CeraTEMP® 80

Straight Thermocouple Temperature Sensors with Metal, Ceramic or Sapphire Protective Tube without/with Transmitter

- **Wire thermocouple 1x / 2x “J“, “K“, “R“, “S“, “B“ with diameter legs 0.5, 1, 2 nebo 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 IEC 584-2**
- **Protective tube material stainless steel 1.4541, 1.4845, 1.4762, KANTHAL AF, ceramics SiC, C530, C610, C799, sapphire**
- **Optional length of protective tube**
- **Mounting of temperature sensor by fixing shift pipe union or flange**
- **Housing IP 53, IP 65**
- **Optional headmounted transmitter with output 4 to 20 mA, HART, Profibus, Fieldbus, including version with galvanic isolation and intrinsically safe version**

Application

Straight thermocouple temperature sensors CeraTEMP® 80 are designed for remote temperature measurement in furnaces and incinerators and other technological devices. These sensors are mounted on walls of furnaces by fixing shift pine union or flange.
The sensors can be supplied with transmitter of output signal from 4 to 20 mA, HART, Profibus, Fiedbus embedded into the lid of sensor head (code H2 and H4).

Description

CeraTEMP® 80 sensors are based on single or double wire thermocouple placed in insulating ceramic bead or in ceramic capillary. Thermocouples are in this form placed into inner ceramic and outer metallic protective tube, possibly in two ceramic protective tubes or another combination of one to three protective tubes, including ceramic tubes with platinum coat. Cold junctions of thermocouples are connected to a terminal block in the head type A or B, serving to connection of compensating or extension wiring.
There is made use of rise of thermoelectric voltage. Its size depends on a temperature difference between a measuring junction and a cold junction of the thermocouple. At sensors with transmitter is output thermocouple signal further transformed to linearized unified current signal 4 to 20 mA, optionally to HART, Profibus, Fieldbus output.

Technical specifications

Thermocouple:

“J“ (Fe-CuNi) accuracy class 2 acc. to IEC 584-2
“K“ (NiCr-NiAl) accuracy class 2 acc. to IEC 584-2
“R“ (PtRh13-Pt) accuracy class 1, 2 acc. to IEC 584-2
“S“ (PtRh10-Pt) accuracy class 1, 2 acc. to IEC 584-2
“B“ (PtRh30-PtRh6) accuracy class 2, 3 acc. to IEC 584-2

Measuring range:

according to used thermocouple and protective tube material (see ordering table)

Output signal:

without transmitter voltage
with transmitter linearized 4 to 20 mA
other after agreement

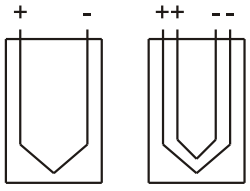
Dielectric strength:

500 V eff

Thermocouple wires diameter:

“J“, “K“	1; 2; 3 mm
“R“, “S“, “B“	0.5 mm

Version of measuring end



single insulated | double insulated separated

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+420 493 760 811
+420 493 760 820
jsp@jsp.cz
www.jsp.cz

JSP Slovakia s.r.o.
Karloveská 63
SK-841 04 Bratislava
PHONE / FAX
+421 2 6030 1080
+421 2 6030 1089
predaj@jsp.sk
www.jsp.sk

Materials:

head - aluminium alloy
support tube
- varnished carbon steel
- stainless steel 1.4541 (AISI 321)
- heat-resisting steel1.4762 (AISI 446)
- heat-resisting steel 1.4845 (AISI 310)

protective tubes
- stainless steel 1.4541 (AISI 321)
- heat-resisting steel 1.4762 (AISI 446)
- heat-resisting steel 1.4845 (AISI 310)
- Kanthal AF (1.4767)
- alloy PtRh10
- ceramics C530 (73 až 80 % Al_2O_3), porous
- ceramics C610 (60 % Al_2O_3)
- ceramics C799 (99.5 % Al_2O_3)
- sapphire
- silicon carbide SiC (HALSIC-R, ≥ 99 % SiC)
- ceramics C530, C610, C799 coated with Pt (platinum)
- ceramics C530, C610, C799 coated with PtRh10 (standard for C610, C799)

insulating bead, capillary
- ceramics C610, C799, sapphire

Standard composition of ceramics:

