

The selection is detailed on page 10

# DB11

## Custom Thermal Resistance Thermometer

### Working principle

Thermal resistance is a kind of temperature measuring element commonly used in low and medium temperature region, which measures temperature by using the property that the resistance of the substance changes with the change of temperature. The heated part of the thermal resistance (temperature sensing element) is evenly wound on the skeleton made of insulating material with a thin metal wire. When there is a temperature gradient in the measured medium, the measured temperature is the average temperature in the medium layer within the range of the temperature sensing element.

### Product description

#### Probe

The probe is mounted in a contact block to meet a variety of flat surface measurement requirements. Contact blocks can be threaded or welded to the surface of the container. In addition, different types of thermal resistors for multiple pipes can also be fixed by means of binding ties, etc.

#### Cable

Cables are available in a variety of insulating materials to meet the application requirements of specific environmental conditions. The end of the cable has been prefabricated and can be connected directly, of course, the customer can also choose a plug or connect the cable to the field junction box.

### Product application

Install directly into the measurement process  
Machine building  
CARS  
bearing  
Pipes and containers

### Functional characteristics

Application range: Up to 250°C(optional: 600 °C)  
Easy to replace, no jacket required  
Installation can be done using threaded, welded or bundled cable ties  
Cables are made of PVC, silicon or PTFE  
Explosion proof type

01



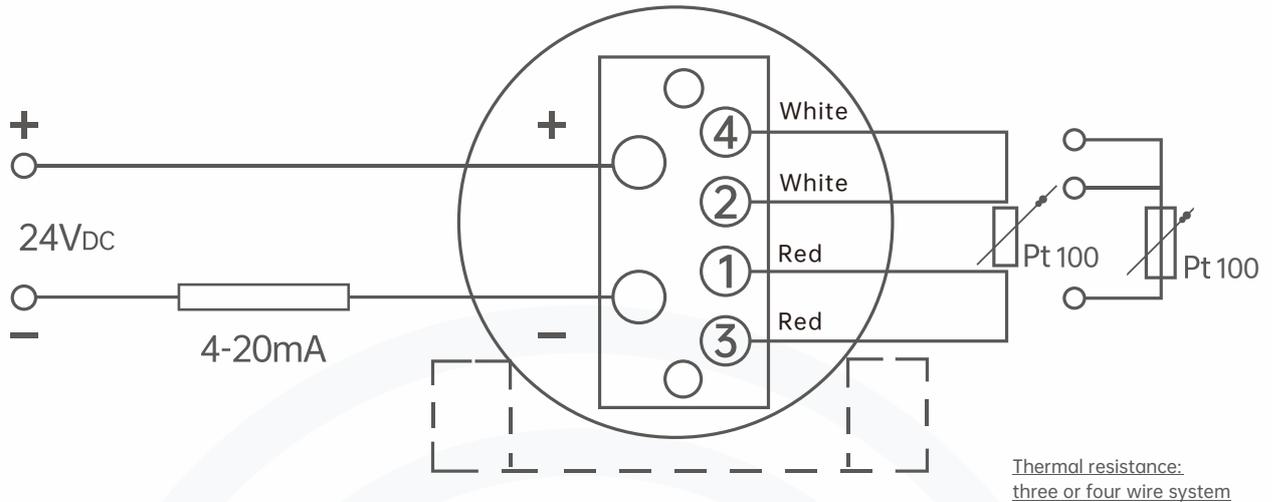
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For more product information, please visit [www.ludwig-schneider.com.cn](http://www.ludwig-schneider.com.cn)



LUDWIG  
INSTRUMENT

**Working principle**  
**Analytic table**



**Sensor**

The sensor is located at the tip of the probe.

**Sensor connection mode**

- Two-wire system
- Three-wire system
- Four-wire system

**Sensor tolerance values according to DIN EN 60751**

- Grade B
  - Level A
  - Grade AA
- It is not permitted to use 2-wire connections with class A or AA accuracy because measuring the lead resistance of the probe rod can adversely affect sensor accuracy.

**Sensor head design**

**Standard version**

In the standard version, a sensor for the selected measurement range will be assembled. The sensor can be operated under acceleration loads up to 30 m/s<sup>2</sup>. (Tested according to DIN EN 60751)

**Vibration resistant sensor tip (Max. 10 g)**

This super rugged version uses special resistors and has a special internal design that can withstand high loads (100 m/s<sup>2</sup>) for a long time. (Tested according to DIN EN 60751)

**Peak response (thin film sensor)**

A special measuring resistor is connected directly to the sensor tip

**Metal sensor**

**Specification parameter**

Material: Stainless steel  
Diameter: 2 mm, 3 mm, 6 mm or 8 mm  
Length: Optional

Regardless of the design, the sensor front 60mm does not allow bending.  
For solid internal temperature measurements, the diameter of the borehole into which the sensor is inserted must not exceed 1 mm of the sensor diameter.

