

# High-pressure thermocouple Model TC90

WIKA data sheet TE 65.90



For further approvals,  
see page 10

## Applications

- Plastics manufacturing industry (LDPE/EVA)
- Hydrogen Refuelling Stations (HRS)
- Test benches for hydrogen systems
- Other compressed gases

## Special features

- Various process connections, metal seals
- Short response times
- High pressure containment without thermowell/protection tube
- Robust, vibration-resistant design
- Compact design with short insertion lengths for small nominal pipe widths



High-pressure thermocouple, model TC90  
Various process connections

## Description

This high-pressure thermocouple is used for temperature measurement in industrial applications. The thermocouple is suitable for the highest process requirements and enables reliable temperature measurement, for example, in plastics production and processing.

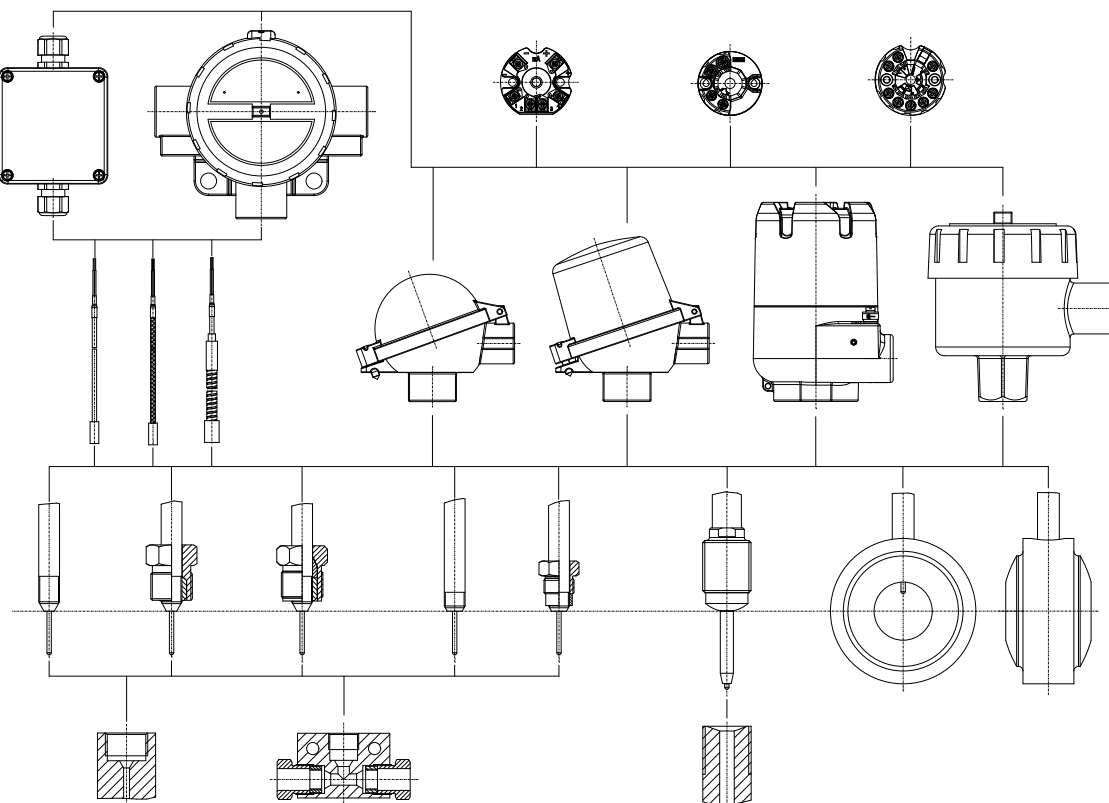
Each TC90 is designed and manufactured according to individual customer specifications. These instruments are manufactured using special manufacturing processes and, in order to ensure their quality, special test arrangements and material tests are applied.

This measuring assembly is sealed by means of metal-to-metal sealing, high-pressure threaded connectors or lens-type sealing rings, which have both proven successful over many years.

# Specifications

Overview of versions				
Version	Description	Process connection	Pressure range	Application
TC90-xxxx-A	Without pressure ring and male nut	Sealing bolt 58°	High pressure (max. 4,500 bar)	LDPE/EVA
	With pressure ring and male nut			
	With anti-vibration gland			
TC90-xxxx-B	Sealing bolts with radius and threads for flange	To customer specification		
TC90-xxxx-C	Lens-type sealing ring/Conical seal			
TC90-xxxx-H	Without pressure ring and male nut	Sealing bolt 58°	Medium pressure (max. 1,550 bar)	H2
	With pressure ring and male nut			Hydraulics
TC90-xxxx-S	Without pressure ring and male nut			
	With pressure ring and male nut			

## Overview of variants

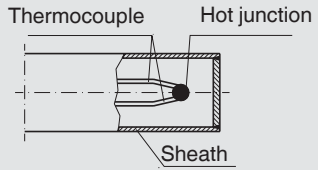
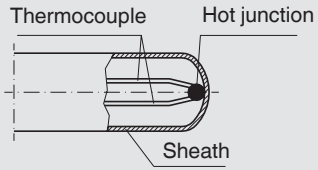
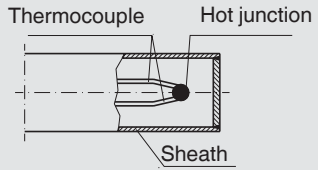
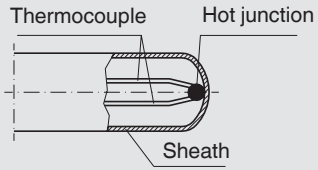
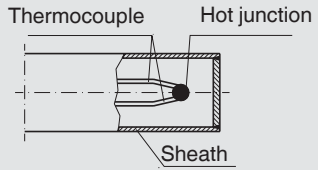
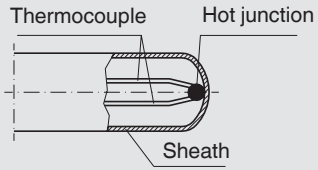
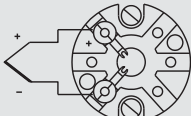
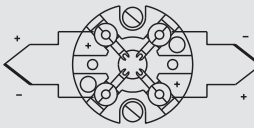


## Overview of approvals for explosion protection

Approval	Explosion protection			
	Ex i (gas) Zone 0, 1, 2	Ex i (dust) Zone 20, 21, 22	Ex e (gas) Zone 1, 2	Ex t (dust) Zone 21, 22
ATEX	x	x	x	x
IECEx	x	x	x	x
EAC	x	x	-	-
Ex Ukraine	x	x	-	-
INMETRO	x	x	-	-
CCC	x	x	x	-
KCs	x	-	-	-
PESO	x	-	-	-
NEPSI	x	-	-	-
ECASEx	-	-	x	x

