

Applications

- Measuring range: -40 .. +1250°C
- Heat treating, Furnaces/kilns
- Turbines, Bearing temperature
- Power stations, Steam generators
- Diesel engines, Nuclear reactors

Features

- Highly compacted magnesium oxide
- Small diameters (from Ø0.25 mm)
- Short reaction time
- Bendable
- High mechanical strength, vibration proof
- Connection head with local LED display as an option (see models PR7501, DANWdie-LED)
- Thermocouple with reduced tip as an option

With sheathed thermocouples, the flexible part of the probe is a mineral insulated cable, often called the sheathed cable. This cable consists of a stainless steel outer sheath, in which the inner conductors are encased for insulation and compressed into a highly compacted ceramic mass. The outer sheath is made of stainless steel or Ni-alloy – with precious metal thermocouples it may also be platinum or a PtRh-alloy

The inner conductors are welded together at the measuring end of the sheathed cable to form the 'thermocouple'. In designs where the measuring element is not insulated the sheath is also welded to the thermocouple. Connector cables are connected to the other end of the sheathed cable, and the sheathed cable is hermetically sealed with a sealing compound. The connector wires form the basis for the electrical interface, with cable, a connector or a terminal block then attached to these connector wires.

Due to their flexibility and the small diameters in which they are available, sheathed thermocouples can be used in locations that are not easily accessible.

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.



TTP-BTW

TTP-TKb

TTP-WL

TTP-NA

ATEX, IECEx, EAC Ex versions



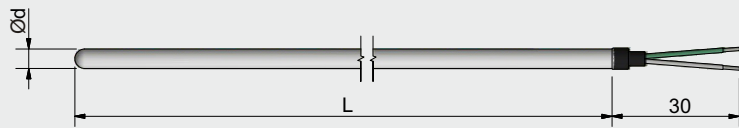
Intrinsically safe and Flameproof designs are available for applications in hazardous areas. These models are provided with certificate for „intrinsically safe“ and „flameproof“ type of protection according to Directive 2014/34/UE (ATEX), IECEx scheme and EAC Ex TR-CU 012/2011 (Eurasian Economic Union).

Intrinsically safe (Exi)	data sheet XI-TPP.. (with connection head, cable or plug)
Flameproof (Exd)	data sheet XD-TT..I (with connection head)

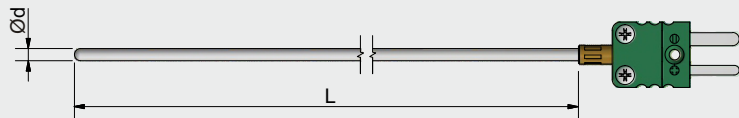
Other versions

This data sheet contains only small part of our supplies program of mineral insulated thermocouples. Upon the customer's request, other versions can also be delivered.

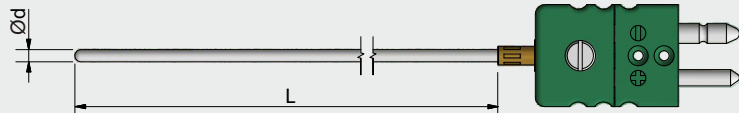
Type BT
with free unisolated
wires 30 mm long



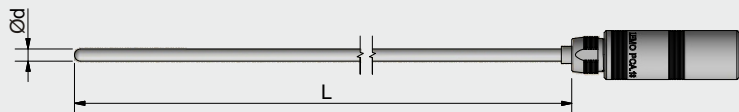
Type BTW
with miniature size plug



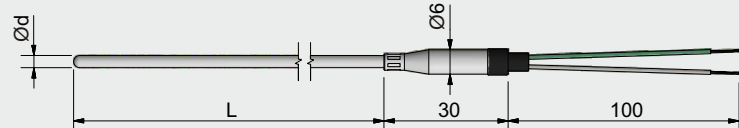
Type BTWs
with standard size plug



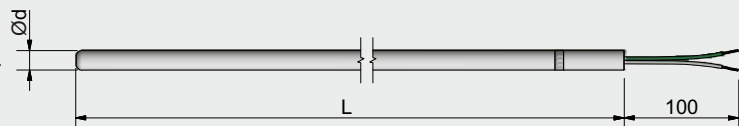
Type WL
with LEMO® plug PCA 1.S



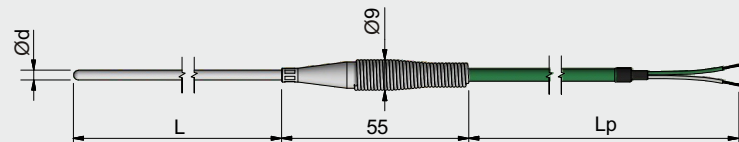
Type T
with pot seal and flying
leads



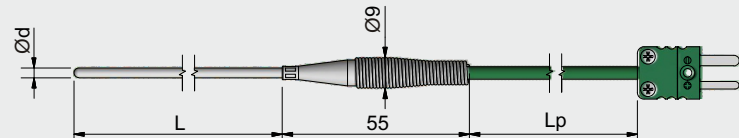
Type TS
with pot seal with the same diameter
like sheath and flying leads
For $\text{Ød}=4.5, 4.76, 6.0, 6.4$ mm



