

WWW.COMECOGROUP.COM

## **Extension Wires**

Genuine thermocouple or substitute materials are used. Substitute materials are used for extension of expensive genuine thermocouple materials such as types "K" and "N", and precious metal thermocouples types "R", "S", and "B". The substitute alloys have identical thermoelectric properties over a limited temperature range. Thermocouple and extension wire coding in this catalog are coded according to DIN 43722 (types "U" and "L" are coded according to DIN 43710):

Standard	Thermocouple Code and Materials			Extension Wire Code and Materials			Color Coding			
							Conductors		Overall	
	Type	+ Pol	- Pol	Code (Type)	+ Pol	- Pol	+ Pol	- Pol	Overall	
DIN 43722 IEC 584	Т	Cu	CuNi	TX	Cu	CuNi	brown	white	brown	
	E	NiCr	CuNi	EX	NiCr	CuNi	purple	white	purple	
	J	Fe	CuNi	JX	Fe	CuNi	black	white	black	
	K	NiCr	Ni	KX	NiCr	Ni	green	white	green	
	K	NiCr	Ni	KC A	Fe	CuNi	green	white	green	
	K	NiCr	Ni	KC B	Cu	CuNi	green	white	green	
	R/S	Pt 13/10 Rh	Pt	RC A / SC A	Cu	CuNi	orange	white	orange	
	R/S	Pt 13/10 Rh	Pt	RC B / SC B	Cu	CuNi	orange	white	orange	
	N	NiCrosil	Nisil	NC	Cu	CuNi	pink	white	pink	
	В	Pt 30 Rh	Pt 6 Rh	BC	Cu-Leg	Cu	grey	white	grey	
DIN 43710	U	Cu	CuNi	UX	Cu	CuNi	red	brown	brown	
	L	Fe	CuNi	LX	Fe	CuNi	red	blue	blue	

Technical specifications of various extension wires made by SENSYCON are given in the specification tables. Wire material is selected by including the code from the shaded column of the table above. The symbols used in the specification tables denote the following:

+ = good

O = fair

- = not recommended

S [mm<sup>2</sup>] - stranded wire effective current carrying cross-section

φ [mm] - solid wire cross-section

## EMF, limits of error, and temperature ranges

Thermocouple and extension grade wires are produced by SENSYCON and conform to DIN 43713. EMF in the admissible temperature range corresponds to DIN IEC part II. Limits of error for thermocouple and extension grade wires correspond to DIN 43722. Two accuracy classes are available:

- accuracy class 1 only for wires from genuine thermocouple materials;
- accuracy class 2 for wires from genuine thermocouple materials and substitute materials.

Limits of error for extension grade wires in the admissible temperature are listed in the table below.

Code	Accurac	cy Class	Admissible Temperature	At Measured Temperature	
	1	2			
JX	± 85 μV (± 1.5 °C)	$\pm$ 140 $\mu V$ (± 2.5 °C)	-25200 °C	500 °C	
TX	$\pm$ 30 $\mu$ V ( $\pm$ 0.5 °C)	$\pm$ 60 $\mu$ V ( $\pm$ 1.0 °C)	-25100 °C	300 °C	
EX	$\pm$ 120 $\mu V$ (± 1.5 °C)	$\pm200~\mu\text{V}~(\pm2.5~^\circ\text{C})$	-25200 °C	500 °C	
KX	± 60 μV (± 1.5 °C)	$\pm$ 100 $\mu V$ (± 2.5 °C)	-25200 °C	900 °C	
NX	± 60 μV (± 1.5 °C)	$\pm$ 100 $\mu V$ (± 2.5 °C)	-25200 °C	900 °C	
KCA	_	$\pm$ 100 $\mu$ V ( $\pm$ 2.5 °C)	0150 °C	900 °C	

Code	A	ccuracy Class	Admissible Temperature	At Measured Temperature	
	1	2			
KCB	_	$\pm$ 100 $\mu V$ (± 2.5 °C)	0100 °C	900 °C	
NC	_	$\pm$ 100 $\mu V$ (± 2.5 °C)	0150 °C	900 °C	
RCA	ı	$\pm$ 30 $\mu V$ (± 2.5 °C)	0100 °C	1000 °C	
RCB	I	$\pm$ 60 $\mu V$ (± 5.0 °C)	0200 °C	1000 °C	
SCA	_	$\pm$ 30 $\mu V$ (± 2.5 °C)	0100 °C	1000 °C	
SCB	-	$\pm$ 60 $\mu V$ (± 5.0 °C)	0200 °C	1000 °C	

Usually, wires of accuracy class 2 according to DIN 43722 are offered (types "U" and "L": according DIN 43710; limits of error  $\pm$  3°C). Accuracy class 1 wires are delivered on request.

Common copper wires may be used for "B" type thermocouples at temperatures up to 100 °C. For this reason, DIN 43722 does not state limits of error for this type. At higher working temperatures, special extension wires are used (delivered on request).



WWW.COMECOGROUP.COM

## **Insulation materials**

The choice of insulation material is made according to extension wire (cable) application. Most important properties are temperature, water, and aggressive media resistance. Approximate values for some commonly used materials are given in the table below.

		Standard PVC	Heat-resistant PVC	Silicone rubber	Chloroprene rubber	Fiber- glass	Teflon FEP	Teflon PTFE
Dielectric constant μ <sub>r</sub>		5.56.5	5.06.0	2.3	3		2.1	2.1
Resistance at 20 °C [Ω·cm]		10 <sup>12</sup>	10 <sup>14</sup>	> 10 <sup>14</sup>	10 <sup>9</sup> 10 <sup>12</sup>		> 2.10 <sup>18</sup>	> 10 <sup>18</sup>
Tensile strength [kp/cm <sup>2</sup> ]		125	125	40	100250		190220	175270
Max. operation temperature [°C]		70	105	200	80	400	205	260
Specific weight [g/cm³]		1.3	1.3	1.151.3	1.351.65		2.142.17	2.142.19
Flammability		Α	Α	Α	Α	В	С	С
Moisture absorption		negligible	negligible	negligible	negligible	none	none	none
Water pressure resistance		good	good	fair	good	poor	very good	very good
	bases	+	+	+	+	+	+	+
	acids	+	+	+	+	+	+	+
Resistance to chemicals	alcohol	+	+	+	+	+	+	+
ivesistance to chemicals	petrol	+	+	+	0	+	+	+
	benzene	-	-	-	-	+	+	+
	petroleum oils	+	+	+	+	+	+	+

A = self-extinguishing B = non-combustible C = non-flammable + = good O = fair - = not recommended