OCTOGON

MANUAL

TEMG

COMPACT TEMPERATURE SENSOR, INTRINSICALLY SAFE

Operating manual



Document	Version	Date	Applies to
Operating manual	V00x	10/2026	TEMG, Pt100 / Pt1000, Ex ia (ATEX, IECEx)

This operating manual describes transport, safety, explosion protection, mounting, connection, operation, fault recovery, maintenance and configuration of the TEMG intrinsically safe compact temperature sensor.

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Contents

1 General ... 2
1.1 Information ... 2
1.2 Signs, abbreviations ... 3
1.3 Device ... 3
2 Transport, packaging, storage ... 3
2.1 Transport ... 3
2.2 Packaging ... 3
2.3 Storage ... 3
3 Safety instructions ... 4
3.1 Intended use ... 4
3.2 Personnel qualification ... 4
3.3 Special hazards ... 4
4 Ex-safety instructions ... 5
4.1 For your safety ... 5
4.2 ATEX approvals ... 5
4.3 Special provisions for operation in hazardous areas ... 5
4.4 Electrical characteristics ... 6
4.5 Environmental conditions ... 6
5 Start-up, operation ... 7
5.1 Function ... 7
5.2 Before mounting ... 7
5.3 Product label (example) ... 7
5.4 Mounting ... 7
5.5 Electrical connection ... 7
5.6 Pin assignment ... 8
5.7 Connection example ... 9
5.8 Function test ... 9
5.9 Fault detection / fault current ... 9
6 Fault recovery ... 9
7 Maintenance, dismounting, return, cleaning, disposal ... 10
7.1 Maintenance ... 10
7.2 Dismounting ... 10
7.3 Return ... 10
7.4 Cleaning ... 11
7.5 Disposal ... 11
8 Technical data ... 11
9 Dimensions (in mm) ... 12
10 Configuration ... 12

1 General

1.1 Information

– These operation instructions contain important information on handling the resistance thermometer. Working safely requires that all safety instructions and work instructions are observed.

– Skilled personnel must have carefully read and understood the operating instructions prior to beginning any work.

– The operating instructions are part of the product and must be kept in the immediate vicinity of the resistance thermometer and readily accessible to skilled personnel at any time.

– Observe the relevant local accident prevention regulations and general safety regulations for the resistance thermometer's range of use.

– If the serial number on the product label becomes illegible (e. g. through mechanical damage), traceability can not be ensured.

– The temperature sensors, described in this operating manual, are carefully designed and manufactured using state-of-the-art technology. Every component undergoes strict quality inspection in all stages of manufacture.

– The manufacturer's liability is void in the case of any damage caused by using the product contrary to its intended use, non-compliance with these operating instructions, unauthorised modifications to the resistance thermometer or assignment of insufficiently qualified skilled personnel.

1.2 Signs, abbreviations

Sign	Meaning
Warning	Non-compliance can cause injuries to persons and/or the demolition of the device. There can be a danger to life.
Attention	Non-compliance can cause faulty device operation or lead to property damage.
Information	Non-compliance can influence device operation or cause unintentional device reactions.
Danger – electrical power	There is a risk of serious or fatal injury caused by electrical power if the safety instructions are not complied with.
Warning – hot surface	There is a potential for dangerous situations resulting in burns from hot surfaces or liquids. Please avoid!
U+	Positive supply connection
U–	Negative supply connection

1.3 Device

Feature	Version
Design	modular and compact temperature sensor (resistance thermometer), Ex version
Sensor	1x Pt100 / 1x Pt1000 / 2x Pt100 / 2x Pt1000
Output	transmitter analog (current 2-wire or voltage 3-wire) or without transmitter
Explosion protection	ATEX: TÜV 21 ATEX 201293 X · IECEx: IECEx TUN 21.0005X
Manufacturer type	MKTS-Ex

2 Transport, packaging, storage

2.1 Transport

Check the instrument for any damage that may have been caused during transportation. If any damage is found, report it immediately.

2.2 Packaging

Do not remove packaging until just before mounting. Keep the packaging as it will provide optimum protection during transport (e.g. change in installation site, return).

2.3 Storage

For long-term storage avoid the following influences:

– Direct sunlight or proximity to hot objects
– Mechanical vibration, mechanical shock (rough handling)
– Soot, vapour, dust and corrosive gases

If possible store the device in its original package or an equivalent one.

3 Safety instructions

Warning Before installation, commissioning and operation ensure that the appropriate resistance thermometer has been selected in terms of measuring range, design, specific measuring conditions and appropriate wetted parts materials (corrosion).

