

MTC11R

MINERAL INSULATED METAL-SHEATHED THERMOCOUPLES

Temperature sensors of the MTC11R series are hand-held flexible and robust sensors with a fast temperature response suitable for industrial environments.

The measuring element is a thermocouple of the J, K or N type, which uses the dependence of the thermoelectric voltage on the temperature to measure the temperature. The output signal is a thermoelectric voltage, the value of which is according to the ČSN EN 60584-1 ed. 2.

Thermocouple is mineral insulated metal-sheathed according to the ČSN EN 61515 with handle and compensation cable. The sheath is flexible and the sensor can be easily adapted to the measurement place.

General Information (Table 11R.1)

	Insulation class acc. ČSN EN 60529	IP50 (connector), IP00 (stripped ends), IP6X (transition part), IP68 (measuring part in length N)
Common metal thermocouple (stem)		
①	Design	Mineral insulated metal-sheathed thermocouple according to the ČSN EN 61515 ed.2
	Min. bending radius	$10 \times \phi A$
Handle		
②	Material	Silon
Compensation cable		
	Min. bending radius	$15 \times$ outer diameter of the cable
Stripped ends		
Connector		
Additional protection tube		
⑥	Material	1.4541
	Outer / inner diameter	5 / 4 mm

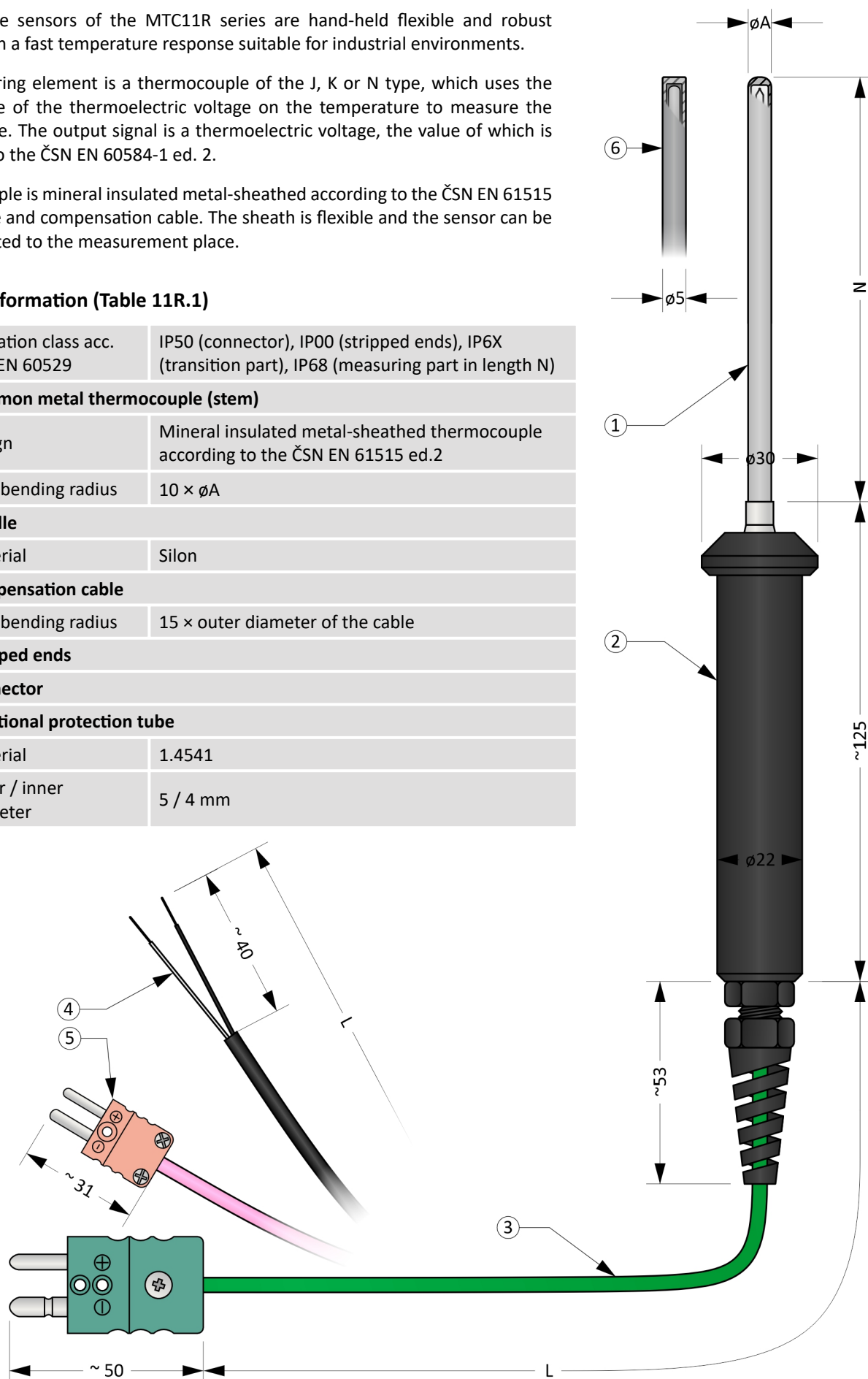


Figure 11R.1: MTC11R

Optional Parameters Including the Creation of an Order Code (Table 11R.2)

Pos.	Code	MTC11R - ① ② ③ - ④ - ⑤ - ⑥ ⑦
①	Thermocouple type of dia. A = 2,0 mm (thermocouples acc. ČSN EN 60584-1 ed. 2)	
	1	1 x „J“, sheath material 1.4541
	0	1 x „K“, sheath material 2.4816
	8	1 x „N“, sheath material 2.4816
	Thermocouple type of dia. A = 3,0 mm (thermocouples acc. ČSN EN 60584-1 ed. 2)	
	3	1 x „J“, sheath material 1.4541
	2	1 x „K“, sheath material 2.4816
	9	1 x „N“, sheath material 2.4816