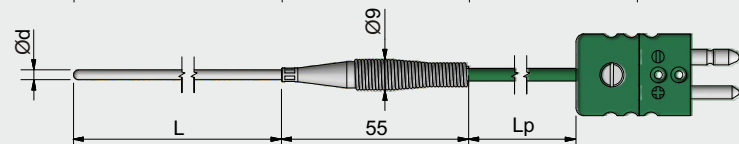
Type TKb
with pot seal and compensating
cable



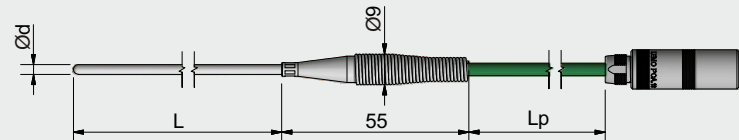
Type TKbW
Tkb + miniature size plug



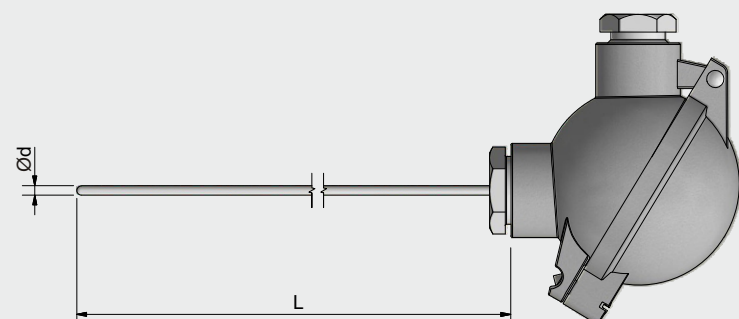
Type TKbWs
Tkb + standard size plug



Type TKbWL
Tkb + LEMO® socket PCA.1S



Type NA
with aluminum connection
head NA type



Possible combinations of sheath diameter and number of sensors

No. of sensors	Sheath diameter [mm]									
	Ø 0.25	Ø 0.5	Ø 1.0	Ø 1.5	Ø 2.0	Ø 3.0	Ø 4.5	Ø 6.0	Ø 6.4	Ø 8.0
Single (1xTC)	✓	✓	✓	✓	✓	✓	✓	✓	✓*	✓
Double (2xTC)					✓	✓	✓	✓	✓*	✓
Triple (3xTC)						✓	✓	✓		

✓ : available

*Option, available upon request.

Other diameters available upon request:

Ø0.15 mm Ø3.2 mm
 Ø0.6 mm Ø4.76 mm
 Ø1.6 mm Ø12.7 mm

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

Temperature		°C	100	200	300	400	500	600	700
Basic value	Type J	mV	5.27	10.78	16.33	21.85	27.39	33.10	33.10
	Type K	mV	4.10	8.14	12.21	16.40	20.64	24.91	24.91
	Type N	mV	2.77	5.91	9.34	12.97	16.75	20.61	20.61
Tolerance	Class 1	°C	±1.5	±1.5	±1.5	±1.6	±2.0	±2.4	±2.4
	Class 2	°C	±2.5	±2.5	±2.5	±3.0	±3.7	±4.5	±4.5

Tolerances

Basic values and limiting errors for the thermocouple sensors are laid down in PN-EN 60584.

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 K (NiCr-Ni), Typ 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 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

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

Type S (PtRh10-Pt), Typ R (PtRh13-Pt)

Class	Temperature range	Tolerance
1	0 °C .. +1100 °C	± 1.0 °C
	+1100 °C .. +1600 °C	± [1+0.003 (t-1100)]
2	0 °C .. +600 °C	± 1.5 °C
	+600 °C .. +1600 °C	± 0.0025 x t

Responses times

Diameter [mm]	Junction type	water 0.4 m/s		air 2 m/s	
		t ₅₀	t ₉₀	t ₅₀	t ₉₀
Ø 0.5	isolated	0.06	0.15	1.80	6.00
	grounded	0.03	0.10	1.80	6.00
Ø 1.0	isolated	0.15	0.50	3.00	10.00
	grounded	0.06	0.20	3.00	10.00
Ø 1.5	isolated	0.21	0.60	8.00	25.00
	grounded	0.13	0.40	8.00	25.00
Ø 3.0	isolated	2.50	2.90	26.00	88.00
	grounded	0.45	0.75	23.00	80.00
Ø 4.5	isolated	4.00	6.00	37.00	120.00
	grounded	0.55	1.60	33.00	110.00
Ø 6.0	isolated	7.00	9.50	60.00	200.00
	grounded	0.75	2.60	55.00	185.00
Ø 8.0	isolated	7.00	14.00	100.00	290.00
	grounded	0.75	3.90	87.00	250.00

