2 x thermocouple
M = MI cable structured sensor (constant in code)
313 = with STD connector
314 = with mini connector
0.5, 1, 1.5, 2, 3, 4.5, 6 (Note: mini connector up to 4.5mm diameter) outer diameter of sensor element (ØOD) [mm] (other diameters on request)
1000 = MI cable length, L [mm]
K,N,J = thermocouple type
1, 2, 3 = thermocouple accuracy class, (class 1 as standard delivery)
X = additional details on the text line

Installation examples
EPIC® SENSORS T-M-N / W-M-N

Mineral insulated insert with connection head

**Features**
- according to DIN 43721
- temperature range -200...+1200 °C
- AISI 316L or INCONEL 600 as standard delivery material, other materials on request
- Pt100 or thermocouple as sensing element
- Pt100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- MI cable structured sensor element
- bendable
- vibration proof
- typically used with compression fitting
- adjustable immersion length can be achieved
- tailored solutions according to customer specific needs
- ATEX compatible Ex db version also available.

**Typical applications**
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry

**Technical data**

**Materials**
- AISI 316L, maximum temperature +550 °C, temporarily +600 °C
- INCONEL 600, maximum temperature +1100 °C, temporarily +1200 °C
- Other materials on request

**Tolerances Pt100**
- A tolerance ±0.15 + 0.002 x t, operating temperature -100...+450 °C
- B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C
- B 1/3 DIN, tolerance ±1/3 x (0.3 + 0.005 x t), operating temperature -196...+600 °C
- B 1/10 DIN, tolerance ±1/10 x (0.3 + 0.005 x t), operating temperature -196...+600 °C

**Tolerances thermocouple**
- Type J tolerance class 1 = -40...375 °C ±1.5 °C, 375...750 °C ±0.004 x t
- Type K and N tolerance class 1 = -40...375 °C ±1.5 °C, 375...1000 °C ±0.004 x t

**Temperature range Pt100**
- -200...+1200 °C, depending on sensor element material and length

**Temperature range thermocouple**
- -40...+1200 °C, depending on thermocouple type, sensor element material and length

**Approvals**
- ATEX, RU Ex
- METROLOGICAL PATTERN APPROVAL

**Quality certificate**
- ISO 9001:2015 issued by DNV

**IP rating**
- IP65, higher IP rating on request
**EPIC SENSORS W-E-6-HST-S / W-E-6-HST-CLAMP**

**Acid proof temperature sensor for hygienic installation**

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**Features**
- temperature range -200...+550 °C
- shaped for hygienic installations
- Pt100 as sensing element
- Pt100 accuracy class A as standard delivery
- mounting by weldable ball flange or with tri-clamp fitting
- thermowell material according to the application
- MI cable structured inner element
- inner element replaceable on the fly
- vibration proof
- tailored solutions according to customer specific needs.

**Typical applications**
- food industry
- pharmaceutical industry
- chemical industry
- process industry
- energy and power plant technology
- machinery and vessel construction
- manufacturing industry.

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**Technical data**

**Materials**
AISI 316 L, max. temperature +550 °C, temporarily +600 °C, other materials on request

**Tolerances Pt100**
- A tolerance ±0.15 + 0.002 x t, operating temperature -100...+450 °C
- B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C
- B 1/3 DIN, tolerance ±1/3 x (0.3 + 0.005 x t), operating temperature -196...+600 °C

**Temperature range Pt100**
-200...+550 °C, depending on materials and neck pipe length

**Approvals**
METROLOGICAL PATTERN APPROVAL

**Quality certificate**
ISO 9001:2015 issued by DNV

**IP rating**
IP65, higher IP rating on request

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**Drawing**

**Product code key**

**Example code:**

W = Pt100 resistance thermometer  
2xW = 2 x Pt100 resistance thermometer  
E = sensor for food processing industry (constant in code)  
6, 11 = outer diameter of sensor element (ØOD) [mm] (other diameters on request)  
B = connection head B  
D/W/O = connection head with snap lock and double barrel (2x cable gland)  
D/W/H = high cover connection head with snap lock  
HST = acid proof connection head  
S = with weldable ball flange Ø25 mm  
CLAMP/51 = tri-clamp flange with diameter Ø51 mm (all sizes available)  
500 = immersion length, L [mm]  
4,3,2 = Pt100 wire count  
A,B = Pt100 accuracy class, (class A as standard delivery)  
TR = wires for transmitter connection  
CB = with ceramic terminal block  
X = additional details on the text line

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**Installation examples**
EPIC® SENSORS T-RO / W-RO
Pipe surface temperature sensor

Features
- temperature range -200...+550 °C
- fitting for pipes or other cylindrical shapes
- on request, the fitting can be welded on the sensor element at the factory
- sensors with no welded fitting meet the ATEX Ex e, EAC, IECEx, and Russian Ex requirements
- fitting can be supplied as separate item
- Pt100 or thermocouple as sensing element
- Pt100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- AISI 316L as standard delivery material, other materials on request
- MI cable structured sensor element
- bendable
- vibration proof
- tailored solutions according to customer specific needs.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

Materials
AISI 316L, max. temperature +550 °C, temporarily +600 °C; other materials on request
(Note: max. safe temperature +100 °C for the sealant tube in cable to sensor element transition)

Fittings available for pipe sizes
0…1000 mm, other sizes on request

Cable material
SIL = silicone, max. +180 °C
FEP = Teflon®, max. +205 °C
GGD = glass-silk cable/metal braid jacket, max. +350 °C
FDF = FEP wire insulation/braid shield/FEP jacket, max. +205 °C
SDS = silicone wire insulation/braid shield/silicone jacket, only available as 2 wire cable, max. +180 °C
TDT = Teflon® wire insulation/braid shield/Teflon® jacket, max. +205 °C
FDS = FEP wire insulation/braid shield/silicone jacket, max. +180 °C
FS = FEP wire insulation/silicone jacket, max. +180 °C
(Note: max. safe temperature +100 °C for the cable in the sensor element transition)

Tolerances Pt100
(IEC 60751)
A tolerance ±0.15 x 0.002 x t, operating temperature -100...+450 °C
B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C
B 1/3 DIN, tolerance ±1/3 (0.3 + 0.005 x t), operating temperature -196...+600 °C
B 1/10 DIN, tolerance ±1/10 (0.3 + 0.005 x t), operating temperature -196...+600 °C

Tolerances thermocouple
(IEC 60584)
Type J tolerance class 1 = -40...375 °C ±0.5 °C, ±0.004 x t
Type K and N tolerance class 1 = -40...375 °C ±1.5 °C, ±0.004 x t

Temperature range Pt100
-200...+550 °C, depending on materials and neck pipe length
(Note: max. safe temperature +100 °C for the sensor element in cable to sensor element transition)

Temperature range thermocouple
-200...+150 °C, depending on thermocouple type, materials and neck pipe length
(Note: max. safe temperature +100 °C for the sensor element in cable to sensor element transition)

Approvals
ATEX Ex e, EAC, IECEx, and RU Ex with remarks (see features), METROLOGICAL PATTERN APPROVAL

Quality certificate
ISO 9001:2015 issued by DNV

Product code key


Installation examples
EPIC® SENSORS T-M-P / W-M-P or T-P / W-P
Surface temperature sensor

Features
- temperature range -200...+550 °C
- fitting for plane surfaces
- fitting can be welded to sensor element at factory
- sensors with no welded fitting meet the ATEX Ex e, IECEx, and EAC Ex requirements
- fitting can be supplied as separate item
- installation typically with welding, bolt or steel ties
- Pt100 or thermocouple as sensing element
- AISI 316L as standard delivery material, other materials on request
- Pt100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- MI cable structured
- bendable sensor element
- vibration proof
- tailored solutions according to customer specific needs.

Typical applications
- energy and power plant technology
- process industry
- machinery and vessel construction
- manufacturing industry.

