

Up to 2 300°C

Very high temperature thermocouples

Type C (rigid or flexible)

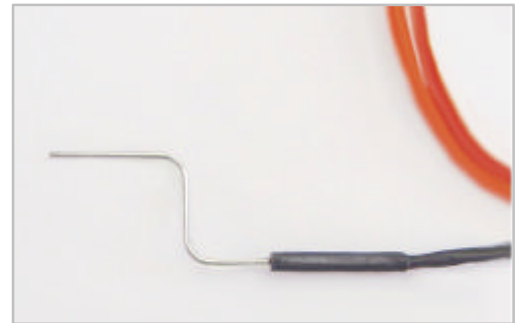
Tungsten-rhenium 5%Re (+) - Tungsten-rhenium 26%Re (-)

These thermocouples are used for very high temperature measurements, up to 2300°C in reducing neutral atmosphere, or vacuum.

Type D (rigid)

Tungsten-rhenium 3%Re (+) - Tungsten-rhenium 25%Re (-)

These thermocouples are used for very high temperature measurements, up to 1800°C in reducing neutral atmosphere, or vacuum.



Environment and limits of use

In oxidizing atmosphere, tantalum, niobium, molybdenum and rhenium burn rapidly.

- In nitrogen, hydrogen and reducing atmosphere, molybdenum is well adapted up to 2000°C. In nitrogen or hydrogen, niobium and tantalum engender nitrides and hydrides which rapidly make the sheath brittle.

- In vacuum atmosphere, due to its relatively high vapour pressure, molybdenum is not recommended over 1800°C.
- Use in presence of graphite has to be done carefully. Adequate coating such as titanium or silicide nitride (TiN) could extend their life time.

These thermocouples have been developed by the International Centres of Nuclear Research and is specially recommended when a longer life time over 2000°C is requested.

They also developed a thermocouple insulated with hafnium oxide. It has been chosen for its exceptional chemical stability in presence of the tungsten wires and the rhenium sheath.

The rhenium sheath

Rhenium sheathed thermocouples offer various particular properties:

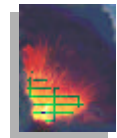
- one of the most important ones is high melting point (3180°C),
- it remains ductile when after working at high temperature,
- it is not affected by the oxidoreducing atmospheres,
- it also offers high electrical resistivity,
- it can easily be welded without embrittlement,
- it has an excellent behaviour in inert atmosphere and does not react in presence of uranium oxide.

Data subject to alteration without notice

Wire Materials	Type	Mean Sensitivity $\mu\text{V}/^\circ\text{C}$	Working Temperature $^\circ\text{C}$	Code	Material	Diameter in mm								
						0.7	1.2	1.4	1.5	1.6	2	2.1	3.17	
Tungsten-rhenium 5 % Re (+) - Tungsten-rhenium 26 % Re (-)	C	15	0 up to 2200°C	2W5W26	Mo			●		●	●			
					Ta		●	●	●	●	●	●	●	
			Nb			●			●					
			Rhe			●								
Tungsten-rhenium 3 % Re (+) - Tungsten-rhenium 25 % Re (-)	D	19	0 up to 2200°C	2W3W25	Rhe		●							
			0 up to 1800°C		Ta	●		●	●		(flexible version)			

Mo : Molybdenum - Nb : Niobium - Rhe : Rhenium - Ta : Tantalum

Please consult us for other diameters, other sheath materials or other construction



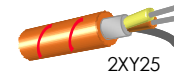
High temperature thermocouples: type C

Prolongation cable

The thermocouple is connected to the measurement device by means of a compensation cable.

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TC Type	Wire Materials	Sheath Material	Maximum temperature	For thermocouple diameter	Code	Loop Resistance Ω/m
C		Stainless steel		1.2 – 1.4	2XYA ϕ 10 (OD 1 mm)	8
				1.6 – 2.00	2XYA ϕ 15 (OD 1.5 mm)	
		P.V.C.			2XY 25 (OD 2.5 mm)	

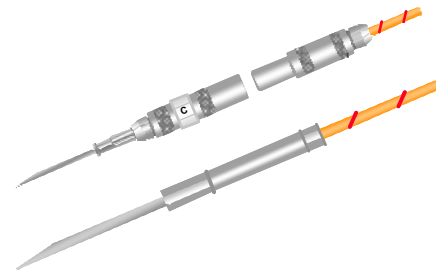


Connection

In order to ensure the faultless function of the thermocouples, the end has to be closed by means of an organic sealing compound to avoid any ingress of moisture.

As connection to the plastic

sheathed cable, transferring the measurement signal to the instrument, direct connections are used. Besides this, it is often necessary, especially when being confronted with difficult of complicated measurement problems or specifications, to develop special connections.



Hot junctions

The hot junction is the point where the two cores are joined. This therefore is the sensing part and can take a number of different forms.



TI insulated hot junction

Accessories

Any form of brazing or welding of a thermocouple through a wall requires some skill, and to facilitate thermocouple mounting, a range of small seal-glands have been developed and adapted for the standard THERMOCOAX dimensions.



THERMOLOK seal gland



Springloaded adaptor

Quality

Whether they are standard or manufactured to customers specifications, all THERMOCOAX products are developed with the same procedures, the same control principles, the same feed back and the same qualified personnel.

Control and tests:

- X-ray of the hot junction
- Sheath integrity test
- Metallographic test on sample
- Calibration with appropriate thermal treatment...

Your Contact

Sales Dept
THERMOCOAX SAS
40 Bd Henri Sellier
F 92156 SURESNES Cedex
Tel.: +33 1 41 38 80 50
Fax: +33 1 41 38 80 58
info@thermocoax.com

German Sales Office
THERMOCOAX GmbH
Brookstieg 1
D 22145 STAPELFELD
Tel.: +49 40 66857 0
Fax: +49 40 66857 133
info@thermocoax.de

USA Sales Office
THERMOCOAX Inc.
6825 Shiloh Road East, Ste B-7
Alpharetta, GA 30005
Tel.: +1 678 947 5510
Fax: +1 678 947 4450
info-usa@thermocoax.com

UK Sales Office
THERMOCOAX UK Ltd.
Second Floor Offices
The Estate Office
Aubourn,
Lincolnshire LN5 9DX
Tel.: +44 (1522) 789 900
Fax: +44 (1522) 789 902
info-uk@thermocoax.com

The Netherlands Sales Office
THERMOCOAX BV
Luchthavenweg 81
European Business Centre
Unit 2.23
5657 EA EINDHOVEN
Tel.: +31 (40) 295 95 58
Fax: +31 (40) 255 54 78
info-nl@thermocoax.com