Standard sheath materials

Maximal temperature	Material	Material properties	Applications
800°C	1.4301 AISI 304 1.4306 AISI 304 L	<p>Materials 1.4301 and 1.4306 have different low carbon contents and differ, in particular, in their resistance to intercrystalline corrosion.</p> <p>Good resistance to organic acids at moderate temperatures, saline solutions, such as sulphates, sulphides and sulphites, and alkaline solutions at moderate temperatures.</p> <p>Good welding properties. Welding retreatment is generally not necessary, in particular with 1.4306.</p>	Chemical apparatus engineering, nuclear power, textile and paper industry, grease and soap industry, food processing industry, dairies and breweries, nitric acid industry
800°C	1.4404 AISI 316 L	<p>As a result of the addition of molybdenum, this material has higher corrosion resistance in non-oxidizing acids such as ethanolic acid, tartaric acid, phosphoric acid, sulphuric acid and others. Increased pitting resistance.</p> <p>Good welding properties. Heat treatment is generally not necessary.</p>	Sulphite, pulp, textile, dyeing, fatty acid, soap and pharmaceutical industries.
800°C	1.4541 AISI 321	<p>Good resistance to intercrystalline corrosion, also after welding. Good resistance to heavy oil products, steam and exhaust gases.</p> <p>Good oxidation resistance.</p> <p>Can be used continuously up to approximately 800 °C. Good welding properties in all standard welding processes without the need for welding retreatment. Good ductility.</p>	Nuclear power and reactor construction, chemical apparatus engineering, annealing furnaces, heat exchangers, paper and textile industry, petrochemical and crude oil industry, grease and soap industry, food processing industry.

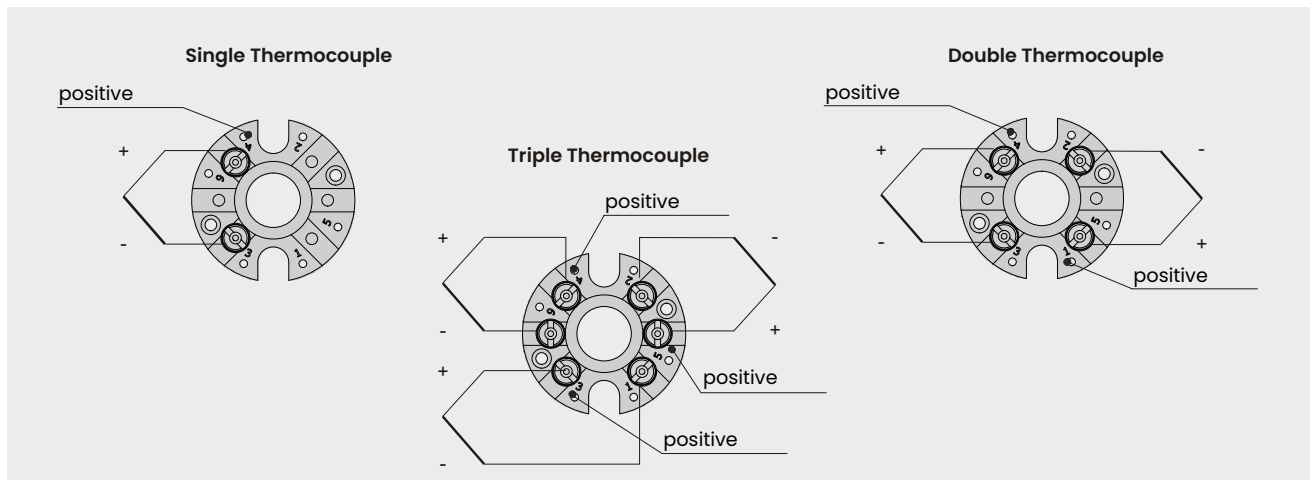
Standard sheaths materials

Maximal temperature	Material	Material properties	Applications
800°C	1.4571 AISI 316Ti	<p>Increased resistance against corrosion from certain acids due to the addition of molybdenum. Resistant against pitting, salt water and aggressive industrial influences.</p> <p>Can be used continuously up to approximately 800 °C. Good welding properties in all standard welding processes without the need for welding retreatment. Good ductility.</p>	Nuclear power and reactor construction, chemical apparatus engineering, furnace construction, chemical and pharmaceutical industries.
1200°C	1.4749 1.4762 AISI 446	<p>Extremely good resistance to reducing, sulphurous atmospheres. Very good resistance to oxidation and air. Good resistance to corrosion caused by incinerator slag and copper, lead and tin smelts.</p> <p>Good welding properties in arc welding and WIG welding. Preheating to 200 – 400 °C is recommended. Retreatment is not necessary.</p>	Petrochemical industry, metallurgy, power technology, recuperators, heat treatment kilns, vortex firing installations, waste incinerators.
1150°C	1.4841 AISI 314	<p>Excellent resistance to corrosion, also at high temperatures. Also suitable in atmospheres containing carbon and sulphur. Resistant to oxidation in air up to 1000 °C (interrupted service) or 1150 °C (continuous service). Well suited with high thermal cycling. Recommended for long-term continuous use in the temperature range from 425 to 850 °C. Good welding properties in arc welding processes. Thermal retreatment is not necessary. The material has good ductility on delivery. After a long period of use, however, the material can become slightly brittle.</p>	Boilers and blast furnaces, cement and brick kilns, glass production, crude oil and petrochemical industries, furnace construction and power stations.
1150°C	2.4816 Inconel 600™ *	<p>Good general resistance to corrosion, resistant to tension crack corrosion. Excellent resistance to oxidation. Not recommended with gases containing CO₂ and sulphur above 550 °C and sodium above 750 °C. In air, resistant up to 1100 °C.</p> <p>Good welding properties for all types of welding processes. Excellent ductility even after long-term use.</p>	PWR, nuclear power, furnace construction, plastics industry, heat treatment, paper and food processing industries, boilers, aircraft engines.
1250°C	Pyrosil® D **	<p>Continuous work at temperature up to 1250°C, short-term up to 1350°C. Low drift of the base metal thermocouple at ultra-high temperatures. Excellent resistance to degradation in nitrogen-based atmospheres.</p>	Construction of industrial furnaces, vacuum furnaces, gas turbines, waste incinerators, jet engines, energy industry

