

TT30..39 || Screw-in Thermocouples

Application

Thermocouples are suited for direct temperature measurement of gaseous and liquid media.

The applications of the measuring inserts are not limited to the specified thermocouples. They are adapted to the given request with regard to temperature, length, bending property, vibration resistance and accuracy. In addition to our standard models we provide a lot of special types for special applications.

Important characteristics:

Thermocouples can be used in many fields of application thanks to the following characteristics:

- Cost-effective measuring principle
- Easy signal processing
- Possibility of use even at large distances from the measuring point (w. transmitter)
- The thermocouples can be equipped with two measuring elements
- Easy exchange

Construction and Operation:

A thermocouple consists of two electric conductors that are made from different materials and are connected to each other at one end (measuring point). The thermoelectric potential developing at the reference junction depends on the materials of the thermo wires and the difference between the temperature at the measuring point and the reference junction. The temperature at the reference junction is to be kept at a constant level. If this is not possible the thermo wires can be extended by a compensating line. Compensating cables transfer the thermoelectric potential of the related thermocouples up to 200°C without any loss. The construction of the screw-in thermocouples described in this data sheet corresponds to the DIN 43770 and DIN 43771, some are further developments.

Standard features

- Protective tube acc. to DIN 43772
- Connection head acc. to DIN 43729
- exchangeable measuring inset acc. to DIN 43735

Please see the end of this data sheet for basic values and deviations of limit values.

The protective tube is designed as screw-in

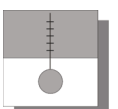


type for this type series. It protects the measuring insert and consequently the thermocouple against pressure, flow and possible damages. It remains installed and assures the continuation of process during an exchange of the measuring insert.

The construction of the protective tube depends on the pressure and temperature of the medium on site. See the load diagrams for the necessary specifications. The connection head in most cases consists of light metal, acc. to DIN EN 50446, type B. Other connection heads are offered at the end of this data sheet.

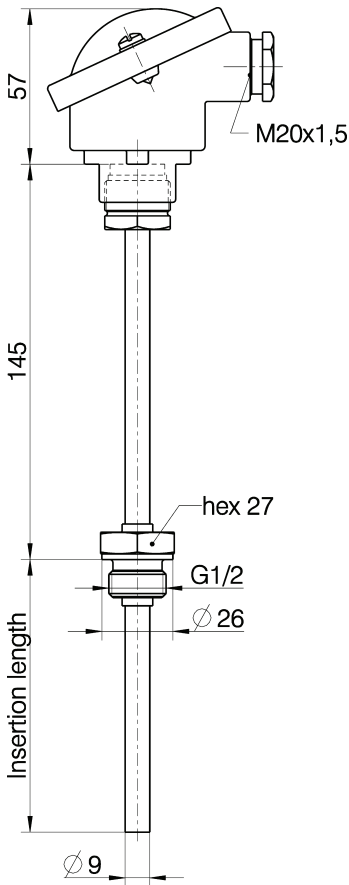
The thermocouples are also available with an integrated 2-wire transmitter.

See the data sheets TE41 for details!



Screw-in Thermocouple TT30

Type B acc. to DIN 43765, for temperature measurement during modest pressure and flow



Measuring element	Measuring insert acc. to DIN 43735 Insert tube of stainless steel 1.4571
Protective tube	acc. to DIN 43772 type 2G; ø 9 mm; wall thickness 1 mm ; material: 1.4571 Mechanical load acc. to diagram 1
Neck pipe	ø 9 mm; length 145 mm; material: 1.4571
Mounting	G½ male acc. to DIN 3852-2
Connection	Standard connection head type B of light metal acc. to DIN EN 50446
max. measuring temp.	400°C

Ordering Code

Screw-in Thermocouple

TT30

			0	0		
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Basic configuration

FeCu-Ni single	>	J	↑
NiCr-Ni single	>	K	↑
NiCr-Ni double	>	Y	↑
FeCu-Ni double	>	Z	↑

Connection Head

Type B (standard)	>	1	↑
Type BBK	>	2	↑
Type S79	>	3	↑
Type BUSH	>	4	↑
Type BUS	>	5	↑

