

The selection is detailed on page 10



DS01

Industrial Thermocouple Thermometer

Working principle

Thermocouple is the use of thermoelectric effect for temperature measurement, thermoelectric effect refers to two different components of the conductor at both ends of the synthetic circuit, when the temperature of the two joint points is not the same, it will produce electromotive force in the circuit phenomenon, the generated electromotive force is called thermoelectric potential. The end that is directly used to measure the temperature of the medium is called the working end or the measuring end, and the end that is not directly used to measure the temperature of the medium is called the cold end or the compensation end. The cold end is connected with the display instrument or other supporting instruments, and the thermoelectric potential generated by the thermocouple will be displayed on the instrument.

Product description

Probe

This series of thermocouples can be used with a variety of jackets. Without sheath protection, it is only recommended for special cases.

The thermocouple is available with a variety of sensors, junction boxes, insertion depth, neck length and sheath. Therefore, the thermometer is suitable for all sizes of sheathing.

We can mount a transmitter on the top.

Explosion protection (optional)

Allowable power P_{max} and allowable ambient temperature can be found in EC Type inspection Certificate, Ex Certificate or operating instructions.

Product application

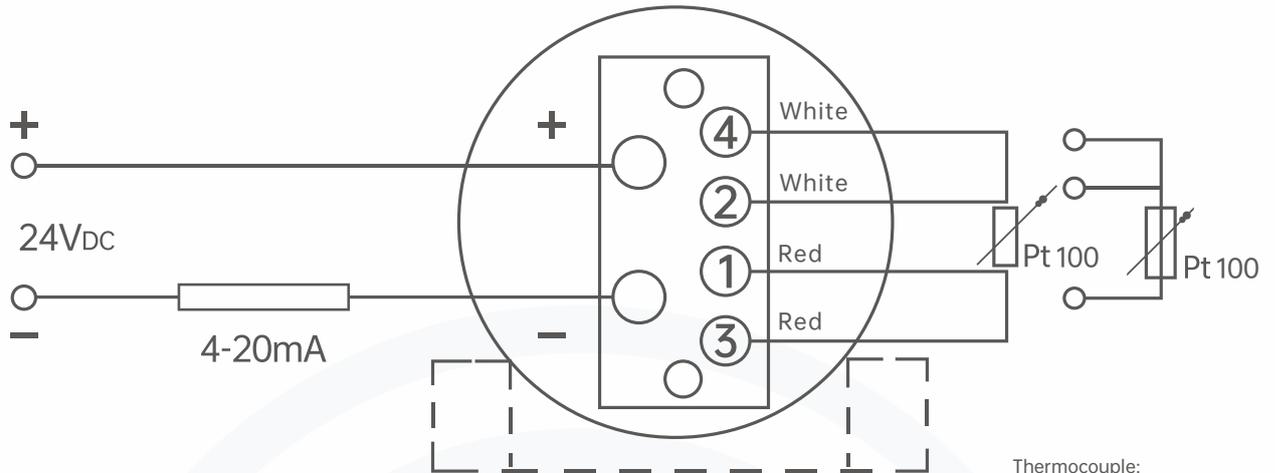
Machinery, equipment and tank manufacturing
 Energy technology, power plants
 Chemical engineering
 Food and beverage industry
 Sanitation, heating and air conditioning technology

Functional characteristics

Sensor range: $-40... +1,200^{\circ}\text{C}$ ($-40... +2,192^{\circ}\text{F}$)
 Suitable for all standard sheath designs
 Spring loaded cartridge (replaceable)
 Explosion proof type



Working principle
Analytic table



Thermocouple:
three or four wire system

Sensor

The thermocouple complies with IEC 60584-1 Standard or ASTM E230 standard

Types K, J, E, N and T (single or double measuring elements)

The table shows the temperature ranges listed in each standard, including the effective tolerance values (accuracy classes). The actual operating temperature range of the thermometer is limited by the maximum allowable operating temperature range, the diameter of the thermocouple, the maximum allowable operating temperature range of the MI cable and the thermocouple material.

Sensor type

Type	Effective range of accuracy level			
	IEC 60584-1		ASTM E230	
	Level 2	Level 1	Standard configuration	special
K	-40 ... +1,200 °C	-40 ... +1,000 °C	0 ... 1,260 °C	0 ... 1,260 °C
J	-40 ... +750 °C	-40 ... +750 °C	0 ... 760 °C	0 ... 760 °C
E	-40 ... +900 °C	-40 ... +800 °C	0 ... 870 °C	0 ... 870 °C
N	-40 ... +1,200 °C	-40 ... +1,000 °C	0 ... 1,260 °C	0 ... 1,260 °C
T	-40 ... +350 °C		0 ... 370 °C	0 ... 370 °C

Measuring point

- Ungrounded (standard)
- Ground connection

Allowance

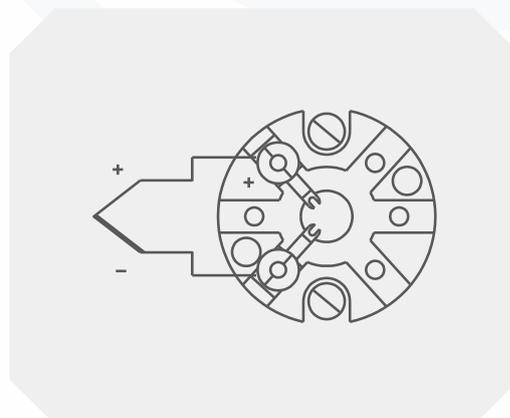
The tolerance of the thermocouple is based on the 0 °C cold end compensation temperature.