* Inco Alloys trade mark

** Tyco Thermal Controls LCC trade mark

Electrical connection on ceramic block



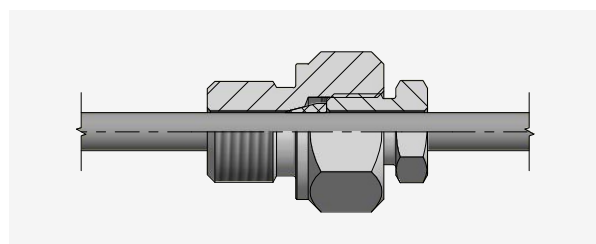
Compression fittings

Allows simple adaptation to the required insertion length at the installation point.

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

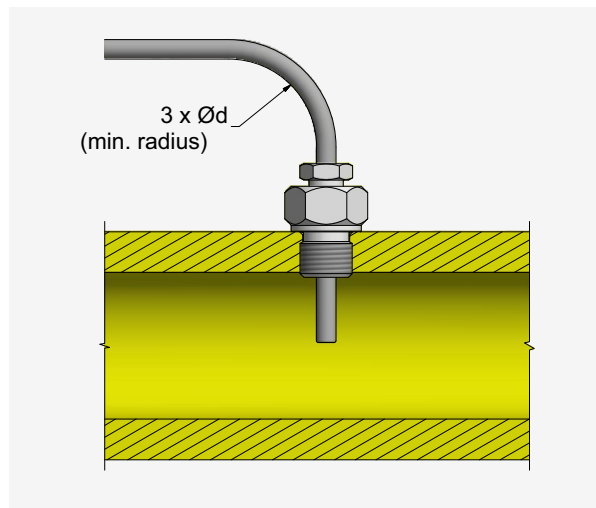
Sealing rings of stainless steel can be adjusted once, after unscrewing, sliding along the sheath is no longer possible. Max. temperature at process connection 500 °C

Sealing rings of PTFE can be adjusted several times, after unscrewing, repeated sliding along the sheath is still possible. Max. temperature at process connection 150 °C



More detailed information are available in the "Compression fittings UG" data sheet.

Example of installation

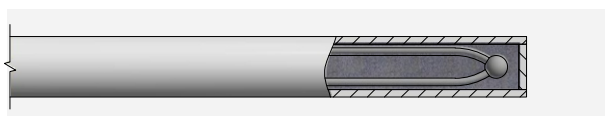


Measuring junction types

Resistance of isolation at ambient temperature, according to wg PN-EN 61515:

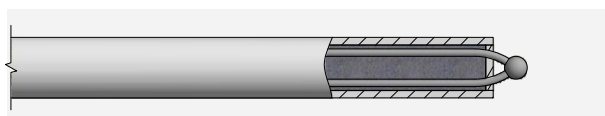
Ø < 1.5 mm	75 Vdc	> 1000 MOhm
Ø > 1.5 mm	500 Vdc	> 1000 MOhm

JUNCTION ISOLATED



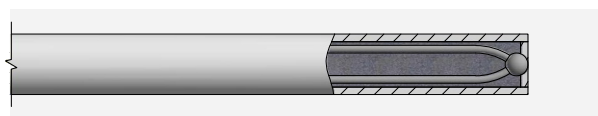
A junction of the thermocouple is fully insulated from sheath that is tightly welded. It is a standard type of thermocouples due to the fact that they can be applied close to devices that may produce electromagnetic fields that are a source of interference at other types of measuring junctions.

JUNCTION EXPOSED



A junction of thermocouple is fully exposed that that will ensure short response times with varying temperature. Wires of the thermocouple are not protected against gases and liquids.

JUNCTION GROUNDED



A junction of thermocouple is connected to a lid that is tightly welded with the sheath. It will produce short response times when temperature varies; the junction is protected against the environment (gases, liquids) in the same time.