C530	73 to 80 % Al_2O_3
C610	60 % Al_2O_3
C799	99.5 % Al_2O_3
SiC	≥ 99 % SiC

Porosity of ceramics:

C530	2 µm
C610, C799	none
SiC (HALSIC-R)	21-27 µm

Housing (according to EN 60529):

IP 53, IP 65

Operation conditions

Maximal temperature of the head:

150 °C (without transmitter, head type A)
100 °C (without transmitter, head type B)
85 °C (with transmitter P5310, P5311 a 5335)

Supplementary parameters

EMC (Electromagnetic compatibility):

according to EN 61326-1

CAUTION!

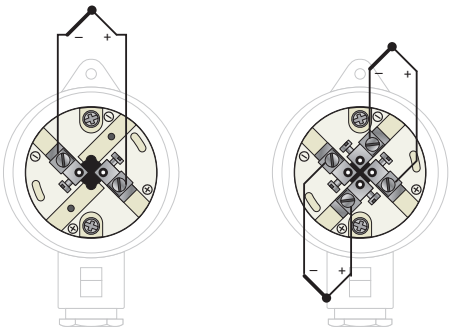
If temperature sensors with ceramic protective tubes are being installed or replaced in operation, it is necessary to insert or pull them out from high temperature environment gradually (see table) so as to prevent the ceramic protective tubes from cracking because of the heat stress caused by a rapid temperature change. Similarly, it is necessary to proceed also for lower temperatures that are not listed in the table.

Working temperature [°C]		1200	1400	1600
Speed	Outer tube diameter ≤ 15 mm	200	60	20
[mm/min]	Outer tube diameter ≥ 24 mm	50	20	15

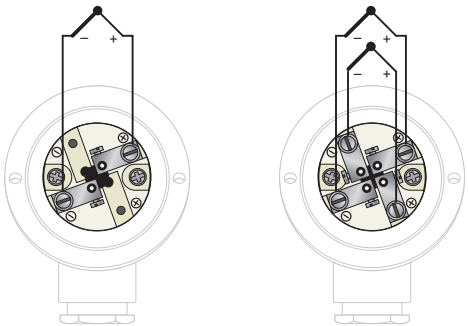
If slow movement of the sensor is not possible, it is at least necessary to ensure a slowly and evenly preheating of the sensor.

Electrical connection

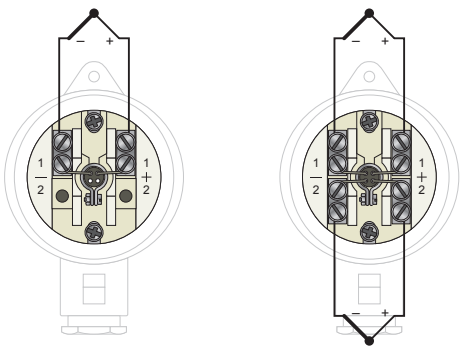
Head type A - version with thermocouple "J", "K", diameter of wires 2 and 3 mm



Head type B - version C107, S088



Head type A - version with thermocouple "R", "S", "B", diameter of wires 0.5 mm and "J", "K", diameter of wires 1 mm

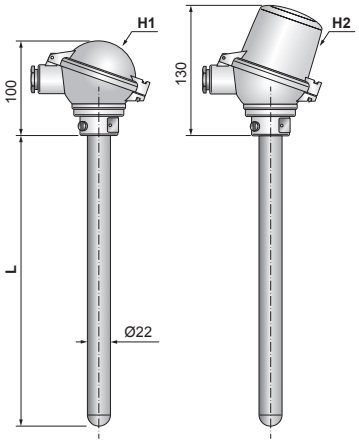


Terminals with connected positive branches are marked acc. to DIN 43 722:

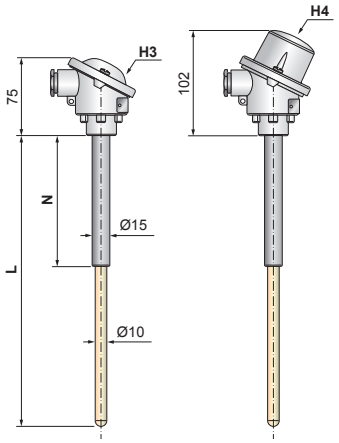
"J"	black
"K"	green
"R"	orange
"S"	orange
"B"	gray

Dimensional drawings

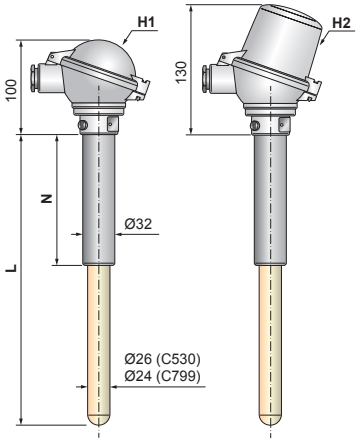
K222, K223, K223Z, K224, K222C, K223C, K224C



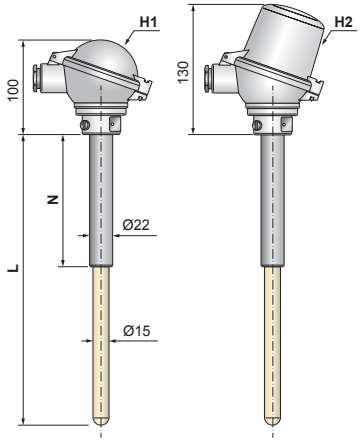
C106, C107



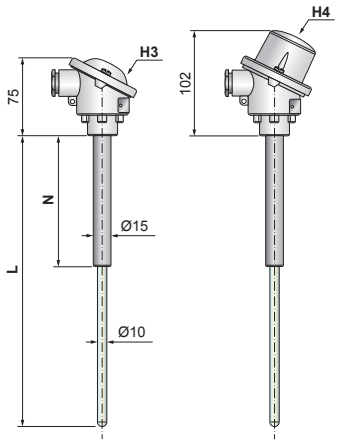
C247, C265, C247S, C265S, C26H, C26HS



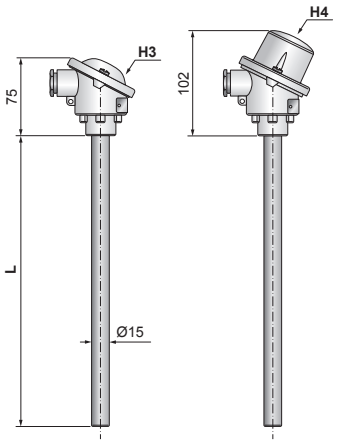
C156, C157, C156S, C157S



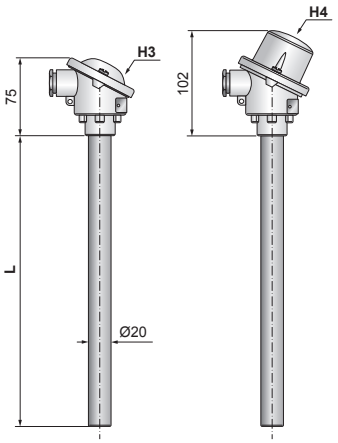
S088



K154, K154C



K201, K203



	Type	Description		
°	**T1580**	**Straight thermocouple temperature sensor with metal, ceramic or sapphire protective tube**		
		Thermocouple		**Max. recommended temperature**
	Code	**Type, measuring end style**	**Measuring range**	**for continuous operation**
°	**21**	**1x"J" (Fe-CuNi), insulated**	**-40 to +900 °C**	**+700 °C (+600 °C for wire diameter 1 mm)**
°	**61**	**2x"J" (Fe-CuNi), insulated, isolated junctions**	**-40 to +900 °C**	**+700 °C (+600 °C for wire diameter 1 mm)**
°	**22**	**1x"K" (NiCr-NiAl), insulated** [1]	**-40 to +1200 °C**	**+1000 °C (+800 °C for wire diameter 1 mm)**
°	**62**	**2x"K" (NiCr-NiAl), insulated, isolated junctions** [1]	**-40 to +1200 °C**	**+1000 °C (+800 °C for wire diameter 1 mm)**
	25	1x"R" (PtRh13-Pt), insulated	0 to +1600 °C	+1300 °C
	65	2x"R" (PtRh13-Pt), insulated, isolated junctions	0 to +1600 °C	+1300 °C
°	**26**	**1x"S" (PtRh10-Pt), insulated**	**0 to +1600 °C**	**+1300 °C**
°	**66**	**2x"S" (PtRh10-Pt), insulated, isolated junctions**	**0 to +1600 °C**	**+1300 °C**
°	**28**	**1x"B" (PtRh30-PtRh6), insulated**	**+300 to +1800 °C**	**+1600 °C**
°	**68**	**2x"B" (PtRh30-PtRh6), insulated, isolated junctions**	**+300 to +1800 °C**	**+1600 °C**
	99	Other		

	Code	Accuracy class according to IEC 584-2
°	**T8**	**3 (standard for thermocouple "B")**
°	**T7**	**2 (standard for thermocouple "J", "K", "R","S")**
	T6C	1 (optional for thermocouple "J", "K", "R", "S"), with certificate of calibration, (must be ordered with calibration - code KTE)
	T9	Other

FITTING VERSION

	Code	Outer protective tube Dimensions [mm] / Material	Inner protective tube Dimensions [mm] / Material	Capilary Material	Diameter of TC wires [mm] R; S; B	Diameter of TC wires [mm] J; K (1x/2x)	Support tube Diameter [mm]	Tmax [2] of protective tubes
	K154	15 x 1.3 / Kanthal AF (1.4767)	-	ceramics C610		3 / 2	-	up to +1300 °C
°	**K201**	**20 x 3 / 1.4541**	**-**	**ceramics C610**	**-**	**3 / 2**	**-**	**up to +800 °C**