Information More important safety instructions can be found in the individual chapters.

3.1 Intended use

The resistance thermometer TEMG is used for the measurement of temperatures from –50 ... 200 °C in liquid and gaseous media. It can be used for pressures up to 25 bar.

The sensor has been designed and built solely for the intended use described here and may only be used accordingly.

The technical specifications contained in these operating instructions must be observed. Improper handling or operation of the instrument outside of its technical specifications requires the instrument to be taken out of service immediately and an inspection by the manufacturer.

When the instrument is transported from a cold into a warm environment, the formation of condensation may result in the instrument malfunctioning. Before putting it back into operation, wait for the instrument temperature and the room temperature to equalise.

The manufacturer shall not be liable for claims of any type based on operation contrary to the intended use.

3.2 Personnel qualification

Warning **Risk of injury if qualification is insufficient**

Improper handling can lead to considerable property damage and injury.

- The required tasks as described in this operating manual should only be conducted by qualified personnel with the qualifications described below.
- Keep unqualified personnel away from hazardous areas.

For mounting and start-up of the TEMG the personnel will have to be familiar with the applicable country-specific regulations and directives and have the required qualifications. They must have knowledge of measurement and control technology, be familiar with electrical circuits, be able to carry out the work described and recognize potential hazards independently. Depending on the operating conditions, other knowledge may also be required, e.g. of corrosive media.

3.3 Special hazards

Warning For hazardous media such as oxygen, acetylene, flammable or toxic gases or liquids, refrigeration plants, compressors, etc., in addition to all standard regulations, the appropriate existing codes or regulations must also be followed.

If you do not comply with the appropriate regulation, serious injuries and/or damage may occur!

Warning A protection from electrostatic discharge (ESD) is required.

The proper use of grounded work surfaces and personal wrist straps is required when working with exposed circuitry (PCB, printed circuit boards), in order to prevent static discharge from damaging sensitive electronic components.

Danger – electrical power There is a danger of death caused by electric current. Upon contact with live parts, there is a direct danger of death.

Electrical instruments may only be installed and connected by skilled electrical personnel.

Operation with a defective power supply unit (e.g. short circuit from the supply voltage to the voltage output) can result in life-threatening voltages at the instrument.

Warning Rest media in dismounted devices can represent a danger to people, the environment and the facility. Please take sufficient security measures!

Do not use this device in safety or emergency stop installations. Improper use of the device may result in injury.

In case of fault, corrosive media with extreme temperatures and under high pressure or vacuum can be in contact with the device.

4 Ex-safety instructions

4.1 For your safety

Danger Danger to life due to loss of explosion protection.

Failure to complay with these contents and instructions can lead to a loss of explosion protection.

ATEX European guideline for explosion protection (Atmosphere=AT, Explosion=EX). The product complies with the requirements of the European directive 2014/34/EU (ATEX) on explosion protection.

Installation and start-up may only be carried out by qualified personnel with knowledge of ignition protection types as well as provisions and regulations for explosion protection. The country-specific regulations for installation and operation in hazardous areas must be complied with. The classification of the device must be suitable for the application. (see "ATEX Approvals" and product label marking)

4.2 ATEX approvals

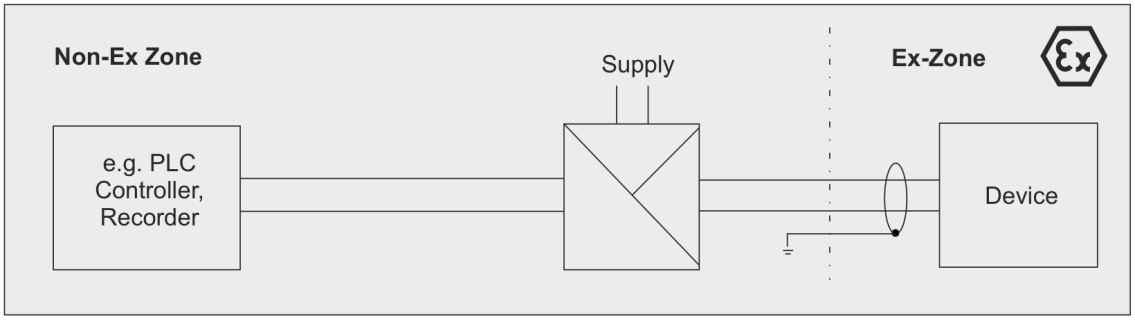
II 1 G Ex ia IIC T6..T1 Ga
II 1/2 G Ex ia IIC T6..T1 Ga/Gb
II 2 G Ex ia IIC T6..T1 Gb

Approval properties: For gases; Installation in zone 0, zone 1 and zone 2.