Insertion length

100 mm	>	1	↑
160 mm	>	2	↑
250 mm	>	5	↑
400 mm	>	8	↑
Other lengths on request	>	9	↑

Output

Without transmitter	>	K	↑
2-wire transmitter output signal 4..20 mA	>	L	↑

Measuring Range Transmitter (°C)

Without transmitter	>	0	0
-50 .. 0	>	1	0
-50 .. +50	>	2	0
0 .. 50	>	3	0
0 .. 100	>	4	0
0 .. 150	>	5	0
0 .. 200	>	6	0
0 .. 300	>	7	0
0 .. 400	>	8	0
Other ranges on request	>		

Mechanical and thermal load of protective tube

Type 2G, DIN 43772

Diagram 1

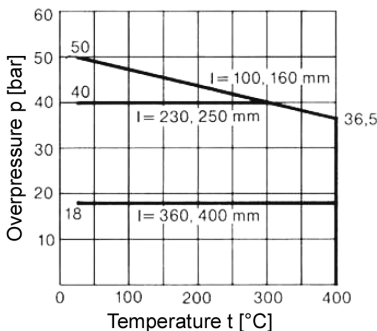
Material 1.4571
(X6CrNiMoTi17122)

Allowable flow rate:

air 25 m/s
water 3 m/s

Allowable clamping torque of
screwed end 50 Nm

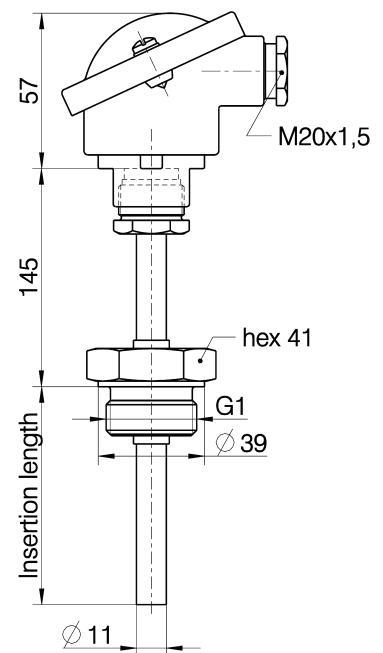
Diagram 1 protective tube 9x1 mm



Screw-in Thermocouple TT31

Type C acc. to DIN 43765, for temperature measurement during higher pressure and flow

Measuring element	Measuring insert acc. to 43735 Insert tube of stainless steel 1.4571
Protective tube	acc. to DIN 43772 type 2G; ø 11 mm; wall thickness 2 mm; material: 1.4571 Mechanical load acc. to diagram 2
Neck pipe	ø 11 mm; length 145; material: 1.4571
Mounting	G1 male acc. to DIN 3852-2
Connection	Standard connection head type B of light metal acc. to DIN EN 50446
max. measuring temp.	400°C



Ordering Code

Screw-in Thermocouple	
TT31	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>

Standard Type

FeCu-Ni single	> J
NiCr-Ni single	> K
NiCr-Ni double	> Y
FeCu-Ni double	> Z

Connection Head

Type B (standard)	> 1
Type BBK	> 2
Type S79	> 3
Type BUSH	> 4
Type BUS	> 5

Insertion length

100 mm	> 1
160 mm	> 2
250 mm	> 5
400 mm	> 8
Other lengths on request	> 9

Output

Without transmitter	> K
2-wire transmitter output signal 4..20 mA	L

Measuring Range Transmitter (°C)

Without transmitter	> 0	0
-50 .. 0	> 1	0
-50 .. +50	> 2	0
0 .. 50	> 3	0
0 .. 100	> 4	0
0 .. 150	> 5	0
0 .. 200	> 6	0
0 .. 300	> 7	0
0 .. 400	> 8	0
Other ranges on request		