**There are two types of cable-type thermal resistors**  
**Design method:**

**Tubular design**

The tubular design is characterized by rigid structure of metal sensor probe; Therefore bending is not allowed. Inside the probe, the resistance element is connected directly to the insulated wire, so a cable-type thermal resistance thermometer of tubular design can only be used if the temperature (see operating temperature) does not reach the lead service temperature.

**Please note:**  
Especially when the flow rate is relatively high, the bendability of the armored thermal resistance thermometer must be taken into account.

**Armor design**

In armored resistance thermometers, the probe part consists of armored cables (MI cables)  
The armored cable includes a stainless steel outer sheath to accommodate an insulated internal lead embedded in a high-density ceramic compound.  
The measuring resistance is directly connected to the internal lead of the armored cable and is therefore suitable for use in high-temperature environments.  
Because of the bendability of the structure and the choice of small size direct armored cables, armored resistance thermometers can also be used in inaccessible locations. Armored cables can be bent up to three times the diameter of the cable, except at the front end of the probe and the filling duct.

## Maximum operating temperature

The maximum temperature of this thermometer is limited by different parameters:

### Sensor - Measuring element

Pt100, Pt1000<sup>1)</sup> (Measuring current: 0.1... 1.0 mA)

Connection mode	
unitware	1 x 2 Wire system
	1 x 3 Wire system
	1 x 4 Wire system
two-element	2 x 2 Wire system
	2 x 3 Wire system
	2 x 4 Wire system <sup>2)</sup>

### Measuring rod tolerance values, according to EN 60751

category	Sensor structure	
	Winding form	Film type
B level	-196 ... +600°C	-50 ... +500°C
	-196 ... +450°C	-50 ... +250°C
A level <sup>3)</sup>	-100 ... +450°C	-30 ... +300°C
AA level <sup>3)</sup>	-50 ... +250°C	0 ... 150°C

1) Pt1000 Can only be used as thin film measuring resistance; 2) Diameter is not 3mm; 3) Not suitable for 2-wire wiring

### Connect cables and single wires

At any position on the connection cable, the maximum temperature that can be tolerated refers to the temperature specified by the connection cable. The sensor (see above) may itself be capable of withstanding higher temperatures. For common connection wires, refer to temperature limits:

PVC: -20 ... +100 °C

Silicone: -50... +200 °C

PTFE: -50 ... +250 °C

Glass fiber: -50... +400 °C

Therefore, in the tubular design series, the insulated lead is also installed in the metal probe, which should be brought into the operating limit of the connecting cable.

### Glue filling catheter

The temperature of the filling tube is further limited by the filling sealant.

Filling sealant temperature range: -40... +150 °C

Optional: <sup>250</sup> °C

<sup>1)</sup>Other models are available on request

Special low temperature version temperature range: -60... +120 °C<sup>4)</sup>

4) Available only with the selected certification

### coupler

When optional connectors are installed, the maximum permissible temperature at the connector is:

Lemosa: -55 ... +250 °C

Binder: -40 ... +85 °C

### Operating temperature

If the temperature to be measured is higher than the allowable temperature at the cable, connector, or duct, the metal part of the probe must be long enough to extend beyond the hot area. It should be noted that the maximum operating temperature of the cable, filling duct or connector should not be exceeded.

## Glue filling catheter

The connection between the sensor metal parts and the connecting cable or bare wire must not be immersed in the process medium and must not be bent. Do not fix the movable sleeve on the filling duct.

### Size T indicates the length of the glue filling tube

Standard	Size T <sup>5)</sup> (mm)	Glue filling catheter Ø (mm)
Probe Ø = Glue filling catheter Ø	n/a	Probe equal
Ø2 ... 4.5 mm (With pressed glue filling catheter)	45	6
Ø6 mm (With pressed glue filling catheter)	45	7
Ø6 mm (With pressed glue filling catheter) <sup>6)</sup>	45	8
Ø8 mm (With pressed glue filling catheter)	45	10

### The filling duct with operating temperature < -40°C is designed as follows

Standard	Size T (mm)	Glue filling catheter Ø (mm)
Probe Ø = filling tube Ø	n/a	Probe equal
Ø2 ... 4.5 mm (With pressed glue filling catheter)	60	8
Ø6 mm (With pressed glue filling catheter)	60	8
Ø8 mm (With pressed glue filling catheter) <sup>6)</sup>	60	10

5) For the 2 x 4 wire sensor connection mode, the length of the glue filling catheter is generally 60 mm;

6) With a large number of wires (such as 2 x 3 wires and sheathing)



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## Glue filling catheter

### Connecting cable

A variety of insulating materials are available to suit special environmental conditions. Cable ends can be directly connected or fitted with connectors.

### Connecting cable (standard)

Wire material: copper wire  
 Cross-sectional area: about 0.22mm<sup>2</sup> (standard)  
 Number of wires: depends on wiring method  
 Insulation material: PVC, silicone, PTFE or glass fiber  
 Screen (optional) : Recommended when connecting a transmitter

## Class of protection

Cable resistance thermometers are available with a housing protection rating of up to IP65 (depending on cable sheathing material and number of wires). After special design, it is also available with IP67 enclosure protection. Leads with glass fiber sheathed should not be used in explosion-proof products.

