EuroSensors

Thermocouples with protection tube

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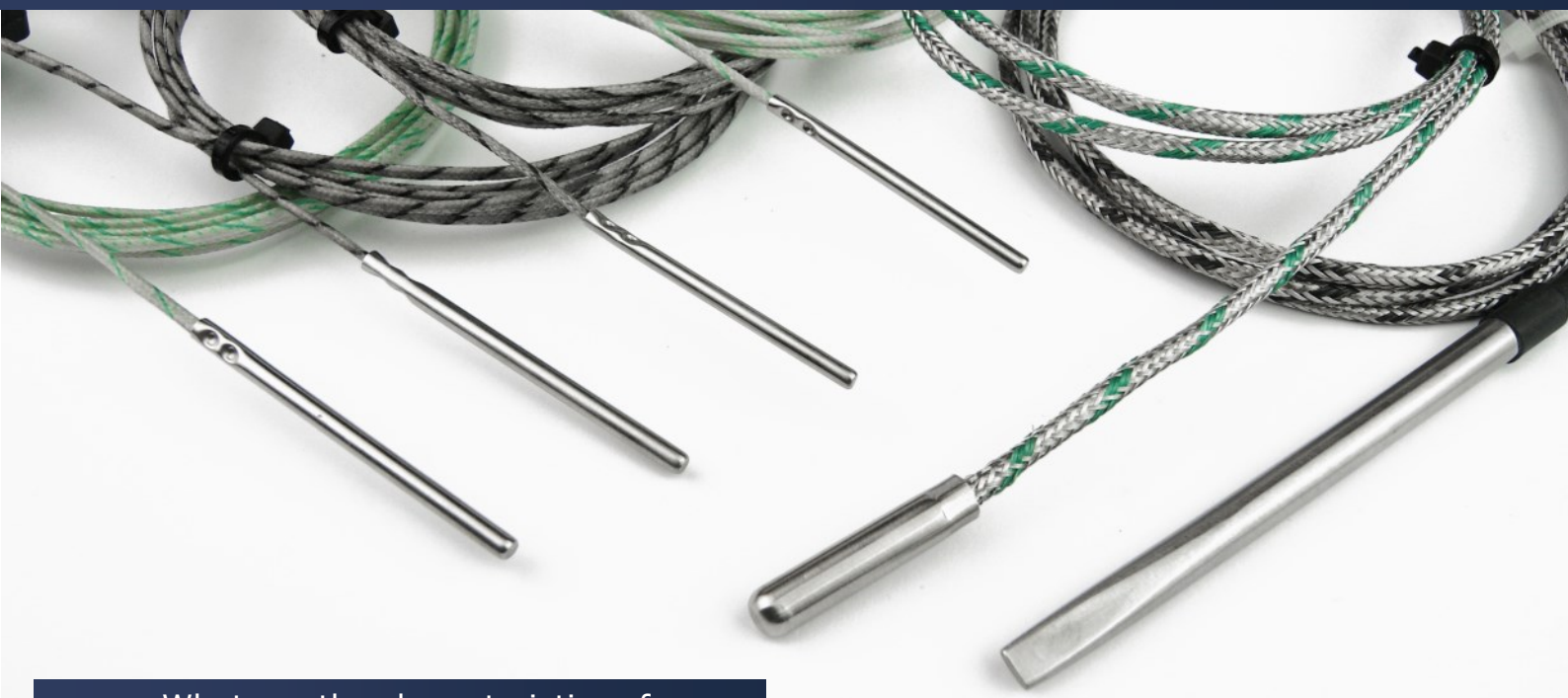


What are the characteristics of thermocouples with protection tube ?

Protection tubes play a crucial role by providing a robust shield for the thermocouple sensor, safeguarding it from potential mechanical damage, corrosive substances, high-pressure environments, and other adverse conditions that may compromise its accuracy or integrity.

The primary purpose of the protection tube is to act as a physical barrier between the external environment and the delicate thermocouple sensor. It serves as a protective sheath, shielding the sensor from impacts, vibrations, abrasion, and other mechanical stresses that can occur during operation. This ensures the longevity and reliability of the thermocouple in rugged industrial settings.

See ***"Technical data - Protection tube"***.

Protection tube materials

For the production of tubes, stainless steel, copper and brass are often used. Due to its good characteristics such as corrosion resistance, strength (abrasion resistance) and good thermal conductivity, stainless steel (SS316) stands out as the most common material from which tubes are produced.

Tube materials:

- Stainless steel (SS316)
- Stainless steel (SS316L)
- Stainless steel (SS316Ti)
- Brass
- Aluminum
- Copper

Thermocouple classes

Classes of thermocouples have certain tolerance values and temperature limits of validity. The most common classes are **class 1** and **class 2**.
With **class 1** you get more precise measurement values while **class 2** provides a wider tolerance values.

Types of thermocouples

Thermocouples are adapted to specific applications depending on the temperature range to be measured, the accuracy required and the environment in which they will be used. They are differentiated by letters (Type K, J, N, T, etc.…) which correspond to the presence of materials that can measure a certain temperature range.
The most commonly used is the type K which is capable of measuring temperatures from -40°C to +1200°C. It is made from a chrome and an aluminum wire.

