

Cables for Heating and Temperature Measurement

Flexible and heat-resistant, with high mechanical stability



- For thermocouples, RTDs and heating systems
- High flexibility for use in confined space
- Various temperature ranges between -200 and 1600 °C ($-328...2912$ °F)
- Compliance with international standards: DIN EN, IEC, ANSI, BS, JIS

ABB Instrumentation

ABB

A Pioneer in Temperature Measurement for More than 100 Years



ABB Instrumentation is a leading global supplier of instrumentation products with temperature measurement expertise. Our in-depth know-how is the basis of the enhancement and continuous improvement of our product portfolio for intelligent process automation equipment. As a result, we can always provide our customers with the solutions they need, even for special requirements.



Global Presence

Our focus is on establishing a close and partnerlike co-operation with our customers from the most different industries and with the most different applications. We offer advanced technical solutions and provide a wide range of services contributing to the continuous improvement of our customers' business processes. Our activities include in-house training of engineering resources and project delivery and support by competent teams on site throughout the world.

Commitment to Quality

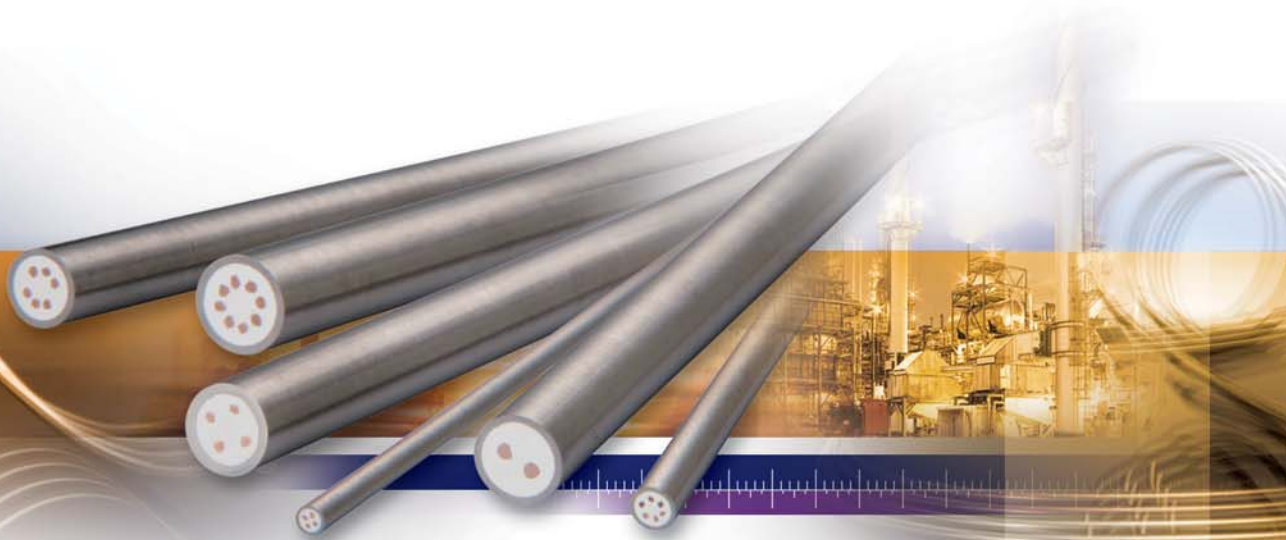
ABB Instrumentation manufactures instrumentation products of highest quality. A global network of production, sales and service centers plus various calibration labs offer the provision of optimal solutions that comply with all relevant international standards and directives. Hundreds of registered patents give proof of our innovative product portfolio.

Solutions Tailored to Various Industries

- Chemical and petrochemical
- Power and steam generation
- Food and beverages
- Oil and gas
- Pulp and paper
- Pharmaceutical
- Water and waste water

SensyMIC Mineral Insulated Cables for Thermocouples, Resistance Thermometers or Heating Systems

Designed for extreme temperature conditions, mineral insulated cables are used wherever there are particularly strict requirements regarding mechanical, chemical and electrical stability. Their minimum bending radius approved by mechanical tests is three times the outer diameter, making mineral insulated cables perfect for applications with confined space.