Technical data

<table>
<thead>
<tr>
<th>Materials</th>
<th>AISI 316L, maximum temperature +550 °C, temporarily +600 °C, other materials on request (Note: max. safe temperature +100 °C for the sealant tube in cable to sensor element transition)</th>
</tr>
</thead>
</table>

| Cable materials | SIL = silicone, max. +180 °C  FEP = Teflon®, max. +205 °C  GGD = glass silk cable/metal braid jacket, max. +350 °C  FDF = FEP wire insulation/brad shield/FEP jacket, max. +205 °C  SDS = silicone wire insulation/brad shield/silicone jacket, only available as 2 wire cable, max. +180 °C  TDT = Teflon® wire insulation/brad shield/ Teflon® jacket, max. +205 °C  SDS = glass silk cable/metal braid jacket, max. +180 °C  FS = FEP wire insulation/silicone jacket, max. +180 °C |

| Dimensions | 5x9x45 (WxHxL) (hole Ø5.1 mm), 12x12x50 (WxHxL) (hole Ø8.0 mm), other dimensions on request |

| Tolerances Pt100 (IEC 60751) | A tolerance ±0.15 ± 0.002 x t, operating temperature -100...-450 °C  B tolerance ±0.3 ± 0.005 x t, operating temperature -196...+600 °C  B 1 / 3 DIN, tolerance ±1/3 x (0.3 ± 0.005 x t), operating temperature -196...+600 °C  B 1 / 10 DIN, tolerance ±1/10 x (0.3 ± 0.005 x t), operating temperature -196...+600 °C  |

| Tolerances thermocouple (IEC 60584) | Type J tolerance class 1 = -40...375 °C ±1.5 °C, 375...750 °C ±0.004 x t  Type K and N tolerance class 1 = -40...375 °C ±1.5 °C, 375...1000 °C ±0.004 x t |

| Temperature range Pt100 | -200...+550 °C, depending on thermocouple type, materials and length of the MI cable or sensor element (Note: max. safe temperature +100 °C for the sealant tube in cable to sensor element transition) |

| Temperature range thermocouple | -200...+550 °C, depending on thermocouple type, materials and length of the MI cable or sensor element (Note: max. safe temperature +100 °C for the sealant tube in cable to sensor element transition) |

| Approvals | ATEX Ex e, EAC, IECEx, and EAC Ex with remarks (see features), EAC EMC, METROLOGICAL PATTERN APPROVAL |

| Quality certificate | ISO 9001:2015 issued by DNV |

W = Pt100 resistance thermometer  
2xW = 2 x Pt100 resistance thermometer  
T = thermocouple  
2xT = 2 x thermocouple  
empty = non-bendable sensor element  
M = bendable MI cable as sensor element  
P = surface temperature sensor (constant in code)  
5x9x45 = dimensions of the tip piece  
12x12x50 = (Note: 5x9x45 tip only with 3 mm element)  
3, 6 = outer diameter of sensor element (ØOD) [mm]  
500 = length of sensor element, L [mm]  
5000 = cable length, CL [mm]  
SIL, FEP, GGD, FDF, TDT, SDS, GGD, FDF = cable materials (for more information, look technical data on first page of this datasheet)  
4, 3, 2 = Pt100 wire count  
K, N, J = thermocouple type  
A, B = Pt100 accuracy class, (class A as standard delivery)  
1, 2, 3 = thermocouple accuracy class, (class A as standard delivery)  
X = additional details on the text line

Installation examples
Steel collar installation

Example code: Model W-M-P

Model W-P

Drawing
EPIC® SENSORS T-CABLE / W-CABLE

Temperature sensor with cable

Features
- temperature range -200...+350 °C
- Pt100 or thermocouple as sensing element
- AISI 316L as standard delivery material, other materials on request
- Pt100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- ATEX compatible Ex e version available
- tailored solutions according to customer specific needs.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

<table>
<thead>
<tr>
<th>Materials</th>
<th>AISI 316L, maximum temperature +300 °C, temporarily +350 °C, other materials on request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>3, 4, 5, 6 or 8 mm, other diameters on request</td>
</tr>
</tbody>
</table>
| Cable materials   | SIL = silicone, max. +180 °C  
|                   | FEP = Teflon®, max. +205 °C  
|                   | GGD = glass silk cable/metal braid jacket, max. +350 °C  
|                   | FDF = FEP wire insulation/braid/PEF jacket, max. +205 °C  
|                   | SDS = silicone wire insulation/braid/silicone jacket, only available as 2 wire cable, max. +180 °C  
|                   | TDT = Teflon® wire insulation/braid/PEF jacket, max. +205 °C  
|                   | FDS = FEP wire insulation/silicone jacket, max. +180 °C  

Tolerances Pt100 (IEC 60751)
A tolerance ±0.15 + 0.002 x t, operating temperature -100...+450 °C  
B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C  
B 1/3 DIN, tolerance ±1/3 x (0.3 + 0.005 x t), operating temperature -196...+600 °C  
B 1/10 DIN, tolerance ±1/10 x (0.3 + 0.005 x t), operating temperature -196...+600 °C

Tolerances thermocouple (IEC 60584)
Type J tolerance class 1 = ±0.375 °C ±1.5 °C, 375...750 °C ±0.004 x t  
Type K and N tolerance class 1 = ±0.375 °C ±1.5 °C, 375...1000 °C ±0.004 x t

Temperature range Pt100  
-200...+350 °C, depending on cable material

Temperature range thermocouple  
-200...+350 °C, depending on thermocouple type and cable material

Approvals  
ATEX, RU Ex, EAC, IECEx, METROLOGICAL PATTERN APPROVAL

Quality certificate  
ISO 9001:2015 issued by DNV

Example code:  

Installation examples
EPIC® SENSORS T-BAJO / W-BAJO
Bayonet temperature sensor

Features
- temperature range -200...+300 °C
- spring-loaded
- suitable for bearings
- vibration proof
- quick installation due to bayonet connection
- AISI 316L as standard delivery material, other materials on request
- Pt100 or thermocouple as sensing element
- Pt100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- ATEX compatible Ex e version available
- tailored solutions according to customer specific needs.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

<table>
<thead>
<tr>
<th>Materials</th>
<th>AISI 316L, max. temperature +250 °C, temporarily +300 °C, other materials on request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor diameter</td>
<td>6 or 8mm, other diameters on request</td>
</tr>
<tr>
<td>Bayonet cup diameter</td>
<td>12.2 mm, other diameters on request</td>
</tr>
</tbody>
</table>
| Cable material            | SIL = silicone, max. +180 °C
FEF = Teflon®, max. +205 °C
GGD = glass silk cable/metal braid jacket, max. +350 °C
FDF = FEP wire insulation/braid shield/silicone jacket, only available as 2 wire cable, max. +180 °C
SDS = silicone wire insulation/braid shield/silicone jacket, only available as 2 wire cable, max. +180 °C
TDT = Teflon® wire insulation/braid shield/Teflon® jacket, max. +205 °C
FDS = FEP wire insulation/braid shield/silicone jacket, max. +180 °C
FS = FEP wire insulation/silicone jacket, max. +180 °C |

Tolerances Pt100
- A tolerance ±0.15 + 0.002 x t, operating temperature -100...+450 °C
- B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C
- 1/10 DIN, tolerance ±0.3 x (0.3 + 0.005 x t), operating temperature -196...+600 °C

Tolerances thermocouple
- Type J tolerance class 1 = -40...375 °C ±1.5 °C, 375...750 °C ±0.005 x t
- Type K and N tolerance class 1 = -40...375 °C  ±1.5 °C, 375...1000 °C ±0.004 x t

Temperature range Pt100
- -200...+300 °C, depending on materials

Temperature range thermocouple
- -200...+300 °C, depending on thermocouple type and materials

Approvals
- ATEX, RU Ex, EAC, IECEx, METROLOGICAL PATTERN APPROVAL

Quality certificate
- ISO 9001:2015 issued by DNV

Product code key


Installation example
EPIC® SENSORS T-MAGN / W-MAGN
Magnetic temperature sensor

Features
- temperature range -200...+350 °C
- magnet suitable for high temperatures, does not lose magnetism when heated below +450 °C
- quick installation
- Pt100 or thermocouple as sensing element
- Pt100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- AISI 316L as standard delivery material, other materials on request
- tailored solutions according to customer specific needs.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

| Materials | AISI 316L, max. temperature +250 °C, temporarily +350 °C, other materials on request |
| Dimensions | Small magnet, external Ø25 mm / height 7 mm, other dimensions on request |
| Large magnet, external Ø60 mm / height 15 mm, other dimensions on request |
| Cable materials | SIL = silicone, max. +180 °C |
| FEP = Teflon®, max. +205 °C |
| GGD = glass silk cable/metal braid jacket, max. +350 °C |
| FDF = FEP wire insulation/braid shield/FEP jacket, max. +205 °C |
| SDS = silicone wire insulation/braid shield/silicone jacket, only available as 2 wire cable, max. +180 °C |
| TDT = Teflon® wire insulation/braid shield/Teflon® jacket, max. +205 °C |
| FDS = FEP wire insulation/braid shield/silicone jacket, max. +180 °C |
| FS = FEP wire insulation/silicone jacket, max. +180 °C |
| Tolerances Pt100 (IEC 60751) | A tolerance ±0.15 + 0.002 x t, operating temperature -100...+450 °C |
| B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C |
| B 1/3 DIN, tolerance ±(0.3 + 0.005 x t), operating temperature -196...+600 °C |
| B 1/10 DIN, tolerance ±(0.3 + 0.005 x t), operating temperature -196...+600 °C |
| Tolerances thermocouple (IEC 60584) | Type J tolerance class 1 = -40...375 °C ±0.5 °C, 375...1000 °C ±0.004 x t |
| Type K and N tolerance class 1 = -40...375 °C ±0.5 °C, 375...1000 °C ±0.004 x t |
| Temperature range Pt100 | -200...+350 °C for large magnet, depending on cable material |
| -200...+200 °C for small magnet, depending on cable material |
| Temperature range thermocouple | -200...+350 °C for large magnet, depending on cable material |
| -200...+200 °C for small magnet, depending on cable material |
| Approvals | METROLOGICAL PATTERN APPROVAL |
| Quality certificate | ISO 9001:2015 issued by DNV |

Product code key

Example code: W – MAGN – D25 / 5.5x7 – 5000 / SIL – 4 – A – X

- W = Pt100 resistance thermometer
- 2xW = 2 x Pt100 resistance thermometer
- T = thermocouple
- 2xT = 2 x thermocouple
- MAGN = magnetic sensor (constant in code)
- D25/5.5x7 = magnet dimensions
- 5000 = cable length, CL [mm]
- SIL, FEP, GGD, FDF, TDT, SDS, FDS, FS = cable material (for more information, look at technical data on first page of the datasheet)
- 4, 3, 2 = Pt100 wire count
- K, A, J = thermocouple type
- 1, 2, 3 = Pt100 accuracy class, (class A as standard delivery)
- 1, 2, 3 = thermocouple accuracy class, (class 1 as standard delivery)
- X = additional details on the text line
EPIC® SENSORS T-106 / W-106
Temperature sensor for food industry

Features
• temperature range -200...+300 °C
• sharp tip
• handle
• Pt100 resistance thermometer as sensing element
• Pt100 accuracy class A as standard delivery
• AISI 316L as standard delivery material, other materials on request
• tailored solutions according to customer specific needs.

