

# CeraTEMP 80

## Straight Thermocouple Temperature Sensors with Ceramic or Steel Protective Tube

- Thermocouple J, K, R, S, B (wire Ø 0.5, 1, 2 or 3 mm)
- Measuring range -40 to +900 °C (J), -40 to +1200 °C (K), 0 to 1600 °C (R, S) 300 to 1800 °C (B)
- Accuracy class 1, 2, 3 according to EN 60584-2
- Head form A, B according to DIN
- Protective tube material of stainless steel DIN 1.4841, X8CrTi25, DIN 1.4767, ceramics SiC, C530, C610, C799, SAPPHIRE
- Selectable protective tube length
- Mounting temperature sensor by means of Fixing Shift Pipe Union or Flange
- Housing IP 53
- Optional headmounted programmable transmitter with output 4 to 20 mA, including circuit isolation version and II 1G EEx ia IIC T4 ... T6 (ATEX) version



### Application

The thermoelectric temperature sensors T1580 are meant for remote temperature measuring in furnaces and incinerators. These sensors are meant for installation on walls of furnaces and other technological devices. The sensors can be supplied with transmitter of output signal from 4 up to 20 mA, HART, Fiedbus, Profibus embedded into the cover of sensor head.

### Description

Single and double wired thermocouple of the „J“, „K“, „R“, „S“, „B“-type is bedded in insulating bead or in ceramic capillary and in protective metal tube or in one, possibly in two protective tubes, made of ceramic or sapphire. The free leads of thermocouple are connected onto terminal box in head of type A or B. The appearance of thermoelectric voltage whose size's depended on the difference of temperatures on the measuring and comparative ends of thermocouple is used for temperature measuring. The thermoelectric voltage is furthermore converted into unitized linearized current signal of 4 up to 20 mA (possibly with protocol HART, Fiedbus, Profibus) at sensors with converter. The sensors are assembled with adjusting mounting flange or adjusting fixing union.

### Technical Specifications

#### Thermocouple:

- „J“ (NiCr-CuNi) accuracy class 2 according to EN 60584-2
- „K“ (NiCr-NiAl) accuracy class 2 according to EN 60584-2
- „R“ (PtRh 13-Pt) accuracy class 1, 2 according to EN 60584-2
- „S“ (PtRh10-Pt) accuracy class 1, 2 according to EN 60584-2
- „B“ (PtRh30-PtRh6) accuracy class 2, 3 according to EN 60584-2

#### Sensor Measuring Range:

according to the used thermocouple and material of protective tubes - see the ordering table

**Output signal:** linearized 4 to 20 mA <sup>1)</sup>

**Dielectric Strength:** 500 V eff

**Diameter of thermocouple:** „J“, „K“ 1, 2, 3 mm  
„R“, „S“, „B“ 0.5 mm

#### Used materials:

- head - aluminium alloy
- supporting tube
  - steel cl. 11
  - stainless steel 1.4541
- protective tubes
  - heat-resisting steel X8CrTi25 (for oxidation and reduction environment containing sulphur)
  - heat-resisting steel 1.4841 (for mediums of high nitrogen content with low content of O<sub>2</sub>)
  - 1.4767 (for higher medium temperatures up to 1400°C)
  - ceramics C530, C610 (max. to 1500 °C), C799 (max. to 1700 °C)
  - SAPPHIRE (for glass furnaces with production of lead or coloured glass, max. to 2000°C)
  - silicon carbide SiC (for special applications, melts of non-ferrous metals, incinerators, etc., max. to 1600°C)
- insulating bead, capillary
  - ceramics C610, C799, SAPPHIRE

<sup>1)</sup>... Only for sensor with transmitter

# Straight Thermocouple Temperature Sensors with Ceramic or Steel Protective Tube CeraTEMP 80

## Typical Composition of Ceramics:

C610 60 % Al<sub>2</sub>O<sub>3</sub>  
 C799 99.7 % Al<sub>2</sub>O<sub>3</sub>

## Porosity of Ceramics:

C530 2 μm  
 C610, C799 No porosity

Housing: IP 53

## Operation conditions

### Maximal Temperature of Head:

150 °C (without transmitter, head type A)  
 100 °C (without transmitter, head type B)  
 80 °C (with transmitter PT-031 and P3301)  
 85 °C (with transmitter P5102, P5201, P5310)