Electrical connection

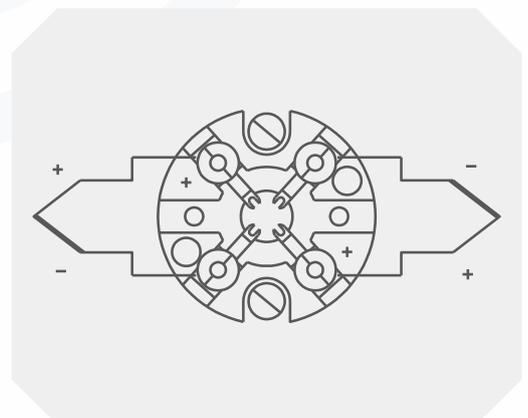
The color coding on the positive terminal of the meter determines the relationship between the polarity and the terminal

For electrical connections for built-in temperature transmitters, see the corresponding data or instructions.

A single thermocouple



Two thermocouples

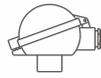


Connector

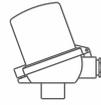
Connector material and specification



DBM



DBM-A



DBM-B



DBM-C



DBM-D



DBM-E

Material	Cable inlet thread specification	Class of protection (maximum value)	Protective cap	Surface	The connection to the neck tube
Aluminum	M20×1.5 or 1/2NPT ¹⁾	IP65 ²⁾	Flat top cover with 2 screws	Blue finish	M24×1.5, 1/2 NPT
Aluminum	M20×1.5 or 1/2NPT ¹⁾	IP65 ²⁾	Spherical hinged cover with cylinder head screws	Blue finish	M24×1.5, 1/2 NPT
Aluminum	M20×1.5 or 1/2NPT ¹⁾	IP65 ²⁾	Raised hinged cover with cylinder head screws	Blue finish	M24×1.5, 1/2 NPT
Aluminum	M20×1.5 or 1/2NPT ¹⁾	IP65 ²⁾	Spherical hinged cover with clamping handle	Blue finish	M24×1.5, 1/2 NPT
Aluminum	M20×1.5 or 1/2NPT ¹⁾	IP65 ²⁾	Raised hinged cover with clamping handle	Blue finish	M24×1.5, 1/2 NPT
Stainless steel	M20×1.5 ¹⁾	IP65 ²⁾	Precision cast nut	Natural color, electric polishing	M24×1.5

1) Standard (other available on demand);

2) Levels of protection can be provided upon request, describing temporary or prolonged immersion

Explosion protection

There is no	Ex i (gas) Zones 0, 1, 2	Ex i (dust) Precincts 20, 21, 22	Ex eb (Gas) Zone 1	Ex tb (Dust) Zone 21	Ex ec (Gas) Zone 2	Ex nA (Gas) Zone 2	Ex tc (Dust) Zone 22
X	X	X	-	-	-	-	-
X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X
X	X	-	-	-	-	-	-
X	X	-	-	-	-	-	-
X	X	-	-	-	-	-	-

Cable inlet

Cable inlet material and specification



Standard



plastic



plastic



Nickel-plated brass



Stainless steel



Optical thread



Sealing plug for transport

Cable inlet	Cable inlet thread specification	Minimum/maximum ambient temperature
Standard cable inlet ¹⁾	M20×1.5 or 1/2NPT	-40 ... +80°C
Plastic cable head (Cable diameter 6... 10 mm) ¹⁾	M20×1.5 or 1/2NPT	-40 ... +80°C
Plastic cable head (Cable diameter 6... 10 mm), Ex e ¹⁾	M20×1.5 or 1/2NPT	-20 ... +80°C (Standard)
		-40 ... +70°C (Selectable)
Nickel-plated brass cable joint (Cable diameter 6... 12 mm)	M20×1.5 or 1/2NPT	-60 ²⁾ /-40 ... +80°C
Stainless steel cable connector (Cable diameter 7... 12 mm)	M20×1.5 or 1/2NPT	-60 ²⁾ /-40 ... +80°C
Optical thread	M20×1.5 or 1/2NPT	-
Sealing plug for transport	M20×1.5 or 1/2NPT	-40 ... +80 °C