	Thermocouple type of dia. A = 4,5 mm (thermocouples acc. ČSN EN 60584-1 ed. 2)	
	5	1 x „J“, sheath material 1.4541
	4	1 x „K“, sheath material 2.4816
	A	1 x „N“, sheath material 2.4816
	Thermocouple type of dia. A = 6,0 mm (thermocouples acc. ČSN EN 60584-1 ed. 2)	
	7	1 x „J“, sheath material 1.4541
	6	1 x „K“, sheath material 2.4816
	B	1 x „N“, sheath material 2.4816
②	Measuring junction design and thermocouple accuracy class acc. ČSN EN 60584-1 ed. 2	
	1	Accuracy class 1, thermocouple isolated from the sheath, blunt tip
	5	Accuracy class 1, thermocouple isolated from the sheath, sharp tip
	3	Accuracy class 1, thermocouple connected to the sheath, blunt tip
	7	Accuracy class 1, thermocouple connected to the sheath, sharp tip
	0	Accuracy class 2, thermocouple isolated from the sheath, blunt tip
	4	Accuracy class 2, thermocouple isolated from the sheath, sharp tip
	2	Accuracy class 2, thermocouple connected to the sheath, blunt tip
	6	Accuracy class 2, thermocouple connected to the sheath, sharp tip
③	Additional protection tube	
	0	Without additional protection tube
	1	With protection tube of dia. 5,0 mm
④	Nominal length N [mm]	
	xxx	Selectable range from 150 mm to 1 500 mm (in 1 cm increments)
⑤	Cable length L [cm]	
	xxx	Compensation cable, selectable range from 20 cm to 450 cm (in 1 cm increments)
	xxx	Compensation cable, selectable range from 460 cm to 5 000 cm (in 10 cm increments)
⑥	Compensation cable insulation type	
	0	Polyvinyl chloride PVC / Polyvinyl chloride PVC (JJ) Only for J, K type thermocouples.
	1	Silicone / silicone (SLSL) Only for J, K type thermocouples.
	2	Silicone / glass fiber braid / galvanized steel wire braid (SLGLP) Only for J, K type thermocouples.
	3	Glass fiber braid / glass fiber braid / galvanized steel wire braid (GLGLP)
	4	Teflon FEP / silicone (TSL)
	5	Teflon FEP / oplet Cu / teflon FEP (TCuT)