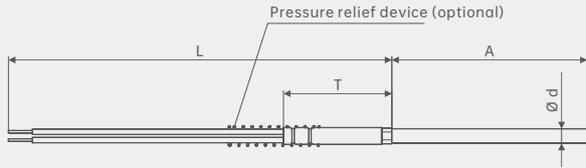
## Need for connection

According to the electrical connection characteristics, cable thermal resistance can be divided into the following types:

- Loose lines lead out
- Cable connection
- With connector
- Bare wire connection

Dimension A indicates the depth of insertion during measurement. Dimension W indicates the length of the connecting wire. L is the length of the individual wire. Size T indicates the glue filling catheter (if any). T consists of length W or L

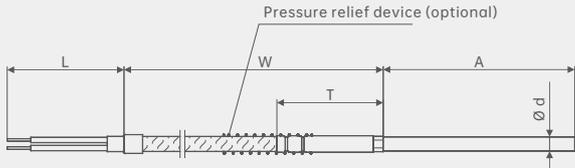
## Scatter extraction



**Scatter extraction**

The cable length is 150mm, other lengths can also be provided according to user requirements, thermocouple wire Ø0.5mm, compensation cable type depends on the sensor type, PTFE insulation, cable logarithm depends on the number of sensors, bare wire end, other models can be provided according to user requirements

## Cable connection

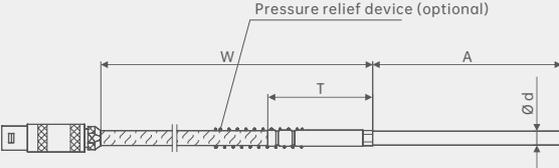


**Cable connection**

The cable and probe are permanently connected together and the cable length meets the user's specifications.

Compensation cable, 0.22mm<sup>2</sup> leads, compensation cable type depends on sensor type, number of wires depends on the number of sensors, bare wire end.

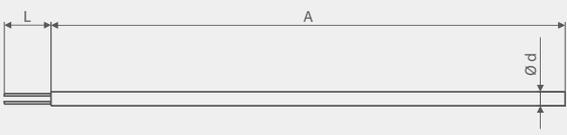
## Assemble connectors on connecting cables



**Assemble connectors on connecting cables**

Optional connectors on flexible wires.

### Bare wire design



**Bare wire design**

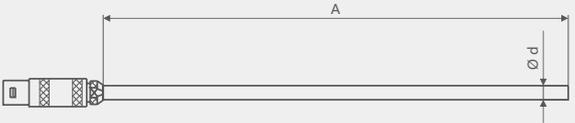
The inner lead of a mineral insulated cable extension.  
L = 20 mm (standard)

Bare wire length can be determined according to user requirements. These exposed inner leads are made of solid wire and are therefore not suitable for long distance deployment.

### Connectors are installed directly to Probe on

**The connector is mounted directly to the probe**

These designs are based on the bare wire design. The connector is mounted directly onto the metal probe.



### Process connector for straight probes

Process connectors can be selected for cable-type thermistors. Dimension A indicates the depth of insertion during measurement. In order to minimize the heat dissipation error of the threaded connection, the insertion depth A should be at least 25mm. The position of the threaded connection is specified by size X and is independent of the connection type.

**Please note:**

- For straight threads (e.g. G1/2), size refers to the seal that is threaded at the closest point in the measurement process
- For conical threads (such as NPT), the measuring plane is located almost in the center of the thread

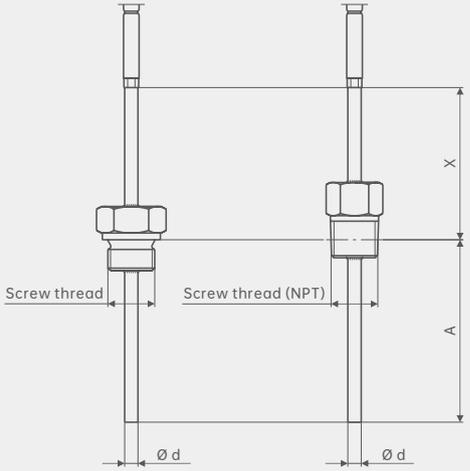
### Process connector Fixed threaded connections/threads

**Fixed threaded connections/threads**

For mounting probes into threaded joints with internal threads.