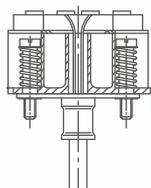
Cable inlet

Cable inlet material and specification

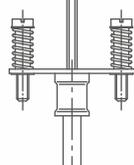
Cable inlet	colour	Protection level ^(Max) IEC/ compliant EN 60529 Standard	Explosion protection							
			There is no	Ex i (Gas) 0, 1, Zone 2	Ex i (Dust) 20, 21, Zone 22	Ex eb (gas) Zone 1	Ex tb (Dust) Zone 21	Ex ec (Gas) 2, 21, Zone 22	Ex nA (Gas) Zone 2	Ex tc (Dust) Zone 22
Standard cable inlet ¹⁾	Natural quality	IP65	x	x	-	-	-	-	-	-
Plastic cable head ¹⁾	Black or grey	IP66 ³⁾	x	x	-	-	-	-	-	-
Plastic cable head, Ex e ¹⁾	Baby blue	IP66 ³⁾	x	x	x	-	-	-	-	-
Plastic cable head, Ex e ¹⁾	black	IP66 ³⁾	x	x	x	x	x	x	x	x
Nickel-plated brass cable joint	Natural quality	IP66 ³⁾	x	x	x	-	-	-	-	-
Nickel plated brass cable head, Ex e	Natural quality	IP66 ³⁾	x	x	x	x	x	x	x	x
Stainless steel cable joint	Natural quality	IP66 ³⁾	x	x	x	x	x	x	x	x
Stainless steel cable head, Ex e	Natural quality	IP66 ³⁾	x	x	x	x	x	x	x	x
Optical thread	-	IP00	x	x	x ⁴⁾	x ⁴⁾	x ⁴⁾	x ⁴⁾	x ⁴⁾	x ⁴⁾
Sealing plug for transport	transparent	-	Not applicable, only for protection during transport							

1) Not applicable to DBM-E connectors;
 2) Special versions (only with special permission) and other temperatures are available on request;
 3) A level of protection can be provided upon request, describing temporary or prolonged immersion;
 4) Suitable cable connectors for operation

Transmitter



The terminal board for the transmitter is installed



Prepare the terminal board for installing the transmitter

Mount to measuring rod

When the transmitter is mounted to the measuring rod, the transmitter replaces the terminal and is fixed directly to the terminal panel of the measuring rod.

Install it in the protective cap of the connection head

Instead of mounting the transmitter on the measuring rod, it is recommended to install it in the connection head protective cap. Because this installation ensures better insulation, in addition, it simplifies the replacement and installation operations required for maintenance.



Transmitter

Transmitter model number

Output signal 4... 20 mA HART [®] protocol, FOUNDATION [™] Fieldbus and PROFIBUS [®] PA standard cable entry			
Transmitter	S10 type	S20 type	S30 type
Exportation			
▪ 4 ... 20 mA	x	x	-
▪ HART [®] agreement	-	x	-
▪ FOUNDATION [™] PROFIBUS [®] PA	-	-	x
Connection mode			
▪ 1 x 2 wire, 3 wire or 4 wire system	x	x	x
Measuring current	< 0.2mA	< 0.3mA	< 0.2mA
Explosion protection	Selectable	Selectable	Standard



Cable inlet

Cable inlet material and specification

Connector	S10 type	S20 type	S30 type
DBM	○	-	○
DBM-A	○	○	○
DBM-B	●	●	●
DBM-C	○	○	○
DBM-D	●	●	●
DBM-E	○	○	○

- Install the wiring terminal instead
- Install the connector in the protective cap
- Cannot install

For all the connectors listed here, they can be used to mount the transmitter on the measuring rod.

2 transmitters can be installed as required.

In order to correctly determine the overall measurement error, the measurement error of the sensor and transmitter must be increased.

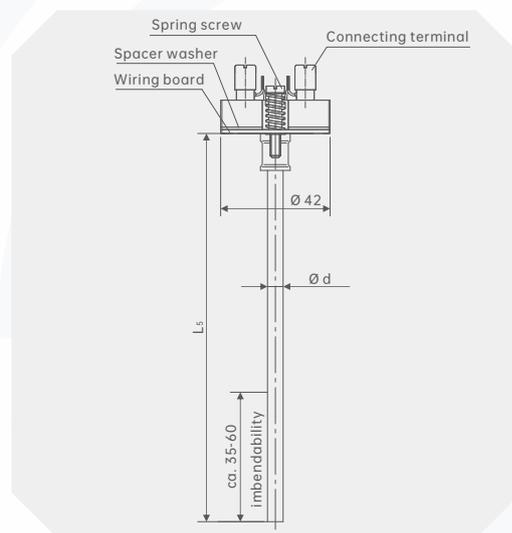
Size mm

Legend:

