

## Temperature & Heat Flux Sensor MCT

**High Frequency Micro Thermocouple, adaptable to any Surface for Measuring Surface Temperatures and Heat Flux into the Surface**

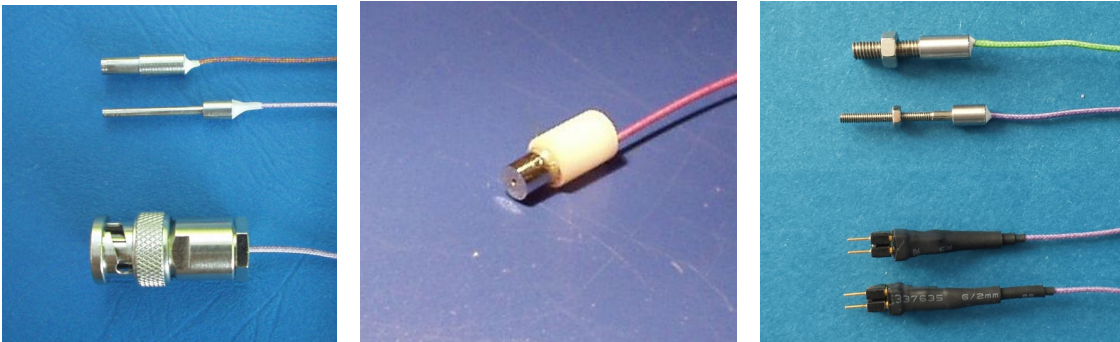
### Application examples:

These special thermocouples are ideal for very fast measurements of temperature changes on the surface of a body. These sensors are ideal for measurements during a short individual event. In the latter case, these measurements can be used to calculate heat flows into the surface. From the signal of the surface temperature change, the convective heat flow into the wall can be determined. The thermocouple is regarded as a half-infinite- body. The max. measuring time ends when the rear part of the sensor also starts to warm up after approx. 40 to 100 ms since then the calculation basis are lost.

For longer continuous heat flux detection we offer the Müller-Double- Head Thermocouple MDT for front and back side measurements for 1.9 and 3.6 mm in diameter.

To calculate the heat flow we offer the program Heat Flux Calculator HFC. It calculates the heat flow in a simple manner using the temperature and material data of the sensor.

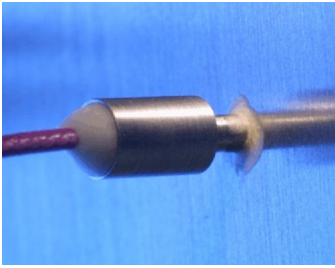
The sensor is small enough to accommodate in each contour e.g. in a wing nose of a space shuttle. In addition, its sensitive end can be completely inserted into the surface by filing and grinding. Alternatively, the end of the probe can be coated with a finished metal coating. This offers the advantage of a longer service life at higher temperatures, but has the disadvantage of a fixed geometry.



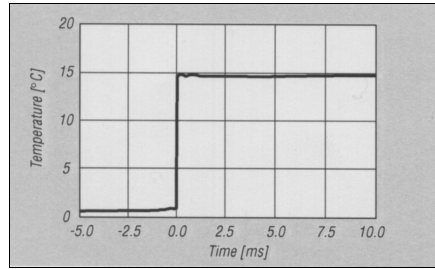
Heat flux sensor MCT 19, 36 and MCTB 48 with bore hole for central pressure measurement. Alternative design with thread and /or short cable for easy screwing

The model MCTB 48 also offers the unique possibility by coaxially installing a pressure probe to measure changes of pressure at one and the same position as the temperature as well. Our pressure probe M60-1L-M3 can be screwed into the thermocouple with its thread.

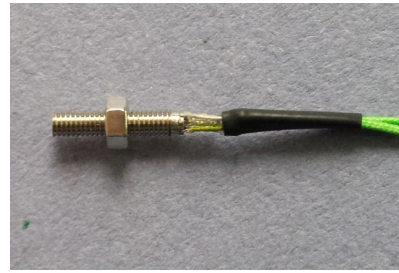
If the experiments take place at constantly high temperatures, the surface begins to corrode after some time and the signal disappears. The duration of the measurement for type E is about 35 minutes at temperatures of 615 °C and about 8 minutes at 715 °C. In these cases, the thermocouple can be refurbished by re-grinding the sensor surface. This gives them almost unlimited durability.



MCT 19 glued



Temperature when immersed in hot water



Müller-Double Head Thermocouple

## Technical Data

Type:	Type E (Type K as a special design)
Material:	Chromel - Constantan, coaxial
Temperature range:	Type E: - 200 to 900 °C Type K: - 200 to 1170°C
Temperature sensitivity:	0.5 K
Heat flux:	20 KW/m <sup>2</sup> to 20 MW/m <sup>2</sup>
Response time:	3 μs
$\sqrt{\rho c k}$	About 9000 W $\sqrt{s/m^2K}$
Diameter:	0.92, 1.9, 3.6 and 4.8 mm
Size:	MCT 9.2: d = 0.92 x 26 mm MCT 19: d = 1.9 x 26 mm MCT 36: d = 3.6 mm x 17 mm MCTB 48: d = 4.8 x 25 mm All sensors can be shortened in the area of their diameter
Sensitivity:	About 60 μV/K for type E, 39.9 μV/K for type K , (s. IEC-584 T1)
Calibration:	Calibrated by the University of Aachen
Tip:	Can be individually shaped by the user.
Specials:	For the thermocouple with an outer diameter of 4.8 mm a coaxial borehole with d = 0.8 – 3 mm for connecting a pressure probe with a diameter of 1.9 -3 mm is possible (Kulite XCQ-080 or Müller M60-1L-M3).
Connection:	Via 2 m temperature resistance coaxial cable with BNC pos.
Amplification:	Amplifier is needed. We recommend our MVA 10 plus 1 MHz filter
Article 100-001-0:	HFC Heat Flux Calculator program
Article 100-001-1:	MCT 19, type E, diameter 1.9 mm
Article 100-001-2:	MCT 36, type E, diameter. 3.6 mm
Article 100-001-3:	MCTB 48, type E, diameter 4.8 mm with coaxial boreholeure.
Article 100-001-5:	MCT 092, type K only, diameter 0.92 mm
Article 100-001-6:	Surcharge for metallic surface
Article 100-001-7:	Surcharge for short 20 cm cable plus extension of 2 m cable with BNC pos.
Article 100-001-8:	Surcharge for thread for easier mount with M2, M3 and M5 with counter nut
Article 100-001-9:	Surcharge for type K instead of type E
Article 100-002-10:	Surcharge for Müller-Double-Head Thermocouple version for MDT 19 and 36