Typical applications
• food industry
• chemical industry.

Technical data

| Materials | AISI 316L, maximum temperature +250 °C, temporarily +300 °C, other materials on request (Note: plastic covered handle max. temperature +110 °C). Available also in acid proof stainless steel |
| Handle diameter | 3, 4 or 6 mm, other diameters and tip shapes on request |
| Cable material | SIL = silicone, max. +180 °C  
FEP = Teflon®, max. +205 °C  
GGD = glass silk cable/metal braid jacket, max. +350 °C  
FDF = FEP wire insulation/braid shield/FEP jacket, max. +205 °C  
SDS = silicone wire insulation/braid shield/silicone jacket, only available as 2 wire cable, max. +180 °C  
TDT = Teflon® wire insulation/braid shield/Teflon® jacket, max. +205 °C  
FDS = FEP wire insulation/braid shield/silicone jacket, max. +180 °C  
FS = FEP wire insulation/silicone jacket, max. +180 °C |
| Tolerances Pt100 (IEC 60751) | A tolerance ±0.15 + 0.002 x t, operating temperature -100...+450 °C  
B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C  
B 1/3 DIN, tolerance ±1/3 x (0.3 + 0.005 x t), operating temperature -196...+600 °C  
B 1/10 DIN, tolerance ±1/10 x (0.3 + 0.005 x t), operating temperature -196...+600 °C |
| Tolerances thermocouple (IEC 60584) | Type J tolerance class 1 = ±0.5 °C ±0.004 x t  
Type K and N tolerance class 1 = ±0.5 °C ±0.004 x t |
| Temperature range Pt100 | -200...+300 °C, depending on material |
| Temperature range thermocouple | -200...+300 °C, depending on thermocouple type and material |
| Approvals | METROLOGICAL PATTERN APPROVAL |
| Quality certificate | ISO 9001:2015 issued by DNV |

Installation example

Example code:
W-106 — 4 / 100 — 5000 / SIL — 4 — A — X
EPIC® SENSORS T-BTD / W-BTD
Bearing temperature sensor

Features
- temperature range -200...+300 °C
- suitable for bearing temperature measurement
- flat tip
- spring-loaded screw for installation
- Pt100 or thermocouple as sensing element
- Pt100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- AISI 316L as standard delivery material, other materials on request
- brass tip as standard delivery material, other tip materials on request
- tailored solutions according to customer specific needs.

Typical applications
- machinery
- motor manufacturing industry
- gear manufacturing industry.

Technical data

<table>
<thead>
<tr>
<th>Material</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable material</td>
<td>SIL = silicone, max. +180 °C</td>
</tr>
<tr>
<td></td>
<td>FEP = Teflon®, max. +205 °C</td>
</tr>
<tr>
<td></td>
<td>GGD = glass silk cable/metal braid jacket, max. +350 °C</td>
</tr>
<tr>
<td></td>
<td>FDF = FEP wire insulation/braid shield/FEP jacket, max. +205 °C</td>
</tr>
<tr>
<td></td>
<td>SDS = silicone wire insulation/braid shield/silicone jacket, max. +180 °C</td>
</tr>
<tr>
<td></td>
<td>TDI = Teflon® wire insulation/braid shield/Teflon® jacket, max. +205 °C</td>
</tr>
<tr>
<td></td>
<td>FDS = FEP wire insulation/braid shield/silicone jacket, max. +180 °C</td>
</tr>
<tr>
<td></td>
<td>FS  = FEP wire insulation/silicone jacket, max. +180 °C</td>
</tr>
<tr>
<td></td>
<td>PUR = polyurethane cable, extremely good oil resistance, max. +80 °C</td>
</tr>
</tbody>
</table>

Thread
R3/8" as standard delivery, R1/2" as option, other threads on request

Tolerances Pt100 (IEC 60751)
A tolerance ±0.15 + 0.002 x t, operating temperature -100...+450 °C
B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C
C tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C
D tolerance ±0.5 + 0.005 x t, operating temperature -196...+600 °C

Tolerances thermocouple (IEC 60584)
Type K tolerance class 1 = ±0.004 x t
Type N tolerance class 1 = ±0.004 x t

Temperature range Pt100
-200...+300 °C, depending on cable material

Temperature range thermocouple
-40...+250 °C, depending on thermocouple type and cable material

Approvals
METROLOGICAL PATTERN APPROVAL

Quality certificate
ISO 9001:2015 issued by DNV

Example code: W – BTD – Pt100A – L30 – 4M / SIL – X

W = Pt100 resistance thermometer
2xW = 2 x Pt100 resistance thermometer
T = thermocouple
2xT = 2 x thermocouple
BTD = bearing sensor (constant in code)
Pt100A = Pt100, with accuracy class A
TC-K1 = thermocouple type K, accuracy class 1
TC-N1 = thermocouple type N, accuracy class 1
TC-J1 = thermocouple type J, accuracy class 1
L30 = length [mm]
4M = cable length, CL [m]
SIL, FEP, GGD, FDF, TDI, SDS = cable material (for more information, look at the technical data on the first page of the datasheet)
PUR = PUR cable (for more information, look at the technical data on the first page of the datasheet)
X = additional details on the text line

Features diagram

Product code key diagram

DATASHEET 20
**EPIC® SENSORS T-MP / W-MP or T-MPT / W-MPT**

Multi-point temperature sensor

### Features
- Temperature range: -200...+1200 °C
- Multi-point measurement
- Pt 100 or thermocouple as sensing element
- AISI 316L or INCONEL 600 as standard delivery material, other materials on request
- Available with a connection box
- Pt 100 accuracy class A as standard delivery
- Thermocouple accuracy class 1 as standard delivery
- MI cable structured sensor elements
- Bendable
- Vibration proof structure
- Flexible armoured conduit version available
- Changeable measurement elements
- Tailored solutions according to customer specific needs.

### Typical applications
- Energy and power plant technology
- Process industry
- Chemical industry
- Machinery and vessel construction
- Manufacturing industry.

### Technical data

<table>
<thead>
<tr>
<th>Material</th>
<th>AISI 316L, maximum temperature +550 °C, temporarily +600 °C, INCONEL 600, max. temperature +1000 °C, temporarily +1200 °C, other materials on request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange material</td>
<td>AISI 316L, max. temperature +550 °C, temporarily +600 °C, other flange material on request</td>
</tr>
</tbody>
</table>

#### Diameter of sensor elements
- 3 or 6 mm, other diameters on request

#### Enclosure
- Enclosure according to customer specific needs

#### Cable material
- SIL = silicone, max. +180 °C
- FEP = Teflon®, max. +205 °C
- GGD = glass silk cable/metal braid jacket, max. +350 °C
- FDF = FEP wire insulation/braid shield/FEP jacket, max. +205 °C
- SDS = silicone wire insulation/braid shield/silicone jacket, only available as 2 wire cable, max. +180 °C
- TDF = Teflon® wire insulation/braid shield/Teflon® jacket, max. +205 °C
- FDS = FEP wire insulation/braid shield/silicone jacket, max. +180 °C
- FS = FEP wire insulation/silicone jacket, max. +180 °C

#### Tolerances Pt100 (IEC 60751)
- A tolerance ±0.15 + 0.002 x t, operating temperature -100...+450 °C
- B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C
- B 1/3 DIN, tolerance ±1/3 x (0.3 + 0.005 x t), operating temperature -196...+600 °C
- B 1/10 DIN, tolerance ±1/10 x (0.3 + 0.005 x t), operating temperature -196...+600 °C

#### Tolerances thermocouple (IEC 60584)
- Type J tolerance: class 1 = ±0.02 + 0.0016 x t, 375...750 °C ±0.004 x t
- Type K and N tolerance: class 1 = ±0.0375 ±1.5 °C, 375...1000 °C ±0.004 x t

#### Temperature range Pt100
- -200...+550 °C, depending on materials

#### Temperature range thermocouple
- -200...+1200 °C, depending on thermocouple type, neck pipe length and other materials

### Approvals
- METROLOGICAL PATTERN APPROVAL

### Quality certificate
- ISO 9001:2015 issued by DNV

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**Drawing**

**Product code key**


- W = Pt100 resistance thermometer
- T = Teflon® wire insulation/braid shield/Teflon® jacket
- N = no junction box
- K = Ceramic terminal block
- X = Additional details on the code line