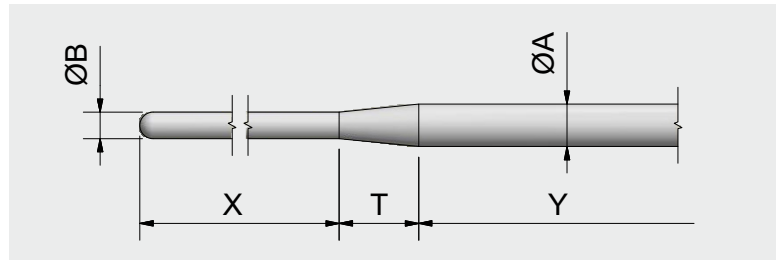
Thermocouples with reduced tip

- Big, solid thermocouple sheath diameter combine with small thermal weight of reduced tip ensures quick response time and great mechanical resistance of thermocouple.
- Tip reducing process increases thermocouple sheath durability through strengthening structure of insulating MgO grain
- Available with thermocouple types K, T, J, N, E, R, S with length from couple millimeters up to 200 meters or even more – depends on thermocouple

Dimensions limits

	Min.	Max.
ØA	x	6 mm
ØB	0.5 mm	x
X	10 mm	900 mm
Y	x	up to full coil length

Design



Standard tip diameters „B” [mm]

ØB																
5.20	4.78	4.65	4.50	4.15	4.00	3.70	3.40	3.30	3.175	3.00	2.70	2.43	2.19	2.00	1.80	
1.80	1.62	1.60	1.50	1.45	1.32	1.20	1.09	1.00	0.90	0.80	0.72	0.65	0.59	0.54	0.50	

Approximate length of reducing section „T” [mm]

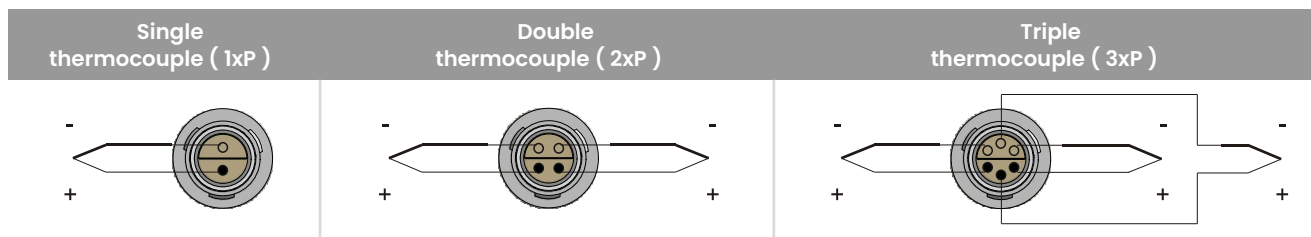
		ØA						
		6	4.5	3	2	1.5	1	0.5
ØB	6	x	x	x	x	x	x	x
	4.5	6	x	x	x	x	x	x
	3	12	6	x	x	x	x	x
	2	16	10	4	x	x	x	x
	1.5	18	12	6	2	x	x	x
	1	20	14	8	4	2	x	x
	0.5	x	x	x	6	4	2	x

Available sheath materials and thermocouple types

	Pyrosil-D	Inconel 600 (2.4816)	AISI310 (1.4841)	AISI316 (1.4401)	AISI321 (1.4541)	AISI304 (1.4301)
N (NiCrSi-NiSi)	✓	✓				
K (NiCr-NiAl)	✓	✓	✓	✓	✓	✓
T (Cu-CuNi)				✓	✓	✓
E (NiCr-CuNi)				✓	✓	✓
J (Fe-CuNi)				✓	✓	✓

✓ : possible

Wiring diagrams, LEMO® socket connectors [Size: 0S, 1S, 2S, 3S]



Compensating Cables / Extension Cables

Colour codes according to IEC 584-3 / EN 60584-3

Thermocouple type			Material for compensating or extension cable			Colour code		Sheath
Type	Positive	Negative	Code	Positive	Negative	Positive	Negative	
T	Cu	CuNi	TX	Cu	CuNi	brown	white	brown
E	NiCr	CuNi	EX	NiCr	CuNi	violet	white	violet
J	Fe	CuNi	JX	Fe	CuNi	black	white	black
K	NiCr	Ni	KX	NiCr	Ni	green	white	green
K	NiCr	Ni	KCA	Fe	CuNi	green	white	green
N	NiCrSi	NiSi	NX	NiCrSi	NiSi	pink	white	pink
N	NiCrSi	NiSi	NC	E-Cu	CuNiMn	pink	white	pink
R / S	Pt13/10Rh	Pt	RCA/SCA	E-Cu	CuNiMn	orange	white	orange
B	Pt30Rh	Pt6Rh	BC	CuMn	E-Cu	gray	white	gray

Standard insulation materials

Designation	No. of cores / cross section	Outer dia.	Maximal temp.	Construction	Applications
JJ	2 x 0.22 mm ² 2 x 1.50 mm ² 4 x 1.50 mm ²	Ø 3.6 Ø 7.3 Ø 7.8	105°C	insulat.: PVC sheath: PVC	humid rooms, weak acids, resistant for oils, gasoline, permanent installation.
SLSL	2 x 0.22 mm ² 4 x 0.22 mm ²	Ø 3.8 Ø 4.3	180°C	insulat.: Silicone sheath: Silicone	humid rooms, weak acids, resistant for oils, gasoline, mobile installation.
TPSL	4 x 0.22 mm ²	Ø 4.5	180°C	insulat.: FEP screen: Cu braid sheath: Silicone	humid rooms, weak acids, resistant for oils, gasoline, mobile installation, suitable for computer systems, resistant to electromagnetic disturbances
TT	2 x 0.22 mm ² 2 x 0.50 mm ² 2 x 0.75 mm ² 4 x 0.75 mm ²	1.9 x 2.3 2.0 x 3.5 2.4 x 4.2 Ø 5.1	200°C	insulat.: FEP sheath: FEP	humid rooms, acids and alkalines, resistant for oils, gasoline, partially mobile installation.
TCuT	4 x 0.22 mm ² 4 x 0.50 mm ² 6 x 0.50 mm ² 6 x 0.75 mm ²	Ø 3.5 Ø 4.2 Ø 5.1 Ø 6.0	200°C	insulat.: FEP screen: oplot Cu sheath: FEP	humid rooms, acids, resistant for oils, gasoline, mobile installation, suitable for computer systems, resistant to electromagnetic disturbances.
GLGLP	2 x 0.22 mm ²	Ø 3.8	400°C	insulat.: fibreglass sheath: fibreglass braid: steel	dry rooms, resistant for high temperatures and mechanical duty