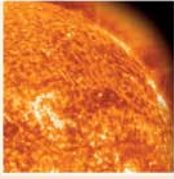
Applications

Due to the efficient processing procedure the spectrum of applications for mineral insulated cable is expanding especially in industrial measurement and control industry. They are used for example in the sensor production for chemical and petrochemical industry, machine construction and as well for applications in hazardous areas. Mineral insulated cables are also applied as heating cables for subsequent processing in heating systems. Heating cables are manufactured with the same production technique.

Benefits

Mineral insulated cables have an outer sheath consisting of a stainless and/or heat-resistant steels and 1 to 8 inner conductors. The insulating material (ceramics capillary) is made from a highly compressed metal oxide powder – preferably magnesia (MgO) or aluminum oxide (Al_2O_3) – featuring good insulation capabilities even when exposed to high temperatures.

The Right Mineral Insulated Cable for all Applications



All mineral insulated cables have two things in common: a metal sheath, which makes them resistant against mechanical and chemical impact from the measured medium, and a highly temperature-resistant ceramics insulation. The insulation protects the inner conductors from electrical short-circuits and holds them in the wanted position. The variety of potential applications calls for a wide range of conductor and sheath materials. As a result, mineral insulated cables are carefully tailored to their respective application in the manufacturing process. In order to obtain the specified size, the cables are drawn in several reduction stages and are subject to heat treatments.



Sheath

Basically, all mineral insulated thermocouples can be produced with a sheath of cold workable materials including the full range of austenitic stainless steels. For the vast majority of applications nickel-base alloy materials are used. Additionally, special sheath materials are available on request.

Insulation

Standard ceramics insulators are made of magnesia (MgO) with a purity of > 96 % and aluminum oxide (Al₂O₃). Mineral insulated thermocouple cables are usually produced with ceramics capillaries of a quality better than 99.0 %.

Conductor Materials

Mineral insulated cables for thermocouples have inner conductors of thermocouple base material in accordance with the international standards DIN EN, IEC, ANSI, BS, JIS.

Mineral insulated precious cables for thermocouples are best suited for high-temperature applications in an oxidizing environment. They are used in chemical plants wherever full resistance to all kinds of acids is required.

Mineral insulated cables for RTDs have inner conductors of copper, copper-nickel alloys, nickel, nickel-chromium or nickel-plated copper.

Delivery Program

ABB offers a wide range of mineral insulated cables for the production of mineral insulated thermocouples and resistance thermometers.

All standardized thermocouple types K, J, L, T, U, E and N and the precious metal thermocouple types R, S and B are available as mineral insulated thermocouple cables. Additionally, various mineral insulated cables with copper, copper-nickel, nickel and nickel-chromium inner conductors are available ex stock.

Mineral insulated cables can be produced in various combinations. The choice of base materials depends on different criteria (application temperature range, required heat treatment during the drawing process, etc.).

The cables are available with an outer diameter of 0.25 to 12.7 mm and can be delivered in production lengths between 20 and 2000 m, depending on the diameter.

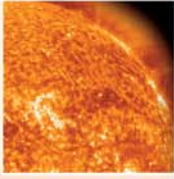
	Mineral insulated thermo-couple cables (SensyMIC)	Mineral insulated cables (RTD) (SensyMIC)	Heating cables (SensyHEAT)
Temperature*	-200...1300 °C (-328... 2372 °F)	-200...1100 °C (-328... 2012 °F)	(up to 800 °C (up to 1472 °F)
Type	K**, J, E, N, R, S, B to DIN EN 584 / IEC 584	Cu, Ni-plated Cu, NiCr, Ni, CuNi	NiCr 8020, FeNi, CoFe, CuNi
Sheath	Alloy: 75, 600, 601, 800 AISI: 304, 310, 314, 316, 321, 347 446	Alloy: 600, 601 AISI: 304, 316, 321	Alloy: 600, 601 AISI: 321
<p>* The maximum operating temperature is directly related to the material of the outer sheath and the inner conductors and can be derived from the ordering information.</p> <p>** All K-type mineral insulated thermocouples are subject to a defined heat treatment in order to bring them to the K-state and ensure stable, reproducible and reliable temperature measurement.</p>			