## Other specifications

### Caution!

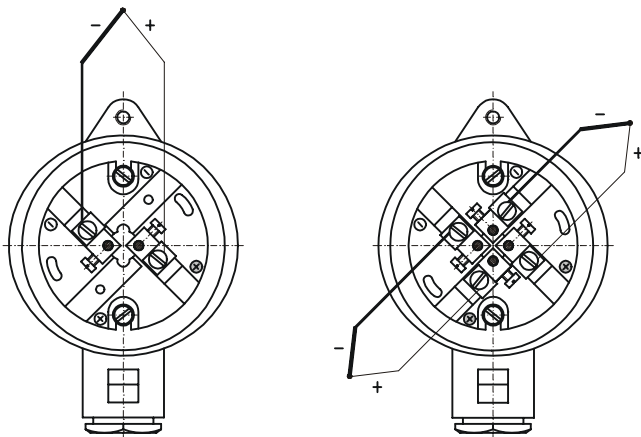
If the temperature sensor is being installed or replaced in operation it is necessary to insert it into a furnace tube gradually (see table) so as to prevent the ceramic protective tubes from cracking because of the heat stress caused by a rapid temperature change.

Working Temperature [°C]		1200	1400	1600
Speed [mm/min]	Outside Diameter of Tube Δ 15 mm	200	60	20
	Outside Diameter of Tube 3 24 mm	50	20	10

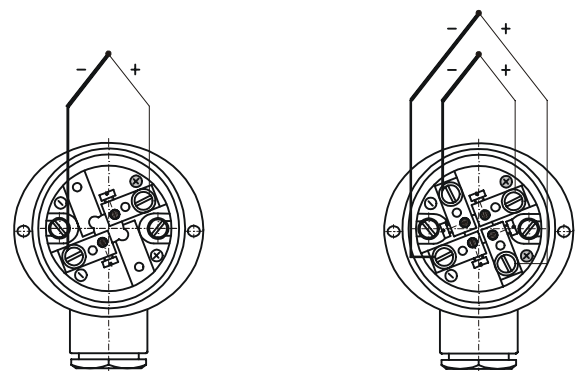
If it is impossible to provide recommended velocity of shifting, sensors have to be slowly and evenly pre-heating.

## Electrical Connections

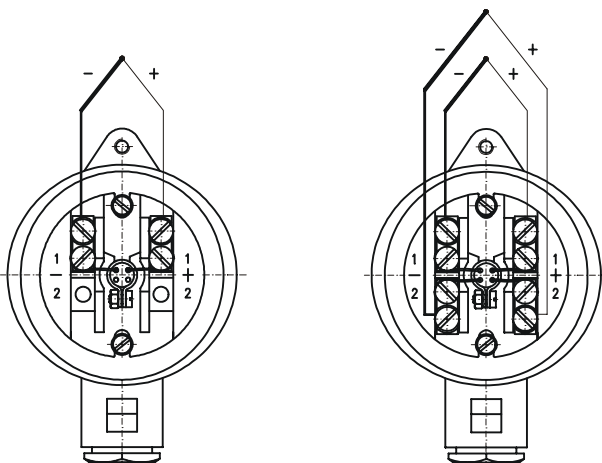
Head A-type - version with thermocouple "J", "K", diameter of lines 2 and 3 mm



Head B-type - version C107, S088



Head A-type - version with thermocouple "R", "S", "B", diameter of lines 0,5 mm and "J", "K", diameter of lines 1 mm