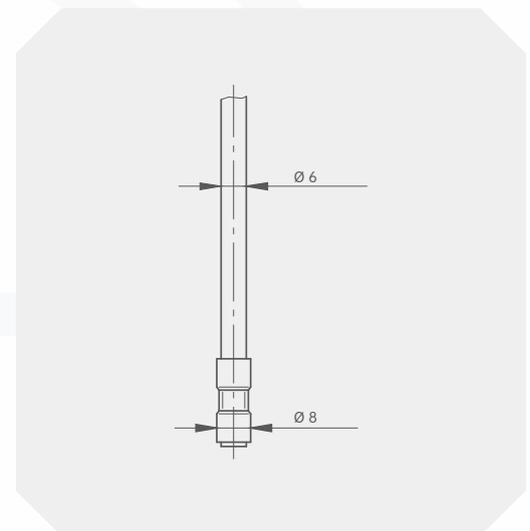
L_5 Measure the length of the probe

$\varnothing d$ Measure the diameter of the probe rod

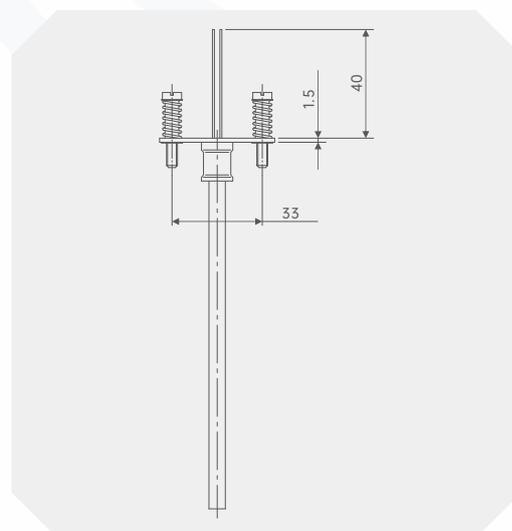
Sensor internal description



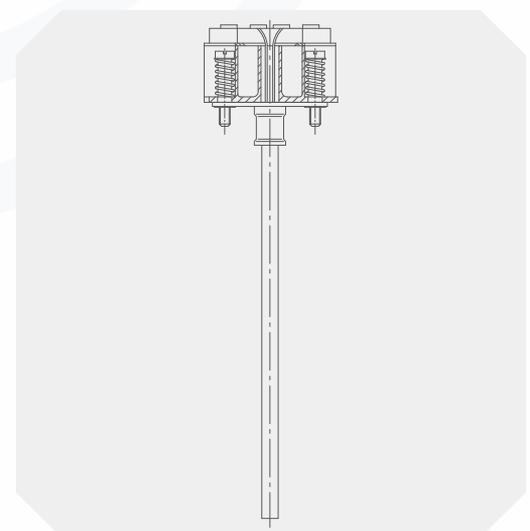
A measuring rod with casing in the sensor area



Prepare the transmitter design for installation



A transmitter design is installed



Specification and material

Measuring rod diameter Ød (Unit: mm)		Index basis DIN 43735	Tolerance (mm)	Sheath material	
				Standard design	Recessed welded lugs
3 ¹⁾	Standard	30	3 _{±0.05}	1.4571, 316L ¹⁾	1.4571
6	Standard	60	6 _{-0.1} ⁰	1.4571, 316L ¹⁾	1.4571
8 (6mm, thimble)	Standard	-	8 _{-0.1} ⁰	1.4571	1.4571
8	Standard	80	8 _{-0.1} ⁰	1.4571, 316L ¹⁾	1.4571

1) Not available for 2 x 4 wire versions

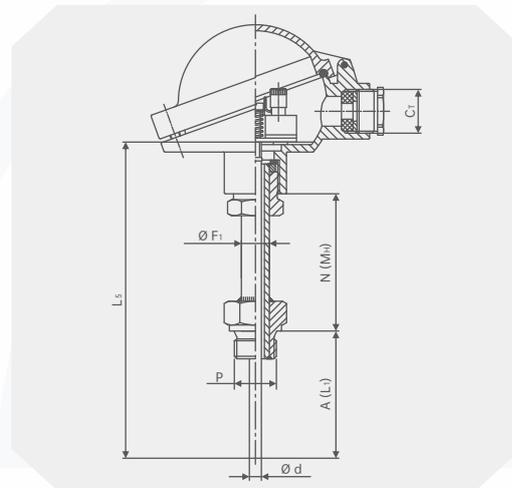
Neck tube design

The neck tube, it fits DIN 43772

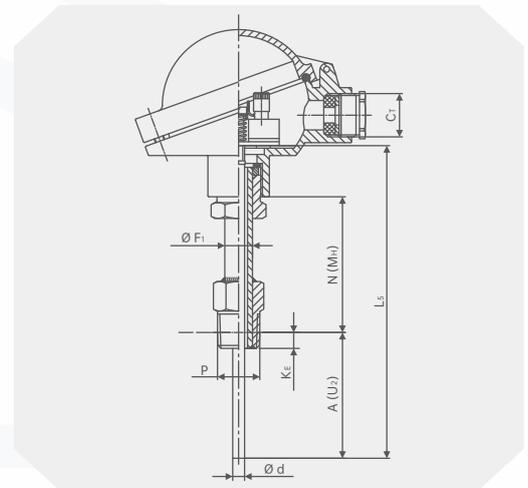
Legend:

- A(L₁) Insert length (straight thread)
- A(U₂) Insert length (taper thread)
- L_s Measure the length of the probe
- N(MH) Neck length
- K_e 1/2 NPT: 8.13 mm
3/4 NPT: 8.61mm
- C_r Threaded cable inlet
- ØF₁ Neck diameter
- P Sheath thread diameter
- d Measure rod diameter

Straight thread



Taper thread



Neck tube design

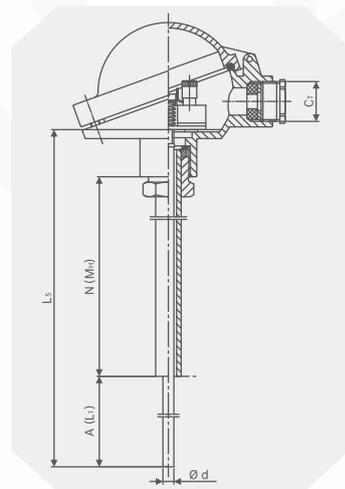
Neck tube, according to DIN 43772

Straight, with/without active clamp

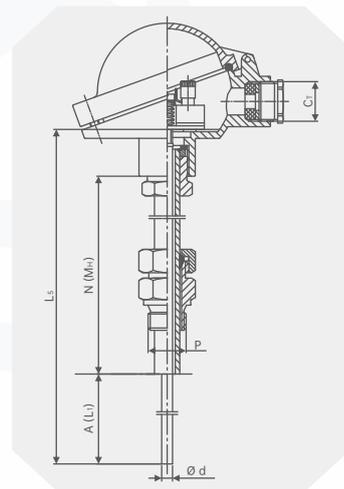
Legend:

- A(L₁) Insert length (straight thread)
- L_s Measure the length of the probe
- N(MH) Neck length
- K_e 1/2 NPT: 8.13 mm
3/4 NPT: 8.61mm
- C_r Threaded cable inlet
- ØF₁ Neck diameter
- P Sheath thread diameter
- d Measure rod diameter

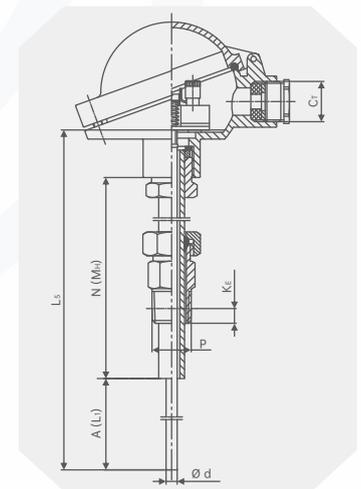
No thread (straight)



Straight thread



Taper thread

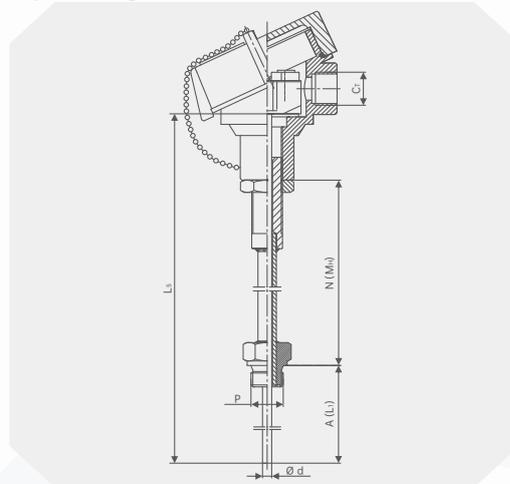


Neck tube design

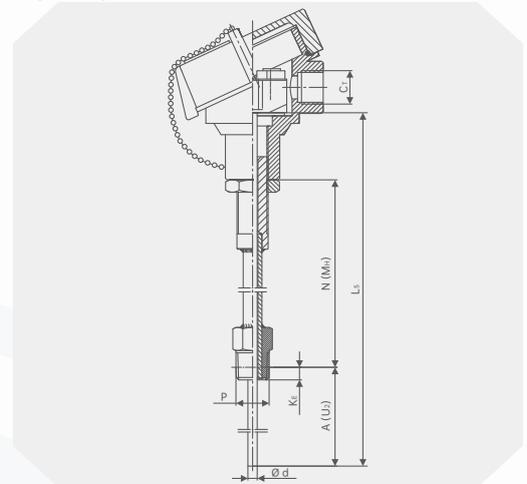
Legend:

- A(L₁) Insert length (straight thread)
- A(U₂) Insert length (taper thread)
- L_s Measure the length of the probe
- N(MH) Neck length
- K_e 1/2 NPT: 8.13 mm
3/4 NPT: 8.61mm
- C_r Threaded cable inlet
- ØF₁ Neck diameter
- P Sheath thread diameter
- d Measure rod diameter