°	**K203**	**20 x 3 / 1.4845**	**-**	**ceramics C610**	**-**	**3 / 2**	**-**	**up to +1100 °C**
°	**K222**	**22 x 2 / 1.4762**	**-**	**ceramics C610**	**-**	**3 / 3**	**-**	**up to +1100 °C**
°	**K223**	**22 x 2 / 1.4845**	**-**	**ceramics C610**	**-**	**3 / 3**	**-**	**up to +1100 °C**
	K223Z	22 x 3,5 / 1.4845	-	ceramics C610	-	3 / 2	-	up to +1100 °C
	K224	22 x 1,3 / Kanthal AF (1.4767)	-	ceramics C610	-	3 / 3	-	up to +1300 °C
	K154C	15 x 1.3 / Kanthal AF (1.4767)	10 x 1.5 / C610	ceramics C610	0.5	1 / 1	-	up to +1300 °C
°	**K222C**	**22 x 2 / 1.4762**	**15 x 2 / C610**	**ceramics C610**	**0.5**	**3 / 2**	**-**	**up to +1100 °C**
°	**K223C**	**22 x 2 / 1.4845**	**15 x 2 / C610**	**ceramics C610**	**0.5**	**3 / 2**	**-**	**up to +1100 °C**
	K224C	22 x 1,3 / KANTHAL AF (1.4767)	15 x 2 / C610	ceramics C610	0.5	3 / 2	-	up to +1300 °C
°	**C106**	**10 x 1.5 / ceramics C610**	**-**	**ceramics C610**	**0.5**	**1 / 1**	**15**	**up to +1550 °C**
°	**C107**	**10 x 1.5 / ceramics C799**	**-**	**ceramics C799**	**0.5**	**1 / 1**	**15**	**up to +1700 °C**
°	**C156**	**15 x 2 / ceramics C610**	**-**	**ceramics C610**	**0.5**	**3 / 2**	**22**	**up to +1550 °C**
°	**C157**	**15 x 2.5 / ceramics C799**	**-**	**ceramics C799**	**0.5**	**3 / 2**	**22**	**up to +1700 °C**
°	**C247**	**24 x 3 / ceramics C799**	**15 x 2.5 / C799**	**ceramics C799**	**0.5**	**3 / 2**	**32**	**up to +1700 °C**
°	**C265**	**26 x 4 / ceramics C530**	**15 x 2 / C610**	**ceramics C610**	**0.5**	**3 / 2**	**32**	**up to +1550 °C**
	C26H	26 x 5 / ceramics SiC	15 x 2.5 / C799	ceramics C799	0.5	3 / 2	32	up to +1600 °C
	S088	8 x 1.5 / sapphire	-	ceramics C799	0.5	-	15	up to +2000 °C
	….SF	Inner protective tube sapphire diameter 4.8x0.7 – only with codes C..., PC..., PK…						acc. to code C…
	….PT	Pt coat on measuring end of ceramic protective tube (coat dimensions according to customer requirement) – only with codes C…						up to +1550 °C
	….PR	PtRh10 coat on measuring end of ceramic protective tube (coat dimensions according to customer requirement) – only with codes C…						up to +1600 °C
	PC999	Protective tube made of PtRh10 connected on ceramic tube (dimensional version according to the agreement)						up to +1650 °C
	PK999	Protective tube made of PtRh10 connected on metal support tube (dimensional version according to the agreement)						up to +1650 °C
	C999	Other						

