

Applications

- Machinery industry
- General industrial services, especially surfaces of blocks and other construction elements

Features

- Single thermocouple
- Sensing element according to (PN-EN 60584-1):
 - Type K (NiCr-NiAl),
 - Type J (Fe-CuNi),
 - Type N (NiCrSi-NiSi),
 - Type E (NiCr-CuNi),
 - Type T (Cu-CuNi)
- Non-standard sensor versions available upon customer's request:
 - thermocouple cable perpendicular to copper plate

Thermocouples TTE422 are designed for assembling directly onto machine parts or other construction elements.

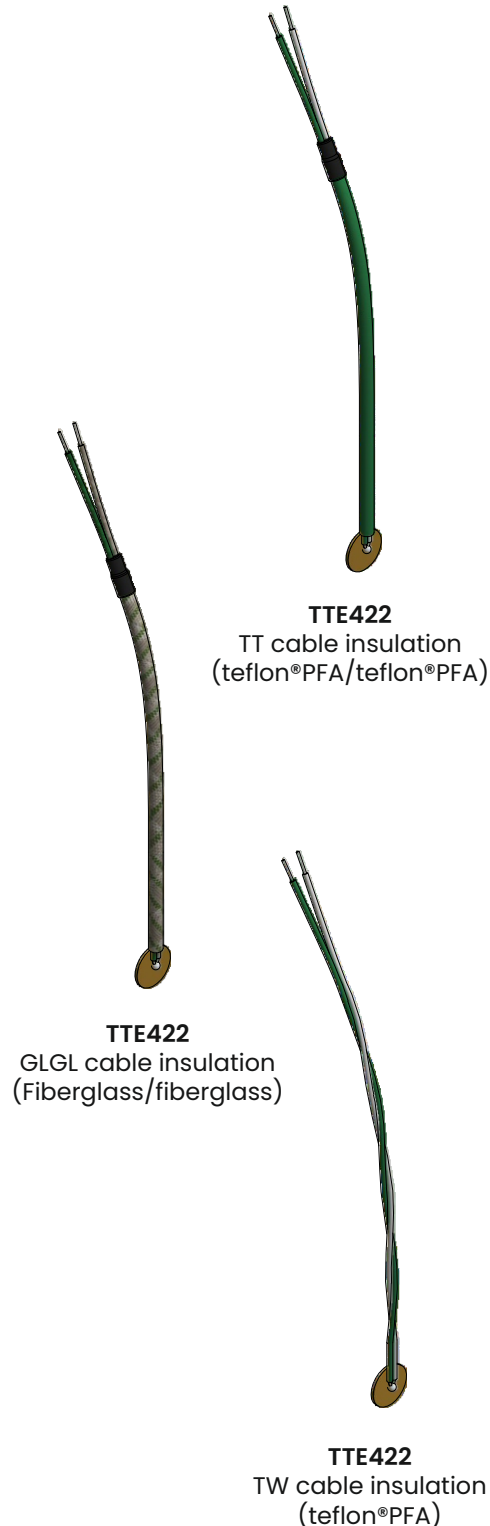
Copper plate allows to weld sensor to machine body or part.

The sensor consists of thermocouple cable and copper plate.