Neck tube with countersunk nut at top - straight thread



Neck tube with countersunk nut at top - tapered thread

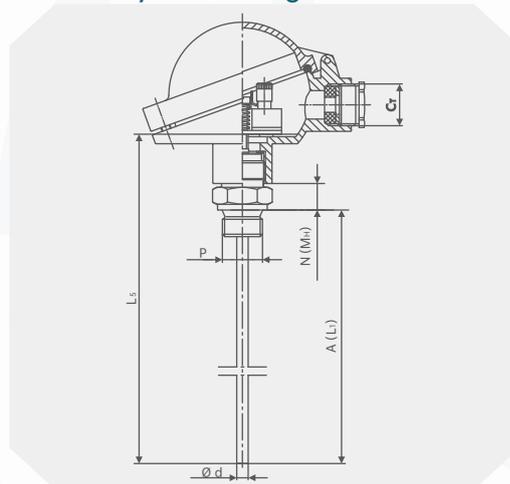


Neck tube design

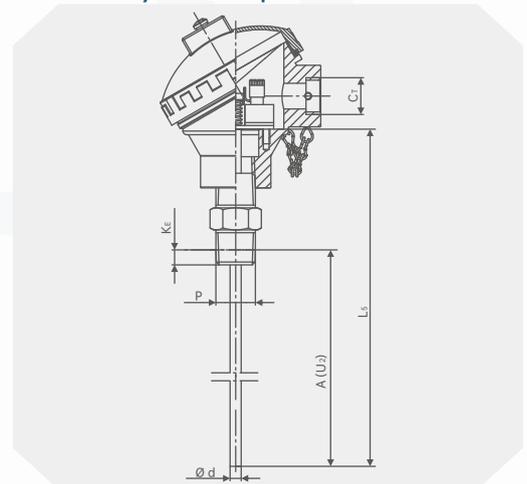
Legend:

- A(L₁) Insert length (straight thread)
- A(U₂) Insert length (taper thread)
- L_s Measure the length of the probe
- N(MH) Neck length
- K_e 1/2 NPT: 8.13 mm
3/4 NPT: 8.61mm
- C_r Threaded cable inlet
- ØF₁ Neck diameter
- P Sheath thread diameter
- d Measure rod diameter

Double thread (with hexagonal head wrench bayonet)- Straight thread



Double thread (with hexagonal head wrench bayonet)- Taper thread

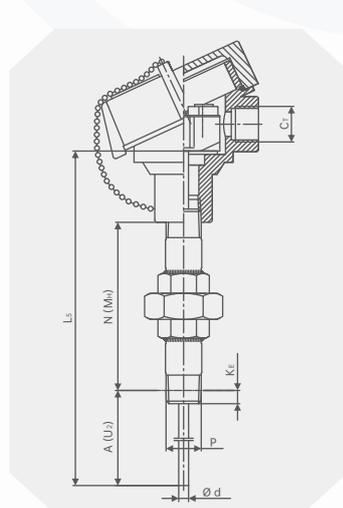


Neck tube design

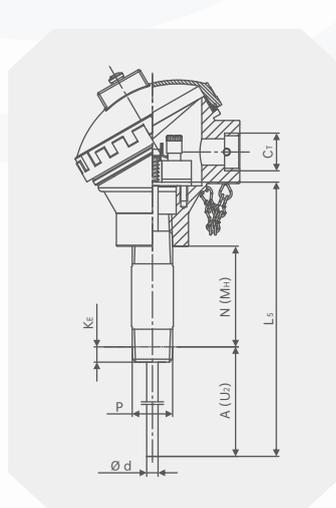
Legend:

- A(L₁) Insert length (straight thread)
- A(U₂) Insert length (taper thread)
- L_s Measure the length of the probe
- N(MH) Neck length
- K_e 1/2 NPT: 8.13 mm
3/4 NPT: 8.61mm
- C_r Threaded cable inlet
- ØF₁ Neck diameter
- P Sheath thread diameter
- d Measure rod diameter

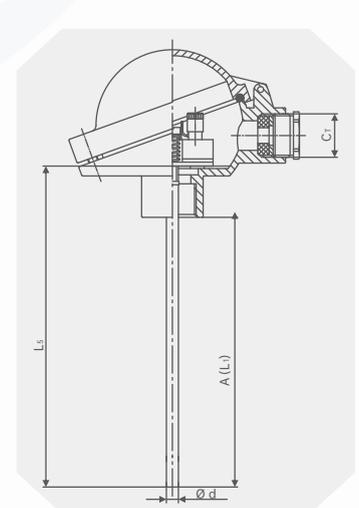
"Flexible joint" type neck tube Double thread (pipe joint)



Double thread (pipe joint)