	Code	Nominal length L [mm]	
°	**L180**	**180**	
°	**L250**	**250**	
°	**L350**	**350**	
°	**L500**	**500**	
°	**L700**	**700**	
°	**L800**	**800**	**- not for C107**
°	**L1000**	**1000**	**- not for C107**
°	**L1200**	**1200**	**- not for C106, C107**
°	**L1400**	**1400**	**- not for C106, C107**
°	**L1600**	**1600**	**- not for C106, C107 and all armatures with sapphire, diameter 4.8 mm**
	L2000	2000	- not for C106, C107 and all armatures with sapphire
	L ...	Other length specify in mm	

	Code	Head	
°	**H1**	**Type A, Al alloy, cable outlet 4 to 12.5 mm, IP 53**	**- not for C106, C107, K154, K154C, S088**
°	**H2** [3]	**Type A, cap for transmitter Ø 62 mm, Al alloy, cable outlet 4 to 12.5 mm, IP 53**	**- not for C106, C107, K154, K154C, S088**
°	**H2D** [3]	**Type A, cap for transmitter Ø 62 mm, Al alloy, 2x cable outlet 4 to 12.5 mm, IP 53**	**- not for C106, C107, K154, K154C, S088**
°	**H3**	**Type B, Al alloy, cable outlet 4 to 12.5 mm, IP 53**	**- for C106, C107, K201, K203, K154, K154C, S088**
°	**H4** [3]	**Type B, cap for transmitter Ø 44 mm, Al alloy, cable outlet 4 to 12.5 mm, IP 53**	**- for C106, C107, K201, K203, K154, K154C, S088**
	H9	Other	

	Code	Support tube Length N [mm] ONLY FOR VERSION WITH SUPPORT TUBE!
°	**N080**	**80 (standard for length L 180 mm)**
°	**N150**	**150 (standard for length L 250 and 350 mm)**
°	**N200**	**200 (standard for length L 500, 700 and 800 mm)**
°	**N300**	**300**
°	**N400**	**400 (standard for length L 1000, 1400, 1600 and 2000 mm)**
	N ...	Other length specify in mm

° ... Marked version can be dispatched up to 5 working days (with calibration up to two weeks)

[1] … Wire thermocouples type "K" are not suitable for a reducing atmosphere, where the material of TC branches is degraded by the "Green rot" as it is called; in this environment, it is more suitable to choose a sensor with plastic insert, see the series of ModuTEMP® 70 sensors.

[2] … Effective temperature resistance of protective tube is affected other process parameters (aggressivity, flow speed and abrasive of measuring medium, temperature shocks, vibrations etc.).