Mechanical and thermal load of protective tube

Type 2G, DIN 43772

Diagram 2

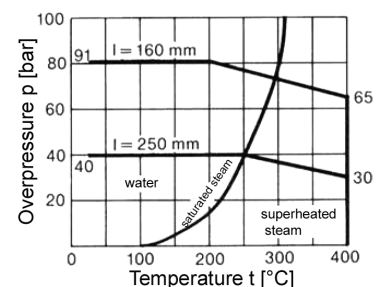
Material 1.4571
(X6CrNiMoTi17122)

Allowable flow rate:

air 40 m/s
water 5 m/s

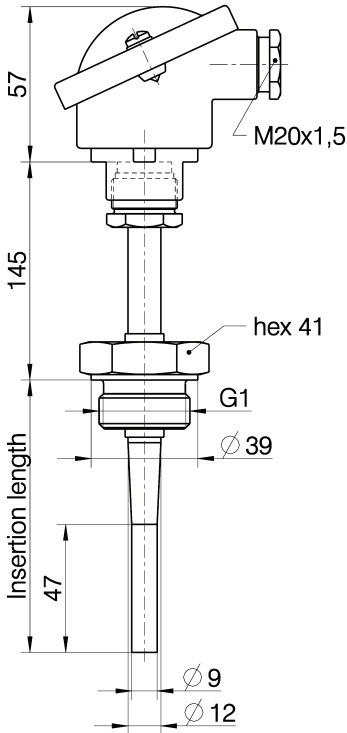
Allowable clamping torque of
screwed end 100 Nm

Diagram 2 protective tube 11x2 mm



Screw-in Thermocouple TT32

Acc. to type G DIN 43766, for temperature measurement during higher pressure and flow



Measuring element	Measuring insert acc. to 43735 Inset tube of stainless steel 1.4571
Protective tube	Acc. to DIN 43772 type 3G; ø 12 mm; 2,75 mm wall thickness; measuring point reduced to ø 9 mm; material: 1.4571 Mechanical load acc. to diagram 3
Neck pipe	ø 12 mm; length 147 mm; material: 1.4571
Mounting	G1 male acc. to DIN 3852-2
Connection	Standard connection head type B of light metal acc. to DIN EN 50446
max. measuring temp.	400°C

Ordering Code

Screw-in Thermocouple

TT32

			0		0	
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Basic configuration

FeCu-Ni single	>	J	↑
NiCr-Ni single	>	K	↑
NiCr-Ni double	>	Y	↑
FeCu-Ni double	>	Z	↑

Connection Head

Type B (standard)	>	1	↑
Type BBK	>	2	↑
Type S79	>	3	↑
Type BUSH	>	4	↑
Type BUS	>	5	↑

Insertion length

160 mm	>	2	↑
220 mm	>	5	↑
280 mm	>	8	↑
Other lengths on request	>	9	↑

Output

Without transmitter	>	K	↑
2-wire transmitter output signal 4...20 mA		L	↑

Measuring Range Transmitter (°C)

Without transmitter	>	0	0
-50 .. 0	>	1	0
-50 .. +50	>	2	0
0 .. 50	>	3	0
0 .. 100	>	4	0
0 .. 150	>	5	0
0 .. 200	>	6	0
0 .. 300	>	7	0
0 .. 400	>	8	0

Other ranges on request

Mechanical and thermal load of protective tube

acc. to type 3G, DIN 43772)

Diagram 3

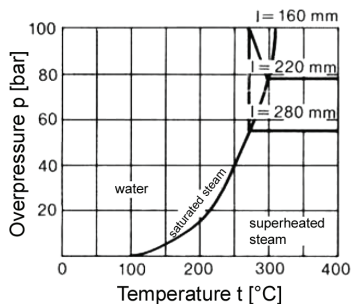
Material 1.4571
(X6CrNiMoTi17122)

Allowable flow rate:

air 40 m/s
water 5 m/s

Allowable clamping torque of
screwed end 100 Nm

Diagram 3



Screw-in Thermocouple TT35

Quick type, for temperature measurement during pressure up to 10 bar and modest flow