Note that connector colors vary by standard and country. Check the ***"International Color Codes applied to temperature measuring engineering"***.

Thermocouples with protection tube - Technical information

Types of thermocouple cables

For additional information about thermocouple cables see ***"Accessories - Cables".***

Fiberglass

Description: fiberglass/fiberglass/braid
Operating T°: -60°C/+400°C
Cross section shape: round

Shielded teflon

Description: teflon/shield/teflon
Operating T°: -190°C / +260°C
Cross section shape: round

Shielded PVC

Description: PVC/shield/PVC
Operating T°: -30°C / +105°C
Cross section shape: round

Silicone

Description: silicone/silicone
Operating T°: -60°C / +180°C
Cross section shape: round

Twisted teflon

Description: twisted teflon
Operating T°: -190°C / +260°C
Cross section shape: twisted

Flat teflon

Description: teflon/teflon
Operating T°: -190°C / +260°C
Cross section shape: flat

Flat fiberglass

Description: fiberglass/fiberglass
Operating T°: -60°C / +400°C
Cross section shape: flat

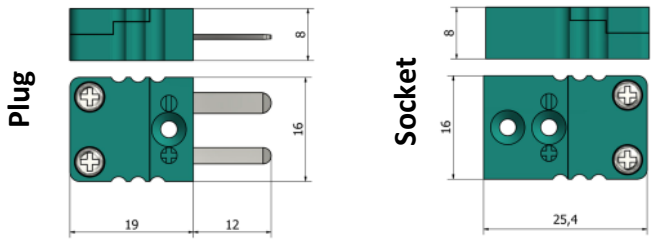
Types of connectors

Thermocouple connectors plugs and sockets are available in two sizes (miniature and standard).

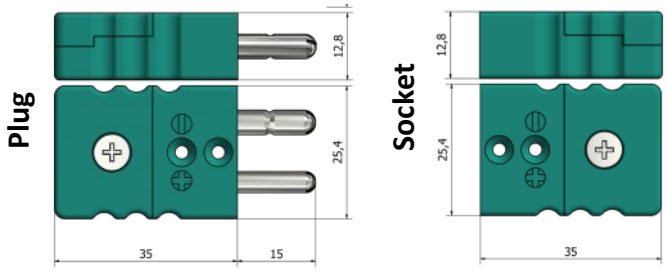
Miniature thermocouple connectors are smaller and have flat pins, these are usually found on small diameter thermocouples or fitted to the end of cables for connection to hand held and panel instruments.

Standard connectors have larger round pins and tend to be used for more industrial applications.

Miniature connector



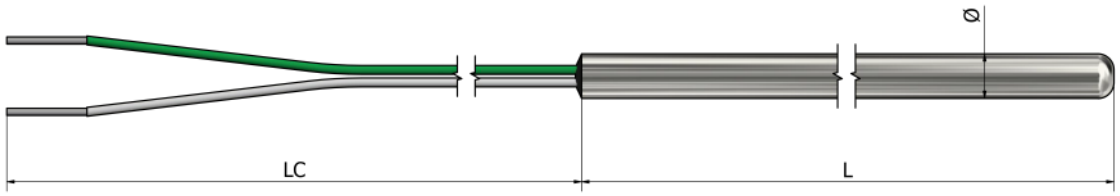
Standard connector



Global cable insulation characteristics

	PVC	Silicone	Teflon	Fiberglass
Abrasion resistance	Very good	Fair	Good	Fair
Chemical resistance	Very good	Poor	Excellent	Good
Moisture resistance	Good	Good	Excellent	Poor
Fire resistance	Good	Good	Excellent	Excellent

TT00 – Thermocouples with protection tube
Free leads



Ordering information

1. Thermocouple:

☐ Type K ☐ Type N ☐ Type J ☐ Type T ☐ Type E
☐ Type R ☐ Type S ☐ Type B ☐ Other:

2. Class:

☐ Class 1 ☐ Class 2

3. Tube dimensions (mm): *(material **Stainless steel 316L**)*

L _____ Ø _____

4. Free leads length LC (mm):

Additional:

Application:

Operating temperature (min/max):

Type of environment:

Accessories:
See the part "Accessories"

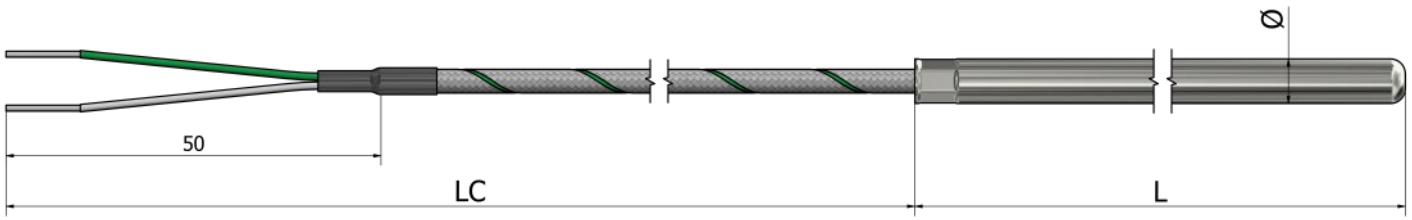
Quantity:

Note:

How to order?

