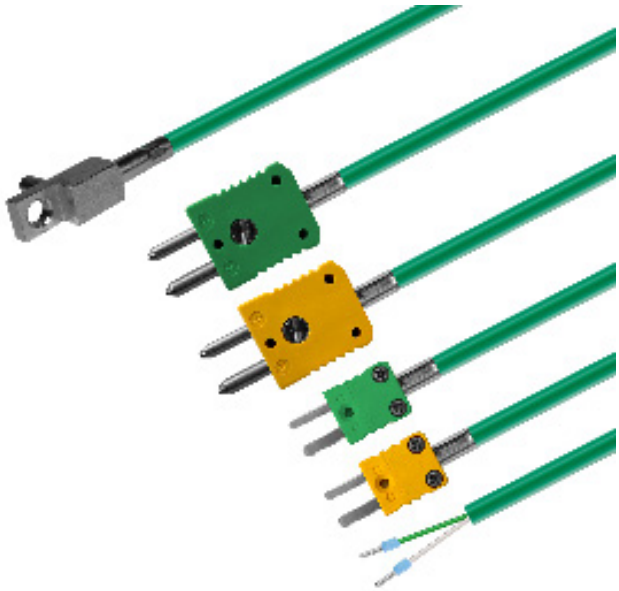
User Manual

Angle contact thermocouple Type K with silicone cable

Article no.802063 4211



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Please find our whole temperature probe and transmitter portfolio in our webshop at: www.testo-sensor.shop

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1. Table of content

1. General ... 3
1.1. Security ... 3
1.2. Intended use ... 3
1.3. Personnel qualification ... 3
1.4. Signage, safety labels, type plate ... 4
2. Transport, packaging and storage ... 4
3. Commisioning ... 4
3.1. Assambly ... 4
3.2. Requirements for achieving the protection class (IP 65) ... 4
3.3. Drilling template ... 4
3.4. Pin assignment ... 5
3.5. Maintenance ... 5
3.6. Disposal ... 5
4. Technical data and assembly instructions ... 6
5. Characteristics ... 11

HP / CK 07.07.2025

1. General

- The temperature probe described in the operating instructions is manufactured according to the current state of the art. All components are subject to strict quality and environmental criteria during manufacture. Our management systems are certified according to ISO 9001 and ISO 14001. The general terms and conditions in the sales documents apply, subject to technical changes.
- These operating instructions are an important part of the product. It must be available to qualified personnel and must be carefully read and understood before starting any work. Please be sure to comply with all the safety and handling instructions given. In particular, observe the local accident prevention regulations and general safety regulations applicable to the area of use of the product.
- The manufacturer‘s liability expires in the event of damage caused by improper use, non-observance of the instructions, use of insufficiently qualified personnel and unauthorised modifications to the product.

1.1. Security

WARNING! Before installation, commissioning and operation, please make absolutely sure that the correct temperature probe has been selected with regard to design and specific measuring conditions. Failure to do so may result in serious personal injury and/or damage to property.

- The selection of the products and, in particular, the determination of their suitability for a specific purpose are the sole responsibility of the purchaser, who must also ensure that incorrect planning, operation or installation does not cause any further damage and that compliance with the relevant construction and safety guidelines is observed and guaranteed.
- No liability or warranty is expressly accepted for damage caused by incorrect planning, operation, installation or malfunction of the products.
- The technical data and connection conditions in the supplied installation and operating instructions apply exclusively. Changes are possible in the interests of technical progress and the continuous improvement of our products.

1.2. Intended use

- For the intended use of the probe, please refer to the technical data and the commissioning instructions in the operating instructions. The product is designed and built exclusively for the intended use described there and may only be used accordingly. The technical specifications must be observed. Claims due to improper use are excluded.
- This product must not be used for safety-relevant tasks, such as monitoring or protecting persons against danger or injury, as an emergency stop switch on systems or machines, etc.
- This type of temperature probe has been developed, qualified and manufactured to the highest quality standards. Application-specific environmental or stress conditions can influence the behaviour and lead to deviations from the specifications in the data sheet. To avoid this, we recommend application-specific advice.