Approval	Certificate
ATEX	TÜV 21 ATEX 201293 X
IECEx	IECEx TUN 21.0005X

The complete certificates are available on request.

4.3 Special provisions for operation in hazardous areas



– The single wires and the free cable ends have to be comply with the requirements of clause 9 of IEC 60079-14.

– For EPL Ga/Gb applications, reverse heat flow from the process exceeding the permissible ambient temperature is not allowed and shall be avoided by suitable thermal insulation or suitable neck length of the tubing.

– For EPL Ga/Gb applications and at risks by pendulum or vibration the respective parts have to be secured effectively against these dangers.

– For EPL Ga/Gb applications any ignition hazards caused by impact or friction have to be excluded.

– The ambient temperature range depending on temperature class is to be taken from the operating manual.

– The materials in contact with the medium have to be resistant to the medium.

– For EPL Ga/Gb applications the whole device shall be mounted in a way that allows an installation that results in a sufficient tight joint (IP66 or IP67) or a flameproof joint (IEC 60079-1) in the direction of the less endangered area.

– The installation in the partition wall between areas with EPL Ga/Gb requirements has to be carried out in such a way that all metal parts are conductively connected to the metallic container wall, or in the case of containers made of plastic, all insulated metal parts have to be included in the potential equalization.

– For EPL Ga, EPL Ga/Gb and EPL Gb applications, the temperature sensor TEMG has to be installed and used in such a way that electrostatic charges due to operation, maintenance and cleaning are excluded.

4.4 Electrical characteristics

Parameter	Current Output (2-Wire)	Voltage Output (3-Wire)	Passive
Connections	+ / - (I_{out})	+ / -	+ (+) / - (-)
Voltage U_i	30 VDC	30 VDC	30 V
Current I_i	110 mA	110 mA	100 mA
Power P_i	1 W	1 W	100 mW
Effective internal capacitance C_i	Capacitance of 330m cable = 66 nF	Capacitance of 330m cable = 66 nF	Capacitance of 330m cable = 66 nF
Effective internal inductance L_i	Inductance of 330m cable = 330 µH	Inductance of 330m cable = 330 µH	Inductance of 330m cable = 330 µH
Connections	...	U_{out}	
Voltage U_0	...	= 12.6 V	
Current U_0	...	= 48 mA	
Power P_0	...	= 148 mW	
Characteristic line	...	linear	
Effective internal capacitance C_i	...	Negligibly small	
Effective internal inductance L_i	...	Negligibly small	

4.5 Environmental conditions

Current Output (2-Wire)

Temperature Class	Environmental Temperature	Medium Temperature
T1	–40 °C ... +75 °C	–50 °C ... +425 °C
T2	–40 °C ... +75 °C	–50 °C ... +275 °C
T3	–40 °C ... +75 °C	–50 °C ... +180 °C
T4	–40 °C ... +75 °C	–50 °C ... +115 °C
T5	–40 °C ... +(95 °C – P_i x 45 K/W), max. 75 °C	–50 °C ... +80 °C
T6	–40 °C ... +(80 °C – Pi x 45 K/W), max. 75 °C	–50 °C ... +65 °C

Voltage Output (3-Wire)

Temperatur Class	Environmental Temperature	Medium Temperature
T1	–40 °C ... +50 °C	–50 °C ... +425 °C
T2	–40 °C ... +50 °C	–50 °C ... +275 °C
T3	–40 °C ... +50 °C	–50 °C ... +180 °C
T4	–40 °C ... +50 °C	–50 °C ... +115 °C
T5	–40 °C ... +(95 °C – Pi x 55 K/W), max. 50 °C	–50 °C ... +80 °C
T6	–40 °C ... +(80 °C – Pi x 55 K/W), max. 50 °C	–50 °C ... +65 °C

Passive

Temperature Class	Environmental Temperature	Medium Temperature
T1	–50 °C ... +100 °C	–50 °C ... (+440 °C ~ π x 200 K/W)
T2	–50 °C ... +100 °C	–50 °C ... (+290 °C ~ π x 200 K/W)
T3	–50 °C ... +100 °C	–50 °C ... (+195 °C ~ π x 200 K/W)
T4	–50 °C ... +100 °C	–50 °C ... (+130 °C ~ π x 200 K/W)
T5	–50 °C ... +95 °C	–50 °C ... (+95 °C ~ π x 200 K/W)
T6	–50 °C ... +80 °C	–50 °C ... (+80 °C ~ π x 200 K/W)

5 Start-up, operation

5.1 Function

The TEMG is screwed directly into the process via a process connection. A change in resistance of the sensor element in the tip of the thermowell is transformed into an electrical standard signal by a measuring amplifier. The signal changes proportional to the temperature and can be processed further.