Connection head DANWdie with local LED display

The display is mounted in connection head cover with glasswindow which allows preview of measuring temperature. 4 digits with a height of 9.5 millimeter ensure clear reading of values.

Programming of measure range can be performed via three buttons placed on the back of display panel.

Mounted temperature transmitter 4..20mA on measuring insert is necessary for proper use. It also works with temperature transmitters with HART® protocol.

Features

Accuracy:	0,1% of range +/- 1 digit
Thermocouple:	B, E, J, K, L, N, R, S, T
Output types:	4-20 mA
Response time:	from 1 to 10 sec
Min. amps for LED activation:	3,5mA
Display:	LED / 30x14 mm
No of process value digits:	4
Backlight color:	None
Buttons:	None
Electromagnetic standards:	made in accordance to EN61000, 55022 with positive result

More technical parameters available in DANWdie data sheet.



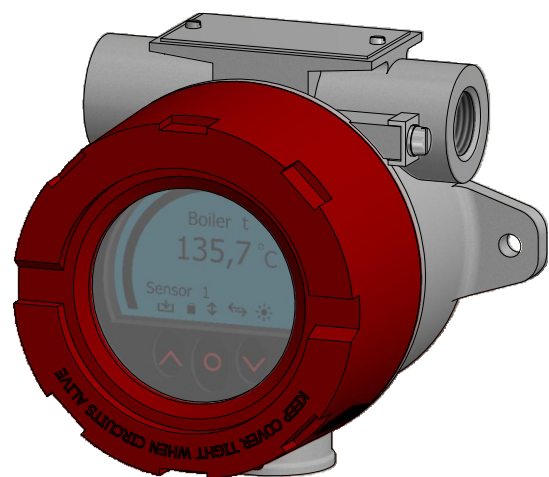
Field mounted temperature transmitter PR7501

PR7501 field mounted HART® temperature transmitter with display and optical buttons allows to easy programming, review and diagnostics from the front of the sensor. Sensor display can be rotated in 90 degree increments for easy vertical or horizontal viewing.

Features

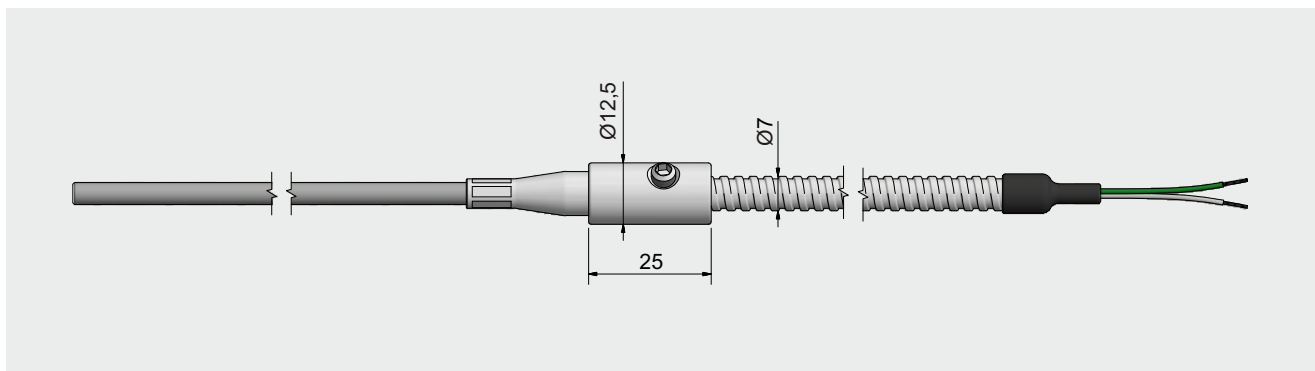
Accuracy:	Better than 0.05% of selected range
Thermocouple::	B, E, J, K, L, N, R, S, T
Output types:	4-20 mA
Response time: (programmable)	from 1 to 60 sec
Min. amps for LED activation:	3,5mA
Display:	Dot matrix / 60 mm
No of process value digits:	5
Backlight color:	Selectable red or white
Buttons:	Three optical buttons: up arrow, down arrow and OK.
Electromagnetic standards:	made in accordance to EN 61326-1

More technical parameters available in PR7501 data sheet.