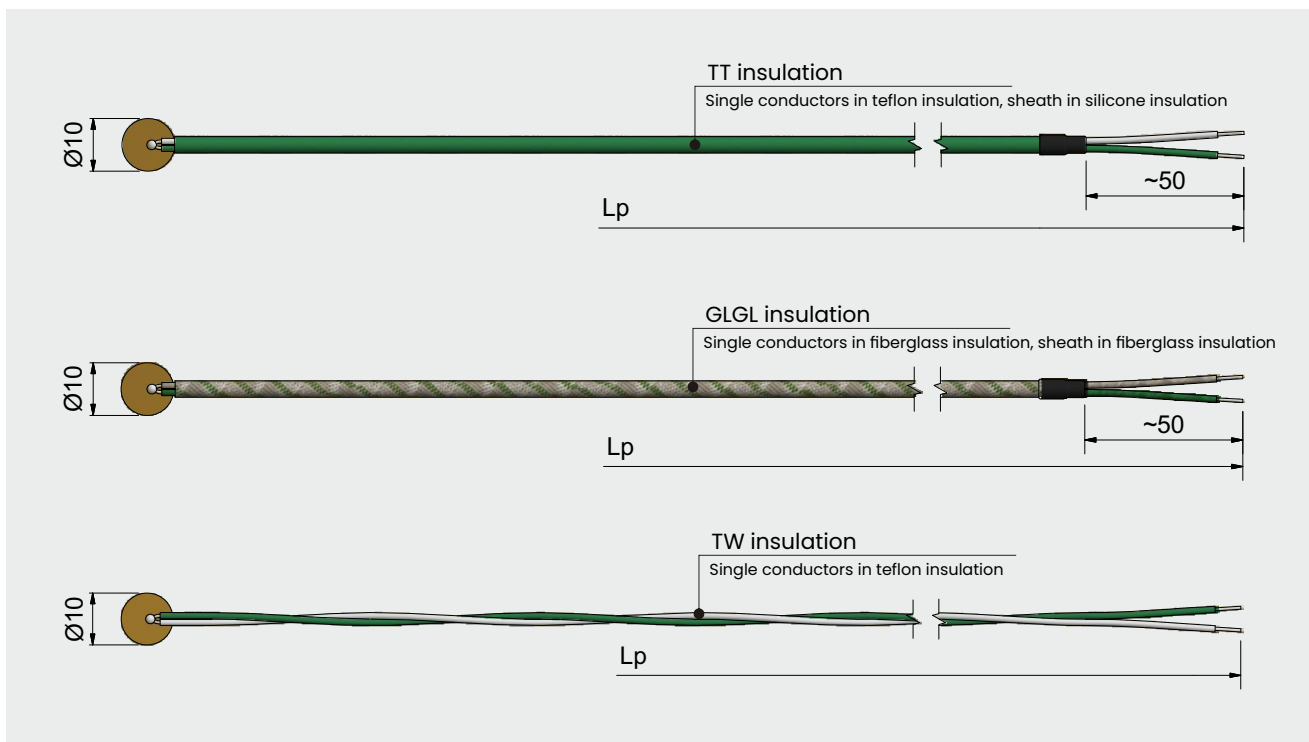
Thermocouple type, accuracy, cable length and insulation can be selected individually for the respective application.

Temperature transmitter (Option)

There is possibility of using standard temperature transmitter (4÷20mA, 0÷10V) or temperature transmitter with HART®, Profibus® PA, Foundation Fieldbus communication protocol, mounted inside electrical control cabinet.



Designs



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

Temperature		°C	100	200	300	400	500	600
Nominal value	Type J	mV	5.27	10.78	16.33	21.85	27.39	33.10
	Type K	mV	4.10	8.14	12.21	16.40	20.64	24.91
	Type N	mV	2.77	5.91	9.34	12.97	16.75	20.61
Tolerance	Class 1	°C	±1.5	±1.5	±1.5	±1.6	±2.0	±2.4
	Class 2	°C	±2.5	±2.5	±2.5	±3.0	±3.7	±4.5

Tolerance

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

Type J (Fe-CuNi)

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

Type E (NiCr-CuNi)

Class	Temperature range	Tolerance
1	-40 °C .. +375 °C	± 1.5 °C
	+375 °C .. +800 °C	± 0.0040 x t
2	-40 °C .. +333 °C	± 2.5 °C
	+333 °C .. +900 °C	± 0.0075 x t

Electrical parameters

Isolation resistance test dependings on cable insulation type

Type K (NiCr-Ni), Type N (NiCrSi-NiSi)

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

Type T (Cu-CuNi)

Class	Temperature range	Tolerance
1	-40 °C .. +125 °C	± 0.5 °C
	+125 °C .. +350 °C	± 0.0040 x t
2	-40 °C .. +133 °C	± 1.0 °C
	+133 °C .. +350 °C	± 0.0075 x t

Insulation types of connection cable

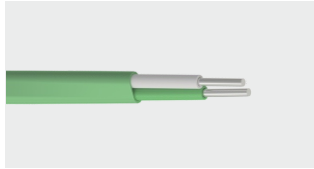
TW insulation (wire)

Conductor: Teflon® PFA



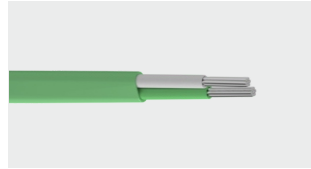
TT insulation (wire)

Conductor: Teflon® PFA
Sheath: Teflon® PFA



TT insulation (stranded)

Conductor: Teflon® PFA
Sheath: Teflon® PFA



GLGL insulation (wire)

Conductor: Fiberglass
Sheath: Fiberglass



GHGH insulation (wire)

Conductor: Spec. Fiberglass
Sheath: Spec. Fiberglass



GLP insulation (stranded)