	Code	Support tube material	
°	**M1**	**Varnished carbon steel**	**- not for code C106, C107 and S088**
°	**M2**	**Stainless steel 1.4541**	
	M3	Heat-resisting steel 1.4845	- for support tube diameter 22 mm, for other diameters consult with supplier
	M4	Heat-resisting steel 1.4762	- for support tube diameter 22, 32 mm, for other diameters consult with supplier
	M5	Kanthal AF (1.4767)	- for support tube diameter 15, 22 mm, for other diameters consult with supplier
	M9	Other	
		OPTIONAL ACCESSORIES	
	Code	**Special version**	
•	**RU**	**Snap lock**	**- only for heads H1, H2, H2D**
°	**ZT**	**Sealed joint between the support and ceramic tube**	**- only for M4, M5**
°	**ZK**	**Increased housing to IP 65**	**- only for M4, M5, not for C530** [4]
	Code	**Calibration in customer defined points, including certificate of calibration**	
°	**KTE32AB**	**Thermocouple temperature sensor calibration in three points in range -40 to +1100 °C**	
°	**KTE42AB**	**Thermocouple temperature sensor calibration in four points in range -40 to +1100 °C**	
°	**KTE52AB**	**Thermocouple temperature sensor calibration in five points in range -40 to +1100 °C**	
°	**KTE32B**	**Thermocouple temperature sensor calibration in three points in range +400 to +1600 °C**	
°	**KTE42B**	**Thermocouple temperature sensor calibration in four points in range +400 to +1600 °C**	
°	**KTE52B**	**Thermocouple temperature sensor calibration in five points in range +400 to +1600 °C**	
	KTE9	Other	
	Code	**Certificates**	
•	**GR**	**Certificate for supply and operation in Customs Union**	
	Code	**Accessories**	
•	**BZS**	**Stainless steel tag for attachment (70x15 mm) with laser description according to order**	
	Code	**Fixing shift flanges and pipe unions**	
°	**UP02**	**Fixing shift flange for diameter 15 mm (see data sheet No. 0126)**	
°	**UP03**	**Fixing shift flange for diameter 22 mm (see data sheet No. 0126)**	
°	**UP04**	**Fixing shift flange for diameter 32 mm (see data sheet No. 0126)**	
°	**UPS15M27**	**Fixing shift pipe union for diameter 15 mm, connecting thread M27x2 (see data sheet No. 0126)**	
°	**UPS20M30**	**Fixing shift pipe union for diameter 20 mm, connecting thread M30x2 (see data sheet No. 0126)**	
°	**UPS22M33**	**Fixing shift pipe union for diameter 22 mm, connecting thread M33x2 (see data sheet No. 0126)**	
	P9	Other	
	Code	**Transmitters for headmounting**	
•	**P5310 H10**	**Transmitter with LHP protocol (see data sheet No. 0824)**	
°	**P5310EN2 H10**	**Transmitter with LHP protocol, (Ex) II 3G Ex nA IIC T4 Gc (see data sheet No. 0824)**	
•	**P5311 H10**	**Transmitter with LHP protocol with galvanic isolation (see data sheet No. 0824)**	
°	**P5311EN2 H10**	**Transmitter with LHP protocol with galvanic isolation, (Ex) II 3G Ex nA IIC T4 Gc (see data sheet No. 0824)**	
°	**P5311EI1 H10**	**Transmitter with LHP protocol with galvanic isolation, (Ex) II 1G Ex ia IIC T4-T6 Ga, (Ex) II 1D Ex ia IIIC T106°C Da (see data sheet No. 0824)**	
•	**5335A**	**Transmitter with HART protocol with galvanic isolation, (Ex) II 3G, (Ex) II 3D (see data sheet No. 0786)**	
•	**5335D**	**Transmitter with HART protocol with galvanic isolation, Ex) II 1G Ex ia IIC T6 or T4 Ga, (Ex) II 1D Ex ia IIIC Da, (Ex) I M1 Ex ia I Ma, CSA and FM (see data sheet No. 0786)**	
Example of order: T1580 26 T6C C247 L700 H1 N200 M1 KTE32AB (0, 400, 800 °C) UP04			

• ... Ex stock version ° ... Marked version can be dispatched up to 5 working days (with calibration up to two weeks)

[3] … Temperature of head with transmitter inside should not exceed 80 or 85 °C according to transmitter type.

[4] … C530 is a porous material and cannot fully ensure the tightness of the sensor against medium leakage into the sensor fitting.