Insert depth A: consistent with user specifications  
Material: Stainless steel, other materials can also be provided according to user's request

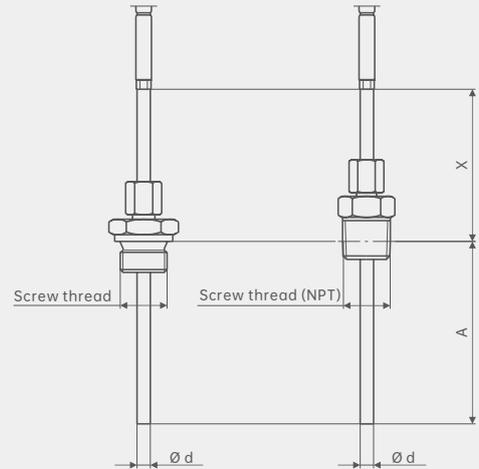
The probe must be rotated to screw it into the measurement process. Therefore, the mechanical installation must be carried out before the electrical connection is completed.



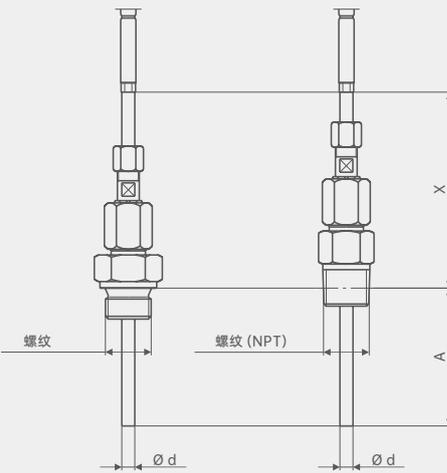
**Process connector  
Movable sleeve**

**Movable sleeve**

Can be used to easily adjust the required insertion depth at the installation position.  
 Since the movable sleeve can be adjusted on the probe, dimensions A and X refer to the values at the time of delivery. The length of the movable sleeve determines the minimum length X to be approximately 40 mm.  
 Material: Stainless steel  
 Ring material: stainless steel or PTFE  
 Stainless steel collar can only be adjusted once; Once unscrewed, it can no longer slide along the sheath.  
 · The maximum temperature of the process connector is 500 °C  
 · Maximum pressure load 4 MPa  
 The PTFE sheath can be adjusted multiple times, and can be repeatedly slid along the sheath after being unscrewed.  
 · The maximum temperature of process connectors is 150 °C  
 · Use under pressure free conditions  
 For armored resistors with a diameter of 2mm, only PTFE sleeves are allowed.



**Process connector  
Flexible sleeve**



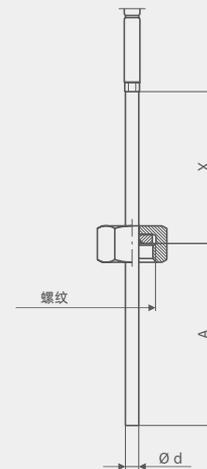
**Flexible sleeve**

It can be used to easily adjust the desired insertion depth in the mounting position while maintaining the pre-stressed spring.  
 Since the movable sleeve can be adjusted on the probe, dimensions A and X refer to the values at the time of delivery. The length of the movable sleeve determines the minimum length X to be approximately 80mm.  
 Material: Stainless steel  
 Ring material: stainless steel  
 Stainless steel collar can only be adjusted once; Once unscrewed, it can no longer slide along the sheath.  
 No pressure load should be applied to the movable sleeve.

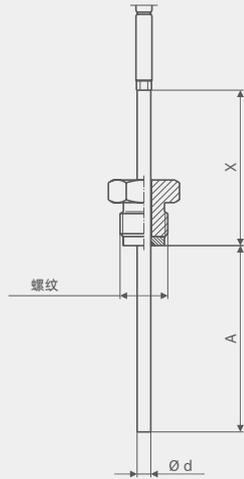
**Process connector  
Movable nut**

**Movable nut**

For mounting probes into threaded joints with external threads.  
 The probe and thread rotate opposite each other, so the order of mechanical and electrical installation does not matter.  
 This option is not recommended for NPT threads.  
 Insert depth A: consistent with user specifications  
 Material: Stainless steel, other materials can also be provided according to user's request