---

**Technical data**

### Materials

- **AISI 316L**:
  - Maximum temperature: +550 °C, temporarily +600 °C
- **INCONEL 600**:
  - Maximum temperature: +1000 °C, temporarily +1200 °C

### Flange Type

- Flange type according to ANSI, EN 1092-1, other flange types on request

### Diameter of Sensor Elements

- 3 or 6 mm, other diameters on request

### Enclosure

- Enclosure according to customer specific needs

### Cable Material

- **SIL**: Silicone, max. +180 °C
- **FEP**: Teflon®, max. +205 °C
- **GGD**: Glass silk cable/metal braid jacket, max. +350 °C
- **FDF**: FEP wire insulation/braid shield/FEP jacket, max. +205 °C
- **SDS**: Silicone wire insulation/braid shield/silicone jacket, only available as 2 wire cable, max. +180 °C
- **TDF**: Teflon® wire insulation/braid shield/Teflon® jacket, max. +205 °C
- **FDS**: FEP wire insulation/braid shield/silicone jacket, max. +180 °C
- **FS**: FEP wire insulation/silicone jacket, max. +180 °C

### Tolerances Pt100 (IEC 60751)

- **A** tolerance: ±0.15 + 0.002 x t, operating temperature -100...+450 °C
- **B** tolerance: ±0.3 + 0.005 x t, operating temperature -196...+600 °C
- **B 1/3 DIN** tolerance: ±1/3 x (0.3 + 0.005 x t), operating temperature -196...+600 °C
- **B 1/10 DIN** tolerance: ±1/10 x (0.3 + 0.005 x t), operating temperature -196...+600 °C

### Tolerances Thermocouple (IEC 60584)

- **Type J**:
  - Tolerance: ±0.02 + 0.0016 x t, 375...750 °C ±0.004 x t
- **Type K and N**:
  - Tolerance: ±0.0375 ±1.5 °C, 375...1000 °C ±0.004 x t

### Temperature Range Pt100

- -200...+550 °C, depending on materials

### Temperature Range Thermocouple

- -200...+1200 °C, depending on thermocouple type, neck pipe length and other materials

### Approvals

- METROLOGICAL PATTERN APPROVAL

### Quality Certificate

- ISO 9001:2015 issued by DNV
EPIC® SENSORS T-SCREW / W-SCREW
Threaded temperature sensor with cable

Features
- temperature range -200...+300 °C
- Pt 100 or thermocouple as sensing element
- AISI 316L as standard delivery material, other materials on request
- Pt 100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- tailored solutions according to customer specific needs.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

<table>
<thead>
<tr>
<th>Materials</th>
<th>AISI 316L, maximum temperature +250 °C, temporarily +300 °C, other materials on request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>3, 4, 5, 6 or 8mm, other diameters on request</td>
</tr>
<tr>
<td>Thread size and length</td>
<td>According to request, all sizes and lengths available</td>
</tr>
<tr>
<td>Cable material</td>
<td>SIL = silicone, max. +180 °C</td>
</tr>
<tr>
<td></td>
<td>FEP = Teflon®, max. +205 °C</td>
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<td></td>
<td>SDS = silicone wire insulation/braid shield/silicone jacket, only available as 2 wire cable, max. +180 °C</td>
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<tr>
<td></td>
<td>TDT = Teflon® wire insulation/braid shield/Teflon® jacket, max. +205 °C</td>
</tr>
<tr>
<td></td>
<td>FDS = FEP wire insulation/braid shield/silicone jacket, max. +180 °C</td>
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<tr>
<td></td>
<td>FS = FEP wire insulation/silicone jacket, max. +180 °C</td>
</tr>
<tr>
<td>Tolerances Pt100</td>
<td>A tolerance ±0.15 + 0.002 x t, operating temperature -100...+450 °C</td>
</tr>
<tr>
<td>(IEC 60751)</td>
<td>B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C</td>
</tr>
<tr>
<td></td>
<td>1/3 DIN, tolerance ±1/3 x (0.3 + 0.005 x t), operating temperature -196...+600 °C</td>
</tr>
<tr>
<td></td>
<td>1/10 DIN, tolerance ±1/10 x (0.3 + 0.005 x t), operating temperature -196...+600 °C</td>
</tr>
<tr>
<td>Tolerances thermocouple</td>
<td>Type J tolerance class 1 = ±40...375 °C ±1.5 °C, 375...750 °C ±0.004 x t</td>
</tr>
<tr>
<td>(IEC 60584)</td>
<td>Type K and N tolerance class 1 = ±40...375 °C ±1.5 °C, 375...1000 °C ±0.004 x t</td>
</tr>
<tr>
<td>Temperature range Pt100</td>
<td>-200...+300 °C, depending on material</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-200...+300 °C, depending on thermocouple type and material</td>
</tr>
<tr>
<td>Approvals</td>
<td>METROLOGICAL PATTERN APPROVAL</td>
</tr>
<tr>
<td>Quality certificate</td>
<td>ISO 9001:2015 2015 by DNV</td>
</tr>
</tbody>
</table>

Product code key


Product code:
- W = Pt100 resistance thermometer
- 2xW = 2 x Pt100 resistance thermometer
- T = thermocouple
- 2xT = 2 x thermocouple
- SCREW = sensor with thread (constant in code)
- S = solid structure
- R = rotating structure (easy to assemble, note: does not obstruct gas or liquid flow)
- M8x1 = thread size (all available)
- 10 = thread length [mm]
- 5000 = cable length, Cl [mm]
- SIL, FEP, GGD, FDF, TDT, SDS, FDS, FS = cable material (for more information, look technical data on first page of the datasheet)
- 4,3,2 = Pt100 wire count
- K, NJ = thermocouple type
- A, B = Pt100 accuracy class, (class A as standard delivery)
- 1,2,3 = thermocouple accuracy class, (class 1 as standard delivery)
- X = additional details on the foot line
EPIC® SENSORS W-M-TRACE or 2x W-M-TRACE
Trace heating sensor

Features
- temperature range -40...+450 °C, temporarily +550 °C
- temperature range -40...+80 °C for standard delivery enclosure
- Pt 100 as sensing element
- Pt 100 accuracy class A as standard delivery
- 1 or 2 measurement points
- replaceable sensor elements
- AISI 316L as standard delivery material for the sensor elements, other materials on request
- components are available as ATEX compatible Ex e, however the complete assembly is not ATEX certified
- tailored solutions according to customer specific needs.

Typical applications
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

<table>
<thead>
<tr>
<th>Materials</th>
<th>AISI 316L, maximum temperature +450 °C, temporarily +550 °C, other materials on request</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Tolerances Pt100 (IEC 60751)</th>
<th>A tolerance ±0.15 + 0.002 x t, operating temperature -100...+450 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B tolerance ±0.3 + 0.005 x t, operating temperature -196...+600 °C</td>
</tr>
<tr>
<td></td>
<td>B 1/3 DIN, tolerance ±1/3 x 0.3 + 0.005 x t, operating temperature -196...+600 °C</td>
</tr>
<tr>
<td></td>
<td>B 1/10 DIN, tolerance ±1/10 x 0.3 + 0.005 x t, operating temperature -196...+600 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature range Pt100</th>
<th>-40...+450 °C, temporarily +550 °C</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Sensing element classification</th>
<th>II 2 GD Ex e IIC T6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex e A21 IP66 T 60 °C T amb (max.): -40...+125/550 °C</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length</th>
<th>1000 or 2000 mm as standard delivery, other lengths on request</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Diameter</th>
<th>3 or 6 mm, other diameters on request</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Enclosure dimensions</th>
<th>160x160x90 mm (WxHxD)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Enclosure material</th>
<th>Glass-reinforced polyester as standard delivery, other materials on request</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Enclosure classification</th>
<th>II 2 GD Ex e IIC T6 Ga (Ta = -65...+40°C, +55°C, +60°C or +65°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ex e IIC T4 Ga (Ta = -65°C...+90°C)</td>
</tr>
<tr>
<td></td>
<td>Ex lb IIC T6 Ga (Ta = -65°C...+90°C)</td>
</tr>
<tr>
<td></td>
<td>Ex lb IIC T4 Ga (Ta = -65°C...+90°C)</td>
</tr>
<tr>
<td></td>
<td>Ex lb IIC T85°C Ga (Ta = -65°C...+48°C, +55°C...+60°C or +65°C)</td>
</tr>
<tr>
<td></td>
<td>Ex lb IIC T100°C Ga (Ta = -65°C...+90°C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Box temperature range</th>
<th>-40...+80 °C</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Cable glands</th>
<th>Product with 2 sensing elements: 1 x cable gland, M25x1.5, for cable diameters 6-13 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Product with 1 sensing element: 2 x cable gland, M25x1.5, for cable diameter 6-13 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Approvals</th>
<th>ATEX Ex e compatible components, assembly not certified</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Quality certificate</th>
<th>ISO 9001:2015 issued by DNV</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>IP rating</th>
<th>IP66 or IP67, other IP rating on request</th>
</tr>
</thead>
</table>

Product code key

Example code: W - M - TRACE - 6 / 1000 - 4 - A - EX - X

W = Pt100 resistance thermometer
2xW = 2 x Pt100 resistance thermometer
M-TRACE = mineral insulated trace heating sensor (constant in code)
3, 4 = Pt100 wire count
A/B = Pt100 accuracy class, (class A as standard delivery)
EX = Ex e-approved
X = additional details on the last line

Installation example
EPIC® SENSORS T-SIL-PATCH / W-SIL-PATCH or 2xT-SIL-PATCH / 2xW-SIL-PATCH

Silicone patch sensor

Features

- temperature range -40…+180 °C
- Pt100 or thermocouple as sensing element
- Pt100 accuracy class A as standard delivery
- thermocouple accuracy class 1 as standard delivery
- EMI shielded version available
- ELASTOSIL® RT 607 A/B silicone material
- aluminum tape on measuring surface as option
- tinned fine stranded copper wires supplied with cable or twisted wires
- tailored solutions according to customer specific needs.