Conductor: Fiberglass
Sheath: Stainless steel braid



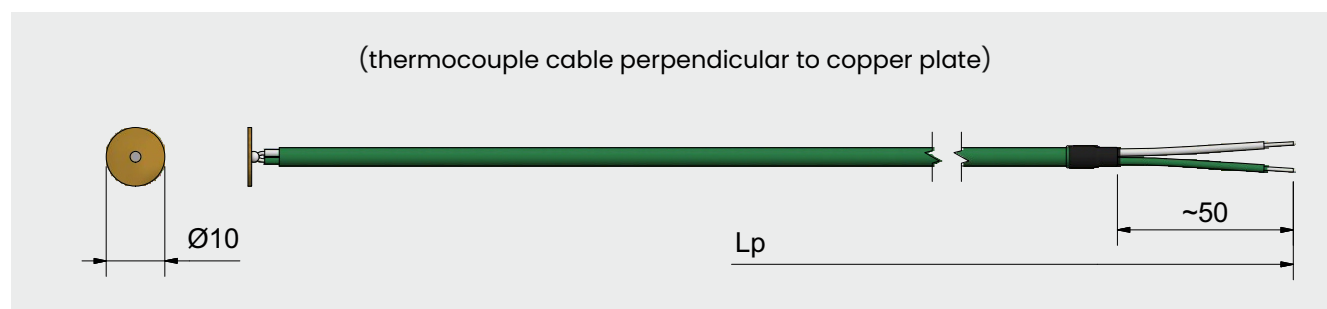
Available measuring range

Measuring range	Insulation type	
-50 .. +260°C	TW, TT	teflon® PFA
-50 .. +400°C	GLGL, GLP	fiberglass
-50 .. +600°C	GHGH	spec. fiberglass

Dimensions of thermocouples cables

Code	Cross section	Outer dimensions
TW	2 x 0.20 mm (wire)	Ø0.5 mm
TT	2 x 0.20 mm (wire)	0.6 x 1.0 mm
	2 x 0.22 mm ² (stranded)	1.5 x 2.8 mm
GLGL	2 x 0.20 mm (wire)	0.9 x 1.4 mm
	2 x 0.50 mm (wire)	1.3 x 2.1 mm
GHGH	2 x 0.50 mm (wire)	1.5 x 2.4 mm
	2 x 1.00 mm (wire)	1.8 x 3.1 mm
GLP	2 x 0.22 mm ² (stranded)	Ø2.6 mm

Non-standard sensor versions



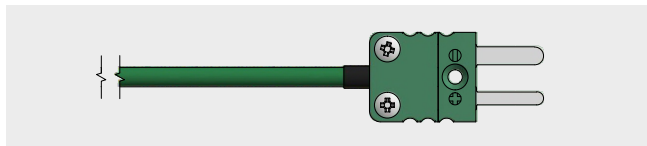
Connectors (optional)

Sensors with connection cable can be equipped with connector.

Available options:

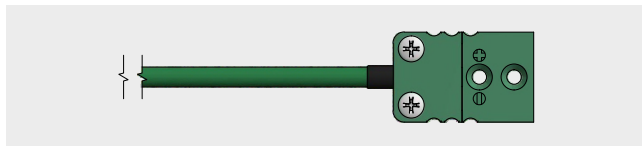
Connector S-010-(thermocouple type)-W

Miniature plug, 2-pin.



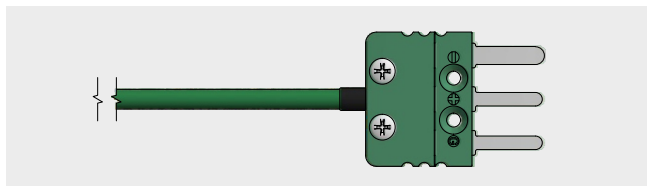
Connector S-010-(thermocouple type)-G

Miniature socket, 2-pin.



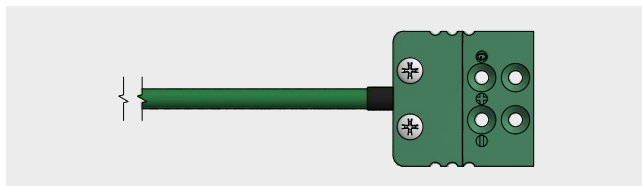
Connector S-013-(thermocouple type)-W

Miniature plug, 3-pin.



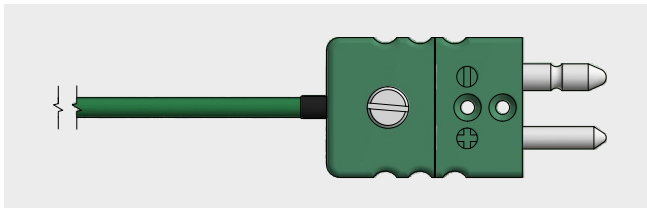
Connector S-013-(thermocouple type)-G

Miniature socket, 3-pin.