Application-specific environmental or stress conditions can be in particular:

- Ingress of humidity, which can lead to falsification of measured values
- Vibration, which causes high acceleration forces
- UV irradiation, which can lead to embrittlement of the cable insulation
- Tensile forces acting on the cable, which can damage the probe‘s internal structure
- Insufficient thermal coupling to the measured medium, with increased response times as a result
- impact with excessively high temperatures, which can change or destroy the built-in measuring resistor or electronic components
- corrosion at the cable ends or the connector contacts, so that measured value falsifications can occur

1.3. Personnel qualification

WARNING! - Risk of injury due to insufficient professional qualification! Improper handling can lead to considerable personal injury and damage to property.

- The activities described in these operating instructions may only be carried out by adequately qualified personnel. Special operating conditions may require additional, appropriate knowledge, e.g. about aggressive media, possible dangers or country-specific regulations, standards or guidelines.Please keep unqualified personnel away from the danger areas.

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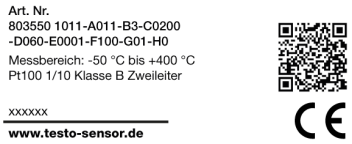
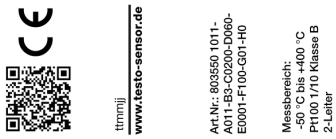
1.4. Signage, safety labels, type plate

Products are labelled as follows. (Exemplary representation)

Label for temperature probes with housing/head



Label for cable probes (attached to the cable as a flag)



2. Transport, packaging and storage

Transport: Please inspect the product for any transport damage immediately after delivery. Please notify us immediately of any obvious damage.
Packaging: Please remove the packaging only immediately before assembly and keep it, as the packaging provides optimum protection during transport.
Storage: The permissible storage temperature is -20 ... +70 °C and the ambient humidity conditions at the storage location should preferably be approx. 20% ... 85% relative humidity; condensation should be avoided.

The following influences should be avoided:

- Direct sunlight or proximity to hot objects
- Mechanical vibration, mechanical shock (hard impact)
- Exposure to soot, steam, dust or corrosive gases
- Explosive environment, flammable atmospheres

Original packaging: Please store the product in the original packaging in a place that meets the conditions listed above. If the original packaging is not available, please pack and store the product as follows:

- Wrap the product in an antistatic plastic sheet.
- Place the product with the insulation material in the packaging.
- For longer storage (more than 30 days), add a bag of desiccant to the packaging.

3. Commisioning

3.1. Assambly

- The products may only be connected in a de-energised state, only to safety extra-low voltages and only by suitably qualified personnel.
- Please observe the safety regulations of the VDE, the federal states, their monitoring bodies, the TÜV and the local EVU. The installation instructions in the data sheet must be observed.
- Please observe EMC guidelines to prevent damage, faults on the product or measured value deviations.

3.2. Requirements for achieving the protection class (IP 65)

- Only use the cable gland in the specified clamping range (select the cable Ø to match the cable gland).
- Do not use the lower clamping area when using very soft cable types.
- Only use round cables (a slightly oval cross-section may also be suitable).
- Do not twist the cable.
- Multiple opening/closing is possible, but can have a negative effect on the protection class.
- For cables with pronounced cold flow behaviour, please tighten the screw connection if necessary.

3.3. Drilling template

You will find the drilling template, if available, in the technical data.

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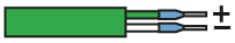
3.4. Pin assignment

The characteristics of our sensors can be found on our website or in the appendix to these operating instructions.

- The products are designed for operation on safety extra-low voltages (SELV).
- For the electrical connection of the products, the technical data of the products apply.
- Especially for passive probes (e.g. Pt100 etc.) in a two-wire circuit, the lead resistance of the supply line must be taken into account in order to correct measured value deviations (offset).
- If necessary, the lead resistance must be corrected in the subsequent electronics.
- Due to self-heating, the measuring current influences the measuring accuracy. Therefore, the measuring current should not be greater than 1 mA.