→ For detailed information, see “Approvals” on page 11

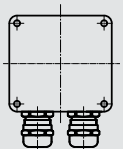
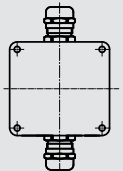

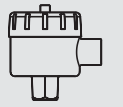
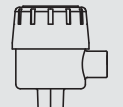
Basic information	
Sealing cone	<ul style="list-style-type: none"> <li>■ Stainless steel 1.4545</li> <li>■ Stainless steel 1.4571</li> <li>■ Stainless steel 2.4816</li> <li>■ Stainless steel 316/316L</li> <li>■ 15-5 PH</li> </ul> <p>→ Other materials on request</p>
Probe material	<ul style="list-style-type: none"> <li>■ Alloy 600</li> <li>■ Stainless steel 316L</li> <li>■ Stainless steel 1.4571</li> </ul>

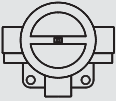
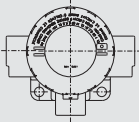
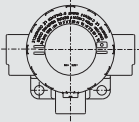

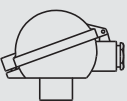
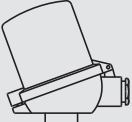
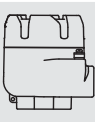
Measuring element					
Type of measuring element	Thermocouple per IEC 60584-1 or ASTM E230 Types K, J, E, T, N				
Probe tip design (hot junction)	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;">                     Ungrounded (hot junction welded isolated, standard)                 </td> <td style="width: 50%; vertical-align: top;">                     Grounded (hot junction not isolated, welded to the bottom)                 </td> </tr> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </table>	Ungrounded (hot junction welded isolated, standard)	Grounded (hot junction not isolated, welded to the bottom)		
Ungrounded (hot junction welded isolated, standard)	Grounded (hot junction not isolated, welded to the bottom)				
					
Marking of the polarity	The colour code at the positive poles of the instrument decides the correlation of polarity and terminal				
Single thermocouple					
Dual thermocouple					
<b>Validity limits of the class accuracy in accordance with IEC 60584-1</b>					
Type K	Class 2	-40 ... +1,200 °C [-40 ... +2,192 °F]			
	Class 1	-40 ... +1,000 °C [-40 ... +1,832 °F]			
Type J	Class 2	-40 ... +750 °C [-40 ... +1,382 °F]			
	Class 1	-40 ... +750 °C [-40 ... +1,382 °F]			
Type E	Class 2	-40 ... +900 °C [-40 ... +1,652 °F]			
	Class 1	-40 ... +800 °C [-40 ... +1,472 °F]			

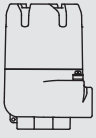
Measuring element		
Type T	Class 2	-40 ... +350 °C [-40 ... +662 °F]
	Class 1	-40 ... +350 °C [-40 ... +662 °F]
Type N	Class 2	-40 ... +1,200 °C [-40 ... +2,192 °F]
	Class 1	-40 ... +1,000 °C [-40 ... +1,832 °F]
Validity limits of the class accuracy in accordance with ASTM-E230		
Type K	Standard/Special	0 ... 1,260 °C [32 ... 2,300 °F]
Type J	Standard/Special	0 ... 760 °C [32 ... 1,400 °F]
Type E	Standard/Special	0 ... 870 °C [32 ... 1,598 °F]
Type T	Standard/Special	0 ... 370 °C [32 ... 698 °F]
Type N	Standard/Special	0 ... 1,260 °C [32 ... 2,300 °F]

## Sensors

Although the thermocouple types used (K, J, E, T, N) have a much higher temperature range, the maximum working temperature for high-pressure measurements is limited through the process to 350 °C [662 °F]. For all characteristic values of the thermocouples, see technical information IN 00.23.

International connection heads and cases								
Model		Material	Cable inlet thread size	Ingress protection (max.) <sup>1)</sup> IEC/EN 60529	Cap	Surface	Con-nection to neck tube	Dimen-sions in mm [in]
	Field case	Plastic (ABS)	■ M12 x 1.5 ■ 1/2 NPT ■ M16 x 1.5	IP65	Flat cover with 4 plug screws	Grey	-	82 x 80 x 55 3.2 x 3.1 x 2.2 (L x W x H)
	Field case	Aluminium	■ M12 x 1.5 ■ 1/2 NPT ■ M16 x 1.5	IP65	Flat cover with 4 plug screws	Natural finish	-	80 x 75 x 57 3.1 x 2.9 x 2.3 (L x W x H)
	Field case	Plastic (ABS)	■ M12 x 1.5 ■ 1/2 NPT ■ M16 x 1.5	IP65	Flat cover with 4 plug screws	Grey	-	82 x 80 x 55 3.2 x 3.1 x 2.2 (L x W x H)
	Field case	Aluminium	■ M12 x 1.5 ■ 1/2 NPT ■ M16 x 1.5	IP65	Flat cover with 4 plug screws	Natural finish	-	80 x 75 x 57 3.1 x 2.9 x 2.3 (L x W x H)
	1/4000	Aluminium	■ M20 x 1.5 ■ 1/2 NPT ■ 3/4 NPT	IP66	Screw-on lid	Blue, painted <sup>2)</sup>	1/2 NPT	-
	1/4000	Stainless steel	■ M20 x 1.5 ■ 1/2 NPT ■ 3/4 NPT	IP66	Screw-on lid	Natural finish	1/2 NPT	-
	7/8000	Aluminium	■ M20 x 1.5 ■ 1/2 NPT ■ 3/4 NPT	IP66	Screw-on lid	Blue, painted <sup>1)</sup>	1/2 NPT	-
	7/8000	Stainless steel	■ M20 x 1.5 ■ 1/2 NPT ■ 3/4 NPT	IP66	Screw-on lid	Natural finish	1/2 NPT	-
	7/8000	Aluminium	■ M20 x 1.5 ■ 1/2 NPT ■ 3/4 NPT	IP66	Screw-on lid, with digital temperature display DIH50-B	Blue, painted <sup>2)</sup>	1/2 NPT	-
	7/8000	Stainless steel	■ M20 x 1.5 ■ 1/2 NPT ■ 3/4 NPT	IP66	Screw-on lid, with digital temperature display DIH50-B	Natural finish	1/2 NPT	-

