CABLE THERMOCOUPLE

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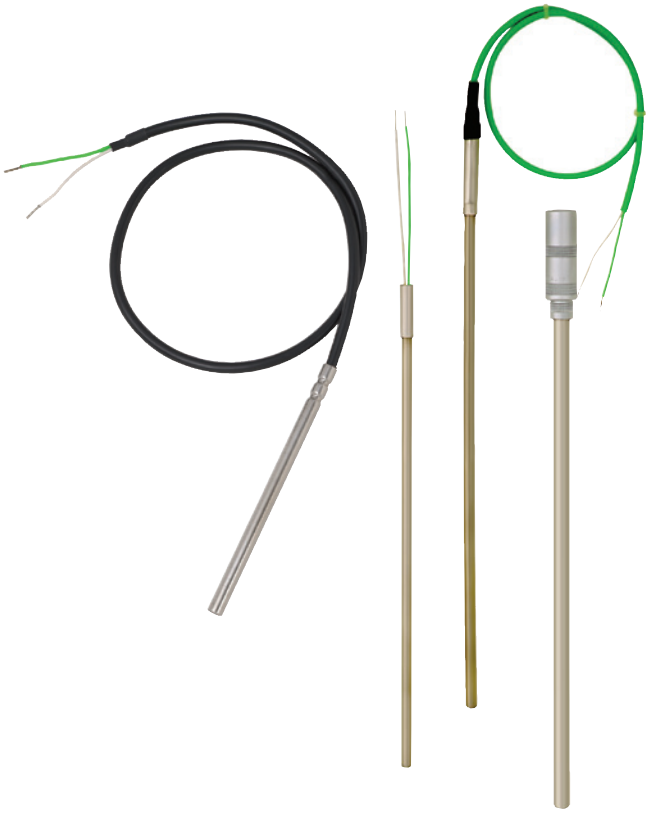
TEC200



Description

Cable thermocouples are particularly suited to those applications in which the metallic sensor tip is mounted directly into bored holes (e.g. in machine components) or directly into the process for any application with no chemically aggressive media or abrasion.

For mounting into a thermowell, a spring-loaded compression fitting should be provided, since only this can press the sensor tip into the bottom of the thermowell. Otherwise a potentially critical force could be exerted on the measuring tip.

In the standard version the cable sensors are manufactured without process connections. Fastening elements such as threaded fittings, union nuts, etc. can also be used.

Features

- Application ranges from 0 ... +1200 °C
- For insertion, screw-in with optional process connection
- Cable from PVC, silicone, PTFE or glass fibre
- Explosion-protected versions Ex-i, Ex-n and NAMUR NE24
- High mechanical strength

Applications

- For direct installation into the process
- Machine building
- Motors
- Bearings
- Pipelines and vessels

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Sensor

Sensor type

Model	Recommended max. operating temperature
K (NiCr-Ni)	1200 °C
J (Fe-CuNi)	800 °C
E (NiCr-CuNi)	800 °C
T (Cu-CuNi)	400 °C
N (NiCrSi-NiSi)	1200 °C

The actual application range of these thermometers is limited both by the permissible max. temperature of the thermocouple as well as by the permissible max. temperature of the thermowell material. If the temperature under measurement is higher than the permissible temperature at the cable access point, the distance between the cable transition and the critical temperature has to be adapted accordingly by an increased sensor length.

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

Tolerance value

A cold junction temperature of 0 °C is taken as basis with the definition of the tolerance value of thermocouples.

Type K

Class	Temperature range	Tolerance value
DIN EN 60584 part 2		
1	-40 ... +375 °C	± 1.5 °C
1	+375 ... +1000 °C	± 0.0040 • | t | [1]
2	-40 ... +333 °C	± 2.5 °C
2	+333 ... +1200 °C	± 0.0075 • | t | [1]
ISA (ANSI) MC96.1-1982		
Standard	0 ... +1250 °C	± 2.2 °C or [2] ± 0.75 %
Special	0 ... +1250 °C	± 1.1 °C or [2] ± 0.4 %

Type J

Class	Temperature range	Tolerance value
DIN EN 60584 part 2		
1	-40 ... +375 °C	± 1.5 °C
1	+375 ... +750 °C	± 0.0040 • | t | [1]
2	-40 ... +333 °C	± 2.5 °C
2	+333 ... +750 °C	± 0.0075 • | t | [1]
ISA (ANSI) MC96.1-1982		
Standard	0 ... +750 °C	± 2.2 °C or [2] ± 0.75 %
Special	0 ... +750 °C	± 1.1 °C or [2] ± 0.4 %