Wiring diagram



3.5. Maintenance

The product is maintenance-free. Repairs may only be carried out by the manufacturer or by qualified personnel.

3.6. Disposal

The product is to be classified as electrical and electronic equipment, so that it must be disposed of as electrical / electronic waste. Alternatively, you can return the product to us for proper disposal. The product should not be disposed of as household waste. Special treatment for special components may be legally mandatory and ecologically sensible. Please also observe the local legislation applicable to disposal.

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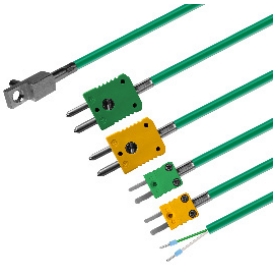
4. Technical data and assembly instructions

Angle contact thermocouple Type K with silicone cable

Article no. 802063 4211

Our type K angle contact thermocouple with silicone cable is used for temperature measurements on smooth surfaces, e.g. in hot runner technology. The sensor is attached via a screw connection and the existing barb. The silicone cable provides excellent sealing and flexibility so that the sensor can be used reliably in the temperature range from -50 °C to +180 °C. We offer various cable lengths and connection plugs so that you can adapt the thermocouyple optimally to your installation situation. You will find suitable plugs and connection cables in our accessories.



General Information	
Measuring range	-40 °C to +180 °C depending on chosen connection cable
Perm. °C range cable	-50 °C to +180 °C
Accuracy	-40 °C to +375 °C: ±1,5 °C according to DIN IEC 60584 Class 1

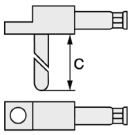
Supply and output	
Measuring element	Thermocouple Type K
Measuring point	Measuring point isolated
Measurement signal	Thermovoltage

Ambient conditions	
Protection class	IP54 according DIN 60529 (depending on cable)
Humidity and moisture condensation resistance	according to application-specific qualification

Certificates and Standards	
Standards	DIN EN 61326-1:2013 | DIN EN IEC 63000:2019-05
Directive	RoHS 2011/65/EU | 2014/30/EU

Customizable options
C - Length protection sleeve
E - Material connection cable
F - Length connection cable
G - Connector
H - Bend protection

Contact body

Picture	Contact body		Dimensioning		Protection sleeve		Drawing
	Contact geometry	Square with step and hook	Length (mm)	20	**C -Length protection sleeve**		
			Width (mm)	8	**Length (mm)**	**Code**	
	Material	Stainless Steel	Height (mm)	8	12[1)]	C0012	
	Mounting hole (mm)	4,5			16[1)]	C0016	
					24[1)]	C0024	
	We offer other contact bodies on request.				**Ø (mm)**	4[1)]	

E - Cable material and configuration connection cable

Picture	Code	Type	Color	IP	From (°C)[1)]	To (°C)[1)]	Outside material	Material strand	Ø (mm)[2)]	Q (mm²)	Color strand
	E8220	Thermocouple cable	Type K[3)]	IP67	-50	+180	Silicone	FEP	3,6	0,22	gn, wt
	Insulation resistance: ≥ 100 MOhm a min. 100 VDC | [1)]Perm. range °C | [2)]Tolerance ± 0,2 mm | [3)]Color according to IEC 584 | [4)]per thermocouple										

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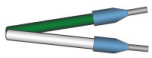
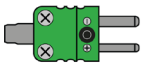
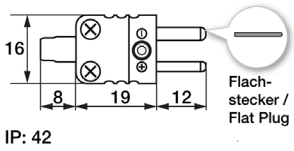
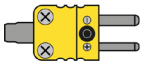
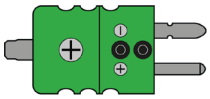
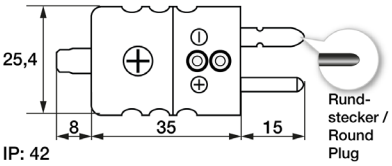
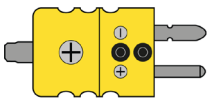
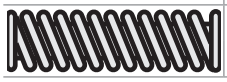
F - Length								
Code	F010	F020	F030	F040	F050	F100	F150	F200
m	1	2	3	4	5	10	15	20
Other lengths on request								