International connection heads and cases								
Model		Material	Cable inlet thread size	Ingress protection (max.) <sup>1)</sup> IEC/EN 60529	Cap	Surface	Con- nection to neck tube	Dimen- sions in mm [in]
	5/6000	Aluminium	■ 2 x M20 x 1.5 ■ 2 x 1/2 NPT ■ 2 x 3/4 NPT	IP66	Screw-on lid	Blue, painted <sup>2)</sup>	-	-
	5/6000	Stainless steel	■ 2 x M20 x 1.5 ■ 2 x 1/2 NPT ■ 2 x 3/4 NPT	IP66	Screw-on lid	Natural finish	-	-
	5/6000	Aluminium	■ 2 x M20 x 1.5 ■ 2 x 1/2 NPT ■ 2 x 3/4 NPT	IP66	Screw-on lid, with digital temperature display DIH50-B	Blue, painted <sup>2)</sup>	-	-
	5/6000	Stainless steel	■ 2 x M20 x 1.5 ■ 2 x 1/2 NPT ■ 2 x 3/4 NPT	IP66	Screw-on lid, with digital temperature display DIH50-B	Natural finish	-	-
	Field transmitter TIF50 <sup>3)</sup>	Aluminium	■ 2 x M20 x 1.5 ■ 2 x 1/2 NPT ■ 2 x 3/4 NPT	IP66	-	-	-	-
	Field transmitter TIF50 <sup>2)</sup>	Stainless steel	■ 2 x M20 x 1.5 ■ 2 x 1/2 NPT ■ 2 x 3/4 NPT	IP66	-	-	-	-
	Field transmitter TIF52 <sup>2)</sup>	Aluminium	■ 2 x M20 x 1.5 ■ 2 x 1/2 NPT ■ 2 x 3/4 NPT	IP66	-	-	-	-
	Field transmitter TIF52 <sup>2)</sup>	Stainless steel	■ 2 x M20 x 1.5 ■ 2 x 1/2 NPT ■ 2 x 3/4 NPT	IP66	-	-	-	-
	KN4-A <sup>2)</sup>	Aluminium	■ M20 x 1.5 ■ 1/2 NPT ■ 3/4 NPT	IP65	Screw-on lid	Blue, painted <sup>2)</sup>	■ 1/2 NPT ■ M24 x 1.5	-
	KN4-P <sup>2)</sup>	Polypropylene	■ M20 x 1.5 ■ 1/2 NPT ■ 3/4 NPT	IP65	Screw-on lid	White	1/2 NPT	-
	BSZ <sup>4)</sup>	Aluminium	■ M20 x 1.5 ■ 1/2 NPT	IP65	Spherical, hinged cover with plug screw	Blue, painted <sup>1)</sup>	■ 1/2 NPT ■ M24 x 1.5	-
	BSZ-H <sup>3) 5)</sup>	Aluminium	■ M20 x 1.5 ■ 1/2 NPT	IP65	High hinged cover with plug screw	Blue, painted <sup>2)</sup>	■ 1/2 NPT ■ M24 x 1.5	-
	PIH-L	Aluminium	■ 1/2 NPT / closed ■ M20 x 1.5 / closed ■ 2 x 1/2 NPT ■ 2 x M20 x 1.5	IP66 <sup>3)</sup>	Screw-on lid, flat	Blue lid, painted Grey lower body, painted	■ 1/2 NPT ■ M20 x 1.5	-

International connection heads and cases								
Model		Material	Cable inlet thread size	Ingress protection (max.) <sup>1)</sup> IEC/EN 60529	Cap	Surface	Con- nection to neck tube	Dimen- sions in mm [in]
 PIH-H <sup>6)</sup>		Aluminium	<ul style="list-style-type: none"> <li>■ ½ NPT</li> <li>■ M20 x 1.5</li> <li>■ 2 x ½ NPT</li> <li>■ 2 x M20 x 1.5</li> </ul>	IP66 <sup>3)</sup>	Screw-on lid, high	Blue lid, painted Grey lower body, painted	<ul style="list-style-type: none"> <li>■ ½ NPT</li> <li>■ M20 x 1.5</li> </ul>	-

1) IP ingress protection of the connection head. The IP ingress protection of the complete TC90 instrument does not necessarily have to correspond to that of the connection head. Ingress protections, describing temporary or permanent immersion, on request

2) RAL 5022

3) Not permissible with Ex e

4) Not permissible with IECEx Ex e

5) With DIH10 or TND display, on request

6) With display as PIH-W version, on request




→ Further thread sizes on request

Connection head	Explosion protection				
	Without	Ex i (gas) Zone 0, 1, 2	Ex i (dust) Zone 20, 21, 22	Ex e (gas) Zone 1, 2	Ex t (dust) Zone 21, 22
Field case, plastic (ABS)	x	-	-	-	-
Field case, aluminium	x	x	x	x	x
BS	x	x	x	-	-
BSZ	x	x	x	x <sup>2)</sup>	x <sup>2)</sup>
BSZ-H	x	x	x	x <sup>2)</sup>	x <sup>2)</sup>
BSZ-H / DIH10 <sup>1)</sup>	x	x	-	-	-
BSZ-H/TND <sup>3)</sup>	x	x	x	-	-
BSS	x	x	-	-	-
BSS-H	x	x	-	-	-
BVS	x	x	-	-	-
BSZ-K	x	x	-	-	-
BSZ-HK	x	x	-	-	-
PIH-L / PIH-H <sup>1)</sup>	x	x	x	x	x

1) LED display, loop-powered indicator, a transmitter with 4 ... 20 mA interface is required for operation (e.g. WIKAT16)

2) Only ATEX

3) For operation of an LC display, a model T38 transmitter is required

Transmitter models	Model T16	Model T32	Model T38
Transmitter data sheet	TE 16.01	TE 32.04	TE 38.01
Figure			
Output			
4 ... 20 mA	x	x	x
HART® protocol	-	x	x
Input	<ul style="list-style-type: none"> <li>■ Type K</li> <li>■ Type J</li> <li>■ Type E</li> <li>■ Type N</li> <li>■ Type T</li> </ul>	<ul style="list-style-type: none"> <li>■ Type K</li> <li>■ Type J</li> <li>■ Type E</li> <li>■ Type N</li> <li>■ Type T</li> </ul>	<ul style="list-style-type: none"> <li>■ Type K</li> <li>■ Type J</li> <li>■ Type E</li> <li>■ Type N</li> <li>■ Type T</li> </ul>
Explosion protection	Ex version possible		

Possible mounting positions for transmitters	Model T16	Model T32	Model T38
BS	○	-	-
BSZ	○	○	○
BSZ-H	●	●	●
BSZ-H / DIH10	○	○	○
BSZ-H / TND	-	-	●
BSS	○	○	○
BSS-H	●	●	●
BVS	○	○	○
BSZ-K	○	○	○
BSZ-HK	●	●	●
KN4-A	○	○	○
1/4000	○	○	○
7/8000	○	○	○
7/8000 / DIH50	○	○	○
PIH-L / PIH-H	○	○	○
PIH-W	-	-	○

Legend:

- Mounted instead of terminal block
- Mounted within the cover of the connection head
- Mounting not possible

#### Functional safety version possible with model T38 temperature transmitter







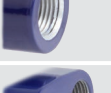





In safety-critical applications, the entire measuring chain must be taken into consideration in terms of the safety parameters. The SIL classification allows the assessment of the risk reduction achieved by the safety installations.