**Process connector  
Outer nut**

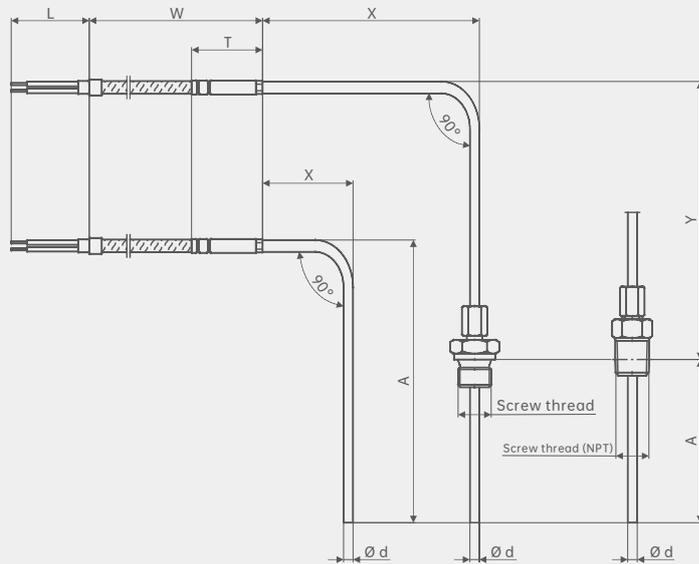


**Outer nut**

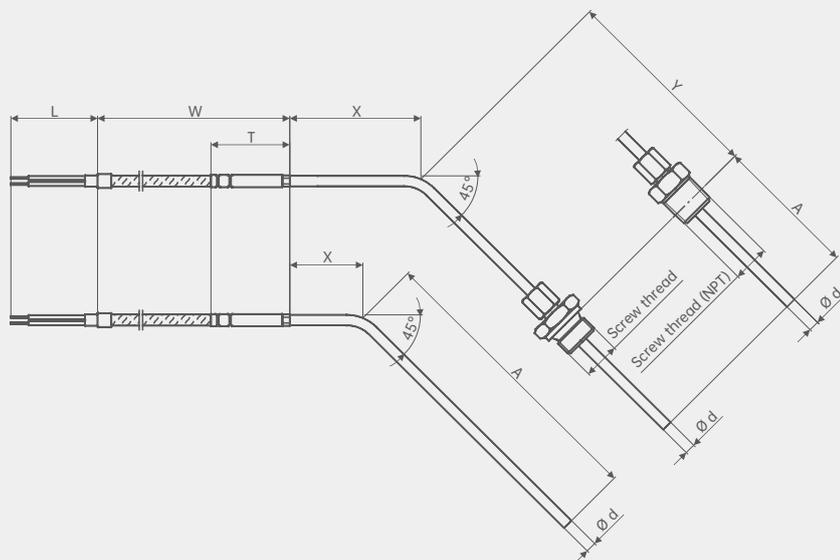
For mounting probes into threaded joints with internal threads. The probe and thread rotate opposite each other, so the order of mechanical and electrical installation does not matter. This option is not recommended for NPT threads. Insert depth A: consistent with user specifications. Material: Stainless steel, other materials can also be provided according to user's request

**Angle probe**

Cable-type thermistors made of armored cables can be provided in prefabricated shapes. In this case, other dimensions are needed to indicate the corner position. Size X indicates the distance between the corner and the lower edge of the filling tube. Dimension A always indicates the depth of insertion of the probe, as well as the area inside the measurement process.



If threaded connections are used on Angle probes, dimension Y indicates the distance between the center of the bend and the measurement plane of the threaded connection. A fixed threaded connection is not recommended because a wide range of swings is required to screw the angular probe into the measurement process.

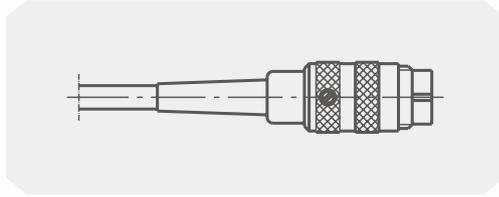


**Connector (optional)**

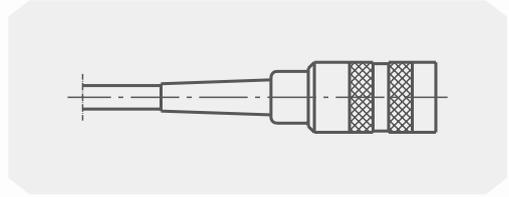
Cable type thermal resistors are available with pre-installed connectors.

Users can choose from the following options:

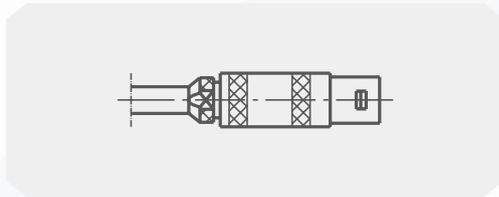
**Binder Screw in plug (outside)**



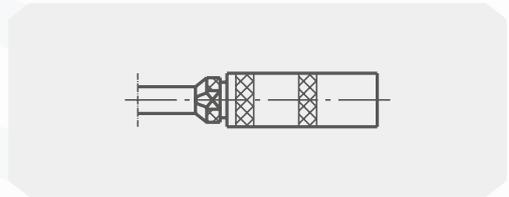
**Binder Screw in plug**



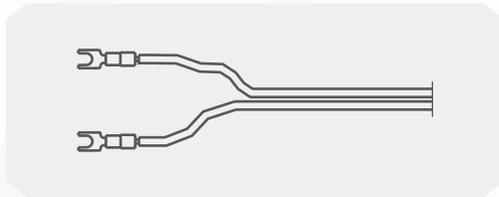
**Lemosa 1S Connector (outside)  
Lemosa 2S Connector (outside)**



**Lemosa 1S Free socket (inside)  
Lemosa 2S Free socket (inside)**



**Flat connector (not applicable to products with bare wire connections)**



Other types (sizes) of connectors can also be selected according to demand.