Typical Applications

- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

Tolerances Pt100 (IEC 60751)

<table>
<thead>
<tr>
<th>Type</th>
<th>Tolerance</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>±0.15 + 0.002 x t, operating temperature -100…-450 °C</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>±0.3 + 0.005 x t, operating temperature -196…+600 °C</td>
<td></td>
</tr>
<tr>
<td>1/3 DIN</td>
<td>±1/3 x 0.3 + 0.005 x t, operating temperature -196…+600 °C</td>
<td></td>
</tr>
<tr>
<td>1/10 DIN</td>
<td>±1/10 x 0.3 + 0.005 x t, operating temperature -196…+600 °C</td>
<td></td>
</tr>
</tbody>
</table>

Tolerances thermocouple (IEC 60584)

<table>
<thead>
<tr>
<th>Type</th>
<th>Tolerance</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>±1 + 0.004 x t, operating temperature -40…375 °C</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>±1.5 + 0.009 x t, operating temperature -40…1000 °C</td>
<td></td>
</tr>
</tbody>
</table>

Cable materials (IEC 60584)

<table>
<thead>
<tr>
<th>Material</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIL</td>
<td>-40…+180 °C</td>
</tr>
<tr>
<td>FEP</td>
<td>-40…+205 °C</td>
</tr>
<tr>
<td>SGD</td>
<td>-40…+205 °C</td>
</tr>
<tr>
<td>SDS</td>
<td>-40…+180 °C</td>
</tr>
<tr>
<td>FDF</td>
<td>-40…+205 °C</td>
</tr>
<tr>
<td>FDS</td>
<td>-40…+205 °C</td>
</tr>
<tr>
<td>FS</td>
<td>-40…+205 °C</td>
</tr>
</tbody>
</table>

Wire materials

<table>
<thead>
<tr>
<th>Wire</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 wires = FEP insulated twisted wires 2x0.22/-200 °C</td>
<td></td>
</tr>
<tr>
<td>3 wires = FEP insulated twisted wires 3x0.22/-200 °C</td>
<td></td>
</tr>
<tr>
<td>4 wires = FEP insulated twisted wires 4x0.22/-200 °C</td>
<td></td>
</tr>
</tbody>
</table>

Temperature range

-40…+180 °C

(Note: range is for silicone sensor head, cable range according to selection)

Approvals

METROLOGICAL PATTERN APPROVAL

Quality certificate

ISO 9001:2015 issued by DNV

IP rating

IP65, higher IP rating on request

Product code key


W = Pt100 resistance thermometer
2xW = 2 x Pt100 resistance thermometer
T = thermocouple
2xT = 2 x thermocouple
SILPATCH = silicone patch sensor (constant in code)
40X15X3 = silicone element size [mm]
5000 = cable or wiring length, CL [mm]
CON, SIL, FEP, GGD, FDF, TDT, SDS, FDS, FS = cable material (for more information, look technical data on first page of the datasheet)
4,3,2 = Pt100 wire count
K, J = thermocouple type
A, B = Pt100 accuracy class, thermocouple accuracy class, (class A as standard delivery)
Y = with aluminum foil on installation surface
N = no aluminum foil
X = additional details on the text line

Installation examples
EPIC® SENSORS nxT-MP-303
Mineral insulated temperature sensor for multipoint measurement

Features
- according to DIN 43721
- temperature range -200...+1200 °C
- AISI 316L or INCONEL 600 as standard delivery material, other materials on request
- customer specific lengths
- customer specific amount of measurement points
- MI cable structured sensor element
- bendable
- vibration proof
- thermocouple as sensing element
- thermocouple accuracy class 1 as standard delivery
- EMI shielded version available.

Typical applications
- steel industry, chill moulds
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.

Technical data

<table>
<thead>
<tr>
<th>Materials</th>
<th>AISI 316L, maximum temperature +550 °C, temporarily +600 °C, INCONEL 600, maximum temperature +1100 °C, temporarily +1200 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Other materials on request (Note: max. safe temperature +100 °C for the sealant tube in cable to sensor element transition)</td>
</tr>
</tbody>
</table>
| Tolerances thermocouple (IEC 60584) | Type J tolerance class 1 = -40...375 °C ±1.5 °C, 375...750 °C ±0.004 x t  
Types K and N tolerance class 1 = -40...375 °C ±1.5 °C, 375...1000 °C ±0.004 x t |
| Cable materials       | SIL = silicone, max. +180 °C  
FEP = Teflon®, max. +205 °C  
GSD = glass silk cable/metal braid jacket, max. +350 °C  
FDF = FEP wire insulation/braid shield/FEP jacket, max. +205 °C  
SDS = silicone wire insulation/braid shield/silicone jacket, only available as 2 wire cable, max. +180 °C  
TDF = Teflon® wire insulation/braid shield/Teflon® jacket, max. +205 °C  
SDS = silicone wire insulation/braid shield/silicone jacket, max. +180 °C  
FS = FEP wire insulation/silicone jacket, max. +180 °C  |
|                       | (Note: max. safe temperature +100 °C for the sealant tube in cable to sensor element transition)                          |
| Temperature range      | -200...+1200 °C depending on thermocouple type and cable material (Note: max. safe temperature +100 °C for the sealant tube in cable to sensor element transition) |
| Quality certificate    | ISO 9001:2015 issued by DNV                                                                                           |
| IP rating              | IP65, Higher IP rating on request                                                                                   |


Typical applications
- steel industry, chill moulds
- energy and power plant technology
- process industry
- chemical industry
- machinery and vessel construction
- manufacturing industry.
Wireless LoRa transmitter

A configurable, energy efficient LoRa 868 MHz (EU) transmitter for industrial grade wireless measuring and IoT systems using the LoRaWAN® protocol.

- Three configurable sensor inputs
- Self adjusting transmit power
- Battery or external power supply
- Self diagnostics including battery monitoring
- Configurable measurement intervals and alarm limits.

The IoTKey® WLT 310 transmitter has two inputs for temperature and Lin.R measurements. A third analog input can be configured as voltage or current input, or as a humidity sensor input.

The main power supply is a C sized Lithium primary cell battery, 3.6 V nominal 8.5 Ah. The device operates also on an external, 12 or 24 V DC power supply.

Technical data

- Weight: 39 g
- Height: 25 mm
- Diameter: 57 mm
- Wire size: 1 x 1.0 mm² stranded wire
- The product is CE marked, and the compliance standards are: EN 61326-1:2013 and EN 60601-1
- Vibration: EN 60068-2-6
- Assembly examples

**NOTE! Channel S1 and S2 are identical**

<table>
<thead>
<tr>
<th>Connection examples</th>
<th>Lin. R TC humidity</th>
<th>Lin. R TC mA V</th>
<th>RTD TC humidity</th>
<th>RTD TC mA V</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Battery</td>
<td>E. Humidity sensor gnd</td>
<td>G. Humidity sensor 5V/10V</td>
<td>H. mA and V input gnd</td>
<td>I. mA and V input +</td>
</tr>
<tr>
<td>B. Ext. supply 12/24DC</td>
<td>F. Humidity sensor out</td>
<td>K. Lin.R 3w</td>
<td>L. Lin.R 2w</td>
<td>M. RTD 4w</td>
</tr>
<tr>
<td>C. Ext. supply gnd</td>
<td>J. Lin.R 4w</td>
<td>N. RTD 3w</td>
<td>O. RTD 2w</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE! Channel S1 and S2 are identical**

**Power supply**

Battery
- Main power supply is a C size Lithium primary cell battery, 3.6 V nominal 8.5 Ah
- The battery input is polarity protected
- Battery life time depends on configuration (typically min. 1-2 years)
- Electricity consumption < 100 mA.

External power supply
- The device operates on external nominal 12 or 24 V DC supply
- The operating voltage range is 9 to 40 V (12-24V more than ±30 %)
- The power supply is isolated from the inputs. The isolation between the power supply/inputs is 1500 Vrms.
- Inputs are not isolated from each other!
- Electricity consumption < 70 mA.

**Environmental specifications**

Operating temperature range when powered by battery ***)
-25 to +60 °C

Operating temperature range when powered by external DC supply
-40 to +80 °C

Plastic casing / protection class
IP20

Vibration resistance
-certification No 2.4 class B (DNV Standard)

Humidity
- RH for device < 90 %, non-condensing
- Storage < 95 %, non-condensing
- Transportation < 95 %, non-condensing

The expected lifetime is more than 10 years in temperature range -40...+80 °C.