Choose the desired characteristics of your sensor by marking the checkboxes and by filling up the text. You can provide sketches, images, personal notes, special requirements or any important data. For additional questions and assistance, feel free to contact us.

TT10 – Thermocouples with protection tube
Standard tube



Ordering information

1. Thermocouple:

☐ Type K ☐ Type N ☐ Type J ☐ Type T ☐ Type E
☐ Type R ☐ Type S ☐ Type B ☐ Other:

2. Class:

☐ Class 1 ☐ Class 2

3. Tube dimensions: *(material **Stainless steel 316L**)*

☐ Ø3 x 50 mm ☐ Ø4 x 40 mm ☐ Ø5 x 50 mm
☐ Ø6 x 50 mm ☐ Other:

4. Cable prolongation:

☐ PVC (105°C) ☐ Silicone (180°C) ☐ Teflon (260°C)
☐ Fiberglass (400°C) ☐ Other:

5. Cable length LC (mm):

6. Crimp protection:

☐ Spring ☐ Heat shrink sleeve ☐ Without

Additional:

Application:

Operating temperature (min/max):

Type of environment:

Accessories:
See the part "Accessories"

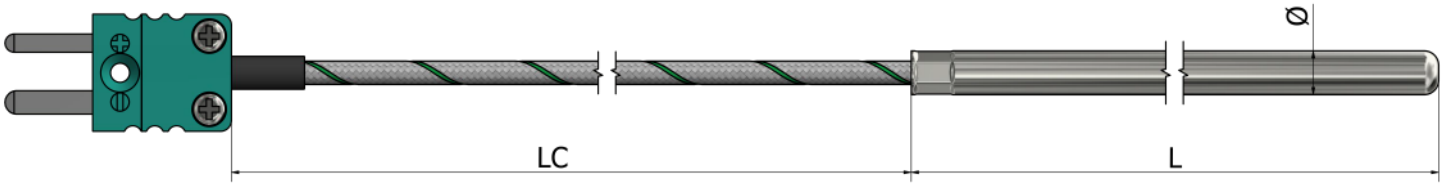
Quantity:

Note:

How to order?

Choose the desired characteristics of your sensor by marking the checkboxes and by filling up the text. You can provide sketches, images, personal notes, special requirements or any important data. For additional questions and assistance, feel free to contact us.

TT11 – Thermocouples with protection tube
Standard tube with connector



Ordering information

1. Thermocouple:
☐ Type K ☐ Type N ☐ Type J ☐ Type T ☐ Type E
☐ Type R ☐ Type S ☐ Type B ☐ Other:

2. Class:
☐ Class 1 ☐ Class 2

3. Tube dimensions: *(material **Stainless steel 316L**)*
☐ Ø3 x 50 mm ☐ Ø4 x 40 mm ☐ Ø5 x 50 mm
☐ Ø6 x 50 mm ☐ Other:

4. Cable prolongation:
☐ PVC (105°C) ☐ Silicone (180°C) ☐ Teflon (260°C)
☐ Fiberglass (400°C) ☐ Other:

5. Cable length LC (mm):

6. Crimp protection:
☐ Spring ☐ Heat shrink sleeve ☐ Without

7. Connector:
☐ Miniature Plug ☐ Miniature Socket ☐ Standard Plug ☐ Standard Socket

8. Connector temperature: ☐ 200°C ☐ 350°C ☐ 650°C

9. Option:
☐ Cable clamp ☐ Custom ID label ☐ Without

Additional:

Application:

Operating temperature (min/max):

Type of environment:

Accessories:
See the part "Accessories"

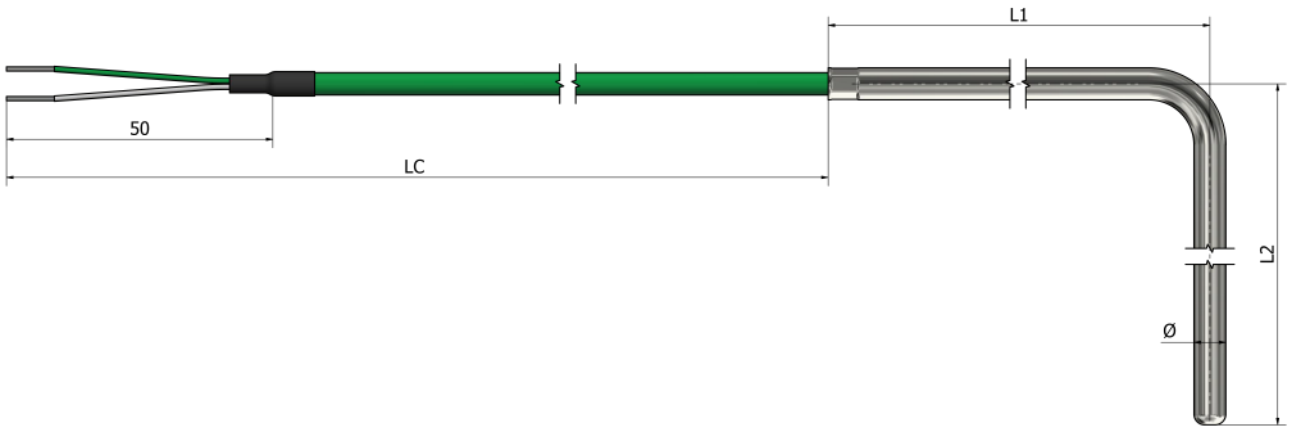
Quantity:

Note:

How to order?