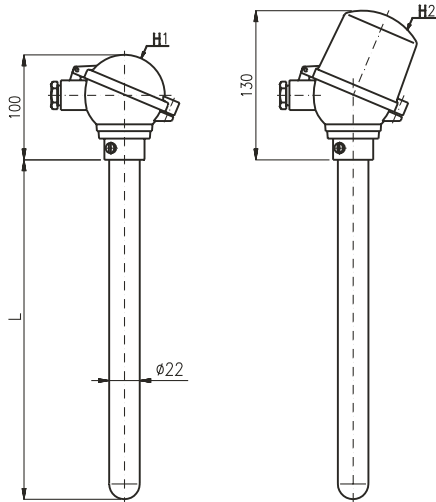


The terminals with connected positive lines are marked according to DIN 43 722:

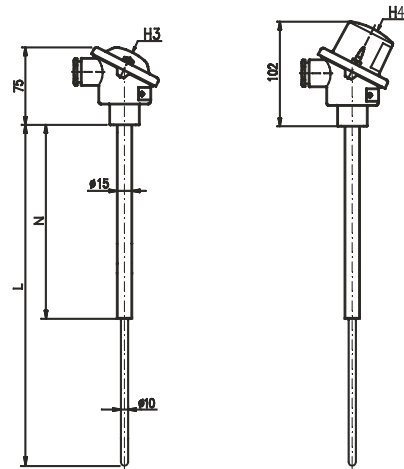
"J" black  
 "K" green  
 "R" orange  
 "S" orange  
 "B" gray

**Dimensional Drawings**

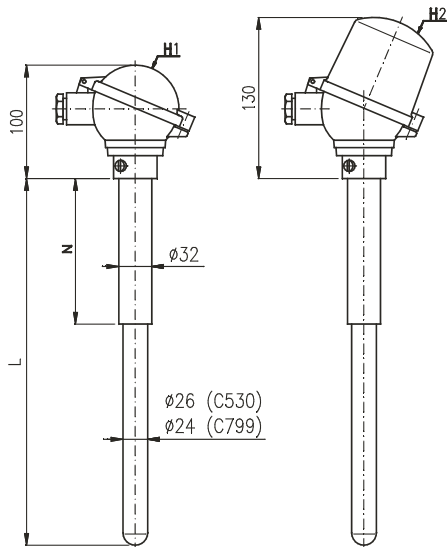
**K222, K223, K223Z, K224, K222C, K223C, K224C**



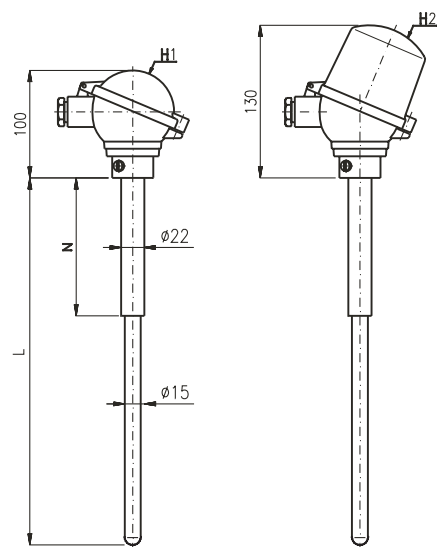
**C107**



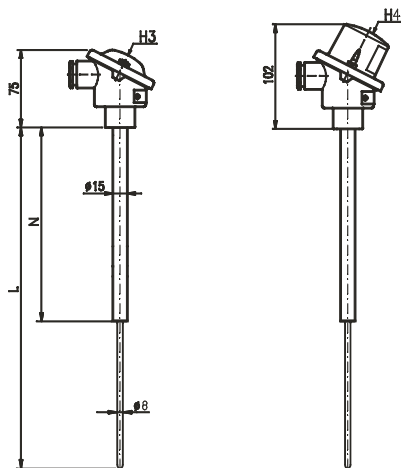
**C247, C265, C247S, C265S, C26H, C26HS**