**Other options**

**Stress relief device**

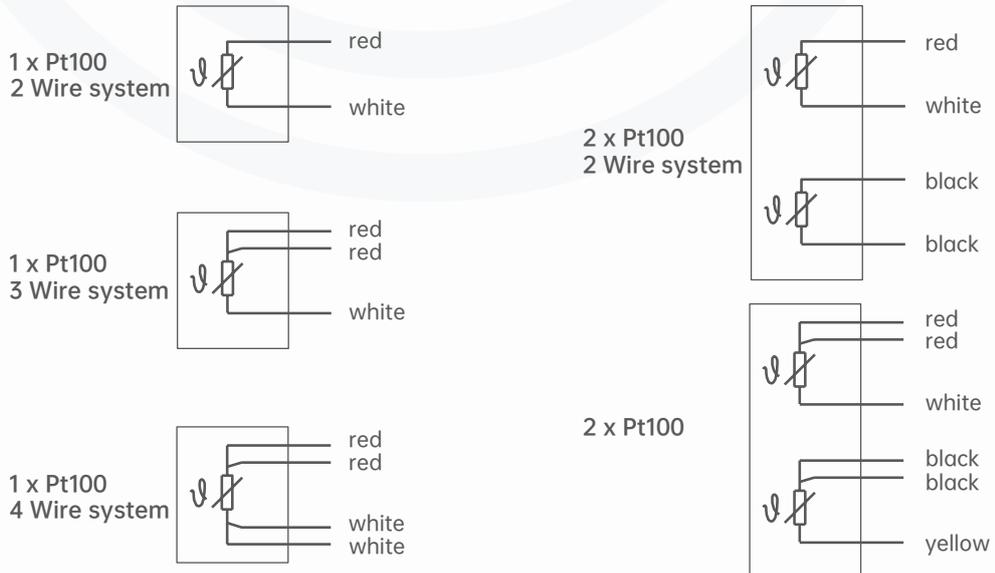
Stress relief devices (springs or shrink tubes) are used to protect the transition point between the rigid probe and the flexible connection cable. This device must be used in applications where relative motion may occur between the cable and the thermometer.  
For Ex n explosion-proof designs, stress relief devices must be mandatory.  
The standard length of the stress relief spring is 60 mm.

**Glue filling catheter of the same diameter as probe**

As an alternative, you can also choose a glue filling tube of the same diameter as the metal probe. This allows the cable gland or movable sleeve to slide from both ends of the probe. The glue tube is barely visible.  
The operating limits of the filling tubes do not change, but they must be kept outside the measurement process and should not be used with movable sleeves.

**Electrical connection**

**Splice free**

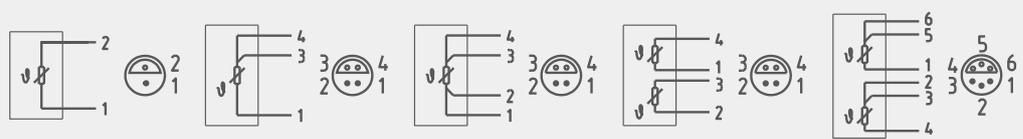
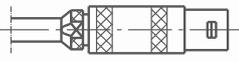


## Electrical connection

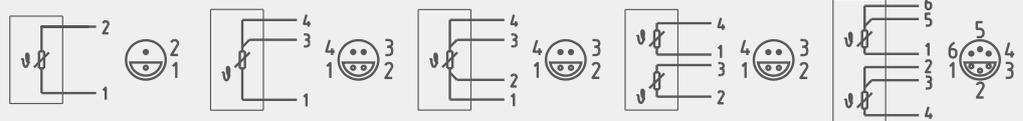
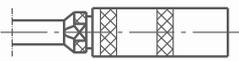
### Lemosa splice

Maximum permissible temperature range: -55 ... +250°C

#### Joint (external thread)



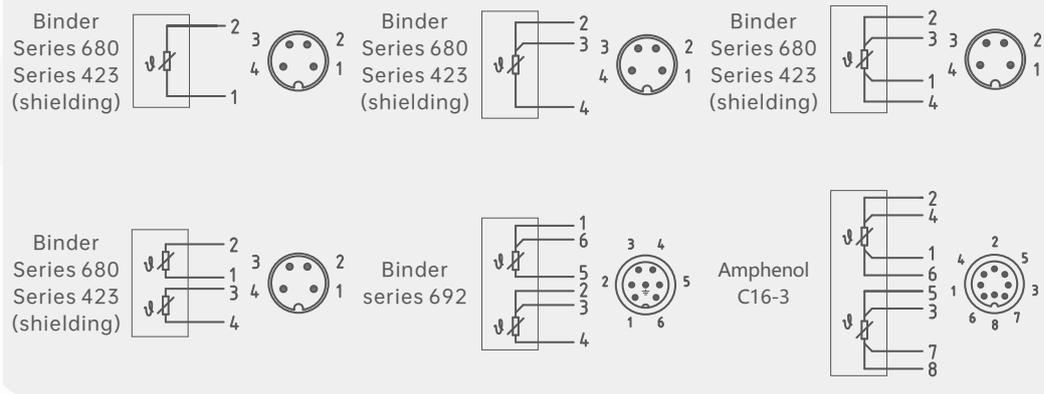
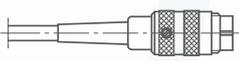
#### Joint (internal thread)