Type E

Class	Temperature range	Tolerance value
DIN EN 60584 part 2		
1	-40 ... +375 °C	± 1.5 °C
1	+375 ... +800 °C	± 0.0040 • | t | [1]
2	-40 ... +333 °C	± 2.5 °C
2	+333 ... +900 °C	± 0.0075 • | t | [1]

Type T

Class	Temperature range	Tolerance value
DIN EN 60584 part 2		
1	-40 ... +125 °C	± 0.5 °C
1	+125 ... +350 °C	± 0.0040 • | t | [1]
2	-40 ... +133 °C	± 1.0 °C
2	+133 ... +350 °C	± 0.0075 • | t | [1]

Type N

Class	Temperature range	Tolerance value
DIN EN 60584 part 2		
1	-40 ... +375 °C	± 1.5 °C
1	+375 ... +1000 °C	± 0.0040 • | t | [1]
2	-40 ... +333 °C	± 2.5 °C
2	+333 ... +1200 °C	± 0.0075 • | t | [1]

1) | t | is the value of the temperature in °C irrespective of the sign.
2) Whichever is the greater

Limited error with selected temperatures in °C for thermocouples type K and type J

Temperature (ITS 90) °C	Tolerance value DIN EN 60584 part 2 Class 1 °C	Class 2 °C
0	± 1.5	± 2.50
100	± 1.5	± 2.50
200	± 1.5	± 2.50
300	± 1.5	± 2.50
400	± 1.6	± 3.00
500	± 2.0	± 3.75
600	± 2.4	± 4.50
700	± 2.8	± 5.25
800	± 3.2	± 6.00
900	± 3.6	± 6.75
1000	± 4.0	± 7.50
1100	± 4.4	± 8.25
1200	± 4.8	± 9.00

Process connections for straight probes

The cable thermocouples can be fitted with an optional process connection. The dimension A describes the insertion length into the process.

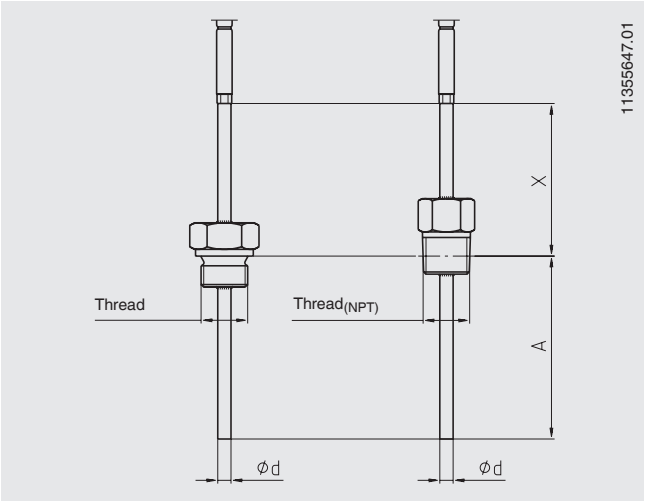
To minimise heat dissipation errors via the threaded connection, the insertion length, A, should be at least 25 mm long. The position of the threaded connection is specified by the dimension X and is not dependent on the connection type.

Please note:
- For parallel threads (e.g. G ½) the dimensioning always refers to the sealing collar of the threaded connector nearest the process.
- For tapered threads the measurement plane is located approx. in the centre of the thread.

Fixed threaded connections/threads
used to mount the probe into a threaded coupling with a female thread.

Insertion length A: in accordance with customer specification
Material: stainless steel, others on request

The sensor must be rotated in order to screw it into the process. Therefore, this design must first be mounted mechanically and it can then be electrically connected.



Compression fitting
allows simple adjustment to the required insertion length at the installation point.

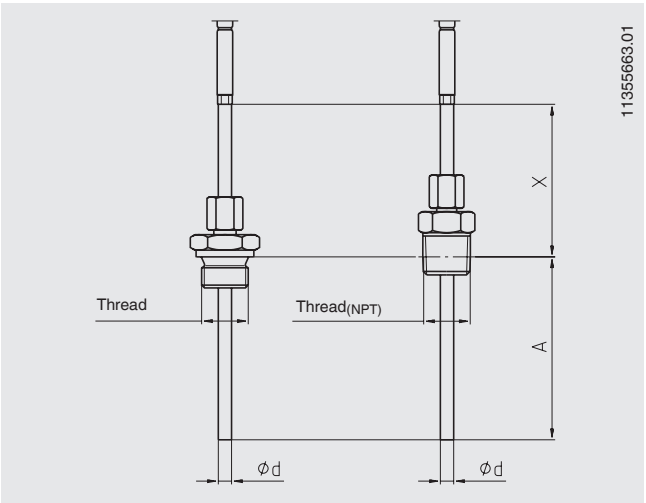
Since the compression fitting is adjustable on the thermowell, the dimensions A and X are stated as the values for the delivered item. The length of the compression fitting determines the smallest possible neck length X of approx. 40 mm.