Selected TC90 thermocouples, in combination with a suitable temperature transmitter (e.g. model T38, TÜV-certified SIL version for protection systems developed in accordance with IEC 61508), are suitable as sensors for safety functions to SIL 2.

For SIL 3 applications, WIKA recommends the use of two individual TC90 with one SIL-certified T38 transmitter connected to each.

→ Functional safety: safety-relevant temperature measurement per IEC 61508 available at [www.wika.de](http://www.wika.de).

Cable inlet	Colour	Ingress protection (max.) IEC/EN 60529 <sup>1)</sup>	Cable inlet thread size	Min./Max. ambient temperature
 Standard cable inlet <sup>2)</sup>	Natural finish	IP65	■ M20 x 1.5 ■ ½ NPT	-40 ... +80 °C [-40 ... +176 °F]
 Plastic cable gland (cable Ø 6 ... 10 mm) <sup>2)</sup>	■ Black ■ Grey	IP66 <sup>1)</sup>	■ M20 x 1.5 ■ ½ NPT	-40 ... +80 °C [-40 ... +176 °F]
 Plastic cable gland (cable Ø 6 ... 10 mm), Ex e <sup>2)</sup>	■ Light blue ■ Black	IP66 <sup>1)</sup>	■ M20 x 1.5 ■ ½ NPT	■ -20 ... +80 °C [-4 ... +176 °F] ■ -40 ... +70 °C [-40 ... +158 °F]
 Nickel-plated brass cable gland (cable Ø 6 ... 12 mm)	Natural finish	IP66 <sup>1)</sup>	■ M20 x 1.5 ■ ½ NPT	-60 <sup>3)</sup> / -40 ... +80 °C [-76 / -40 ... +176 °F]
 Nickel-plated brass cable gland (cable Ø 6 ... 12 mm), Ex e	Natural finish	IP66 <sup>1)</sup>	■ M20 x 1.5 ■ ½ NPT	-60 <sup>3)</sup> / -40 ... +80 °C [-76 / -40 ... +176 °F]
 Stainless steel cable gland (cable Ø 7 ... 12 mm)	Natural finish	IP66 <sup>1)</sup>	■ M20 x 1.5 ■ ½ NPT	-60 <sup>3)</sup> / -40 ... +80 °C [-76 / -40 ... +176 °F]
 Stainless steel cable gland (cable Ø 7 ... 12 mm), Ex e	Natural finish	IP66 <sup>1)</sup>	■ M20 x 1.5 ■ ½ NPT	-60 <sup>3)</sup> / -40 ... +80 °C [-76 / -40 ... +176 °F]
 Plain threaded	-	IP00	■ M20 x 1.5 ■ ½ NPT	-
 2 x plain threaded <sup>4)</sup>	-	IP00	■ 2 x M20 x 1.5 ■ 2 x ½ NPT	-
 Sealing plugs for shipping	Transparent	-	■ M20 x 1.5 ■ ½ NPT	-40 ... +80 °C [-40 ... +176 °F]


- 1) IP ingress protection of the connection head. The IP ingress protection of the complete TC90 instrument does not necessarily have to correspond to that of the connection head. Ingress protections, describing temporary or permanent immersion, on request  
2) Not available for field cases, PIH, 1/4000, 5/6000, 7/8000  
3) Special version on request (explosion-protected versions only available with specific approvals)  
4) Only for BSZ-H connection head

Cable inlet	Explosion protection				
	Without	Ex i (gas) Zone 0, 1, 2	Ex i (dust) Zone 20, 21, 22	Ex e (gas) Zone 1, 2	Ex t (dust) Zone 21, 22
Standard cable inlet <sup>1)</sup>	x	x	-	-	-
Plastic cable gland <sup>1)</sup>	x	x	-	-	-
Plastic cable gland (light blue), Ex e <sup>1)</sup>	x	x	x	-	-
Plastic cable gland (black), Ex e <sup>1)</sup>	x	x	x	x	x
Brass cable gland, nickel-plated	x	x	x	-	-
Brass cable gland, nickel-plated, Ex e	x	x	x	x	x
Stainless steel cable gland	x	x	x	-	-
Stainless steel cable gland, Ex e	x	x	x	x	x
Plain threaded	x	x	x <sup>5)</sup>	x <sup>5)</sup>	x <sup>5)</sup>
2 x plain threaded <sup>2)</sup>	x	x	x <sup>5)</sup>	x <sup>5)</sup>	x <sup>5)</sup>
Junction box M12 x 1 (4-pin) <sup>3)</sup>	x	x <sup>4)</sup>	x <sup>4)</sup>	-	-
Sealing plugs for shipping	Not applicable, transport protection <sup>5)</sup>				

- 1) Not available for BVS connection head  
2) Only for BSZ-H connection head  
3) Not available for ½ NPT thread size cable entry  
4) With appropriate mating connector connected  
5) Suitable cable gland required for operation



**Lead ends**

Version	Illustration	
End splices		<p>With end splices</p> <p>Cable and probe are permanently connected to each other. Cable length and insulation materials to customer specification. Number of leads dependent on the number of sensors and the sensor connection method, bare wire ends</p>

**Bend protection**

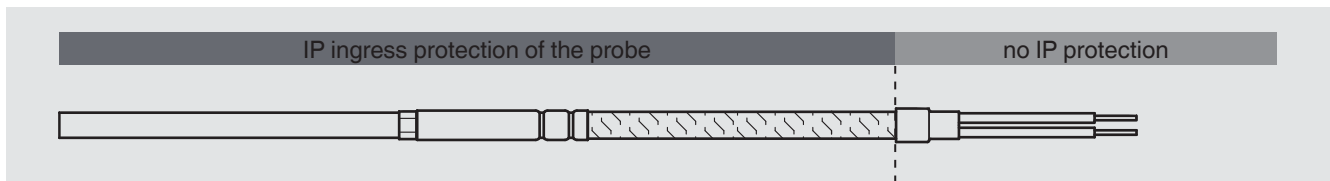
A bend protection (spring) is used to protect the transition point from rigid probe to flexible connection lead. This should always be used when a relative movement between the connection lead and the thermometer mounting is expected. For designs to Ex e, the use of bend protection is mandatory.