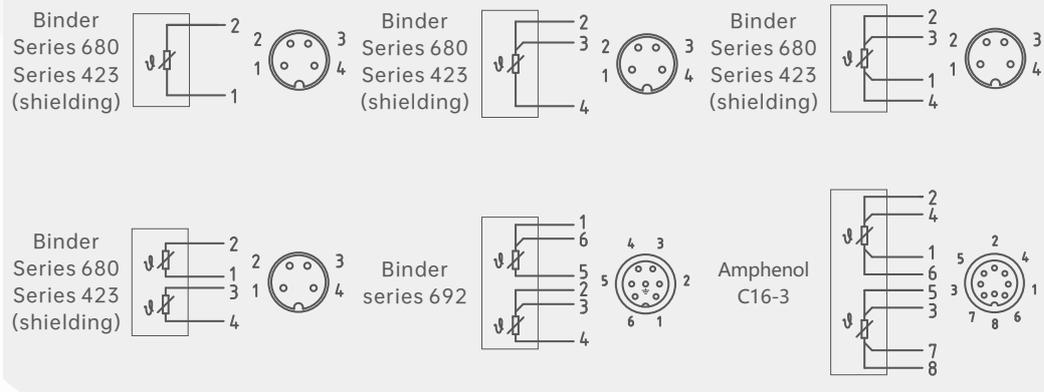
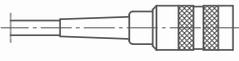
### Screw in plug (Amphenol, Binder)

Maximum permissible temperature range: -40 ... +85°C

#### Joint (external thread)



#### Joint (internal thread)



## DB11-Selection composition

 Selection example  
 Threaded type **DB11**

1 B 2 S 3 G 4 J 5 S 6 V 7 S 8 B 9 E 10 M 11 N 12 A 13 P 14 N

1.Selection description	<b>A</b>	All-in-one transmitter
	<b>B</b>	Threaded casing
	<b>C</b>	Intrinsically safe explosion-proof type
	<b>D</b>	Flameproof type
	<b>Z</b>	Cable type
	<b>T( )</b>	Other types
2.Threaded connection	<b>S</b>	Sliding thread
	<b>F</b>	Fixed thread
3.Insert probe design	<b>G</b>	Fixed installation
	<b>H</b>	Spring fixed terminal block (replaceable insert)
4.Junction box	<b>I</b>	Aluminum
	<b>J</b>	Stainless steel
	<b>K</b>	With digital temperature display
	<b>T( )</b>	Other types of junction boxes
5.Electrical interface	<b>R</b>	1/2NPT
	<b>S</b>	M20×1.5
	<b>T( )</b>	Other electrical interfaces
6.Wiring block/sensor	<b>U</b>	Crastin Terminal block
	<b>V</b>	Ceramic connection block
	<b>W</b>	S10 (4-20mA transmitter)
	<b>X</b>	S20 (HART transmitter)
	<b>Y</b>	S30 (Fieldbus transmitter)
7.Wire system	<b>S</b>	Single 3-wire system
	<b>Z</b>	Double branch 6-wire system
	<b>T( )</b>	Other wire system
8.Dimension of thread connection	<b>A</b>	1/2NPT
	<b>B</b>	G1/2
	<b>C</b>	M20×1.5
	<b>T( )</b>	Other connection sizes
9.Thermistor	<b>E</b>	Pt100, B level
	<b>F</b>	Pt100, A level
	<b>G</b>	Pt1000, B level
	<b>H</b>	Pt1000, A level
10.Probe rod material	<b>M</b>	304SS
	<b>L</b>	316/316L (1.4401/1.4435)
	<b>T( )</b>	Other materials

DB11-Selection composition

Selection example Threaded type **DB11** **B** **S** **G** **J** **S** **V** **S** **B** **E** **M** **N** **A** **P** **N**

11. Temperature range (°C)	<b>N</b>	-50...+250
	<b>O</b>	-50...+450
	<b>P</b>	-200...+250
	<b>Q</b>	-200...+450
	<b>R</b>	-200...+600
	<b>S</b>	0...+400
	<b>U</b>	0...+500
	<b>T( )</b>	Other measured temperatures
12. Rod length (mm)	<b>A</b>	50
	<b>B</b>	100
	<b>C</b>	150
	<b>D</b>	200
	<b>E</b>	250
	<b>F</b>	300
	<b>G</b>	350
	<b>H</b>	400
	<b>I</b>	450
	<b>J</b>	500
	<b>T( )</b>	Other lengths
	13. Rod diameter(mm)	<b>P</b>
<b>Q</b>		4mm
<b>R</b>		5mm
<b>S</b>		6mm
<b>V</b>		8mm
<b>U</b>		10mm
<b>T( )</b>		Other specifications
14. Safety certification	<b>E</b>	Intrinsic safety
	<b>D</b>	flameproof
	<b>N</b>	There is no
15. Additional order information	<b>X</b>	Additional information
	<b>Z</b>	There is no