Choose the desired characteristics of your sensor by marking the checkboxes and by filling up the text. You can provide sketches, images, personal notes, special requirements or any important data. For additional questions and assistance, feel free to contact us.

TT12 – Thermocouples with protection tube
Standard tube (90° bend)



Ordering information

1. Thermocouple:
☐ Type K ☐ Type N ☐ Type J ☐ Type T ☐ Type E
☐ Type R ☐ Type S ☐ Type B ☐ Other:

2. Class:
☐ Class 1 ☐ Class 2

3. Tube dimensions (mm): *(material **Stainless steel 316L**)*
L1 _____ L2 _____ Ø _____

4. Cable prolongation:
☐ PVC (105°C) ☐ Silicone (180°C) ☐ Teflon (260°C)
☐ Fiberglass (400°C) ☐ Other:

5. Cable length LC (mm):

6. Crimp protection:
☐ Spring ☐ Heat shrink sleeve ☐ Without

7. Connector:
☐ Miniature Plug ☐ Miniature Socket ☐ Standard Plug ☐ Standard Socket ☐ Without

8. Connector temperature: ☐ 200°C ☐ 350°C ☐ 650°C

9. Option:
☐ Cable clamp ☐ Custom ID label ☐ Without

Additional:

Application:

Operating temperature (min/max):

Type of environment:

Accessories:
See the part "Accessories"

Quantity:

Note:

How to order?

Choose the desired characteristics of your sensor by marking the checkboxes and by filling up the text. You can provide sketches, images, personal notes, special requirements or any important data. For additional questions and assistance, feel free to contact us.

TT20 – Thermocouples with protection tube
Pot seal

Ordering information

1. Thermocouple:
☐ Type K ☐ Type N ☐ Type J ☐ Type T ☐ Type E
☐ Type R ☐ Type S ☐ Type B ☐ Other:

2. Class:
☐ Class 1 ☐ Class 2

3. Tube dimensions (mm): *(material **Stainless steel 316L**)*
L _____ Ø _____

4. Cable prolongation:
☐ PVC (105°C) ☐ Silicone (180°C) ☐ Teflon (260°C)
☐ Fiberglass (400°C) ☐ Other:

5. Cable length LC (mm):

6. Crimp protection:
☐ Spring ☐ Heat shrink sleeve ☐ Without

7. Connector:
☐ Miniature Plug ☐ Miniature Socket ☐ Standard Plug ☐ Standard Socket ☐ Without

8. Connector temperature: ☐ 200°C ☐ 350°C ☐ 650°C

9. Option:
☐ Cable clamp ☐ Custom ID label ☐ Without

Additional:

Application:

Operating temperature (min/max):

Type of environment:

Accessories:
See the part "Accessories"

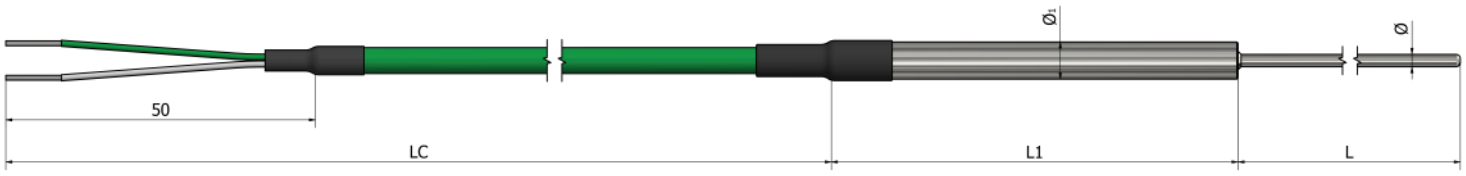
Quantity:

Note:

How to order?

Choose the desired characteristics of your sensor by marking the checkboxes and by filling up the text. You can provide sketches, images, personal notes, special requirements or any important data. For additional questions and assistance, feel free to contact us.