G - Connector

Picture	Code	Feature	Technical drawing - Stecker
	G01	Insulated end ferrules (50 mm)	
	G12	Mini-TC connector Type K gn	
	G19	Mini-TC connector Type K ye	
	G32	TC connector Type K gn	
	G39	TC connector Type K ye	

H - Bend protection

Picture	Length (mm)	Material	Code	Feature
	50	Stainless steel spring 1.4310 | SUS 302	H0	Without (Standard)
			H1	Metal bend protection

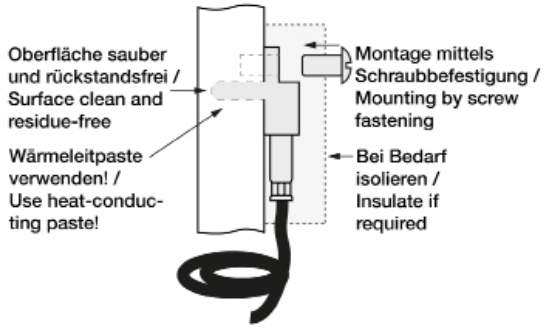
Your order code

Article no.	Length protection sleeve	Material connection cable	Length connection cable	Connector	Bend protection
802063 4211	C____	E_____	F_____	G_____	H_____

Delivery and Assembly	
Assembly instructions	by means of screw fastening
Delivery and Packaging	Probe, seperatly packaged in PE bag

Important assembly advices

The surface must be brightly polished and free of residues. Please attach the probe firmly. Please ensure good thermal contact, use thermal paste if necessary. Depending on the requirements, it may be useful to insulate the probe to minimize the influence of the ambient temperature.



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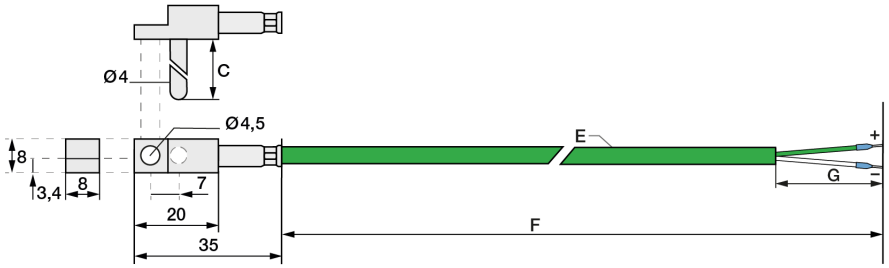
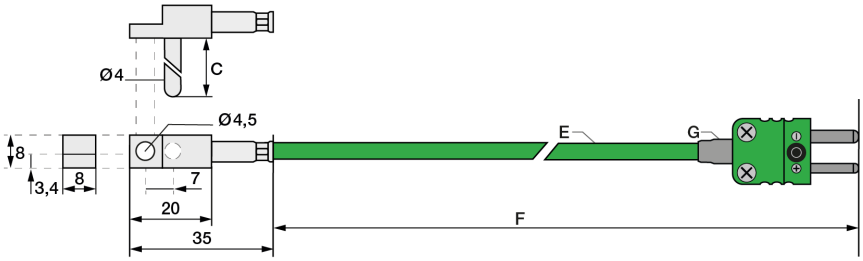
Technical drawing			
Customizable options	C - Length protection sleeve E - Material connection cable	F - Length connection cable G - Connector	H - Bend protection All dimensions in mm