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Pos.	Code	MTC11R - ① ② ③ - ④ - ⑤ - ⑥ ⑦
⑦	Design of the cold junction - single thermocouples	
	0	Stripped ends, length 40 mm
	1	Standard connector, MTCK-S type, plug
	2	Standard connector, MTCK-S type, plug + socket
	3	Miniature connector, MTCK-M type, plug
	4	Miniature connector, MTCK-M type, plug + socket
	5	Ceramic standard connector, MTCK-CS type, plug
	6	Ceramic standard connector, MTCK-CS type, plug + socket
	7	Ceramic miniature connector, MTCK-CM type, plug
	8	Ceramic miniature connector, MTCK-CM type, plug + socket

Order code example: MTC11R-000-500-500-00

... 1 x „K“, sheath dia. A = 1 mm, sheath material 2.4816 (INCONEL 600)

... Accuracy class 2, thermocouple isolated from the sheath, blunt tip

... Without additional protection tube

... Nominal length N = 500 mm

... Compensation cable length L = 500 cm

... Cable insulation type JJ

... Stripped ends

Approximate weight of the product: MTC11R-000-500-500-00 ... 0,4 kg

Length Tolerances (Table 11R.3)

Length N, L	Tolerance N	Tolerance L
$50 \leq (N, L) \leq 1500$ mm	± 2 mm	± 10 mm
$1500 < L \leq 2500$ mm	± 3 mm	± 10 mm
$2500 < L \leq 5000$ mm	± 5 mm	± 15 mm
$5000 < L \leq 50000$ mm	$\pm 0,5$ % of N	$\pm 0,5$ % of N

Diameter tolerance (Table 11R.4)

Stem diameter A	Tolerance A
$1 \leq A \leq 4,5$ mm	$\pm 0,05$ mm
$4,5 < A$ mm	$\pm 0,06$ mm

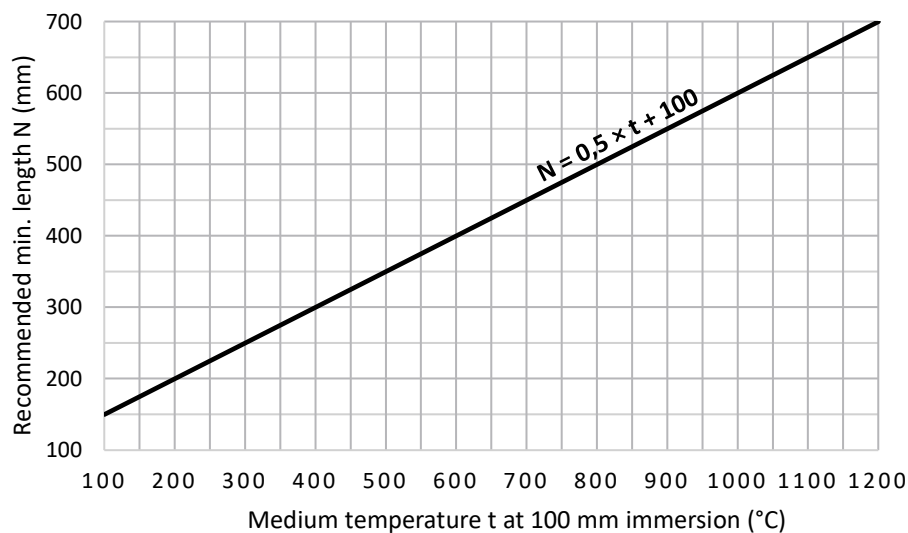
Recommended Maximum Temperatures of Sensor Parts (Table 11R.5)