***) Depends on the battery manufacturer’s specifications.
THERMOWELLS WITH FLANGE

Flanged thermowells are used when it must be possible to replace the thermowell during process maintenance. Thanks to flanged thermowells, all welding work can be avoided.

Thermowells with flanges, as components (without sensing elements), according to DIN 43772 Form 2F.

IMMERSIBLE THERMOWELLS

Immersible thermowells are used for e.g. in channel sensors. The immersion depth can be adjusted upon installation with gas-tight threaded couplings or adjustable flanges.

With special TC sensing elements and heat-resistant well materials, the measuring range can reach as high as +1200 °C.

To increase wear resistance, the wells can be manufactured as a solid tip version (code key letter U).

<table>
<thead>
<tr>
<th>Product number</th>
<th>Type</th>
<th>For sensing element diameter/length [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>915188</td>
<td>F-11-D/H-250-DN25/PN40</td>
<td>6/405</td>
</tr>
<tr>
<td>3220269</td>
<td>F-11-D/H-1000-DN25/PN40</td>
<td>6/1155</td>
</tr>
</tbody>
</table>

Other types and dimensions are quoted upon request. Flanged sensors/wells can also be coated to increase acid resistance features.

<table>
<thead>
<tr>
<th>Product number</th>
<th>Type</th>
<th>For sensing element diameter/length [mm]</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>5118915</td>
<td>A-15-D/H-500</td>
<td>6/525</td>
<td></td>
</tr>
<tr>
<td>5118916</td>
<td>A-15-D/H-710</td>
<td>6/735</td>
<td></td>
</tr>
<tr>
<td>915323</td>
<td>A-15-D/H-1000</td>
<td>6/1025</td>
<td></td>
</tr>
<tr>
<td>915324</td>
<td>A-15-D/H-1400</td>
<td>6/1425</td>
<td></td>
</tr>
<tr>
<td>5118919</td>
<td>A-15-D/H-500/1.4841</td>
<td>6/525</td>
<td></td>
</tr>
<tr>
<td>916323</td>
<td>A-15-D/H-710/1.4841</td>
<td>6/735</td>
<td></td>
</tr>
<tr>
<td>916484</td>
<td>A-22-D/H-710</td>
<td>6/735</td>
<td></td>
</tr>
<tr>
<td>916486</td>
<td>A-22-D/H-1400</td>
<td>6/1425</td>
<td></td>
</tr>
<tr>
<td>916479</td>
<td>A-22-D/H-500/1.4749</td>
<td>6/525</td>
<td></td>
</tr>
<tr>
<td>916480</td>
<td>A-22-D/H-710/1.4749</td>
<td>6/735</td>
<td></td>
</tr>
<tr>
<td>916481</td>
<td>A-22-D/H-1000/1.4749</td>
<td>6/1025</td>
<td></td>
</tr>
<tr>
<td>916482</td>
<td>A-22-D/H-1400/1.4749</td>
<td>6/1425</td>
<td></td>
</tr>
<tr>
<td>916326</td>
<td>A-22-D/H-U/710/1.4204</td>
<td>6/735</td>
<td>U = solid tip</td>
</tr>
<tr>
<td>916327</td>
<td>A-22-D/H-U/1000/1.4304</td>
<td>6/1025</td>
<td>U = solid tip</td>
</tr>
<tr>
<td>1015021</td>
<td>A-22-D/H-U/710/1.44845</td>
<td>6/735</td>
<td>U = solid tip</td>
</tr>
<tr>
<td>1015022</td>
<td>A-22-D/H-U/1000/1.44845</td>
<td>6/1025</td>
<td>U = solid tip</td>
</tr>
<tr>
<td>1059823</td>
<td>A-22-D/H-U/1000/253MA</td>
<td>6/1025</td>
<td>U = solid tip</td>
</tr>
</tbody>
</table>

Other types, dimensions and materials are quoted upon request.
THE MATERIAL OF WELDED THREAD SLEEVES IS, AS STANDARD ACID PROOF STAINLESS STEEL AISI 316L. OTHER TYPES, DIMENSIONS AND MATERIALS ARE QUOTED UPON REQUEST.

THREADED WELLS WITH COOLING NECK
Threaded thermowells with a cooling neck are used on pipes/containers which are insulated. The cooling neck’s length should be selected so that the sensor head is left outside the insulation layer. Another reason for using a cooling neck is to increase the distance from the hot measurement point to the coupling head, which often has a transmitter installed.

Threaded wells with cooling neck, as components (without sensing elements), according to DIN 43772 Form 2G, are available according to the below table:

<table>
<thead>
<tr>
<th>Product number</th>
<th>Type</th>
<th>For sensing element diameter/length [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>915180</td>
<td>B-9-D/H-100-G½</td>
<td>6/255</td>
</tr>
<tr>
<td>915181</td>
<td>B-9-D/H-160-G½</td>
<td>6/315</td>
</tr>
<tr>
<td>915182</td>
<td>B-9-D/H-250-G½</td>
<td>6/405</td>
</tr>
<tr>
<td>915183</td>
<td>B-9-D/H-400-G½</td>
<td>6/555</td>
</tr>
<tr>
<td>916857</td>
<td>B-11-D/H-160-G½</td>
<td>6/315</td>
</tr>
<tr>
<td>916865</td>
<td>B-11-D/H-250-G½</td>
<td>6/405</td>
</tr>
<tr>
<td>1015020</td>
<td>B-11-D/H-400-G½</td>
<td>6/555</td>
</tr>
<tr>
<td>915184</td>
<td>B-11-D/H-160-R1</td>
<td>6/315</td>
</tr>
</tbody>
</table>

THE MATERIAL OF WELDED THREAD SLEEVES IS, AS STANDARD ACID PROOF STAINLESS STEEL AISI 316L. OTHER TYPES, DIMENSIONS AND MATERIALS ARE QUOTED UPON REQUEST.

THREADED WELLS WITHOUT COOLING NECK
Threaded thermowells without a cooling neck are used when there is no insulation layer on the surface of installation thread. A connection head with a transmitter or cable close to the thread is not exposed to high temperatures.

Threaded wells without cooling neck, as components (without sensing elements), according to DIN 43772 Form 2, are available according to the below table:

<table>
<thead>
<tr>
<th>Product number</th>
<th>Type</th>
<th>For sensing element diameter/length [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>915112</td>
<td>B-8K-NA-50-G½</td>
<td>3/95</td>
</tr>
<tr>
<td>915175</td>
<td>B-8K-NA-100-G½</td>
<td>3/145</td>
</tr>
<tr>
<td>915176</td>
<td>B-9K-D/H-100-G½</td>
<td>6/145</td>
</tr>
<tr>
<td>915177</td>
<td>B-9K-D/H-160-G½</td>
<td>6/205</td>
</tr>
</tbody>
</table>

PRODUCT CODE KEY

Example code: TPIE – G½ / G½ – 9 / 100 – X

TPIE = thermowell type (constant in code)
G½ = thread 1, external thread
G½ = thread 2, internal thread
9 = external diameter [ØOD]
100 = immersion depth, L [mm]
X = additional details on the text line
COATING MATERIALS

We can manufacture all metal surface sensors or thermowells, also with special coatings.

- FEP known as Teflon®, good for low temperatures, exhaust gases or various acids, resistant to sunlight
- PFA very similar to FEP, slightly better than FEP in thermal stability and resistance to high temperatures
- METCO hard metal coating, specially for applications where sensors are exposed to grinding, like crude oil pipes (sand/stones), rock wool blasting etc.
- HALAR for anti-corrosion applications
- DIAMALLOY corrosion protection, hard surface
- STELLITE® no 6 - good wear resistance
- Other materials upon request.

The allowed temperatures vary from -200 ... + 1200 °C, depending on the material.

THE MOST COMMON SENSOR TYPES FOR COATING

- 1 Threaded temperature sensor without cooling neck
- 2 Threaded temperature sensor with cooling neck
- 3 Flanged temperature sensor
- 8 Immersible temperature sensor.

<table>
<thead>
<tr>
<th>Coating material</th>
<th>Material thickness</th>
<th>Temperature resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR-223 PFA</td>
<td>approx. 500 µm</td>
<td>approx. +260 °C</td>
</tr>
<tr>
<td>AR-310 HALAR</td>
<td>approx. 600 µm</td>
<td>approx. +140 °C</td>
</tr>
</tbody>
</table>

WELDED THERMOWELLS

For welded applications, we offer welded wells with a separate cooling neck which has a connection head. We also have welded root sleeves for installing threaded sensors.

The welded well and root sleeve materials are heat-resistant

- L = 13CrMo44 / 1.7335 / 550 °C
- M = 10CrMo910 / 1.7380 / 580 °C
- O = 16Mo3 / 1.5415 / 480 °C
- K = AISI 316L / 800 °C.

Individual components are presented below.