**C156, C157, C156S, C157S**



**S088**



# Straight Thermocouple Temperature Sensors with Ceramic or Steel Protective Tube CeraTEMP 80

Type	Popis						
o T1580 →	<b>Straight Thermocouple Temperature Sensors CeraTEMP 80 with Ceramic or Steel Protective Tube</b>						
Code	Thermocouple Type, Measuring End Style	Measuring Range	Max. Temperature Recommended for Continuous Operation				
o 21	1x"J" (Fe-CuNi), Insulated	-40 až +900 °C	+700 °C (+600 °C for Diameter Legs 1 mm)				
o 61	2x"J" (Fe-CuNi), Insulated, Isolated Junctions	-40 až +900 °C	+700 °C (+600 °C for Diameter Legs 1 mm)				
o 22	1x"K" (NiCr-NiAl), Insulated	-40 až +1200 °C	+1000 °C (+800 °C for Diameter Legs 1 mm)				
o 62	2x"K" (NiCr-NiAl), Insulated, Isolated Junctions	-40 až +1200 °C	+1000 °C (+800 °C for Diameter Legs 1 mm)				
25	1x"R" (PtRh13-Pt), Insulated	0 až +1600 °C	+1300 °C				
65	2x"R" (PtRh13-Pt), Insulated, Isolated Junctions	0 až +1600 °C	+1300 °C				
o 26 →	1x"S" (PtRh10-Pt), Insulated	0 až +1600 °C	+1300 °C				
o 66	2x"S" (PtRh10-Pt), Insulated, Isolated Junctions	0 až +1600 °C	+1300 °C				
o 28	1x"B" (PtRh30-PtRh6), Insulated	+300 až +1800 °C	+1600 °C				
o 68	2x"B" (PtRh30-PtRh6), Insulated, Isolated Junctions	+300 až +1800 °C	+1600 °C				
99	Other						
Code	Accuracy Class according to EN 60584-2						
6	1 (Selectable, only for Thermocouple "R", "S")						
o 7 →	2 (Standard for Thermocouple "J", "K", "R", "S")						
o 8	3 (Standard for Thermocouple "B")						
9	Other						
ARMATURE VERSION							
Code	Protective Tube - Outside / Inside // Second Inside		Material Capillary	Diameter Legs Thermocouple [mm]		Support Tube Diameter [mm]	Temperature Resistance of Protective Tubes <sup>1</sup>
	Outside Diameter x Wall [mm]	Material		R;S;B	J;K (1x/2x)		
o K222	22x2	Steel X8CrTi25	Ceramics C610	-	3 / 3	-	do +1100 °C
o K223	22x2	Steel 1.4841	Ceramics C610	-	3 / 3	-	do +1100 °C
K223Z	22x4	Steel 1.4841	Ceramics C610	-	3 / 2	-	do +1100 °C
K224	22x2	1.4767	Ceramics C610	-	3 / 3	-	do +1400 °C
o K222C	22x2 / 15x2	Steel X8CrTi25 / Ceramics C610	Ceramics C610	0,5	3 / 2	-	do +1100 °C
o K223C	22x2 / 15x2	Steel 1.4841 / Ceramics C610	Ceramics C610	0,5	3 / 2	-	do +1100 °C
K224C	22x2 / 15x2	Steel 1.4767 / Ceramics C610	Ceramics C610	0,5	3 / 2	-	do +1400 °C
o C107	10x1,5	Ceramics C799	Ceramics C799	0,5	1 / 1	15	do +1700 °C
o C156	15x2	Ceramics C610	Ceramics C610	0,5	3 / 2	22	do +1600 °C
o C157	15x2,5	Ceramics C799	Ceramics C799	0,5	3 / 2	22	do +1700 °C
o C247 →	24x3 / 15x2,5	Ceramics C799 / C799	Ceramics C799	0,5	3 / 2	32	do +1700 °C
o C265	26x4 / 15x2	Ceramics C530 / C610	Ceramics C610	0,5	3 / 2	32	do +1500 °C
C26H	26x5 / 15x2	Ceramics SiC / C799	Ceramics C799	0,5	3 / 2	32	do +1600 °C
C156S	15x2 / 4,8x0,7	Ceramics C610 / SAPPHIRE	SAPPHIRE	0,5	-	22	do +1600 °C
C157S	15x2,5 / 4,8x0,7	Ceramics C799 / SAPPHIRE	SAPPHIRE	0,5	-	22	do +1700 °C
C247S	24x3 / 15x2,5 // 4,8x0,7	Ceramics C799 / C799 // SAPPHIRE	SAPPHIRE	0,5	-	32	do +1700 °C