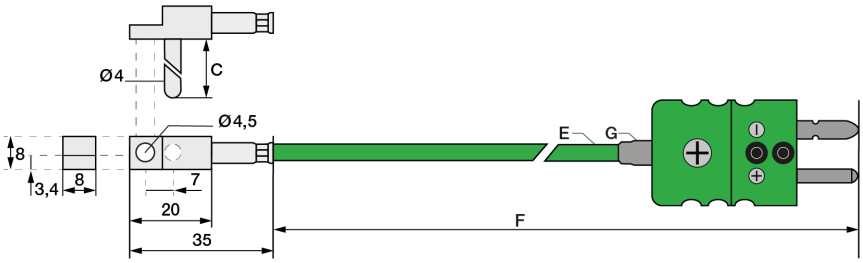
Version with insulated end ferrules



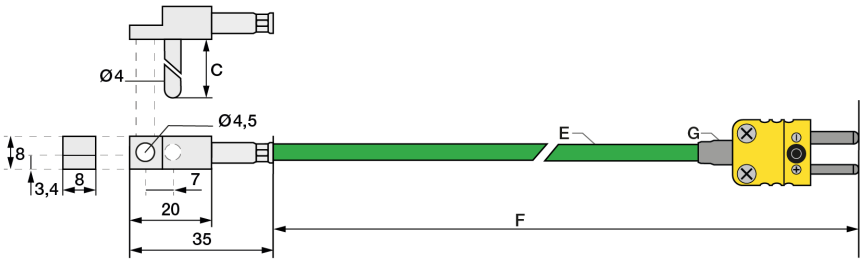
Version with Mini TE connector



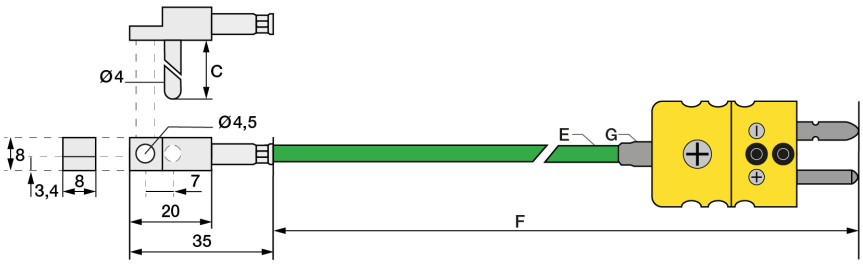
Version with TE connector



Version with Mini TE connector



Version with TE connector



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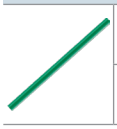
Matching accessories: Thermocouple cables

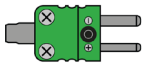
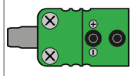
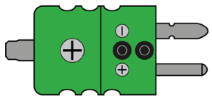
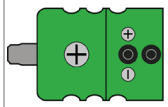
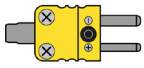
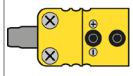
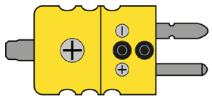
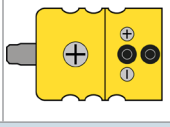
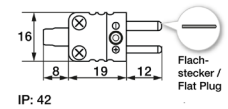
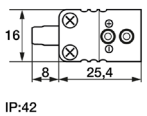
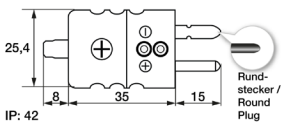
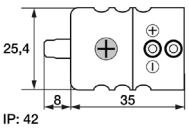
Thermocouple cables - Please select your desired cable first.												
	Order code	**Type**	**Color**	**IP**	**From (°C)[1]**	**To (°C)[1]**	**Outside material**	**Material strand**	**Ø (mm)[2]**	**Q (mm²)**	**Color strand**	**Ω / m[4]**
	809310 2	Thermocouple cable	Type K[3]	IP67	-50	+180	Silicone	FEP	3,6	0,22	gn, wt	4,50

Insulation resistance: ≥ 100 MOhm at min. 100 VDC | [1]per. °C range | [2]Tolerance ± 0.2 mm | [3] Color according to IEC 584 | [4]per thermocouple

Now please select the length and add the code to the article no. of the cable.					
Length (m)	1	2	5	10	20
Code	010	020	050	100	200

Please append these digits to the part number of your desired cable.