Bend protection spring

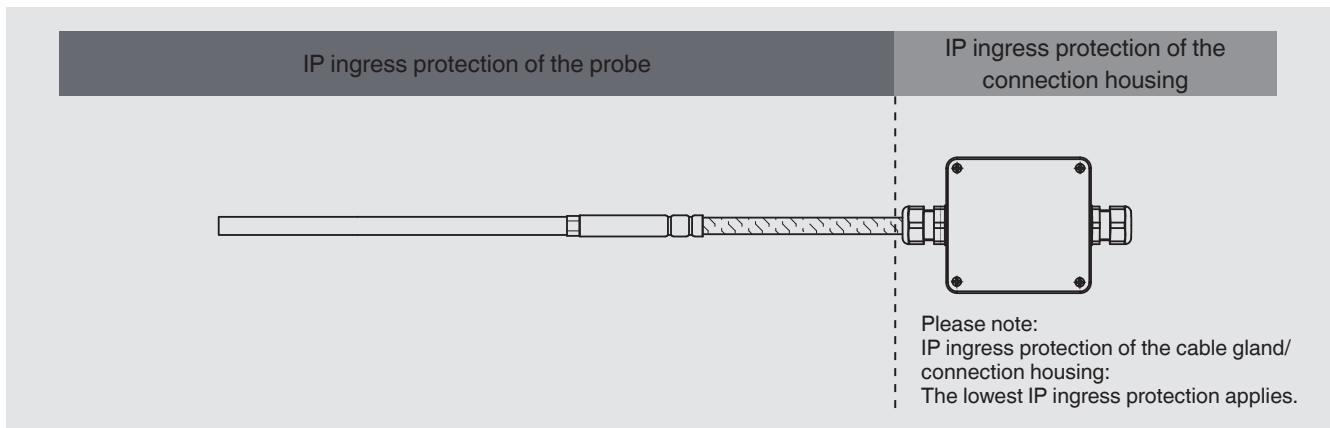
**Classification of the IP ingress protection zones of the sensor**

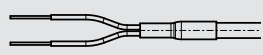
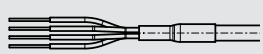
Version with connection cable



- Version with connector, on request
- For connection cables, see page 15

Version with connection housing, fitted at the cable end



Version with connection cable <sup>1)</sup>	
Cable ends	Polarity
	+
	-
	+
	-
	+
	-

1) See table „Colour code of cable“

## Colour code of cable

Sensor type	Standard	Thermocouple cable, compensating cable		
		Outer sheath	Positive	Negative
K	IEC 60584-3	Green	Green	White
J	IEC 60584-3	Black	Black	White
E	IEC 60584-3	Violet	Violet	White
T	IEC 60584-3	Brown	Brown	White
N	IEC 60584-3	Pink	Pink	White

Sensor type	Standard	Thermocouple cable			Compensating cable		
		Outer sheath	Positive	Negative	Outer sheath	Positive	Negative
K	ASTM E230	Brown	Yellow	Red	Yellow	Yellow	Red
J	ASTM E230	Brown	White	Red	Black	White	Red
E	ASTM E230	Brown	Violet	Red	Violet	Violet	Red
T	ASTM E230	Brown	Blue	Red	Blue	Blue	Red
N	ASTM E230	Brown	Orange	Red	Orange	Orange	Red

→ For further information on colour codes, see technical information IN 00.23 at [www.wika.com](http://www.wika.com).

Operating conditions		
Process temperature	Sheath material Ni alloy: alloy 600	To 1,200 °C [2,192 °F] (air)
	Sheath material stainless steel	To 850 °C [1,562 °F] (air)
Storage temperature range	■ -40 ... +80 °C [-40 ... +176 °F]	
	■ -60 °C [-76 °F]	
	→ Others on request	

## IP ingress protection per IEC/EN 60529

First index number	Degree of protection / Short description	Test parameters
<b>Degrees of protection against solid foreign bodies (defined by the 1st index number)</b>		
5	Dust-protected	Per IEC/EN 60529
6	Dust-tight	Per IEC/EN 60529
<b>Degrees of protection against water (defined by the 2nd index number)</b>		
4	Protected against splash water	Per IEC/EN 60529
5	Protected against water jets	Per IEC/EN 60529
6	Protected against strong water jets	Per IEC/EN 60529
7 <sup>1)</sup>	Protected against the effects of temporary immersion in water	Per IEC/EN 60529
8 <sup>1)</sup>	Protected against the effects of permanent immersion in water	As agreed upon


1) Ingress protections, describing temporary or permanent immersion, on request.

Standard ingress protection of the model TC90 is IP65.






The specified degrees of protection apply under the following conditions:







- Use of a suitable cable gland
- Use of a cable cross-section appropriate for the gland or select the appropriate cable gland for the available cable
- Adhere to the tightening torques for all threaded connections

## Approvals

Logo	Description	Region
	<b>EU declaration of conformity</b>	European Union
	Pressure Equipment Directive (TC90-xxxx-C, if DN >25)	
	RoHS directive	