Measuring element	Measuring insert acc. to 43735 (not exchangeable) Inset tube of stainless steel 1.4571
Protective tube	ø 11 mm; 1 mm wall thickness; material: 1.4571; Length of measuring point 45 mm, reduced to ø 6mm; Mechanical load at 400°C: 10 bar
Neck pipe	ø 11 mm; length 145 mm; material: 1.4571
Mounting	G½ male acc. to DIN 3852-2
Connection	Standard connection head type B of light metal acc. to DIN EN 50446
max. measuring temp.	400°C

Ordering Code

Screw-in Thermocouple	
TT35	<input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value=""/>

Basic configuration

FeCu-Ni single	>	J	↑
NiCr-Ni single	>	K	↑
NiCr-Ni double	>	Y	↑
FeCu-Ni double	>	Z	↑

Connection Head

Type B (standard)	>	1	↑
Type BBK	>	2	↑
Type S79	>	3	↑
Type BUSH	>	4	↑
Type BUS	>	5	↑

Insertion length

100 mm	>	1	↑
200 mm	>	2	↑
300 mm	>	5	↑

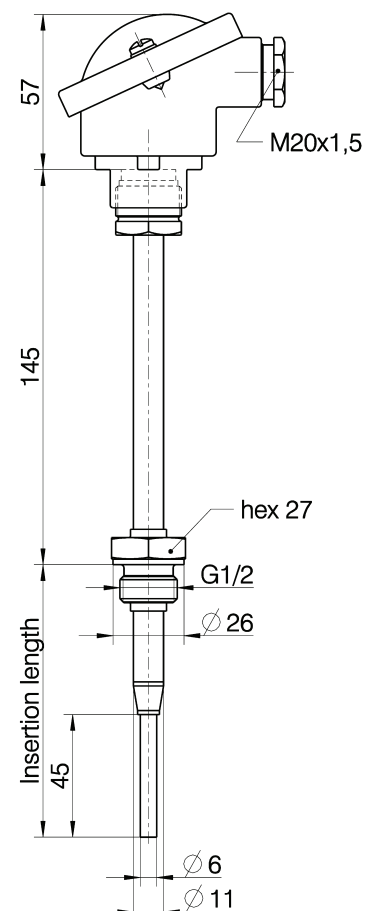
Output

Without transmitter	>	K	↑
2-wire transmitter output signal 4..20 mA		L	↑

Measuring Range Transmitter (°C)

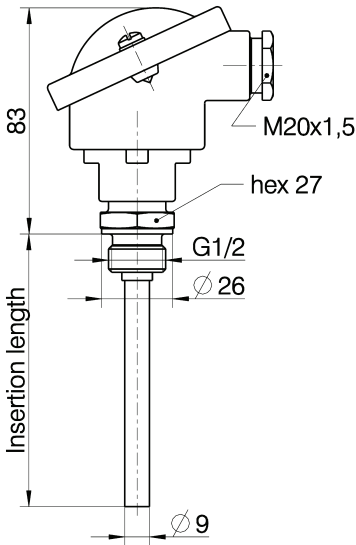
Without transmitter	>	0	0
-50 .. 0	>	1	0
-50 .. +50	>	2	0
0 .. 50	>	3	0
0 .. 100	>	4	0
0 .. 150	>	5	0
0 .. 200	>	6	0
0 .. 300	>	7	0
0 .. 400	>	8	0

Other ranges on request.



Screw-in Thermocouple TT36

for temperature measurement during modest pressure and flow



Measuring element	Measuring insert acc. to 43735 Inset tube of stainless steel 1.4571
Protective tube	ø 9 mm; 1 mm wall thickness; material: 1.4571 Mechanical load acc. to diagram 6 comparable to type 2G DIN 43772
Neck pipe	Without
Mounting	G½ male acc. to DIN 3852-2
Connection	Standard connection head type B of light metal acc. to DIN EN 50446
max. measuring temp.	200°C

Screw-in Thermocouple

TT36

			0		0	
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Basic configuration

FeCu-Ni single	>	J	↑
NiCr-Ni single	>	K	↑
NiCr-Ni double	>	Y	↑
FeCu-Ni double	>	Z	↑

Connection Head

Type B (standard)	>	1	↑
Type BBK	>	2	↑
Type S79	>	3	↑
Type BUSH	>	4	↑
Type BUS	>	5	↑