Matching accessories: Connector

G - Connector					
Picture	**Code**	**Feature**	**Picture**	**Code**	**Feature**
	809140 2000	Mini-TC connector Type K gn		809100 2000	Mini-TC coupling Type K gn
	809150 2000	TC connector Type K gn		809110 2000	TC coupling Type K gn
	809140 2001	Mini-TC connector Type K ye		809100 2001	Mini-TC coupling Type K ye
	809150 2001	TC connector Type K ye		809110 2001	TC coupling Type K ye
Technical drawing - Connector					
		Mini-TC connector			Mini-TC coupling
		TC connector			TC coupling

Other connectors available on request

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Matching accessories: Heat-conducting paste

Heat-conducting paste		
Picture	**Article no.**	**809540 1000**
	Content	10 ml
	Thermal conductivity	>2.5 W/mK
	Min / Max °C	-30 °C to +280 °C
	Thermal resistance	< 0.126

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5. Characteristics

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Amtsgericht Freiburg HRB 706025 | VAT-ID: DE274417683 | Business-ID: DE274417683-00001

Characteristic Thermocouple Type K

Measuring range: -40 °C to +1.200 °C

Accuracy class Thermocouple Type K according DIN IEC 60584	
Class	**Formula**
Cl. 1	-40 °C to +375 °C: ±1,5 °C | +375 °C to +1.000 °C: ±0,004 |t|
Cl. 2	-40 °C to +333 °C: ±2,5 °C | +333 °C to +1.200 °C: ±0,0075 |t|

Example values		
Value @ T = 100 °C	**Value @ T = 500 °C**	**Value @ T = 1.000 °C**
±1,5 °C	±2,00 °C	±4,0 °C
± 2,5 °C	±3,75 °C	±7,5 °C

Type K	EMF* in µV	Max. tol. ± in °C**	
T in °C		Cl. 1	Cl. 2
-270	-6.458		
-260	-6.441		
-250	-6.404		
-240	-6.344		
-230	-6.262		
-220	-6.158		
-210	-6.035		
-200	-5.891		
-190	-5.730		
-180	-5.550		
-170	-5.354		
-160	-5.141		
-150	-4.913		
-140	-4.669		
-130	-4.411		
-120	-4.138		
-110	-3.852		
-100	-3.554		
-90	-3.243		
-80	-2.920		
-70	-2.587		
-60	-2.243		
-50	-1.889		
-40	-1.527	1,5	2,5
-30	-1.156	1,5	2,5
-20	-778	1,5	2,5
-10	-392	1,5	2,5
0	0	1,5	2,5
10	397	1,5	2,5
20	798	1,5	2,5
30	1.203	1,5	2,5
40	1.612	1,5	2,5
50	2.023	1,5	2,5
60	2.436	1,5	2,5
70	2.851	1,5	2,5
80	3.267	1,5	2,5

Type K	EMF* in µV	Max. tol. ± in °C**	
T in °C		Cl. 1	Cl. 2
90	3.682	1,5	2,5
100	4.096	1,5	2,5
110	4.509	1,5	2,5
120	4.920	1,5	2,5
130	5.328	1,5	2,5
140	5.735	1,5	2,5
150	6.138	1,5	2,5
160	6.540	1,5	2,5
170	6.941	1,5	2,5
180	7.340	1,5	2,5
190	7.739	1,5	2,5
200	8.138	1,5	2,5
210	8.539	1,5	2,5
220	8.940	1,5	2,5
230	9.343	1,5	2,5
240	9.747	1,5	2,5
250	10.153	1,5	2,5
260	10.561	1,5	2,5
270	10.971	1,5	2,5
280	11.382	1,5	2,5
290	11.795	1,5	2,5
300	12.209	1,5	2,5
310	12.624	1,5	2,5
320	13.040	1,5	2,5
330	13.457	1,5	2,5
340	13.874	1,5	2,6
350	14.293	1,5	2,6
360	14.713	1,5	2,7
370	15.133	1,5	2,8
380	15.554	1,5	2,9
390	15.975	1,6	2,9
400	16.397	1,6	3,0
410	16.820	1,6	3,1
420	17.243	1,7	3,2
430	17.667	1,7	3,2
440	18.091	1,8	3,3