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

Stainless steel sealing rings can be adjusted once; once they have been unscrewed, sliding along the sheath is no longer possible.
- Max. temperature at process connection 500 °C
- Max. pressure load 40 bar

PTFE sealing rings can be adjusted several times, after unscrewing, repeated sliding along the sheath is still possible.
- Max. temperature at process connection 150 °C
- For use without pressure

For sheathed resistance thermometers with a Ø of 2 mm, only PTFE sealing rings are approved.

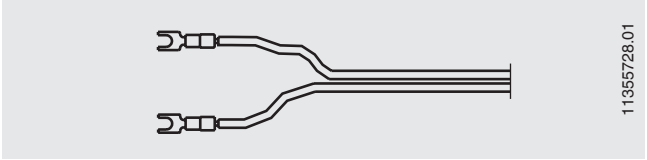


Plug (option)

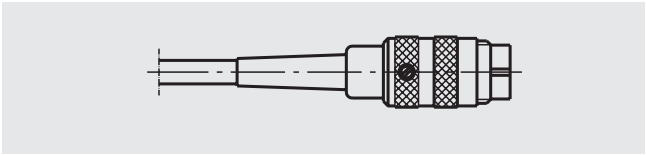
Cable thermocouples can be supplied with plugs fitted.

The following options are available:

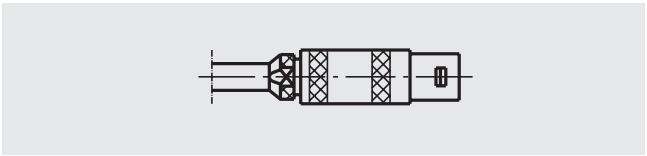
■ **Terminal ends**
(not suitable for versions with bare connecting wires)



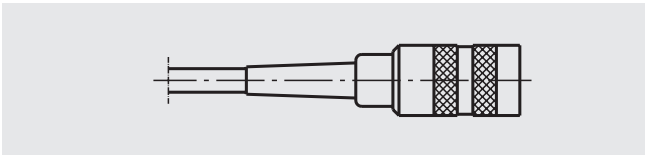
■ **Screw-in-plug, Binder (male)**



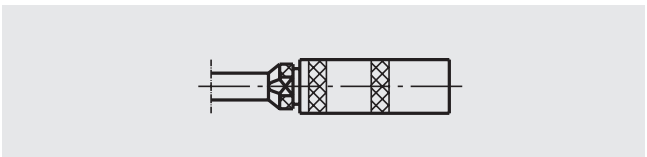
■ **Lemosa plug size, 1 S (male)**
■ **Lemosa plug size 2 S (male)**



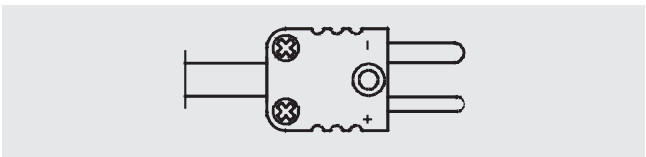
■ **Screw-in-plug, Binder (female)**



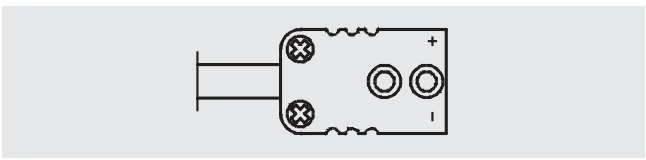
■ **Lemosa plug, size 1 S (female)**
■ **Lemosa plug, size 2 S (female)**



■ **Standard thermo plug 2-pin (male)**
■ **Miniature thermo plug 2-pin (male)**



■ **Standard thermo plug 2-pin (female)**
■ **Miniature thermo plug 2-pin (female)**



Further options

Bend protector
A cable protector (spring or shrink sleeving) is used to protect the transition point from rigid probe to flexible connection cable. This should always be used when a relative movement between the cable and the thermometer mounting is expected.

For designs to Ex-n the use of bend protection is obligatory.

The standard length of the bend protection spring is 60 mm.

Transition with the same diameter as the probe
Optionally, a transition can also be selected that has the same diameter as the metal probe. This makes it possible to slide on cable glands or compression fittings from both ends of the sensor. The transition is hardly visible.

The operating limits of the transition do not change, however, i.e. they must still remain outside the process and should not be loaded with a compression fitting.