TT21 – Thermocouples with protection tube
Pot seal with reduced tip



Ordering information

1. Thermocouple:
☐ Type K ☐ Type N ☐ Type J ☐ Type T ☐ Type E
☐ Type R ☐ Type S ☐ Type B ☐ Other:

2. Class:
☐ Class 1 ☐ Class 2

3. Tube dimensions L and Ø (mm): *(material **Stainless steel 316L**)*
L _____ Ø _____

4. Tube dimensions L1 and Ø1 (mm): *(material **Stainless steel 316L**)*
L1 _____ Ø1 _____

5. Cable prolongation:
☐ PVC (105°C) ☐ Silicone (180°C) ☐ Teflon (260°C)
☐ Fiberglass (400°C) ☐ Other:

6. Cable length LC (mm):

7. Crimp protection:
☐ Spring ☐ Heat shrink sleeve ☐ Without

8. Connector:
☐ Miniature Plug ☐ Miniature Socket ☐ Standard Plug ☐ Standard Socket ☐ Without

9. Connector temperature: ☐ 200°C ☐ 350°C ☐ 650°C

10. Option:
☐ Cable clamp ☐ Custom ID label ☐ Without

Additional:

Application:

Operating temperature (min/max):

Type of environment:

Accessories:
See the part "Accessories"

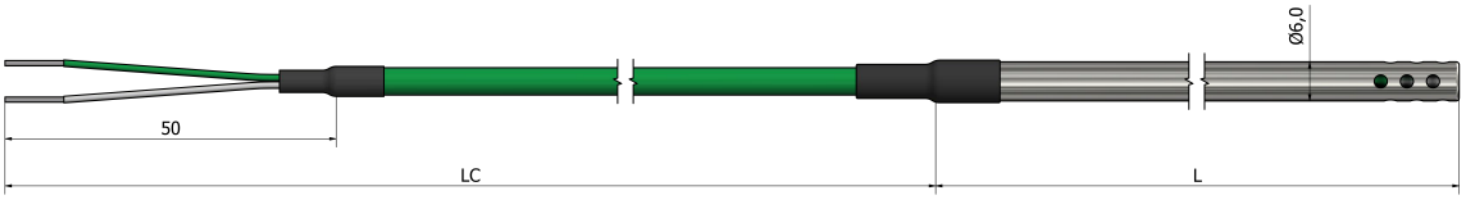
Quantity:

Note:

How to order?

Choose the desired characteristics of your sensor by marking the checkboxes and by filling up the text. You can provide sketches, images, personal notes, special requirements or any important data. For additional questions and assistance, feel free to contact us.

TT25 – Thermocouples with protection tube
Open air



*Tube material **Stainless steel 316L***

Ordering information

1. Thermocouple:
☐ Type K ☐ Type N ☐ Type J ☐ Type T ☐ Type E
☐ Type R ☐ Type S ☐ Type B ☐ Other:

2. Class:
☐ Class 1 ☐ Class 2

3. Tube length L (mm):

4. Cable prolongation:
☐ PVC (105°C) ☐ Silicone (180°C) ☐ Teflon (260°C)
☐ Fiberglass (400°C) ☐ Other:

5. Cable length LC (mm):

6. Crimp protection:
☐ Spring ☐ Heat shrink sleeve ☐ Without

7. Connector:
☐ Miniature Plug ☐ Miniature Socket ☐ Standard Plug ☐ Standard Socket ☐ Without

8. Connector temperature: ☐ 200°C ☐ 350°C ☐ 650°C

9. Option:
☐ Cable clamp ☐ Custom ID label ☐ Without

Additional:

Application:

Operating temperature (min/max):

Type of environment:

Accessories:
See the part "Accessories"

Quantity:

Note:

How to order?

Choose the desired characteristics of your sensor by marking the checkboxes and by filling up the text. You can provide sketches, images, personal notes, special requirements or any important data. For additional questions and assistance, feel free to contact us.

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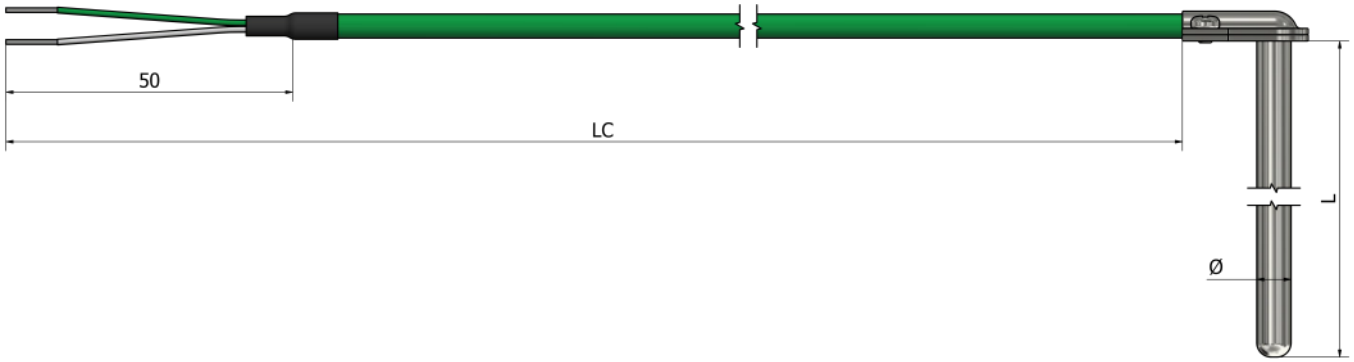
TT30 – Thermocouples with protection tube
Plug-in (clamp)



