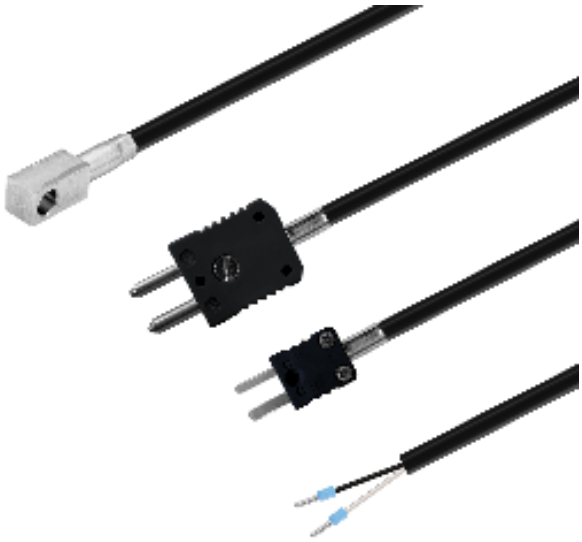
User Manual

Contact thermocouple Type J with PVC cable

Article no.802053 1111



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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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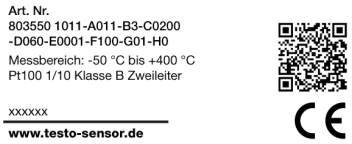
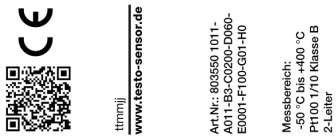
1.4. Signage, safety labels, type plate

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

Contact thermocouple Type J with PVC cable

Article no.802053 1111

The contact thermocouple type J with PVC cable is used for precise temperature measurement on surfaces. It is particularly suitable for applications in mechanical and apparatus engineering where the temperature needs to be measured on smooth surfaces. The sensor is simply attached using a screw connection and offers a cost-effective solution for the temperature range up to 90 °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	-30 °C to +90 °C depending on chosen connection cable
Perm. °C range cable	-30 °C to +90 °C
Accuracy	-40 °C to +375 °C: ±1,5 °C according to DIN IEC 60584 Class 1

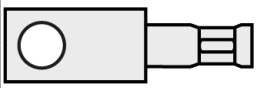
Supply and output	
Measuring element	Thermocouple Type J
Measuring point	Measuring point isolated
Measurement signal	Thermovoltage

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
E - Material connection cable
F - Length connection cable
G - Connector
H - Bend protection

Contact body

Picture	Contact body		Dimensioning		Drawing
	Contact geometry	Square	Length (mm)	15	
	Material	Stainless Steel	Width (mm)	8	
	Mounting hole (mm)	5,2	Height (mm)	8	
	We offer other contact bodies on request.				

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
	E8010	Thermocouple cable	Type J[3]	IP67	-30	+90	PVC	PVC	3,8	0,22	bk, 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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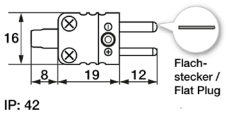
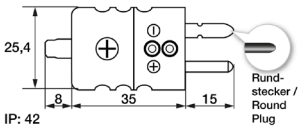
F - Length								
Code	F010	F020	F030	F040	F050	F100	F150	F200
m	1	2	3	4	5	10	15	20
Other lengths on request								

G - Connector			
Picture	**Code**	**Feature**	**Technical drawing - Stecker**
	G01	Insulated end ferrules (50 mm)	
	G11	Mini-TC connector Type J bk	
	G31	TC connector Type J bk	

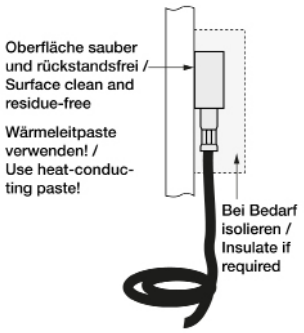
H - Bend protection				
Picture	**Length (mm)**	**Material**	**Code**	**Feature**
	50	Stainless steel spring 1.4310 | SUS 302	H0	Without (Standard)
			H1	Metal bend protection

Your order code				
Article no.	Material connection cable	Length connection cable	Connector	Bend protection
802053 1111	E_____	F_____	G_____	H_____

Delivery and Assembly	
Assembly instructions	by means of screw fastening or mounting adhesive
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	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

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Matching accessories: Thermocouple cables

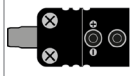
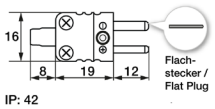
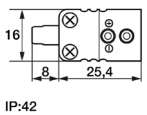
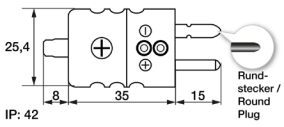
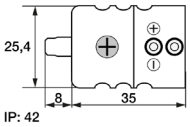
Thermocouple cables - Please select your desired cable first.												
	Order code	Type	Color	IP	From (°C)[1]	To (°C)[1]	Outside material	Material strand	Ø (mm)[2]	Q (mm²)	Color strand	Ω / m[4]
	809300 1	Thermocouple cable	Type J[3]	IP67	-30	+90	PVC	PVC	3,8	0,22	bk, wt	2,50