Sensor part	Sheat dia. / insulation type	Continuous operation	Short-term operation
Compensation cable	JJ	-10 ... 105 °C	-
	SLSL nebo SL	-60 ... 180 °C	-
	SLGLP	-60 ... 180 °C	-
	GLGLP	-200 ... 400 °C	-
	TSL	-60 ... 180 °C	-
	TCuT	-200 ... 205 °C	-
Connectors MTCK-S, MTCK-M		See cable insulation, max. 220 °C	-
Connectors MTCK-CS, MTCK-CM		See cable insulation	-
Handle		< 100 °C	-
Additional protection tube		< 500 °C	-
Thermocouple type „J“ measuring junction	2 mm	< 440 °C	< 490 °C
	3 mm	< 470 °C	< 520 °C
	4,5 mm	< 550 °C	< 620 °C
	6 mm	< 650 °C	< 720 °C
Thermocouple type „K“ and „N“ measuring junction	2 mm	< 900 °C	< 950 °C
	3 mm	< 980 °C	< 1050 °C
	4,5 mm	< 1080 °C	< 1140 °C
	6 mm	< 1140 °C	< 1200 °C

Notes: Operating temperatures are related to temperature measurement in a chemically inert environment. The values are determined empirically.

Recommended Min. Sensor Length (Chart 11R.1)

The minimum recommended length is determined with respect to the heat transfer from the measuring end to the connector or the stripped ends. If the length is not observed, there is a risk of overheating.



Compensation Cable Overview (Table 11R.6)

Compensation cables are in accuracy class 2 and meet the requirements of the ČSN EN 60584-3 standard.

Type	Insulation	Number x cross-section of wires	Cable outer diameter	Pros and cons
JX KCA	JJ	2 x 0,22 mm ²	~ 3,6 mm	↗ Good flexibility, moisture resistant ↘ No shielding, unsuitable for higher temperatures
	SLSL	2 x 0,22 mm ²	~ 3,8 mm	↗ Great flexibility, moisture resistant ↘ No shielding, low mechanical resistance
	SLGLP	2 x 0,22 mm ²	~ 3,7 mm	↗ Moisture resistant, high mechanical resistance
JX KCA NC	GLGLP	2 x 0,22 mm ²	~ 3,5 mm	↗ High mechanical resistance, suitable for higher temperatures ↘ Low moisture resistance
	TCuT	2 x 0,22 mm ²	~ 3,0 mm	↗ Moisture resistant
	TSL	2 x 0,22 mm ²	~ 3,6 mm	↗ Great flexibility, moisture resistant ↘ No shielding, low mechanical resistance

Measuring Junction Design



Figure 11R.3: Blunt tip

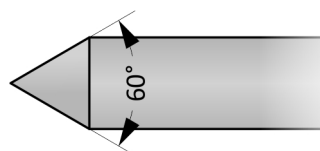


Figure 11R.4: Sharp tip



Figure 11R.5: Thermocouple isolated from the sheath



Figure 11R.6: Thermocouple connected to the sheath

Installation And Operating Instructions

The electrical connection of the sensor is shown in Figures 11R.7 and 11R.8. The output signal is thermoelectric voltage. The dependence of temperature on thermoelectric voltage is given by the standard ČSN EN 60584-1 ed. 2.

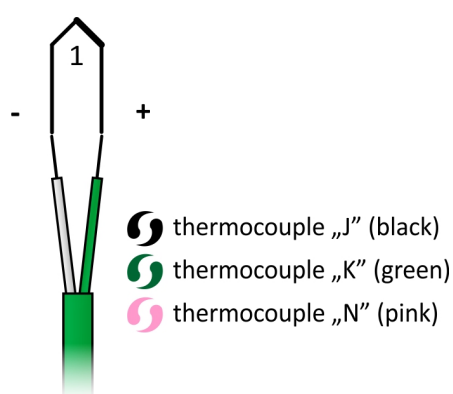


Figure 11R.7: Single thermocouple wiring diagram

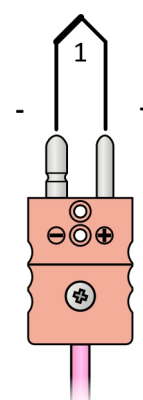


Figure 11R.8: Connector wiring diagram

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