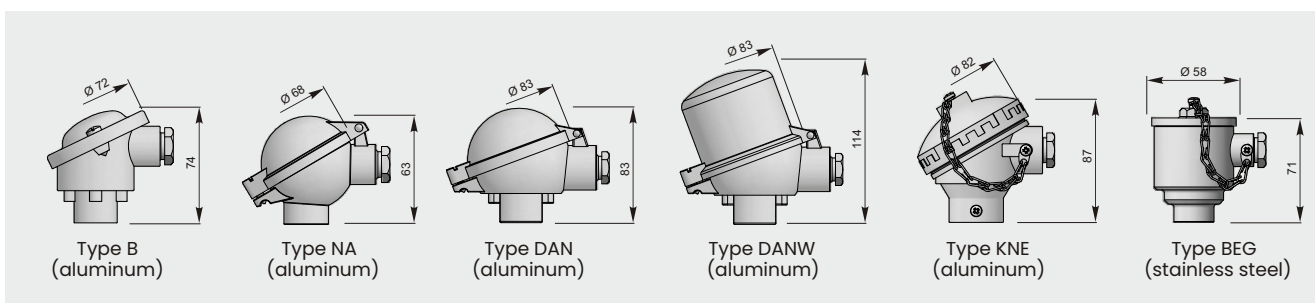
Steel armour

Sheathed sensors can be fitted with stainless steel armour which provides an additional protection against mechanical duty.



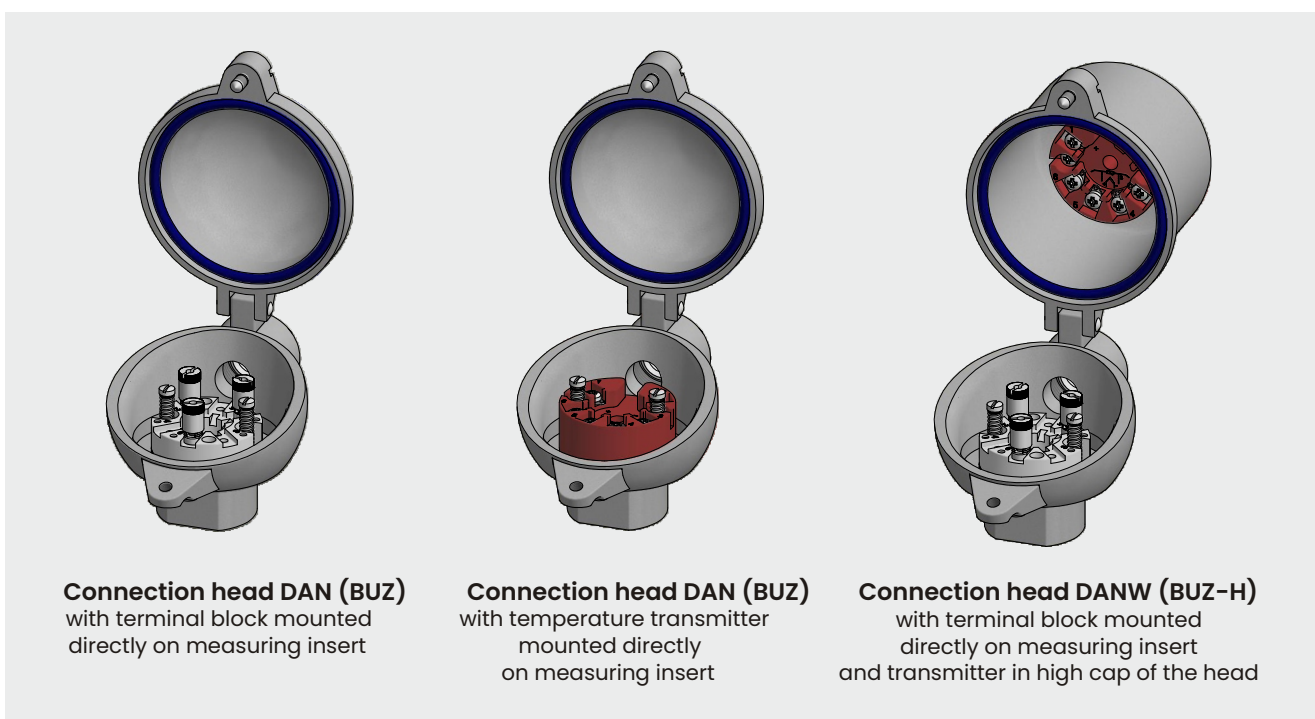
Connection Heads

These sensors can be equipped with one of the following connection heads. For more information about available connection heads see section "Accessories".



Temperature Transmitter

Transmitter is mounted inside the connection head of the sensor: directly on measuring inset or in the high cap of head. The second method is advantageous as it allows changing standard measuring inset quickly without a need to disassemble the transmitter; it means reduction of time and costs of maintenance of the sensor and protecting wires against any damage possible. Mounting of two transmitters inside the connection head available upon request.