5.2 Before mounting

Information Check if a fully assembled TEMG has been supplied.

Inspect the sensor for potential damage accrued during transportation. If such damage exists, inform the transport company and supplier immediately.

Keep the packaging to ensure optimal protection during transportation.

Make sure to keep the process connection thread and the connection contacts from being damaged.

5.3 Product label (example)

Field	Meaning
Type	Order code
Art.No.	Article number
SN	Serial number
Hergestellt*	Year of manufacture (*Manufactured)

5.4 Mounting

Tools: wrench (flats 27), screw driver

The resistance thermometers are designed for direct process screw-in. The fitting length, along with flow velocity and process media viscosity, may reduce the well maximum loading capacity.

Installation on pipes:

- A: on elbows
- B: in small pipes, inclined
- C: perpendicular to flow direction

Use a sealing element appropriate for the selected application. Exceptions may be instruments with self-sealing threads (e. g. NPT thread).

When mounting the instrument, ensure that the sealing surfaces of the instrument and the measuring point are undamaged and clean.

Screw in or unscrew the instrument only via wrench flats by using a suitable tool and the prescribed torque. The appropriate torque depends on the dimension of the process connection and on the sealing element used (form/material). Do not use the casing as working surface for screwing in or unscrewing the instrument.

Do not tilt the threads when screwing the transmitter in.

If necessary, comply with information about female threads and welding sockets.

5.5 Electrical connection

Attention Ground the casing via the process connection.

The specified protection class only applies while the instrument is connected with mating plugs that provide the corresponding protection class.

Ensure that the cable diameter you select fits to the cable gland of the plug. Ensure that the cable glands of the mounted plugs are positioned correctly and that sealings are available and undamaged. Tighten the screw connection and check the correct sealing positions to ensure the protection class.

When cable outlets are used, make sure to prevent moisture intrusion at the cable ends.

The cables must be laid in such a way that no forces or torque affect the device.

5.6 Pin assignment

Pin Assignment without Transmitter

Connection 1 Sensor

Connection Type	2-Wire		3-Wire			4-Wire			
M12, 4-pole / 8-pole	3	2	4	3	2	4	3	2	1
Valve, 4-pole	3	2	Ground	3	2	Ground	3	2	1
MIL, 6-pole	B	C	A	B	C	A	B	C	D
Cable, n-pole	bn	gn	ge	bn	gn	ge	bn	gn	ws
Cable, n-pole (DIN 60751)	rt	ws	rt	rt	ws	rt	rt	ws	ws

Connection 2 Sensors

Connection Type		2-Wire		3-Wire			4-Wire			
M12, 4-pole	Sensor 1	4	3							
	Sensor 2	2	1							
M12, 8-pole	Sensor 1	3	2	4	3	2	4	3	2	1
	Sensor 2	7	6	8	7	6	8	7	6	5
Valve, 4-pole	Sensor 1	Ground	3							
	Sensor 2	2	1							
MIL, 6-pole	Sensor 1	E	D	F	E	D				
	Sensor 2	B	A	C	B	A				
Cable, n-pole (DIN 60751)*	Sensor 1	rd	rd	rd	rd	wh	rd	rd	wh	wh
	Sensor 2	bk	bk	bk	bk	ye	bk	bk	ye	ye

* (Sensor 2): Gray (gr) is a possible alternative to black (bk).