<table>
<thead>
<tr>
<th>Product number</th>
<th>Type</th>
<th>For sensing element diameter/ length (mm)</th>
<th>Inner thread L (mm)</th>
<th>La (mm)</th>
<th>Da (mm)</th>
<th>Lb (mm)</th>
<th>Db (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1025319</td>
<td>E-6/55*</td>
<td>3/145</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1090956</td>
<td>E-6/115*</td>
<td>3/205</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>911966</td>
<td>D1-L</td>
<td>6/315 M18×1.5 140 50 24h7 65 12.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>911964</td>
<td>D4-L</td>
<td>6/375 M18×1.5 200 110 24h7 65 12.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>911968</td>
<td>D5-L</td>
<td>6/435 M18×1.5 260 110 24h7 125 12.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>911907</td>
<td>D1-M</td>
<td>6/315 M18×1.5 140 50 24h7 65 12.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>911457</td>
<td>D5-M</td>
<td>6/435 M18×1.5 260 110 24h7 125 12.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>911890</td>
<td>D1-K</td>
<td>6/315 M18×1.5 140 50 24h7 65 12.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>911961</td>
<td>D4-K</td>
<td>6/375 M18×1.5 200 110 24h7 65 12.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>911967</td>
<td>D5-K</td>
<td>6/435 M18×1.5 260 110 24h7 125 12.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>911906</td>
<td>D1-O</td>
<td>6/315 M18×1.5 140 50 24h7 65 12.5</td>
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<td></td>
</tr>
<tr>
<td>911145</td>
<td>D4-O</td>
<td>6/375 M18×1.5 200 110 24h7 65 12.5</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>911969</td>
<td>D5-O</td>
<td>6/435 M18×1.5 260 110 24h7 125 12.5</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>912066</td>
<td>D1S-L</td>
<td>3/315 M14×1.5 140 50 18h7 65 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>911164</td>
<td>D4S-L</td>
<td>3/375 M14×1.5 200 110 18h7 65 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>912067</td>
<td>D1S-M</td>
<td>3/315 M14×1.5 140 50 18h7 65 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>911166</td>
<td>D4S-M</td>
<td>3/375 M14×1.5 200 110 18h7 65 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>912065</td>
<td>D1S-K</td>
<td>3/315 M14×1.5 140 50 18h7 65 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>911162</td>
<td>D4S-K</td>
<td>3/375 M14×1.5 200 110 18h7 65 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>912068</td>
<td>D1S-O</td>
<td>3/315 M14×1.5 140 50 18h7 65 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>911163</td>
<td>D4S-O</td>
<td>3/375 M14×1.5 200 110 18h7 65 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Welded thermowell ball without a connection head. Other sizes and materials are quoted upon request.
COOLING NECK AND CONNECTION HEAD FOR WELDED THERMOWELLS

If the process already has a welded thermowell, a suitable cooling neck and connection head can be purchased as a separate component.

Cooling necks have outer threads which can be applied to D-wells:
• M14×1,5 for D1S and D4S
• M18×1,5 for D1, D4 and D5

Cooling necks and connection heads, as components (without wells, without sensing elements):

<table>
<thead>
<tr>
<th>Product number</th>
<th>Type</th>
<th>For well type</th>
</tr>
</thead>
<tbody>
<tr>
<td>918138</td>
<td>18-O</td>
<td>D1S and D4S</td>
</tr>
<tr>
<td>912333</td>
<td>24-K</td>
<td>D1, D4 and D5</td>
</tr>
<tr>
<td>912331</td>
<td>24-L</td>
<td>D1, D4 and D5</td>
</tr>
<tr>
<td>912332</td>
<td>24-M</td>
<td>D1, D4 and D5</td>
</tr>
<tr>
<td>912334</td>
<td>24-O</td>
<td>D1, D4 and D5</td>
</tr>
</tbody>
</table>

A cooling neck, and connection head equipped with a sensing element - without a welded thermowell - is presented on datasheet 5. A cooling neck, and connection head equipped with a sensing element and with a welded well is presented on datasheet 4.

COMPRESSION FITTINGS AISI 316

Compression fittings are used with sensing inserts or sensors when thermowells are not needed. The immersion depth of the sensor can be adjusted when installed. The compression fitting has a metal ferrule inside. The ferrule is made of stainless steel SS316L (other materials and sizes upon request). Single or double ferrules are used depending on the inner diameter. By tightening the compression fitting, the ferrule is permanently pressed on the sensing element. This connection is pressure-resistant.

GAS-TIGHT COUPLINGS

Gas-tight threaded couplings are used with 15 mm or 22 mm diameter wells, when a threaded connection is needed, and it is necessary to adjust the sensor immersion depth. A gas-tight coupling has Teflon® ferrules inside. As the coupling is tightened, the ferrule is pressed on the thermowell surface. The connection is gas-tight, but not pressure-resistant.

OTHER TYPES ARE QUOTED UPON REQUEST.

<table>
<thead>
<tr>
<th>Product number</th>
<th>Type - thread - inner diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>875823</td>
<td>Compression fitting G1/2-6mm</td>
</tr>
<tr>
<td>1001171</td>
<td>Compression fitting G1/2-12mm</td>
</tr>
<tr>
<td>914413</td>
<td>Compression fitting G1/2-15mm</td>
</tr>
<tr>
<td>1010922</td>
<td>Compression fitting G1/2-15mm</td>
</tr>
<tr>
<td>91898</td>
<td>Compression fitting G1/2-3mm</td>
</tr>
<tr>
<td>91897</td>
<td>Compression fitting G1/2-4.5mm</td>
</tr>
<tr>
<td>920701</td>
<td>Compression fitting G1/2-6mm</td>
</tr>
<tr>
<td>920587</td>
<td>Compression fitting G1/2-8-1.5mm</td>
</tr>
<tr>
<td>919176</td>
<td>Compression fitting G1/8-3mm</td>
</tr>
<tr>
<td>1090957</td>
<td>Compression fitting G1/8-1.5mm</td>
</tr>
<tr>
<td>1062720</td>
<td>Compression fitting M8x1-1.5mm</td>
</tr>
<tr>
<td>919908</td>
<td>Compression fitting M8x1-3mm</td>
</tr>
<tr>
<td>1040461</td>
<td>Compression fitting M8x1-4.5mm</td>
</tr>
<tr>
<td>914237</td>
<td>Compression fitting NPT1/4-3mm</td>
</tr>
<tr>
<td>1066586</td>
<td>Compression fitting NPT1/4-6mm</td>
</tr>
<tr>
<td>1001559</td>
<td>Compression fitting NPT1/8-3mm</td>
</tr>
<tr>
<td>1066584</td>
<td>Compression fitting NPT1/8-6mm</td>
</tr>
</tbody>
</table>
ADJUSTABLE FLANGES
Welded and adjustable flanges are mainly used for installing different sized thermowells. The flange design allows adjusting of the sensor immersion depth. Thanks to the design, the sensor can be mounted precisely in the process, at just the right depth.

<table>
<thead>
<tr>
<th>Product number</th>
<th>Type</th>
<th>Code key letters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1018378</td>
<td>Adjustable</td>
<td></td>
</tr>
<tr>
<td>1018382</td>
<td>Adjustable</td>
<td></td>
</tr>
<tr>
<td>1018383</td>
<td>Adjustable</td>
<td></td>
</tr>
<tr>
<td>911984</td>
<td>Welded</td>
<td></td>
</tr>
<tr>
<td>911985</td>
<td>Adjustable</td>
<td></td>
</tr>
<tr>
<td>911986</td>
<td>Adjustable</td>
<td></td>
</tr>
</tbody>
</table>

Other sizes are quoted upon request.

CONNECTION HEADS
Connection heads for EPIC® SENSORS temperature sensors can be purchased as accessories. The D/H types come with a quick release clip and blue epoxy varnish finishing as standard, but other connection heads for different applications are also available.

CLAMP FITTING
- AISI 316L as standard delivery material, other materials on request
- clamping fitting for process pipe attachment
- thread fitting for enclosure attachment
- available for various pipe sizes
- special coatings available
- tailored solutions according to customer specific needs.

<table>
<thead>
<tr>
<th>Material</th>
<th>Thread</th>
</tr>
</thead>
<tbody>
<tr>
<td>AISI 316L, maximum temperature +550 °C, temporarily +600 °C, other materials on request</td>
<td>typically G½, G, R, NPT, M available as standard delivery, other threads on request</td>
</tr>
</tbody>
</table>