Acervate tube



Cervical version

Neck tube design	diameter	Attached to top	Connected to the sheath	Materials
Neck tube, according to DIN 43772	12×1.5 mm	M24×1.5 (Rotary threaded joint)	Install thread and movable sleeve	1.4571
	12×2.5 mm		Movable nut, outer nut, straight type	
	14×2.5 mm		Install thread, movable nut and external nut	
Neck tube with countersunk nut at top	14×2.5 mm	M20×1.5 (Countersunk nut)	Mounting thread	1.4571
Double thread (with hexagonal head wrench bayonet)	-	M24×1.5, 1/2NPT	Mounting thread	1.4571
"Flexible coupling" type neck tube	~ 22 mm	1/2 NPT	Mounting thread	316
	~ 27 mm	3/4 NPT		
Double thread	~ 22 mm	1/2 NPT	Mounting thread	316
	~ 27 mm	3/4 NPT		

Cervical version

Neck tube design	Diameter	Protective tube diameter
Neck tube, according to DIN 43772	12×1.5 mm 12×2.5 mm	G1/2B
		G3/4B
		G1/4B
		M20×1.5
		M18×1.5
		M14×1.5
		1/2 NPT
		3/4 NPT
		G1/2B adjustable collar (metal ring)
		G3/4B Adjustable collar (metal ring)
		M18×1.5 Movable collar (metal ring)
		M20×1.5 Movable collar (metal ring)
		G1/2B movable nut
G3/4B Movable nut		
Neck tube, according to DIN 43772	12×1.5 mm 12×2.5 mm	M20 x 1.5 external nuts
		Unthreaded fittings, straight type
Neck tube, according to DIN 43772	14×2.5 mm	G1/2B
		G3/4B
		G1/4B
		M20×1.5
		M18×1.5
		M14×1.5
		1/2 NPT
		3/4 NPT
		G1/2B movable nut
		G3/4B Movable nut
		M20×1.5 Movable nut

Cervical version

Neck tube design	Diameter	Protective tube diameter
Neck tube, according to DIN 43772	14×2.5 mm	G1/2B Outer nut
		G3/4B Outer nut
		M20×1.5 Outer nut

Cervical version

Neck tube design	Diameter	Sheath thread
Neck tube with countersunk nut at top	14×2.5 mm	1/2 NPT
		3/4 NPT
		G1/2B
		G3/4B
		G1/4B
		M14×1.5
		M18×1.5
Double thread (with hexagonal head wrench bayonet)	-	M20×1.5
		G1/2B
		G3/4B
		G1/4B
		1/2 NPT
		3/4 NPT
		M14×1.5
"Flexible coupling" type neck tube	~ 22 mm	1/2 NPT
	~ 27 mm	3/4 NPT
Double thread	~ 22 mm	1/2 NPT
	~ 27 mm	3/4 NPT

Neck length

The neck tube can be screwed into the junction box. Neck length depends on the intended use. Usually the neck tube can act as a bridge isolation. In many cases, the neck tube can also be used as an extended cooling element between the junction box and the medium, providing protection for the built-in transmitter at high medium temperatures. Other models are available on request

Neck tube design	Neck length	Minimum/maximum length of neck tube
Neck tube, according to DIN 43772	150 mm (About 6 inches)	30 mm (About 1.2 inches) / 500 mm (About 20 inches)
Neck tube, conforming to DIN 43772, straight	150 mm (About 6 inches)	75 mm (About 3 inches) / 900 mm (About 35 inches)
Neck tube with countersunk nut at top	150 mm (About 6 inches)	75 mm (About 3 inches) / 250 mm (About 10 inches)
Double thread (with hexagonal head wrench bayonet)		
▪ Connection head M24×1.5, the sheath adopts straight thread	13 mm	-
▪ Connection head 1/2 NPT, sheath with straight thread	25 mm	-
▪ Connection head M24×1.5, sheath with taper thread	25 mm	-
▪ Connector 1/2 NPT, sheath with conical thread	25 mm	-
"Flexible coupling" type neck tube	150 mm (About 6 inches)	75 mm (about 3 inches) / 250 mm (about 10 inches)
Double thread	50 mm (About 2 inches)	50 mm (about 2 inches) / 250 mm (about 10 inches)



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DS01-Selection composition

Selection example
Threaded type DS01

1	C	2	S	3	G	4	I	5	V	6	B	7	H	8	D	9	E	10	0-400	11	D	12	Z	13	M
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	----	-------	----	---	----	---	----	---