SensyHeat Heating Cables for Stabilizing and Increasing the Temperature

Mineral insulated heating cables are used in electrical heating systems with high economic efficiency (specific heating capacity up to 300 W/m) and high temperatures (also in hazardous areas). Due to their high durability they are best suited for transmitting big heat quantities. They are preferably used for machine and plant construction, in the chemical and petrochemical industries and for research and engineering.

- Very high economic efficiency
- Use in hazardous areas
- High-temperature applications
- Transmission of big heat quantities

Extension Cables and Compensating Cables



The choice of insulation materials considerably depends on the application. In many cases, high-temperature insulation materials (200° C and higher) are required, as the cables must be laid close to the measuring point or in hot areas. For other applications, moisture-proof underground compensating cables are needed.



	Extension cable (Original material)	Compensating cables (Substitute material)
Temperature*	-25...200 °C (13...392 °F)	0...200 °C (32...392 °F)
Type	KX, EX, JX, NX to DIN 43722	KCA, NC, KCB, RCA/SCA, RCB/SCB to DIN 43722
Sheath	PVC, silicone, Teflon, glass fiber, PTFE, FEP, braid of galvanized or stainless steel wires	PVC, silicone, Teflon, glass fiber, braid of galvanized or stainless steel wires

* The maximum operating temperature is directly related to the material of the outer sheath and the inner conductors and can be derived from the ordering information.

Compensating Cable

The cable between the thermocouple and the reference junction must have the same thermoelectric characteristics as the thermocouple itself. For this link, a compensating cable or extension cable is used.

Materials for Extension and Compensating Cables to DIN 43 722

A distinction is made between the original materials used for extension cables and substitute materials used for compensating cables. Extension cables consist of the same original materials as the corresponding thermocouple and can be used for measurements up to 200 °C (392 °F).

Compensating cables are usually not made of the same materials as the corresponding thermocouple, but of substitute materials, i.e. inexpensive alloys. Substitute alloys have the same thermoelectric characteristics as the thermocouple in the permissible temperature range and can be used for temperatures up to 200 °C (392 °F).

Insulated and Bare Thermocouple Wires

Bare and insulated thermowires are used to manufacture thermocouples that can comply with the relevant standards. The temperature limits depend on various factors (ambient atmosphere, installation site, etc.) and, therefore, should be considered as approximate values. Both precious metal and non-precious metal wires are available as thermocouples in specified quantities or on spools of up to 500 m.



	Insulated thermocouple wires	Bare thermocouple wires
Temperature*	- 200...1400 °C** (-328...2552 °F)	-200...1600 °C** (-328...2912 °F)
Type	K, J, E, N, L to DIN EN 60584, DIN 43710, DIN 43712, IEC 584	K, J, E, N, L, C, D, R, S, B to DIN EN 60584, DIN 43710, DIN 43712, IEC 584
Sheath	PVC, silicone, Teflon, glass fiber, ceramics fiber	without

* The maximum operating temperature is directly related to the material of the outer sheath and the inner conductors and can be derived from the ordering information.
** Max. temperature limit for short-time usage.

Single Wires or Wire Pairs

Full compliance with thermovoltage tolerances can only be met, if the thermoelectric values of the opposite wire of the thermocouple used are also known. These values can only be determined by reference measurements. For this reason, ABB offers and delivers thermowires only in pair combination for the production of thermocouples.

ABB is a leader in power and automation technologies that enable utility and industry customers to improve performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 111,000 people.

www.abb.de/temperature



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