Type K	EMF* in µV	Max. tol. ± in °C**	
T in °C		Cl. 1	Cl. 2
450	18.516	1,8	3,4
460	18.941	1,8	3,5
470	19.366	1,9	3,5
480	19.792	1,9	3,6
490	20.218	2,0	3,7
500	20.644	2,0	3,8
510	21.071	2,0	3,8
520	21.497	2,1	3,9
530	21.924	2,1	4,0
540	22.350	2,2	4,1
550	22.776	2,2	4,1
560	23.203	2,2	4,2
570	23.629	2,3	4,3
580	24.055	2,3	4,4
590	24.480	2,4	4,4
600	24.905	2,4	4,5
610	25.330	2,4	4,6
620	25.755	2,5	4,7
630	26.179	2,5	4,7
640	26.602	2,6	4,8
650	27.025	2,6	4,9
660	27.447	2,6	5,0
670	27.869	2,7	5,0
680	28.289	2,7	5,1
690	28.710	2,8	5,2
700	29.129	2,8	5,3
710	29.548	2,8	5,3
720	29.965	2,9	5,4
730	30.382	2,9	5,5
740	30.798	3,0	5,6
750	31.213	3,0	5,6
760	31.628	3,0	5,7
770	32.041	3,1	5,8
780	32.453	3,1	5,9
790	32.865	3,2	5,9
800	33.275	3,2	6,0

Type K	EMF* in µV	Max. tol. ± in °C**	
T in °C		Cl. 1	Cl. 2
810	33.685	3,2	6,1
820	34.093	3,3	6,2
830	34.501	3,3	6,2
840	34.908	3,4	6,3
850	35.313	3,4	6,4
860	35.718	3,4	6,5
870	36.121	3,5	6,5
880	36.524	3,5	6,6
890	36.925	3,6	6,7
900	37.326	3,6	6,8
910	37.725	3,6	6,8
920	38.124	3,7	6,9
930	38.522	3,7	7,0
940	38.918	3,8	7,1
950	39.314	3,8	7,1
960	39.708	3,8	7,2
970	40.101	3,9	7,3
980	40.494	3,9	7,4
990	40.885	4,0	7,4
1.000	41.276	4,0	7,5
1.010	41.665		7,6
1.020	42.053		7,7
1.030	42.440		7,7
1.040	42.826		7,8
1.050	43.211		7,9
1.060	43.595		8,0
1.070	43.978		8,0
1.080	44.359		8,1
1.090	44.740		8,2
1.100	45.119		8,3
1.110	45.497		8,3
1.120	45.873		8,4
1.130	46.249		8,5
1.140	46.623		8,6
1.150	46.995		8,6
1.160	47.367		8,7

HP / CK 07.07.2025

Type K	EMF* in µV	Max. tol. ± in °C**	
T in °C		Cl. 1	Cl. 2
1.170	47.737		8,8
1.180	48.105		8,9
1.190	48.473		8,9
1.200	48.838		9,0
1.210	49.202		
1.220	49.565		