Insertion length

160 mm	>	2	↑
220 mm	>	5	↑
280 mm	>	8	↑
Other lengths on request	>	9	↑

Output

Without transmitter	>	K	↑
2-wire transmitter output signal 4..20 mA		L	↑

Measuring Range Transmitter (°C)

Without transmitter	>	0	0
-50 .. 0	>	1	0
-50 .. +50	>	2	0
0 .. 50	>	3	0
0 .. 100	>	4	0
0 .. 150	>	5	0
0 .. 200	>	6	0
Other ranges on request			

Mechanical and thermal load of protective tube

comparable to type 2G, DIN 43772

Diagram 6

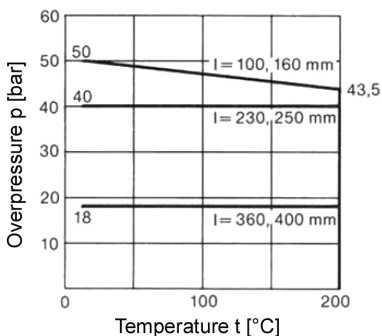
Material 1.4571
(X6CrNiMoTi17122)

Allowable flow rate:

air 25 m/s
water 3 m/s

Allowable clamping torque of
screwed end 100 Nm

Diagram 6 protective tube 9 x 1 mm

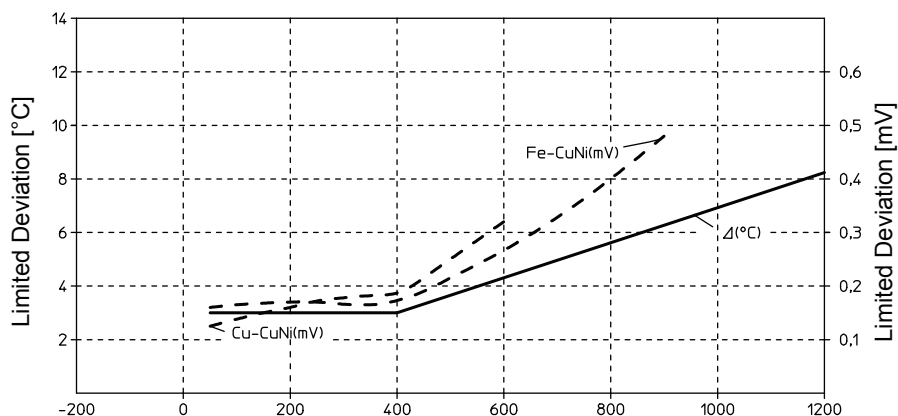


Values of Thermocouples acc. to DIN 43710 and DIN EN 60584-1 [mV]

(Kompensation Temperature. 0°C)

(IPTS68)	Type U	Type L	Type J	Type K	Type S	Type R	Type B
-200	-5,70	-8,15	-7,890	-5,891			
-150	-4,69	-6,60	-6,499	-4,192			
-100	-3,40	-4,75	-4,632	-3,553			
-50	-1,85	-2,51	-2,431	-1,889	-0,236	0,226	
0	0,00	0,00	0,000	0,000	0,000	0,000	0,000
50	2,05	2,65	2,585	2,022	0,299	0,296	0,002
100	4,25	5,37	5,268	4,095	0,645	0,647	0,033
150	6,62	8,15	8,008	6,137	1,029	1,041	0,092
200	9,20	10,95	10,777	8,137	1,440	1,468	0,178
250	11,98	13,75	13,553	10,151	1,873	1,923	0,291
300	14,90	16,56	16,325	12,207	2,323	2,400	0,431
350	17,92	19,36	19,089	14,292	2,786	2,896	0,596
400	21,00	22,16	21,846	16,395	3,260	3,407	0,786
450	24,15	25,00	24,607	18,513	3,743	3,933	1,002
500	27,41	27,85	27,388	20,640	4,234	4,471	1,241
600	34,31	33,67	33,096	24,902	5,237	5,582	1,791
700		39,72	39,130	29,128	6,274	6,741	2,430
800		46,22	45,498	33,277	7,345	7,949	3,154
900		53,14	51,875	37,325	8,448	9,203	3,957
1000			57,942	41,269	9,585	10,503	4,833
1100			63,777	45,108	10,754	11,846	5,777
1200			69,536	48,828	11,947	13,224	6,783
1300				52,398	13,155	14,624	7,845
1400					14,368	16,035	8,952
1500					15,576	17,445	10,094
1600					16,771	18,842	11,257
1700					17,942	20,215	12,426
1800							13,585