CLAMP SIZES

<table>
<thead>
<tr>
<th>ØD (mm)</th>
<th>L (mm)</th>
<th>T (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>Ød (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>½”</td>
<td>21,3</td>
<td>80</td>
<td>2</td>
<td>25</td>
<td>44</td>
</tr>
<tr>
<td>½”</td>
<td>21,3</td>
<td>150</td>
<td>2</td>
<td>25</td>
<td>44</td>
</tr>
<tr>
<td>½”</td>
<td>21,3</td>
<td>270</td>
<td>2</td>
<td>25</td>
<td>44</td>
</tr>
<tr>
<td>½”</td>
<td>21,3</td>
<td>520</td>
<td>2</td>
<td>25</td>
<td>44</td>
</tr>
<tr>
<td>½”</td>
<td>26,9</td>
<td>80</td>
<td>3</td>
<td>25</td>
<td>52</td>
</tr>
<tr>
<td>½”</td>
<td>33,7</td>
<td>150</td>
<td>3</td>
<td>25</td>
<td>57</td>
</tr>
<tr>
<td>½”</td>
<td>60,3</td>
<td>150</td>
<td>3</td>
<td>40</td>
<td>91</td>
</tr>
<tr>
<td>½”</td>
<td>168,3</td>
<td>150</td>
<td>4</td>
<td>40</td>
<td>206</td>
</tr>
<tr>
<td>½”</td>
<td>168,3</td>
<td>270</td>
<td>4</td>
<td>40</td>
<td>206</td>
</tr>
<tr>
<td>⅜”</td>
<td>33,7</td>
<td>80</td>
<td>3</td>
<td>25</td>
<td>57</td>
</tr>
<tr>
<td>⅜”</td>
<td>88,9</td>
<td>80</td>
<td>3</td>
<td>40</td>
<td>120</td>
</tr>
<tr>
<td>⅜”</td>
<td>114,3</td>
<td>80</td>
<td>3</td>
<td>30</td>
<td>156</td>
</tr>
<tr>
<td>⅜”</td>
<td>168,3</td>
<td>80</td>
<td>4</td>
<td>40</td>
<td>206</td>
</tr>
<tr>
<td>⅜”</td>
<td>219,1</td>
<td>80</td>
<td>4</td>
<td>40</td>
<td>262</td>
</tr>
<tr>
<td>⅞”</td>
<td>60,3</td>
<td>80</td>
<td>3</td>
<td>40</td>
<td>91</td>
</tr>
<tr>
<td>⅞”</td>
<td>273,0</td>
<td>80</td>
<td>4</td>
<td>50</td>
<td>316</td>
</tr>
</tbody>
</table>

PRODUCT CODE KEY
Example code: TPIE-PANTA — ½” — G½ / 270 — X

<table>
<thead>
<tr>
<th>TPIE-PANTA</th>
<th>HST</th>
<th>B</th>
<th>N</th>
<th>D/H</th>
<th>D/H/D</th>
<th>D/W/H</th>
<th>D/W/H/D</th>
<th>EXD</th>
<th>DAA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ØD (mm)</td>
<td>21,3</td>
<td>80</td>
<td>2</td>
<td>25</td>
<td>44</td>
<td>7,5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neck pipe</td>
<td>Ø15 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thread</td>
<td>G½</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ød (mm)</td>
<td>7,5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Example code: TPIE-PANTA — ½” — G½ / 270 — X
MINI CONNECTORS FOR THERMOCOUPLES
The connectors are available with male and female contacts and are always made of materials suitable for that type of thermocouple. The color of the connector housing depends on the type of thermocouple, e.g. the type K connector is normally green because the type K cable is green according to the IEC 60584 standard.

There are two different thermocouple connector sizes available, the standard type (STD) and the compact type (MINI).

Other cable types and wire structures can be delivered on request.

<table>
<thead>
<tr>
<th>Products number</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>911476</td>
<td>J-STD-Female</td>
</tr>
<tr>
<td>911475</td>
<td>J-STD-Male</td>
</tr>
<tr>
<td>911477</td>
<td>J-MINI-Female</td>
</tr>
<tr>
<td>911478</td>
<td>J-MINI-Male</td>
</tr>
<tr>
<td>911440</td>
<td>K-STD-Female</td>
</tr>
<tr>
<td>911439</td>
<td>K-STD-Male</td>
</tr>
<tr>
<td>911442</td>
<td>K-MINI-Female</td>
</tr>
<tr>
<td>911441</td>
<td>K-MINI-Male</td>
</tr>
<tr>
<td>1089977</td>
<td>N-STD-Female</td>
</tr>
<tr>
<td>1089978</td>
<td>N-STD-Male</td>
</tr>
<tr>
<td>1023763</td>
<td>S-STD-Female</td>
</tr>
<tr>
<td>1083322</td>
<td>S-STD-Female 350°C</td>
</tr>
<tr>
<td>1023764</td>
<td>S-STD-Male</td>
</tr>
<tr>
<td>1083323</td>
<td>S-STD-Male 350°C</td>
</tr>
<tr>
<td>1017789</td>
<td>Cable clamps for STD connectors</td>
</tr>
</tbody>
</table>

Other types are quoted upon request.

COMPENSATING CABLES FOR THERMOCOUPLE SENSORS
The thermocouple between the hot and cold ends of the sensor must use the correct cable to avoid measurement errors due to different materials. The cables used are either extension cable type (X) or compensation cable type (C).

Our stock items are silicon insulated compensating cables according to the IEC 60584 standard, with a maximum temperature of +180 °C. The cable structure of the one pair cables for a J, K and S type thermocouple sensor is 2 x 1,5 mm².

Stock items

<table>
<thead>
<tr>
<th>Product number</th>
<th>Designation</th>
<th>Number of cores and wire sizes</th>
<th>Colors +/−/ sheath</th>
<th>Outer diameter mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>903242</td>
<td>NiCr/Ni 2G ST 2G J</td>
<td>2x1.5</td>
<td>grn/wht/grn</td>
<td>7.50 (+0.15)</td>
</tr>
<tr>
<td>1084278</td>
<td>NiCr/Ni 2G ST 2G K</td>
<td>3x(2x1.5)</td>
<td>grn/wht/grn</td>
<td>9.50 (+0.15)</td>
</tr>
<tr>
<td>911884</td>
<td>PtRh/Pt 2G ST 2G S</td>
<td>6x(2x1.5)</td>
<td>grn/wht/grn</td>
<td>13.40 (+0.15)</td>
</tr>
<tr>
<td>1084281</td>
<td>PtRh/Pt 2G ST 2G K</td>
<td>8x(2x1.5)</td>
<td>grn/wht/grn</td>
<td>14.90 (+0.15)</td>
</tr>
<tr>
<td>903256</td>
<td>Fe/CuNi 2G ST 2G J</td>
<td>2x1.5</td>
<td>or/wh/ora</td>
<td>7.50 (+0.15)</td>
</tr>
<tr>
<td>1002534</td>
<td>PtRh/Pl 2G ST 2G S</td>
<td>2x(2x1.5)</td>
<td>or/wh/ora</td>
<td>8.50 (+0.15)</td>
</tr>
<tr>
<td>903257</td>
<td>Fe/CuNi 2G ST 2G N</td>
<td>2x1.5 SIL</td>
<td>bck/wht/bck</td>
<td>7.50 (+0.15)</td>
</tr>
<tr>
<td>1210658</td>
<td>NiCr/Si/NiSi 2G ST 2G N</td>
<td>2x1.5</td>
<td>pink/wht/pink</td>
<td>7.50 (+0.15)</td>
</tr>
</tbody>
</table>

Color abbreviations bck = black, grn = green, ora = orange, pnk = pink, wht = white. Other cable types and wire structures can be delivered on request.
FACTORY CALIBRATION

Factory calibrations are done with two calibration ovens, which perform in a temperature range of -25° to 660 °C.

- Factory calibration is recommended to be done in two measuring points minimum.
- More calibration points can be used depending on the calibration temperature range.
- Factory calibration can be done for RTD and TC sensors.
- The minimum length of the sensor to be calibrated is 255 mm. This limitation does not apply to cable sensors.
- Factory calibration can be executed for sensors with an outer diameter of 3 mm, 4 mm, 6 mm, 8 mm or 10 mm.
- The calibration devices are able to work with single sensors or a combination of a sensor and transmitter connected together.
- If the factory calibration is not an adequate proof of measuring value deviation, we can, on customers’ behalf have the sensors (and transmitters) send to an accredited laboratory for a third party laboratory calibration.

WHAT IS CALIBRATION?

Temperature sensor deviation in individual points of a measuring range is defined by comparing the readout of the sensor to be calibrated to another reference sensor, of which the readout accuracy is known. The objective of the calibration is to define the deviation between a measured value and a corresponding reference value.

WHY CALIBRATE?

Through calibration you can achieve many advantages besides measuring accuracy, for example:
- Traceability for temperature measuring results
- Certainty for temperature measuring results
- Optimizing production process quality, consistency and efficiency
- Energy savings due process control driven by accurate measurements
- Reduced pollution due process control driven by accurate measurements
- Savings in material costs
- Minimizing risk of unexpected repairs and changes of process machinery and sensors.

DESIGN AND ENGINEERING

We can assist you with designing, engineering and documenting of temperature sensors. Whether it is a detailed feature of one sensor or a complete solution, our know-how and practical experience are at your disposal.

Power plant applications

We have experience in designing special temperature measurement applications for power plants and their boilers. We have implemented many different measurement applications for soda, fluidized bed and grate boilers as well as waste incineration plants.

Metal processing applications

Temperature measurement for very demanding conditions in the different stages of metal processing is also our expertise. Ceramic and various coated thermowells and their special applications have been executed in collaboration with customers.

Chemical industry applications

Highly corrosion-resistant temperature measurement in demanding conditions of the chemical industry is our specialty. We have decades experience in designing multi-point temperature measurement for different types of tanks and basins.

We have even designed a specific product suitable for trace heating temperature measurement. The trace heating sensor is qualified for high temperatures of MI-heating and explosive atmospheres.

Mechanical engineering applications

Customized and tailor-made temperature sensors according to customers’ specifications are our know-how at its best.

Modeling

3D models can be created of any application as we use SolidWorks and AutoCAD design software. Just send us information of the desired measuring application and we are happy to help you.