Ordering information

1. Thermocouple:
☐ Type K ☐ Type N ☐ Type J ☐ Type T ☐ Type E
☐ Type R ☐ Type S ☐ Type B ☐ Other:

2. Class:
☐ Class 1 ☐ Class 2

3. Tube dimensions (mm): *(material **Stainless steel 316L**)*
L _____ Ø _____

4. Cable prolongation:
☐ PVC (105°C) ☐ Silicone (180°C) ☐ Teflon (260°C)
☐ Fiberglass (400°C) ☐ Other:

5. Cable length LC (mm):

6. Crimp protection:
☐ Spring ☐ Heat shrink sleeve ☐ Without

7. Connector:
☐ Miniature Plug ☐ Miniature Socket ☐ Standard Plug ☐ Standard Socket ☐ Without

8. Connector temperature: ☐ 200°C ☐ 350°C ☐ 650°C

9. Option:
☐ Cable clamp ☐ Custom ID label ☐ Without

Additional:

Application:

Operating temperature (min/max):

Type of environment:

Accessories:
See the part "Accessories"

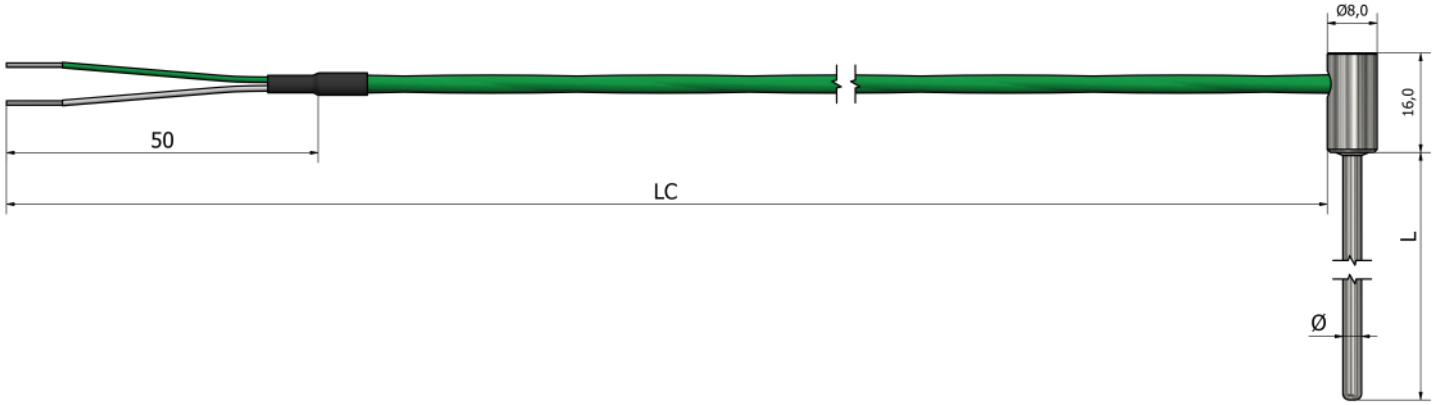
Quantity:

Note:

How to order?

Choose the desired characteristics of your sensor by marking the checkboxes and by filling up the text. You can provide sketches, images, personal notes, special requirements or any important data. For additional questions and assistance, feel free to contact us.

TT35 – Thermocouples with protection tube
Plug-in (miniature)



Ordering information

1. Thermocouple:

☐ Type K ☐ Type N ☐ Type J ☐ Type T ☐ Type E
☐ Type R ☐ Type S ☐ Type B ☐ Other:

2. Class:

☐ Class 1 ☐ Class 2

3. Tube dimensions (mm): *(material **Stainless steel 316L**)*

L _____ Ø _____

4. Cable prolongation:

☐ PVC (105°C) ☐ Silicone (180°C) ☐ Teflon (260°C)
☐ Fiberglass (400°C) ☐ Other:

5. Cable length LC (mm):

6. Connector:

☐ Miniature Plug ☐ Miniature Socket ☐ Standard Plug ☐ Standard Socket ☐ Without

7. Connector temperature: ☐ 200°C ☐ 350°C ☐ 650°C

8. Option:

☐ Cable clamp ☐ Custom ID label ☐ Without

Additional:

Application:

Operating temperature (min/max):

Type of environment:

Accessories:
See the part "Accessories"

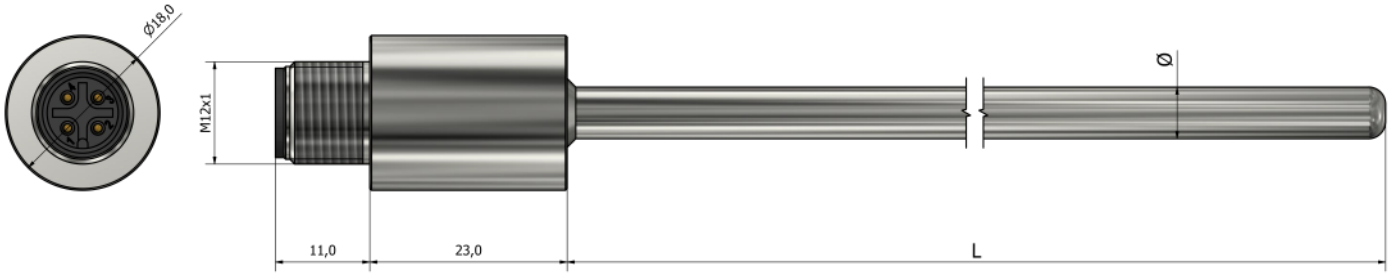
Quantity:

Note:

How to order?