### Optional approvals

Logo	Description	Country
	<b>EU declaration of conformity</b> ATEX directive Hazardous areas - Ex i Zone 0 gas II 1G Ex ia IIC T1 ... T6 Ga Zone 1 gas II 2G Ex ia IIC T1 ... T6 Gb Zone 1 mounting to zone 0 gas II 1/2G Ex ia IIC T1 ... T6 Ga/Gb Zone 20 dust II 1D Ex ia IIIC T125 ... T65 °C Da Zone 21 dust II 2D Ex ia IIIC T125 ... T65 °C Db Zone 21 mounting to zone 20 dust II 1/2D Ex ia IIIC T125 ... T65 °C Da/Db - Ex e <sup>1)</sup> Zone 1 gas II 2G Ex eb IIC T1 ... T6 Gb <sup>3)</sup> Zone 2 gas II 3G Ex ec IIC T1 ... T6 Gc X - Ex t <sup>1)</sup> Zone 21 dust II 2D Ex tb IIIC TX °C Db <sup>3)</sup> Zone 22 dust II 3D Ex tc IIIC TX °C Dc X	European Union
	<b>IECEX</b> Hazardous areas - Ex i Zone 0 gas Ex ia IIC T1 ... T6 Ga Zone 1 gas Ex ia IIC T1 ... T6 Gb Zone 1 mounting to zone 0 gas Ex ia IIC T1 ... T6 Ga/Gb Zone 20 dust Ex ia IIIC T125 ... T65 °C Da Zone 21 dust Ex ia IIIC T125 ... T65 °C Db Zone 21 mounting to zone 20 dust Ex ia IIIC T125 ... T65 °C Da/Db - Ex e <sup>2)</sup> Zone 1 gas Ex eb IIC T1 ... T6 Gb <sup>3)</sup> Zone 2 gas Ex ec IIC T1 ... T6 Gc - Ex t <sup>2)</sup> Zone 21 dust Ex tb IIIC TX °C Db <sup>3)</sup> Zone 22 dust Ex tc IIIC TX °C Dc	International
	<b>Ex Ukraine</b> Hazardous areas - Ex i Zone 0 gas II 1G Ex ia IIC T1 ... T6 Ga Zone 1 gas II 2G Ex ia IIC T1 ... T6 Gb Zone 1 mounting to zone 0 gas II 1/2G Ex ia IIC T1 ... T6 Ga/Gb Zone 20 dust II 1D Ex ia IIIC T65°C Da Zone 21 dust II 2D Ex ia IIIC T65°C Db Zone 21 mounting to zone 20 dust II 1/2D Ex ia IIIC T65°C Da/Db	Ukraine
	<b>INMETRO</b> Hazardous areas - Ex i Zone 0 gas Ex ia IIC T3 ... T6 Ga Zone 1 mounting to zone 0 gas Ex ia IIC T3 ... T6 Ga/Gb Zone 20 dust Ex ia IIIC T125 ... T65 °C Da Zone 21 mounting to zone 20 dust Ex ia IIIC T125 ... T65 °C Da/Db	Brazil
	<b>CCC <sup>3)</sup></b> Hazardous areas - Ex i Zone 0 gas Ex ia IIC T1 ... T6 Ga Zone 1 gas Ex ia IIC T1 ... T6 Gb Zone 1 mounting to zone 0 gas Ex ia IIC T1 ... T6 Ga/Gb Zone 20 dust Ex ia IIIC T <sub>200</sub> 65°C/T <sub>200</sub> 95°C/T <sub>200</sub> 125°C Da Zone 21 dust Ex ia IIIC T65°C/T95°C/T125°C Db Zone 21 mounting to zone 20 dust Ex ia IIIC T <sub>200</sub> 65°C/T <sub>200</sub> 95°C/T <sub>200</sub> 125°C Da/Db Zone 21 dust Ex ib IIIC T65°C/T95°C/T125°C Db - Ex e <sup>2)</sup> Zone 1 gas Ex eb IIC T1 ... T6 Gb Zone 2 gas Ex ec IIC T1 ... T6 Gc	China

Logo	Description	Country
	<b>NEPSI 4)</b> Hazardous areas - Ex i Zone 0 gas Ex ia IIC T1 ~ T6 Ga Zone 1 gas Ex ia IIC T1 ~ T6 Gb Zone 1 mounting to zone 0 gas Ex ia IIC T1 ~ T6 Ga/Gb Zone 20 dust Ex iaD 20 T125...T65°C Zone 21 dust Ex iaD 21 T125...T65°C Zone 21 mounting to zone 20 dust Ex iaD 20/21 T125...T65°C	China
	<b>KCs</b> Hazardous areas - Ex i Zone 0 gas Ex ia IIC T4 ... T6 Zone 1 gas Ex ib IIC T4 ... T6	South Korea
-	<b>PESO</b> Hazardous areas - Ex i Zone 0 gas Ex ia IIC T1 ... T6 Ga Zone 1 gas Ex ia IIC T1 ... T6 Gb Zone 1 mounting to zone 0 gas Ex ia IIC T1 ... T6 Ga/Gb	India
	<b>EAC</b> Hazardous areas - Ex i Zone 0 gas 0 Ex ia IIC T6 ... T1 Ga X Zone 1 gas 1 Ex ia IIC T6 ... T1 Gb X Zone 20 dust Ex ia IIIC T80 ... T440 °C Da X Zone 21 dust Ex ia IIIC T80...T440 °C Db X	Eurasian Economic Community
	<b>PAC Ukraine</b> Metrology, measurement technology	Ukraine
	<b>PAC Kazakhstan</b> Metrology, measurement technology	Kazakhstan
-	<b>MchS</b> Permission for commissioning	Kazakhstan
	<b>PAC Uzbekistan</b> Metrology, measurement technology	Uzbekistan

- 1) Only for connection head model BSZ, BSZ-H, 1/4000, 5/6000 or 7/8000 (see "Connection head")
- 2) Only with connection head, model 1/4000, 5/6000 or 7/8000 (see "Connection head")
- 3) Only without transmitter
- 4) Only with transmitter

## Manufacturer's information and certificates

Logo	Description
	<b>SIL 2</b> Functional safety
-	<b>China RoHS directive</b>

## Test report

Test report	
Pressure test	Each model TC90 high-pressure thermocouple is subjected to 1.5 x PN or a hydrostatic pressure test to customer specification, with test pressures to a max. 5,400 bar (78,320 psi). Furthermore, for example, liquid penetrant inspection of surfaces or X-ray testing of components are possible in accordance with national or international standards (performance, evaluation).

## Certificates

Certificates	
<b>Certificates</b>	<ul style="list-style-type: none"> <li>■ 2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, material proof, indication accuracy)</li> <li>■ 3.1 inspection certificate per EN 10204 (e.g. material proof for wetted metal parts, indication accuracy, calibration certificate)</li> </ul>
<b>Calibration</b>	DAkKS calibration certificate (traceable and accredited in accordance with ISO/IEC 17025), depending on the selected design and probe size
<b>Recommended calibration interval</b>	1 year (dependent on conditions of use)