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 1000	Mini-TC connector Type J bk		809100 1000	Mini-TC coupling Type J bk
	809150 1000	TC connector Type J bk		809110 1000	TC coupling Type J bk
Technical drawing - Connector					
		Mini-TC connector			Mini-TC coupling
		TC connector			TC coupling

Other connectors available on request

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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Characteristic Thermocouple Type J

Measuring range: -40 °C to +750 °C

Accuracy class Thermocouple Type J according DIN IEC 60584	
Class	**Formula**
Cl. 1	-40 °C to +375 °C: ±1,5 °C | +375 °C to +750 °C: ±0,004 |t|
Cl. 2	-40 °C to +333 °C: ±2,5 °C | +333 °C to +750 °C: ±0,0075 |t|

Example values		
Value @ T = 100 °C	**Value @ T = 500 °C**	**Value @ T = 700 °C**
±1,5 °C	±2,00 °C	±2,8 °C
± 2,5 °C	±3,75 °C	±5,25 °C

Type J		Max. Tol. ± in °C**	
T in °C	**EMF* in µV**	**Cl. 1**	**Cl. 2**
-210	-8.095		
-200	-7.890		
-190	-7.659		
-180	-7.403		
-170	-7.123		
-160	-6.821		
-150	-6.500		
-140	-6.159		
-130	-5.801		
-120	-5.426		
-110	-5.037		
-100	-4.633		
-90	-4.215		
-80	-3.786		
-70	-3.344		
-60	-2.893		
-50	-2.431		
-40	-1.961	1,5	2,5
-30	-1.482	1,5	2,5
-20	-995	1,5	2,5
-10	-501	1,5	2,5
0	0	1,5	2,5
10	507	1,5	2,5
20	1.019	1,5	2,5
30	1.537	1,5	2,5
40	2.059	1,5	2,5
50	2.585	1,5	2,5
60	3.116	1,5	2,5
70	3.650	1,5	2,5
80	4.187	1,5	2,5
90	4.726	1,5	2,5
100	5.269	1,5	2,5
110	5.814	1,5	2,5
120	6.360	1,5	2,5
130	6.909	1,5	2,5
140	7.459	1,5	2,5

Type J		Max. Tol. ± in °C**	
T in °C	**EMF* in µV**	**Cl. 1**	**Cl. 2**
150	8.010	1,5	2,5
160	8.562	1,5	2,5
170	9.115	1,5	2,5
180	9.669	1,5	2,5
190	10.224	1,5	2,5
200	10.779	1,5	2,5
210	11.334	1,5	2,5
220	11.889	1,5	2,5
230	12.445	1,5	2,5
240	13.000	1,5	2,5
250	13.555	1,5	2,5
260	14.110	1,5	2,5
270	14.665	1,5	2,5
280	15.219	1,5	2,5
290	15.773	1,5	2,5
300	16.327	1,5	2,5
310	16.881	1,5	2,5
320	17.434	1,5	2,5
330	17.986	1,5	2,5
340	18.538	1,5	2,6
350	19.090	1,5	2,6
360	19.642	1,5	2,7
370	20.194	1,5	2,8
380	20.745	1,5	2,9
390	21.297	1,6	2,9
400	21.848	1,6	3,0
410	22.400	1,6	3,1
420	22.952	1,7	3,2
430	23.504	1,7	3,2
440	24.057	1,8	3,3
450	24.610	1,8	3,4
460	25.164	1,8	3,5
470	25.720	1,9	3,5
480	26.276	1,9	3,6
490	26.834	2,0	3,7
500	27.393	2,0	3,8

Type J		Max. Tol. ± in °C**	
T in °C	**EMF* in µV**	**Cl. 1**	**Cl. 2**
510	27.953	2,0	3,8
520	28.516	2,1	3,9
530	29.080	2,1	4,0
540	29.647	2,2	4,1
550	30.216	2,2	4,1
560	30.788	2,2	4,2
570	31.362	2,3	4,3
580	31.939	2,3	4,4
590	32.519	2,4	4,4
600	33.102	2,4	4,5
610	33.689	2,4	4,6
620	34.279	2,5	4,7
630	34.873	2,5	4,7
640	35.470	2,6	4,8
650	36.071	2,6	4,9
660	36.675	2,6	5,0
670	37.284	2,7	5,0
680	37.896	2,7	5,1
690	38.512	2,8	5,2
700	39.132	2,8	5,3
710	39.755	2,8	5,3
720	40.382	2,9	5,4
730	41.012	2,9	5,5
740	41.645	3,0	5,6
750	42.281	3,0	5,6
760	42.919		
770	43.559		
780	44.203		
790	44.848		
800	45.494		
810	46.141		
820	46.786		
830	47.431		
840	48.074		
850	48.715		
860	49.353		