C265S	26x4 / 15x2 // 4,8x0,7	Ceramics C530 / C610 // SAPPHIRE	SAPPHIRE	0,5	-	32	do +1500 °C
C26HS	26x5 / 15x2 // 4,8x0,7	Ceramics SiC / C799 // SAPPHIRE	SAPPHIRE	0,5	-	32	do +1600 °C
S088	8x1,5	SAPPHIRE	SAPPHIRE	0,5	-	15	do +2000 °C
C999	Other						
Code	Nominal Length L [mm]						
o L180	180						
o L250	250						
o L350	350						
o L500	500						
o L700 →	700 - not for C107						
o L800	800 - not for C107						
o L1000	1000 - not for C107						
o L1400	1400 - not for C107						
o L1600	1600 - not for C107 and All Armatures with SAPPHIRE, Diameter 4,8 mm						
L2000	2000 - not for C107 and All Armatures with SAPPHIRE						
L ...	Other Length Give at mm						
Code	Head						
o H1 →	Type A, Al Alloy, Cable Outlet M20x1,5, IP 53 - not for C107, S088						
o H2 <sup>2</sup>	Type A, with High Cap for Mounting of Transmitter into Cap Ø 62 mm, Al Alloy, Cable Outlet M20x1,5, IP 53 - not for C107, S088						
o H3 <sup>2</sup> →	Type B, Al Alloy, Cable Outlet M20x1,5, IP 53 - for C107, S088						
o H4 <sup>2</sup>	Type B, with High Cap for Mounting of Transmitter into Cap Ø 62 mm, Al Alloy, Cable Outlet M20x1,5, IP 53 - for C107, S088						
H9	Other						
Code	Support Tube Length N [mm]	ONLY FOR VERSION WITH SUPPORT TUBE!					
o N080	80 (Standard for Length L 180 mm)						
o N150	150 (Standard for Length L 250 and 350 mm)						
o N200 →	200 (Standard for Length L 500, 700 and 800 mm)						
o N300	300						
o N400	400 (Standard for Length L 1000, 1400, 1600 and 2000 mm)						
N ...	Other Length Give at mm						
Code	Material Support Tube						
o M1 →	Steel class 11, Varnished - not for Armature Code C107 and S088						
o M2	Stainless Steel 1.4541						
M9	Other						
OPTIONAL ACCESSORIES							
Code	Calibration						
o KTE3 →	Single Sensor Calibrated in Three Point Defined of Customer (0 to 1100 °C)						
KTE9	Other						
Code	Fixing Flanges and Fitting						
o UP02	Fixing Shift Flange for Diameter 15 mm (See Data Sheet No. 126)						
o UP03	Fixing Shift Flange for Diameter 22 mm (See Data Sheet No. 126)						
o UP04 →	Fixing Shift Flange for Diameter 32 mm (See Data Sheet No. 126)						
o UPS15M27	Fixing Shift Pipe Union for Diameter 15 mm, Connecting Thread M27x2 (See Data Sheet No. 126)						
o UPS20M30	Fixing Shift Pipe Union for Diameter 20 mm, Connecting Thread M30x2 (See Data Sheet No. 126)						
o UPS22M33	Fixing Shift Pipe Union for Diameter 22 mm, Connecting Thread M33x2 (See Data Sheet No. 126)						
P9	Other						
Example of Order: T1580 267 C247 L700 H1 N200 M1 KTE3 UP04							

o ... marked Version can be Dispatched up to 5 Working Days

<sup>1</sup> ... effective temperature resistance of protective tube is affected other process parameters (aggressivity, flow speed and abrasive of measuring medium, temperature shocks, vibrations etc.)

<sup>2</sup> ... temperature of head with transmitter inside should not exceed 80 or 85 °C according to transmitter type