## Dimensions

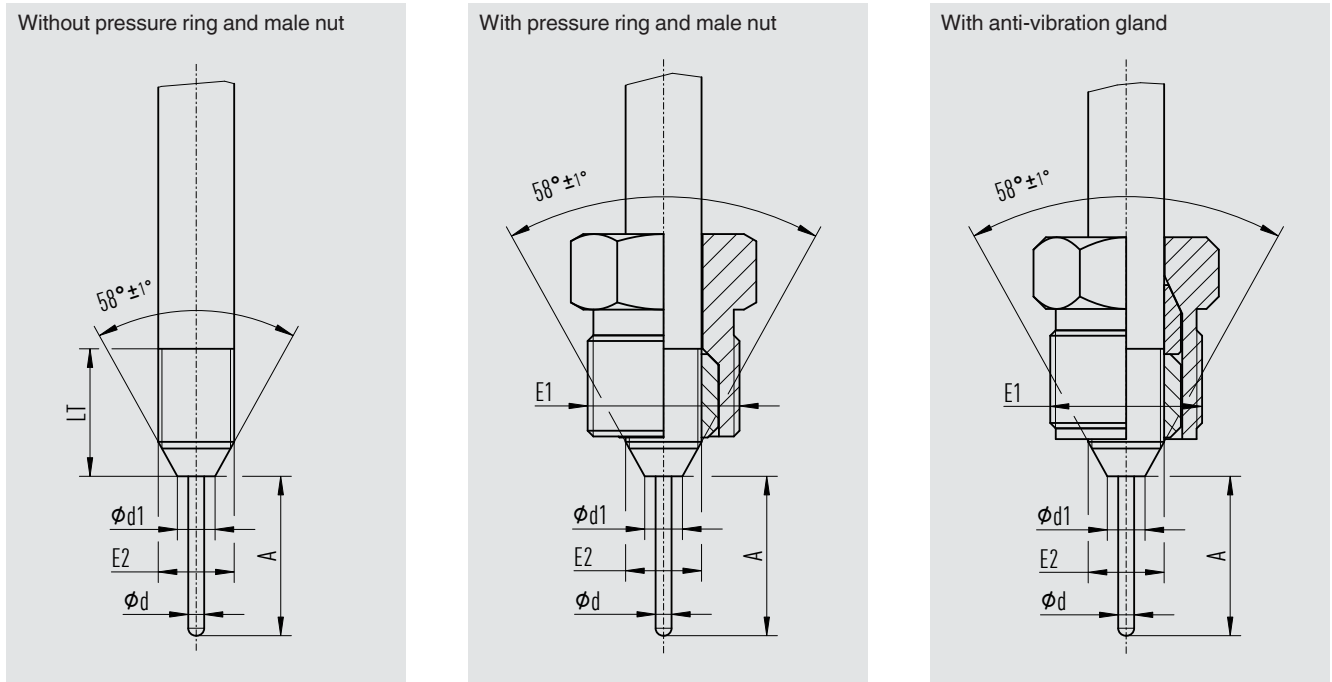
Each TC90 high-pressure thermocouple is designed and manufactured in accordance with individual customer specifications. The specifications contained in the tables are not binding and only constitute examples.

The responsibility for the tolerance and durability of the materials with the medium lies with the operator.

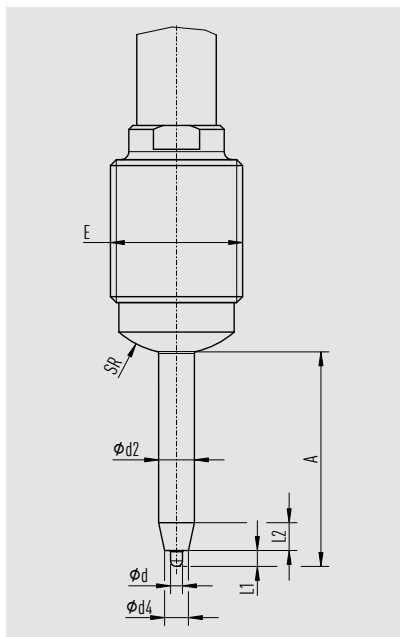
### Legend

E	Pressure flange thread	Ø d2	Support tube diameter	LT	Length of sealing bolt thread
E1	Male nut thread	Ø d3	Outer diameter	L1	Thermocouple length
E2	Pressure ring thread	Ø d4	Cone diameter	L2	Cone length
SR	Lens-type sealing ring radius	Ø d5	Lens-type sealing ring diameter	W	Cable length
Ø d	Thermocouple diameter	Ø d6	Inner diameter	L	Length of the stranded wire
Ø d1	Sealing cone tip diameter	A	Insertion length		

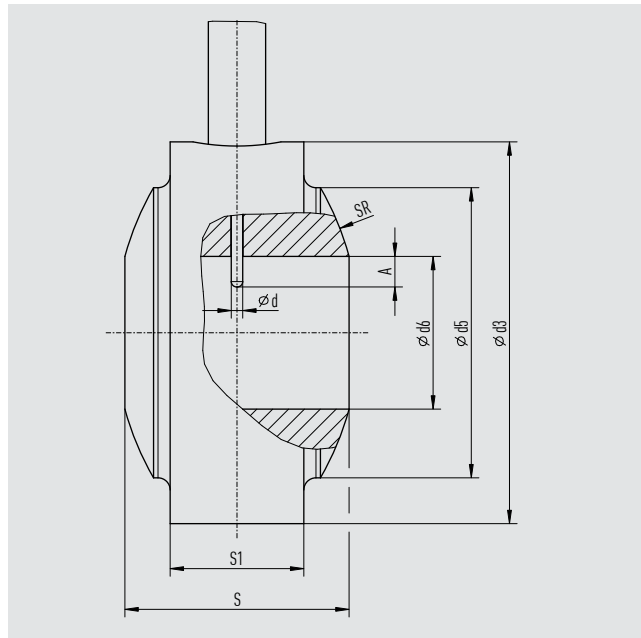
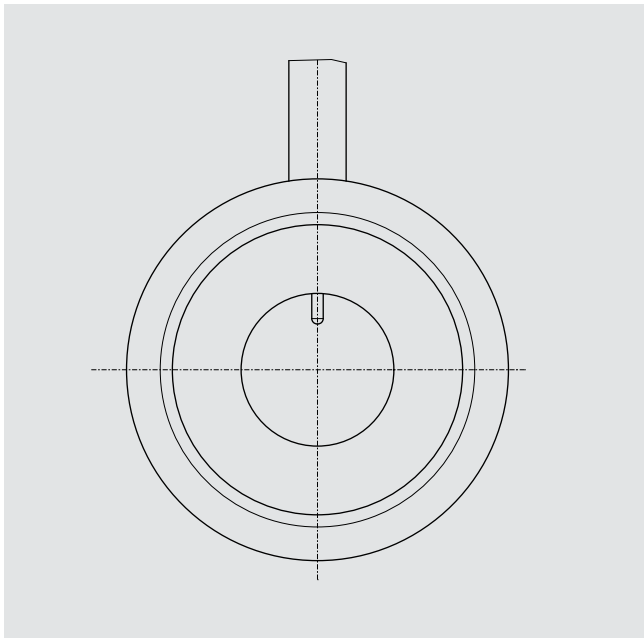
### Version TC90-xxxx-A, high-pressure thermocouple with long threads, up to 4,500 bar [66,268 psi]