Ordering code

1 2 3 4 5 6 7 8 9 10 11 12 13
 TTP - - - - - - - - - - -

Temperature transmitter	
1	<input type="checkbox"/>
	without transmitter
	AP with installed transmitter 4..20 mA
	APW with installed transmitter 4..20 mA and local LED display*
	2AP with two installed transmitters 4..20 mA

* available only with connection head DANWdie and Pr7501

Thermocouple type	
2	<input type="checkbox"/>
	J Type J (Fe-CuNi)
	K Type K (NiCr-Ni)
	xxx other, please specify

Design	
3	<input type="checkbox"/>
	BT without pot seal
	BTW without pot seal, with miniature size plug
	BTWs without pot seal, with standard size plug
	WL without pot seal, with LEMO® PCA socket
	T with pot seal, teflon insulated flying leads
	TS with pot seal with the same diameter like sheath and flying leads
	TKb with pot seal and compensating cable
	TKbW with pot seal, compensating cable and miniature size plug
	TKbWs with pot seal, compensating cable and standard size plug
	TKbWL with pot seal, compensating cable and LEMO® PCA socket
	NA with aluminum connection head NA type (other types, see page 5)
	DANWdie with connection head equipped with local LED display
	PR7501 with field mounted PR7501 temperature transmitter 4..20mA with HART® and local LED display

Multiplicity	
4	<input type="checkbox"/>
	I Single
	II Double
	III Triple

Sheath material	
5	<input type="checkbox"/>
	H stainless steel 1.4306 (AISI 304L)
	Y stainless steel 1.4404 (AISI 316L)
	V stainless steel 1.4541 (AISI 321)
	Z heat-resistant steel 1.4749 (AISI 446)
	J alloy steel 2.4816 (INCONEL® 600)
	XL alloy steel XL-SUPERCLAD
	P alloy steel Pyrosil® D

Sheath diameter	
6	<input type="checkbox"/>
	05 Ø 0.5 mm
	10 Ø 1.0 mm
	15 Ø 1.5 mm
	20 Ø 2.0 mm
	30 Ø 3.0 mm
	45 Ø 4.5 mm
	60 Ø 6.0 mm
	xxx other, please specify

Tolerance	
7	<input type="checkbox"/>
	1 Class 1 acc. to PN-EN 60584-2
	2 Class 2 acc. to PN-EN 60584-2

Measuring junction type	
8	<input type="checkbox"/>
	SO junction isolated
	SOB junctions isolated (double and triple thermocouples)
	SP junction / junctions grounded to sheath
	SW junction exposed

Length L	
9	<input type="checkbox"/>
	150 150 mm
	300 300 mm
	500 500 mm
	1000 1000 mm
	xxx other, please specify

Cable length Lp	
10	<input type="checkbox"/>
	1000 1000 mm
	1500 1500 mm
	xxx other, please specify

Ordering code (continue)

1 2 3 4 5 6 7 8 9 10 11 12 13
 TTP - - - - - - - - - - -

Cable insulation															
11	<table border="1"> <tr> <td>JJ</td> <td>PVC / PVC (up to +105°C)</td> </tr> <tr> <td>SLSL</td> <td>Silicone / Silicone (do +180°C)</td> </tr> <tr> <td>TPSL</td> <td>Teflon® FEP / Cu braid / Silicone (up to +180°C)</td> </tr> <tr> <td>TT</td> <td>Teflon® FEP / Teflon® FEP (do +200°C)</td> </tr> <tr> <td>TCuT</td> <td>Teflon® FEP / Cu braid / Teflon® FEP (do +200°C)</td> </tr> <tr> <td>GLGLP</td> <td>Fiberglass / Fiberglass / Galvanized steel braid (do +400°C)</td> </tr> </table>	JJ	PVC / PVC (up to +105°C)	SLSL	Silicone / Silicone (do +180°C)	TPSL	Teflon® FEP / Cu braid / Silicone (up to +180°C)	TT	Teflon® FEP / Teflon® FEP (do +200°C)	TCuT	Teflon® FEP / Cu braid / Teflon® FEP (do +200°C)	GLGLP	Fiberglass / Fiberglass / Galvanized steel braid (do +400°C)		
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xxx	other, please specify														

Example

TTP-K-TKbWs-I-Y30-I-SO-1000-3000-SLSL

Mineral Insulated Thermocouple 1xK, with pot seal, compensang cable and standard size plug, sheath material AISI316, sheath diameter Ø3.0 mm, class 1 acc. to PN-EN 60584-2, junction isolated, length L=1000mm, cable length Lp=3000 mm, cable insulation silicone/silicone.

TTP-K-DAN-I-J60-I-SO-5000

Mineral Insulated Thermocouple 1xK, with aluminum connection head DAN type, sheath material INCONEL® 600, sheath diameter Ø6.0 mm, class 1 acc. to PN-EN 60584-2, junction isolated, length L=5000mm.

APTTP-N-DANW-I-P60-I-SO-2000-0÷1300°C-PR5334A3B

Mineral Insulated Thermocouple 1xN, with aluminum connection head DANW type with installed temperature transmitter 4..20mA, sheath material Pyrosil® D, sheath diameter Ø6.0 mm, class 1 acc. to PN-EN 60584-2, junction isolated, length L=2000mm.

APWTTP-K-DANWdie-I-J60-I-SO-500-0÷1000°C

Mineral Insulated Thermocouple 1xK, with aluminum connection head DANWdie type with installed temperature transmitter 4..20mA and local LED display, sheath material INCONEL® 600, sheath diameter Ø6.0 mm, class 1 acc. to PN-EN 60584-2, junction isolated, length L=500mm.