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Mineral-insulated thermocouples to DIN 43 710 and EN 60 584

- **for temperatures from -200 to +1200°C**
- **flexible sheath with shock-proof measuring insert**
- **protection tube diameter from 0.5mm**
- **fast response**
- **fitting length to suit application**

Thanks to their special properties, mineral-insulated thermocouples are used in chemical plant, power stations, pipelines, in engine construction and on test beds. The thermocouple wires are embedded in compressed fire-resistant magnesium oxide inside the flexible thin-walled sheath.

The excellent heat transfer between the sheath and the thermocouple enables short response times ($t_{0.5}$ from 0.15sec) and high measurement accuracy. The shock-proof construction ensures a long life. The minimum bending radius is 5 x the external diameter. The minimum fitting length EL is 50mm for 0.5mm to 2.0mm dia., and 100mm for 3.0 to 6.0mm dia.

The thermocouples are normally insulated from the sheath. The measuring insert is fitted with thermocouples to EN 60 584 or DIN 43 710. Versions with two thermocouples are also available.

Test pressure: 40 bar (helium) leakage test at the measurement point.

Insulation resistance: thermocouple against sheath at ambient temperature for lengths up to 1m: 200MΩ, for lengths 1m and above: 200MΩ x m.

Technical data

Connection	available with cable ends as: bare wires, with ferrules, receptacles or multipole connector
Connecting cable	silicone, ambient temperature -50 to +180°C PTFE, ambient temperature -190 to +260°C metal braiding, ambient temperature -20 to +350°C
Protection tube	stainless steel 1.4541, thermocouple Type L and Type J Inconel 2.4816 (Inconel 600) , thermocouple Type K
Measuring insert	insulated assembly: 1 x Fe-Con J, EN 60 584, Cl. 2, operating temperature -200 to +800°C 1 x Fe-Con L, DIN 43 710, Cl. 2, operating temperature -200 to +800°C 1 x NiCr-Ni K, EN 60 584, Cl. 2, operating temperature -200 to +1200°C 2 x Fe-Con L, DIN 43 710, Cl. 2, operating temperature -200 to +800°C 2 x NiCr-Ni K, EN 60 584, Cl. 2, operating temperature -200 to +1200°C
Response times	in water with 0.4m/sec / in air with 2m/sec 0.5mm dia: water $t_{0.5}$ = 0.15sec, $t_{0.9}$ = 0.30sec / air $t_{0.5}$ = 3.5sec, $t_{0.9}$ = 8.0sec 1.0mm dia: water $t_{0.5}$ = 0.20sec, $t_{0.9}$ = 0.60sec / air $t_{0.5}$ = 7.5sec, $t_{0.9}$ = 17.0sec 1.5mm dia: water $t_{0.5}$ = 0.40sec, $t_{0.9}$ = 0.90sec / air $t_{0.5}$ = 10.0sec, $t_{0.9}$ = 25.0sec 2.0mm dia: water $t_{0.5}$ = 0.80sec, $t_{0.9}$ = 2.60sec / air $t_{0.5}$ = 13.0sec, $t_{0.9}$ = 34.0sec 3.0mm dia: water $t_{0.5}$ = 1.00sec, $t_{0.9}$ = 2.80sec / air $t_{0.5}$ = 22.0sec, $t_{0.9}$ = 64.0sec 4.5mm dia: water $t_{0.5}$ = 2.50sec, $t_{0.9}$ = 6.50sec / air $t_{0.5}$ = 34.0sec, $t_{0.9}$ = 113.0sec 6.0mm dia: water $t_{0.5}$ = 3.00sec, $t_{0.9}$ = 9.00sec / air $t_{0.5}$ = 55.0sec, $t_{0.9}$ = 170.0sec

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Lead resistances in Ω/m at 20°C for mineral-insulated thermocouples

Diameter D in mm	1 thermocouple resistance in Ω/m	2 thermocouples resistance in Ω/m
Thermocouple Fe-Con L		
6.0	0.66	0.85
4.5	1.40	1.80
3.0	2.70	3.50
2.0	5.00	7.70
1.5	12.00	-
1.0	21.50	-
Thermocouple Fe-Con J		
6.0	0.54	-
3.0	2.10	-
2.0	8.60	-
1.5	15.00	-
1.0	34.00	-
Thermocouple NiCr-Ni K		
6.0	0.88	2.70
4.5	1.56	4.80
3.0	3.50	11.00
2.0	7.90	25.00
1.5	14.00	-
1.0	32.00	-
0.5	126.00	-