Type J		Max. Tol. ± in °C**	
T in °C	**EMF* in µV**	**Cl. 1**	**Cl. 2**
870	49.898		
880	50.622		
890	51.251		
900	51.877		
910	52.500		
920	53.119		
930	53.735		
940	54.347		
950	54.956		
960	55.561		
970	56.164		
980	56.763		
990	57.360		
1.000	57.953		
1.010	58.545		
1.020	59.134		
1.030	59.721		
1.040	60.307		
1.050	60.890		
1.060	61.473		
1.070	62.054		
1.080	62.634		
1.090	63.214		
1.100	63.792		
1.110	64.370		
1.120	64.948		
1.130	65.525		
1.140	66.102		
1.150	66.679		
1.160	67.255		
1.170	67.831		
1.180	68.406		
1.190	68.980		

*Thermoelectric voltage (EMF) in µV

**Maximum tolerance according DIN IEC 60584

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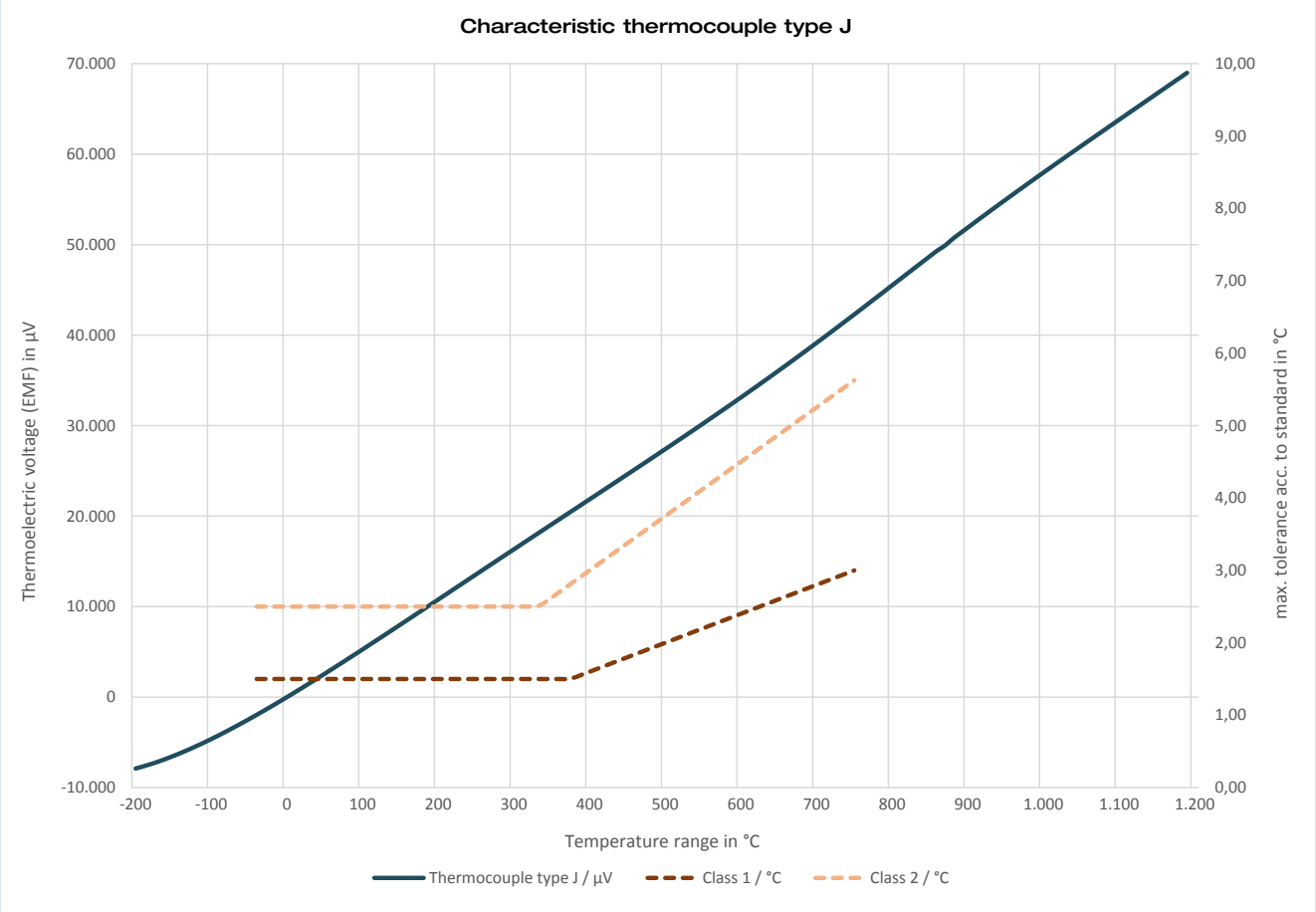

The standard specifies measuring ranges for thermocouples in which the respective measuring accuracy of the tolerance class applies. For use outside this specified measuring range, it is not possible to specify the measuring accuracy. If the thermocouple is operated outside the specified measuring range 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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We reserve the right to make technical changes.
Please read the operating instructions before starting any work.

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