1.Selection description	A	All-in-one transmitter
	C	Threaded casing
	B	Intrinsically safe explosion-proof type
	D	Flameproof type
	T()	Other types
2.Threaded connection	S	Sliding thread
	F	Fixed thread
3.Insert probe design	G	Fixed installation
	H	Spring-fixed terminal block (replaceable ferrule)
4.Junction box	K	Aluminum
	I	Stainless steel
	J	Digital temperature display
	T()	Other types of junction boxes
5.Electrical interface	U	1/2NPT
	V	M20×1.5
6.Wiring block/sensor	A	Crastin Terminal block
	B	Ceramic connection block
	C	S10 (4-20mA transmitter)
	D	S20 (HART transmitter)
	E	S30 (Fieldbus transmitter)
7.Wire system	H	Single 3-wire system
	I	Double branch 6-wire system
	T()	Other wire system
8.Dimension of thread connection	C	1/2NPT
	D	G1/2
	E	M20×1.5
9.Thermocouple element	K	K (NiCr-Ni)
	E	E (NiCr-CuNi)
	N	N (NiCrSi-NiSi)
	F	J (Fe-CuNi)
	T	J (T-CuNi)
	T()	Other measuring elements
10.Temperature range(°C)	S	-200...+1260
	T()	Other measured temperatures
11.Rod diameter (mm)	A	3mm
	B	4mm
	C	5mm
	D	6mm
	E	8mm
	F	10mm



DS01-Selection composition

Selection example Threaded type **DS01** C S G I V B H D E 0-400 D Z M
1 2 3 4 5 6 7 8 9 10 11 12 13

12.Rod length (mm)	Z	50
	Y	100
	W	150
	X	200
	V	250
	U	300
	T	350
	S	400
	Q	450
	R	500
	T()	Other lengths
13.Probe rod material	M	304SS
	L	316L
	T()	Other materials
14.Safety certification	A	Intrinsic safety
	B	flameproof
	N	There is no
15.Additional order information	X	Additional information
	N	There is no

Instructions:

Indicates that the DS01 thermocouple is a thermometer with threaded sleeve, threaded connection mode is sliding thread, probe rod design is fixed installation, connection box material is stainless steel, electrical interface M20*1.5, sensor is ceramic connection block, single three-wire system, thread specification G1/2, thermocouple element is E (NiCr-CuNi), temperature range is 0... 400°C, probe diameter 6mm, insert depth length 50mm, probe material 304SS, item 14/15 in the table is not required.



DS01-Selection composition

Selection example Flange connection type **DS01** C S G I V B H A E W A Q 0-400

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

1.Selection description	A	All-in-one transmitter
	C	Flange casing
	B	Intrinsically safe explosion-proof type EEx-i
	D	Flameproof Ex-d
	T()	Other types
2.Connection mode	S	20592 Standard flange
	F	ANSI Standard flange
3.Insert probe design	G	Fixed installation
	H	Spring-fixed terminal block (replaceable ferrule)
4.Junction box	K	Aluminum
	I	Stainless steel
	J	With digital temperature display
	T()	Other types of junction boxes
5.Electrical interface	U	1/2NPT
	V	M20×1.5
6.Wiring block/sensor	A	Crastin Terminal block
	B	Ceramic connection block
	C	S10 (4-20mA transmitter)
	D	S20 (HART transmitter)
	E	S30 (Fieldbus transmitter)
7.Wire system	H	Single 3-wire system
	I	Double branch 6-wire system
	T()	Other wire system
8.Flange connection size	A	DN25
	B	DN50
	C	DN80
	D	DN100
	E	ANSI 1"
	F	ANSI 2"
	G	ANSI 3"
	H	ANSI 4"
T()	Other flange types	
9.Thermocouple element	K	K (NiCr-Ni)
	E	E (NiCr-CuNi)
	N	N (NiCrSi-NiSi)
	F	J (Fe-CuNi)
	J	J (T-CuNi)
	T()	Other measuring elements
10.Probe rod material	W	304SS
	X	316/316L (1.4401/1.4435)
	Y	Other materials



DS01-Selection composition

Selection example Flange connection type **DS01** C S G I V B H A E W A Q 0-400

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

11.Rod length (mm)	A	50
	B	100
	C	150
	D	200
	E	250
	F	300
	G	350
	H	400
	I	450
	J	500
T()	Other lengths	
12.Rod diameter	N	3mm
	O	4mm
	P	5mm
	Q	6mm
	R	8mm
	S	10mm
13.Temperature range (°C)	T	-200...+1260
	T()	Other measured temperatures
14.Safety certification	U	Intrinsic safety
	S	Flameproof
	V	There is no
15.Additional order information	X	Additional information
	N	There is no

Instructions:

The DS01 industrial thermocouple is a thermometer with flanged sleeve, the connection mode is 20592 standard flange, the probe rod is designed to be fixed installation, the connection box is stainless steel, the electrical interface is M20*1.5, the sensor is ceramic connection block, the single three-wire system, the flange is DN25, the thermocouple element is E (NiCr-CuNi). The probe rod material is 304SS, the length of the probe rod is 50mm, the diameter of the probe rod is 6mm, and the temperature range is 0... 400 °C: Item 14/15 in the table is optional.

Product certification

Compliance and approval; Rodwig thermometers meet key standards and certifications for process measurement technology; Thus guaranteeing the highest reliability in such Settings;