Choose the desired characteristics of your sensor by marking the checkboxes and by filling up the text. You can provide sketches, images, personal notes, special requirements or any important data. For additional questions and assistance, feel free to contact us.

TT40 – Thermocouples with protection tube
Integrated M12 connector



Ordering information

1. Thermocouple:

☐ Type K ☐ Type N ☐ Type J ☐ Type T ☐ Type E
☐ Type R ☐ Type S ☐ Type B ☐ Other:

2. Class:

☐ Class 1 ☐ Class 2

3. Tube dimensions (mm): *(material **Stainless steel 316L**)*

L _____ Ø _____

Additional:

Application:

Operating temperature (min/max):

Type of environment:

Accessories:
See the part "Accessories"

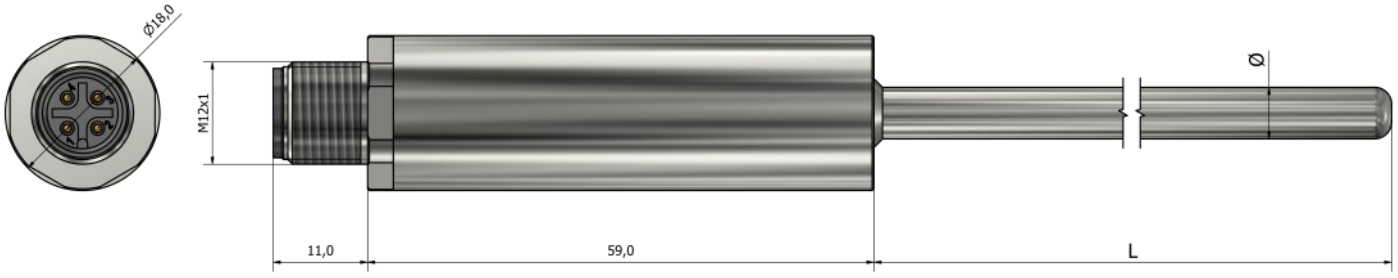
Quantity:

Note:

How to order?

Choose the desired characteristics of your sensor by marking the checkboxes and by filling up the text. You can provide sketches, images, personal notes, special requirements or any important data. For additional questions and assistance, feel free to contact us.

TT41 – Thermocouples with protection tube
Integrated M12 connector with transmitter



Ordering information

1. Thermocouple:

☐ Type K ☐ Type N ☐ Type J ☐ Type T ☐ Type E
☐ Type R ☐ Type S ☐ Type B ☐ Other:

2. Class:

☐ Class 1 ☐ Class 2

3. Tube dimensions (mm): *(material **Stainless steel 316L**)*

L _____ Ø _____

4. Transmitter (°C):
Specify temperature range

Additional:

Application:

Operating temperature (min/max):

Type of environment:

Accessories:
See the part "Accessories"

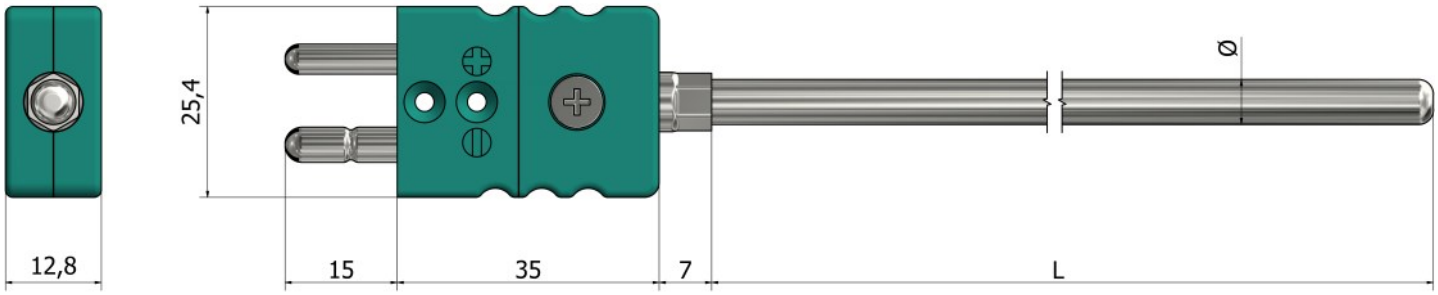
Quantity:

Note:

How to order?

Choose the desired characteristics of your sensor by marking the checkboxes and by filling up the text. You can provide sketches, images, personal notes, special requirements or any important data. For additional questions and assistance, feel free to contact us.

TT45 – Thermocouples with protection tube
TC connector



Ordering information

1. Thermocouple:

☐ Type K ☐ Type N ☐ Type J ☐ Type T ☐ Type E
☐ Type R ☐ Type S ☐ Type B ☐ Other:

2. Class:

☐ Class 1 ☐ Class 2

3. Tube dimensions (mm): *(material **Stainless steel 316L**)*

L _____ Ø _____

4. Connector:

☐ Miniature Plug ☐ Miniature Socket ☐ Standard Plug ☐ Standard Socket ☐ Without

5. Connector temperature: ☐ 200°C ☐ 350°C ☐ 650°C

Additional:

Application:

Operating temperature (min/max):

Type of environment:

Accessories:
See the part "Accessories"

Quantity:

Note:

How to order?