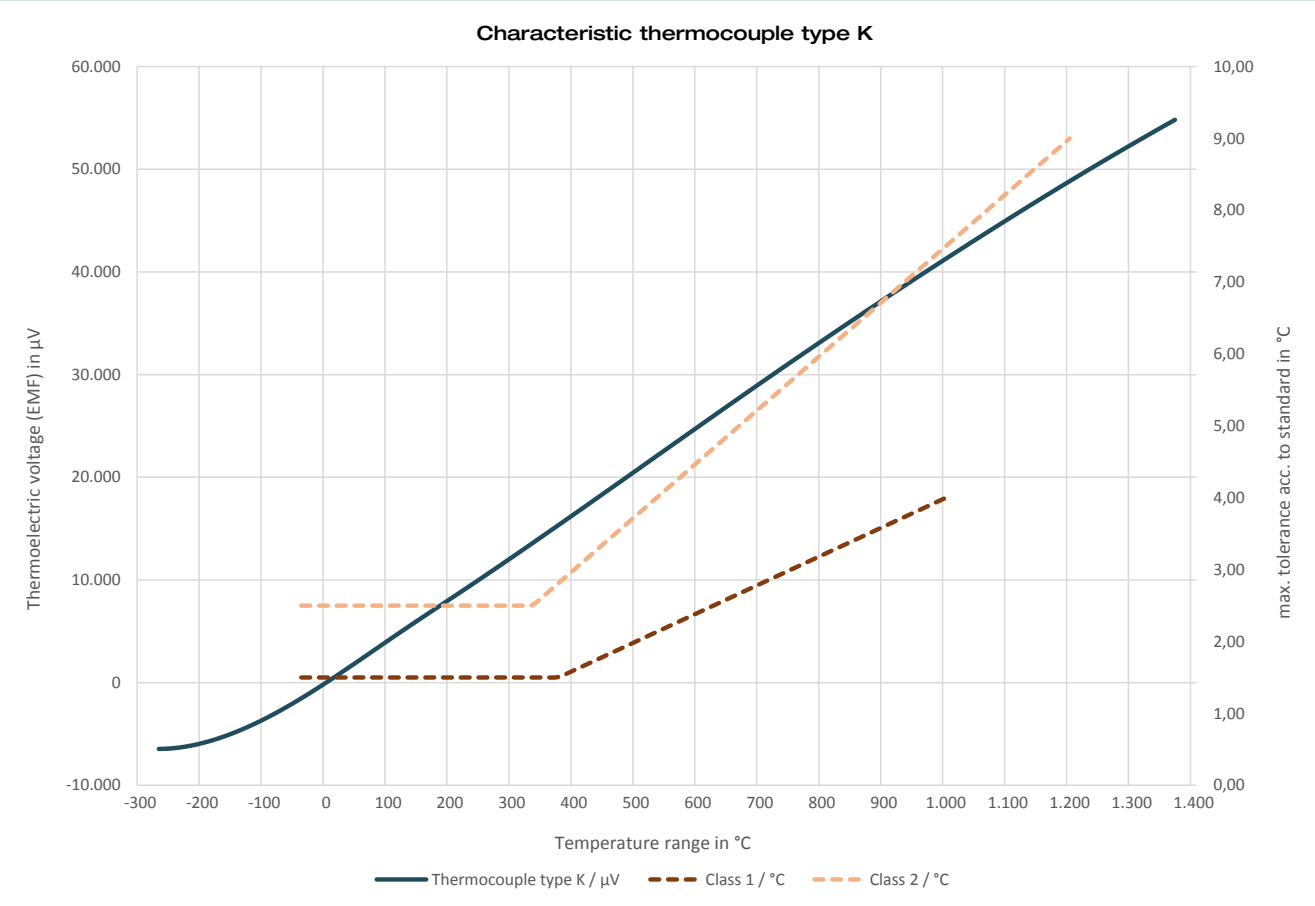
Type K	EMF* in µV	Max. tol. ± in °C**	
T in °C		Cl. 1	Cl. 2
1.230	49.926		
1.240	50.286		
1.250	50.644		
1.260	51.000		
1.270	51.355		
1.280	51.708		

Type K	EMF* in µV	Max. tol. ± in °C**	
T in °C		Cl. 1	Cl. 2
1.290	52.060		
1.300	52.410		
1.310	52.759		
1.320	53.106		
1.330	53.451		
1.340	53.795		

Type K	EMF* in µV	Max. tol. ± in °C**	
T in °C		Cl. 1	Cl. 2
1.350	54.138		
1.360	54.479		
1.370	54.819		

*Thermoelectric voltage (EMF) in µV

**Maximum tolerance according DIN IEC 60584



The standard specifies measuring ranges for thermocouples in which the respective measuring accuracy of the tolerance class applies. For use outside this specified measuring range, it is not possible to specify the measuring accuracy. If the thermocouple is operated outside the specified measuring range of its respective tolerance class, irreversible damage to the thermocouple may occur, which will result in a measurement deviation (even within the specified range). Use beyond the measuring range of the tolerance class represents misuse and leads to a loss of warranty.

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Registergericht: Amtsgericht Freiburg

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