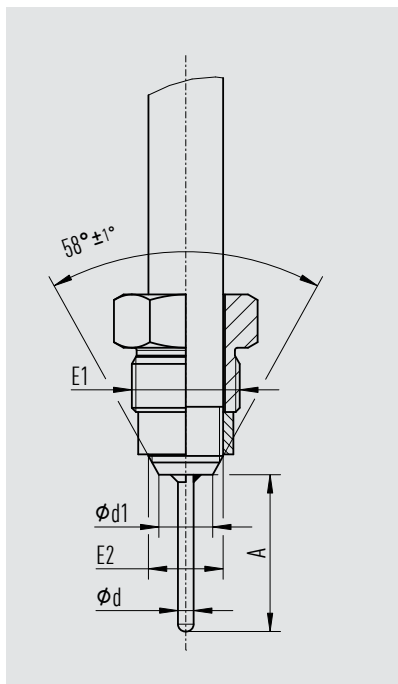
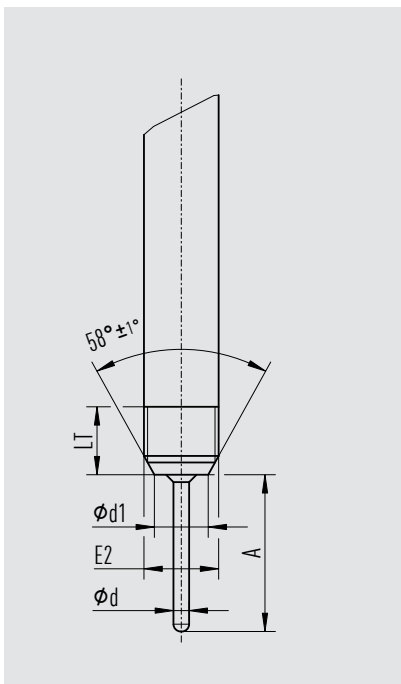
### Version TC90-xxxx-B, high-pressure thermocouple for pressure flanges up to 4,500 bar [66,268 psi]



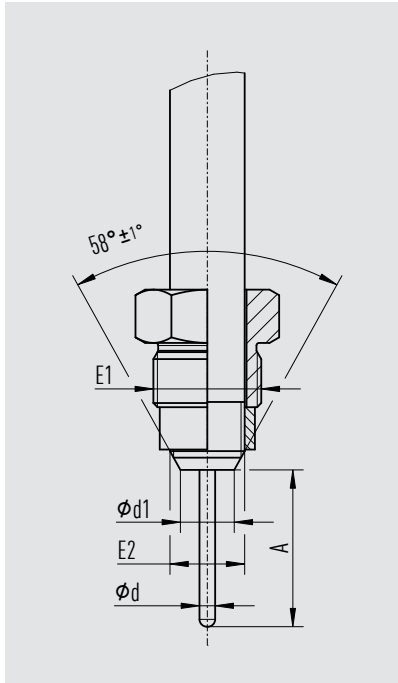
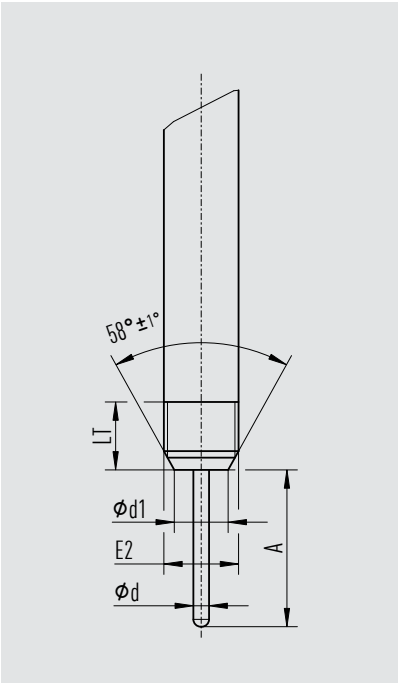
**Version TC90-xxxx-C, high-pressure thermocouple with lens-type sealing ring or sealing cone up to 4,500 bar [66,268 psi]**



**Version TC90-xxxx-H, medium-pressure thermocouple with short threads up to 1,550 bar [22,481 psi] (hydrogen version)**

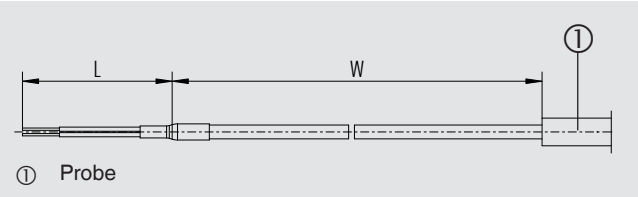


Version TC90-xxxx-S, medium-pressure thermocouple with short threads up to 1,550 bar [22,481 psi]

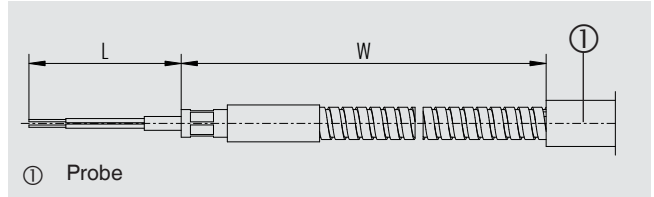


With connection cable

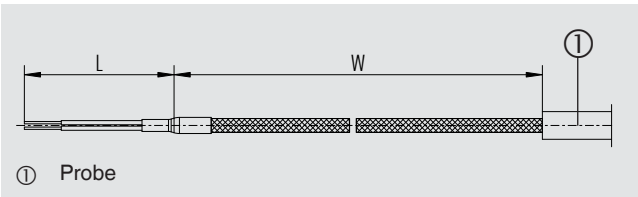
Standard version



Connection cable with protective metal armouring



Connection cable with stainless steel braid



### Ordering information

Model / Version / Connection cable / Nominal pressure / Medium temperature / Number of thermocouples / Class accuracy / Hot junction / Neck tube / Transition sleeve / Connection cable / Jacket / Cable version / Lead end / Shielding / Process connection / Material / Male nut / Sealing contour / Male nut / Support tube / Sensor diameter / Sheath material / Neck length / Insertion length / Cable length / Stranded wire length / Options

To order the described product the order number is sufficient.

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