Instructions:

It means that the DB11 thermal resistance is a thermometer with threaded sleeve, the thread connection mode is sliding thread, the probe rod design is 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 thread specification is G1/2, the thermal resistance element is Pt100, the grade B, the probe rod material is 304SS, and the thermal resistance component is PT100. Temperature range -50... 250°C, rod length 50mm, rod diameter 3mm, no explosion-proof, 15 parts are not required.



## DB11-Selection composition

Selection example  
Flange connection type

DB11

1	B	2	S	3	G	4	L	5	V	6	B	7	G	8	N	9	V	10	D	11	G	12	X	13	F	14	N
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1.Selection description	<b>A</b>	All-in-one transmitter
	<b>B</b>	Flange casing
	<b>C</b>	Intrinsically safe explosion-proof type
	<b>D</b>	Flameproof type
	<b>Z</b>	Cable type
<b>T( )</b>	Other types	
2.Flange connection	<b>S</b>	20592 Standard flange
	<b>F</b>	ANSI Standard flange
	<b>T( )</b>	Other standards
3.Insert probe design	<b>G</b>	Fixed installation
	<b>H</b>	Spring fixed terminal block (replaceable insert)
4.Junction box	<b>K</b>	Aluminum
	<b>L</b>	Stainless steel
	<b>M</b>	With digital temperature display
	<b>T( )</b>	Other types of junction boxes
5.Electrical interface	<b>U</b>	1/2NPT
	<b>V</b>	M20×1.5
	<b>T( )</b>	Other electrical interfaces
6.Wiring block/sensor	<b>A</b>	Crastin Terminal block
	<b>B</b>	Ceramic connection block
	<b>C</b>	S10 (4-20mA transmitter)
	<b>D</b>	S20 (HART transmitter)
	<b>E</b>	S30 (Fieldbus transmitter)
7.Wire system	<b>G</b>	Single 3-wire system
	<b>H</b>	Single 6-wire system
	<b>T( )</b>	Other wire system
8.Flange connection size	<b>N</b>	DN25
	<b>O</b>	DN50
	<b>P</b>	DN80
	<b>Q</b>	DN100
	<b>R</b>	ANSI 1"
	<b>S</b>	ANSI 2"
	<b>Z</b>	ANSI 3"
	<b>U</b>	ANSI 4"
	<b>T( )</b>	Other flange types
9.Thermistor	<b>V</b>	Pt100, B level
	<b>W</b>	Pt100, A level
	<b>X</b>	Pt1000, B level
	<b>Y</b>	Pt1000, A level



## DB11-Selection composition

Selection example  
Flange connection type **DB11** **B** **S** **G** **L** **V** **B** **G** **N** **V** **D** **G** **X** **F** **N**

10.Rod diameter	<b>A</b>	3mm
	<b>B</b>	4mm
	<b>C</b>	5mm
	<b>D</b>	6mm
	<b>E</b>	8mm
	<b>F</b>	10mm
	<b>T ( )</b>	Other specifications
11.Rod length (mm)	<b>G</b>	50
	<b>O</b>	100
	<b>P</b>	150
	<b>Q</b>	200
	<b>R</b>	250
	<b>S</b>	300
	<b>I</b>	350
	<b>U</b>	400
	<b>V</b>	450
	<b>W</b>	500
	<b>T ( )</b>	Other lengths
	12.Probe rod material	<b>X</b>
<b>Y</b>		316/316L (1.4401/1.4435)
<b>T ( )</b>		Other materials
13.Temperature range (°C)	<b>A</b>	-50...+250
	<b>B</b>	-50...+450
	<b>C</b>	-200...+250
	<b>D</b>	-200...+450
	<b>E</b>	-200...+600
	<b>F</b>	0...+400
	<b>G</b>	0...+500
	<b>T ( )</b>	Other measured temperatures
14.Safety certification	<b>X</b>	Intrinsic safety
	<b>Y</b>	Flameproof
	<b>Z</b>	There is no
15.Additional order information	<b>V</b>	Additional information
	<b>N</b>	There is no

## Instructions:

It means that the DB11 thermal resistance is a thermometer with flanged sleeve, the connection mode is 20592 standard flange, the probe rod design is fixed installation, the connection box is stainless steel, the electrical interface is M20\*1.5, the sensor is ceramic connecting block, the single three-wire system, the flange specification is DN25, the thermal resistance element is Pt100, the class B, the diameter of the probe rod is 6mm. The length of the rod is 50mm, the material of the rod is 304SS, and the temperature range is 0... 400°C, no explosion-proof, 15 items are not required.

## Product certification

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