Limited Deviation acc. to DIN 43710



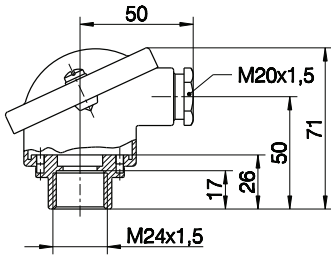
Limited Deviation acc. to DIN EN 60584-2

Class	1	2	3
ltd. deviation	1,5°C or 0,004 x t	2,5°C or 0,0075 x t	2,5°C or 0,015 x t
The limited deviation is true fo temp.range			
Type J	-40°C to 750°C	-40°C to 750°C	---
Type K	-40°C to 1000°C	-40°C to 1200°C	-200°C to 40°C
ltd. deviation	1,0°C or (1+(t-1100)x0,003)°C	1,5°C or 0,0025 x t	4°C or 0,005 x t
The limited deviation is true fo temp.range			
Type R and S	0°C to 1600°C	0°C to 1600°C	---
Type B	---	600°C to 1700°C	600°C to 1700°C

Standard Connecting Heads (Connecting dimensions acc. to DIN EN 50446)

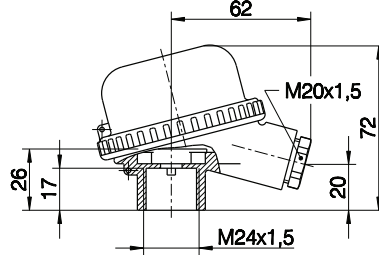
Type B DIN EN 50446

Material: diecast light metal
Protection class: IP54



Type BBK

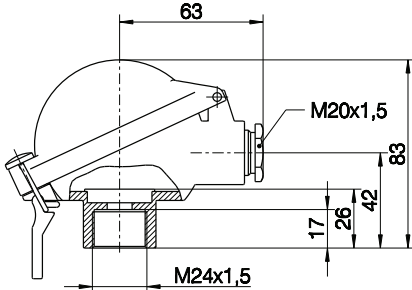
Material: Polyamide (max. 120°C)
Protection class: IP54



Other Possible Connecting Heads (Connecting dimensions acc. to DIN EN 50446)

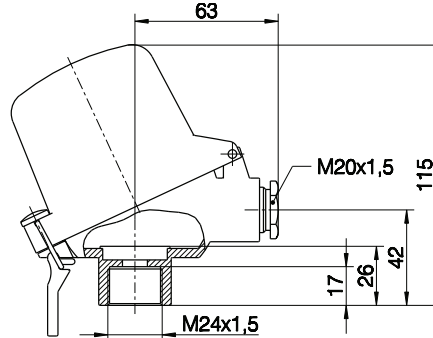
Type BUS

Material: diecast light metal
Protection class: IP65



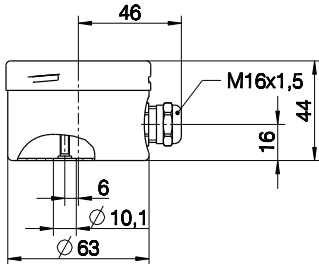
Type BUSH

Material: diecast light metal
Protection class: IP65



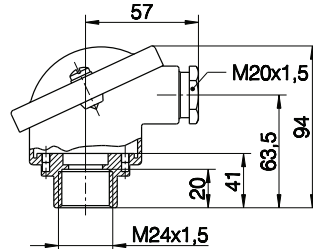
Type S79

Material: stainless steel 1.4301
Protection class: IP65



Type A DIN EN 50446

Material: diecast light metal
Protection class: IP54



Type F

Material: cast light metal
Protection class: IP54