Choose the desired characteristics of your sensor by marking the checkboxes and by filling up the text. You can provide sketches, images, personal notes, special requirements or any important data. For additional questions and assistance, feel free to contact us.

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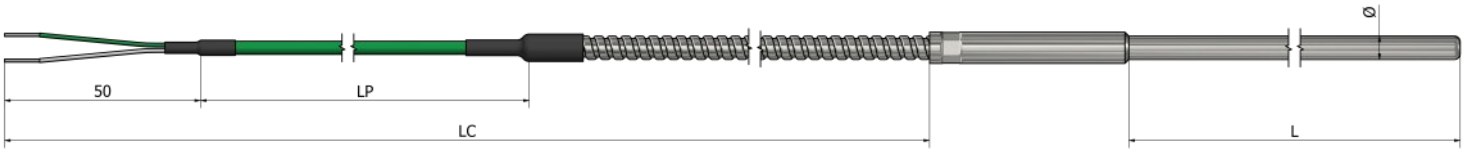
TT50 – Thermocouples with protection tube
Armored cable prolongation



Armored cable material* ***Stainless steel 304*

Ordering information

1. Thermocouple:
☐ Type K ☐ Type N ☐ Type J ☐ Type T ☐ Type E
☐ Type R ☐ Type S ☐ Type B ☐ Other:

2. Class:
☐ Class 1 ☐ Class 2

3. Tube dimensions (mm): *(material **Stainless steel 316L**)*
L _____ Ø _____

4. Cable prolongation:
☐ PVC (105°C) ☐ Silicone (180°C) ☐ Teflon (260°C)
☐ Fiberglass (400°C) ☐ Other:

5. Cable length LC (mm):

6. Bare cable length LP (mm):

7. Crimp protection:
☐ Spring ☐ Heat shrink sleeve ☐ Without

8. Connector:
☐ Miniature Plug ☐ Miniature Socket ☐ Standard Plug ☐ Standard Socket ☐ Without

9. Connector temperature: ☐ 200°C ☐ 350°C ☐ 650°C

10. Option:
☐ Cable clamp ☐ Custom ID label ☐ Without

Additional:

Application:

Operating temperature (min/max):

Type of environment:

Accessories:
See the part "Accessories"

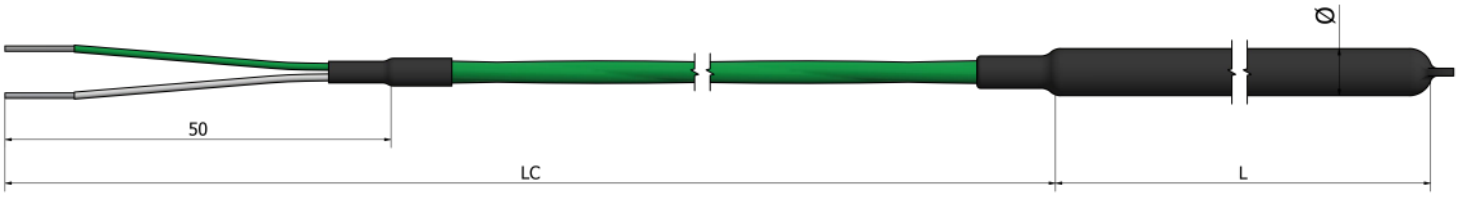
Quantity:

Note:

How to order?

Choose the desired characteristics of your sensor by marking the checkboxes and by filling up the text. You can provide sketches, images, personal notes, special requirements or any important data. For additional questions and assistance, feel free to contact us.

TT60 – Thermocouples with protection tube
For aggressive environments (with PTFE protection up to 250°C)



Protection material **PTFE*

Ordering information

1. Thermocouple:

☐ Type K ☐ Type N ☐ Type J ☐ Type T ☐ Type E
☐ Type R ☐ Type S ☐ Type B ☐ Other:

2. Class:

☐ Class 1 ☐ Class 2

3. Tube dimensions (mm): *(material **SS 316L** with **PTFE** protection)*

L _____ Ø _____

4. Cable prolongation:

☐ PVC (105°C) ☐ Silicone (180°C) ☐ Teflon (260°C)
☐ Fiberglass (400°C) ☐ Other:

5. Cable length LC (mm):

6. Connector:

☐ Miniature Plug ☐ Miniature Socket ☐ Standard Plug ☐ Standard Socket ☐ Without

7. Connector temperature: ☐ 200°C ☐ 350°C ☐ 650°C

8. Option:

☐ Cable clamp ☐ Custom ID label ☐ Without

Additional:

Application:

Operating temperature (min/max):

Type of environment:

Accessories:
See the part "Accessories"

Quantity:

Note:

How to order?

Choose the desired characteristics of your sensor by marking the checkboxes and by filling up the text. You can provide sketches, images, personal notes, special requirements or any important data. For additional questions and assistance, feel free to contact us.