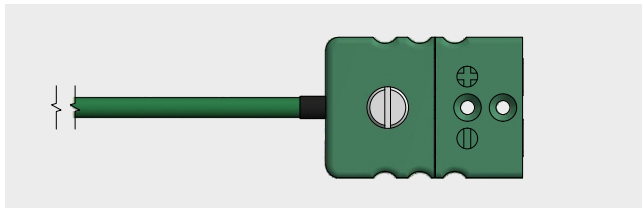
Connector S-020-(thermocouple type)-W

Standard plug, 2-pin.



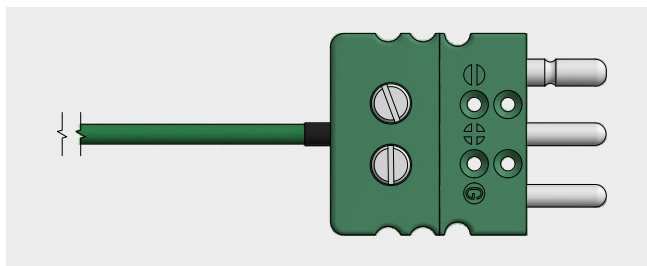
Connector S-020-(thermocouple type)-G

Standard socket, 2-pin.



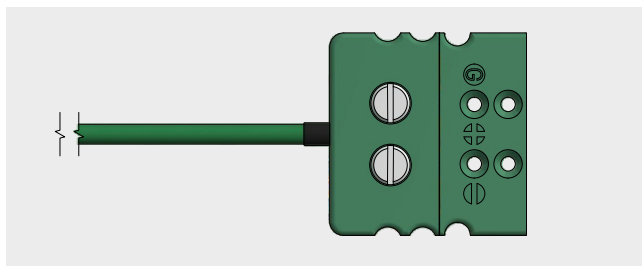
Connector S-023-(thermocouple type)-W

Standard plug, 3-pin.



Connector S-023-(thermocouple type)-G

Standard socket, 3-pin.



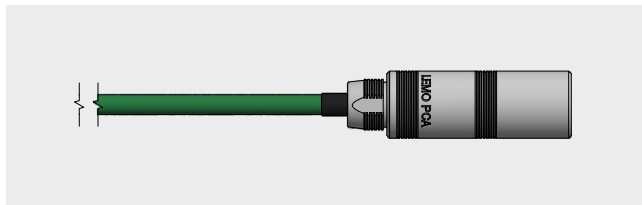
Connector LEMO® FFA

Plug size from 0S to 3S. 2-, 3-, 4-, 6-pin.



Connector LEMO® PCA

Plug size from 0S to 3S. 2-, 3-, 4-, 6-pin.



Ordering code

TTE422 - 1 - 2 - 3 - 4 - 5 - 6

1	<input type="text"/>	Thermocouple type			
		J	Type J (Fe-CuNi)		
		K	Type K (NiCr-Ni)		
	xxx	other, please specify			
2	<input type="text"/>	Cross section			
		2x0.20	2 x 0.20 mm <i>wire</i>		
		2x0.50	2 x 0.50 mm <i>wire</i>		
		2x1.00	2 x 1.00 mm <i>wire</i>		
		2x0.22	2 x 0.22 mm ² <i>stranded</i>		
	xxx	other, please specify			
3	<input type="text"/>	Connecting cable length Lp			
		1000	1000 mm		
		2500	2500 mm		
	xxx	other, please specify			
4	<input type="text"/>	Tolerance class			
		1	Class 1 according to PN-EN 60584-2		
	2	Class 2 according to PN-EN 60584-2			
5	<input type="text"/>	Connecting cable type		Temperature range of sensor	
		TW	Teflon® PFA	-50 .. +260°C	
		TT	Teflon® PFA / Teflon® PFA	-50 .. +260°C	
		GLGL	Włókno szklane / Włókno szklane	-50 .. +400°C	
		GLP	Fiberglass / Stainless steel	-50 .. +400°C	
		GHGH	Spec. fiberglass / Spec. fiberglass	-50 .. +600°C	
	xxx	other, please specify			
6	<input type="text"/>	Connector (optional)			
			without connector, free end conductors of connection cable		
		S-010-K-W	Miniature plug, 2-pin, type K		
		FFA.IS	Connector LEMO® FFA size IS		
	xxx	other, please specify			

Example

TTE422-K-2x0.20-2000-GLGL

TC sensor type K, with copper plate, 2x0.20 mm cross section thermocouple wire cable, connection cable length Lp=2000 mm, tolerance class 1, single conductors in fiberglass insulation, sheath in fiberglass insulation.

TTE422-J-2x0.22-2500-2-TT-FFA.IS

TC sensor type J, with copper plate, 2x0.22 mm² cross section thermocouple stranded cable, connection cable length Lp=2500 mm, tolerance class 2, single conductors in teflon insulation, sheath in teflon insulation, connection cable equipped with LEMO® FFA plug size IS.