Pin Assignment Analog-Transmitter

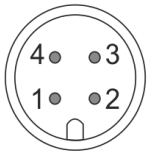
Connection Type	2-Wire			3-Wire		
	+	OUT	–	+	OUT	–
M12, 4-pole	1	X	3	1	2	3
M12, 8-pole	1	X	3	1	3	8
Valve, 4-pole	1	X	2	1	3	2
MIL, 6-pole	A	X	C	A	E	C
Cable, n-pole	ye	X	wh	ye	gn	wh

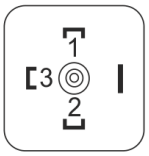
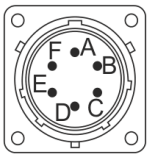
Note: X = NC (not connected/unused)

Information **Cable coding translation:**

bn: brown · ye: yellow · gn: green · wh: white · rd: red · bk: black

Connection plugs

M12, 4-pole	M12, 8-pole	
		

Valve, 4-pole	MIL, 6-pole	Cable, n-pole
		LIYCY n x 0,25 mm², gray

View: plug pins of male plugs

5.7 Connection example

Two-wire connection via the current loop 4 ... 20 mA:

TEMG	Connection
1 (+)	to + of the supply
3 (–)	to + of the evaluation unit (e. g. SPS)
	– of the supply to – of the evaluation unit

5.8 Function test

Information The output signal must be proportional to the temperature. If it is not, this might point to a damaged sensor element. In this case, please refer to chapter Fault recovery (section 6).

Warning – hot surface

- Open process connections only when the system is unpressurized.
- Please comply with the operating parameters laid out in chapter Technical data (section 8).
- Please comply with the Ex-safety instructions (section 4).
- Surfaces of instrument components may have been heated during operation. Please take sufficient measures before touching the device.

5.9 Fault detection / fault current

The device detects wire break and short circuit (sensor element <> measuring amplifier) as well as temperatures outside of the measuring range and indicates this with an error current in the current loop circuit.

The current output is proportional to the temperature from 3.8 to 20.5 mA. If the measured temperature would result in a current below 3.8 mA the current output is set to 21 mA (also for a wire short circuit). If the current would exceed 20.5 mA, the current output is set to 21 mA (also for wire break).

6 Fault recovery

Warning

- Open pressure connections only after the system is unpressurized.
- Rest media in dismounted temperature transmitters can be hazardous to persons, the environment and the installation.
- If faults cannot be rectified using the measures listed here, immediately shut down the temperature transmitter and secure it against accidental start-up.

Failure	Possible cause	Procedure
No output signal	Cable break	Check connectors and cable
	Mechanical load too high or overtemperature	Replace the sensor with a suitable design
No/false output signal	Incorrectly wired	Follow pin assignment (see product label / operating manual)
Erroneous measured values	Sensor drift caused by overtemperature	Replace the sensor with a suitable design
	Sensor drift caused by chemical attack	Replace the sensor with a suitable design
Erroneous measured values (too low)	Entry of moisture into cable or plug	Replace the sensor with a suitable design
Erroneous measured values and response time too long	Wrong mounting geometry, e.g. mounting depth too low or heat dissipation too high	The temperature-sensitive area of the sensor has to be inside the medium, surfaces must be isolated
	Deposits on the sensor	Remove deposits
Measurement signal „comes and goes“	Cable break in connecting cable or loose contact caused by mechanical overload	Replace the sensor with a suitable design, e.g. thicker conductor cross section
Corrosion	Composition of medium not as expected or modified or wrong material of protecting tube	Analyse medium and then select a more suitable material
Signal interference	Stray currents caused by electric fields or earth loops	Use shielded connecting cables, increase the distance to motor and power lines
	Earth circuits	Elimination of potentials, use supply isolators or galvanically isolated measuring amplifiers

Note: Unjustified returns may result in additional costs.

7 Maintenance, dismounting, return, cleaning, disposal

7.1 Maintenance

The screw-in temperature sensors TEMG require no maintenance and contain no components which could be repaired or replaced.

7.2 Dismounting

Warning Rest media in dismounted devices can represent a danger to people, the environment and the facility. Please take sufficient security measures!

Warning – hot surface There is a risk of burns. Let the instrument cool down sufficiently before dismounting. During dismounting there is a risk of dangerously hot and pressurized media escaping.

Only disconnect the resistance thermometer once the system has been depressurized.

7.3 Return

Warning Before returning an instrument, see chapter 7.4.

To return a device, use original packaging or similar.

To protect against damages, use anti-static foil, insulating material or identification as sensitive measurement equipment.

In addition, please mark the shipment as transport of a highly sensitive measuring instrument!

7.4 Cleaning

Attention

- Before cleaning the instrument disconnect the electrical connection.
- Clean the instrument with a moist cloth.
- Keep electrical connections free of moisture.
- Wash or clean the dismounted instrument before returning it in order to protect personnel and the environment from exposure to rest media.
- Rest media in dismounted temperature transmitters can be hazardous to persons, the environment and the installation. Take sufficient precautionary measures!

7.5 Disposal

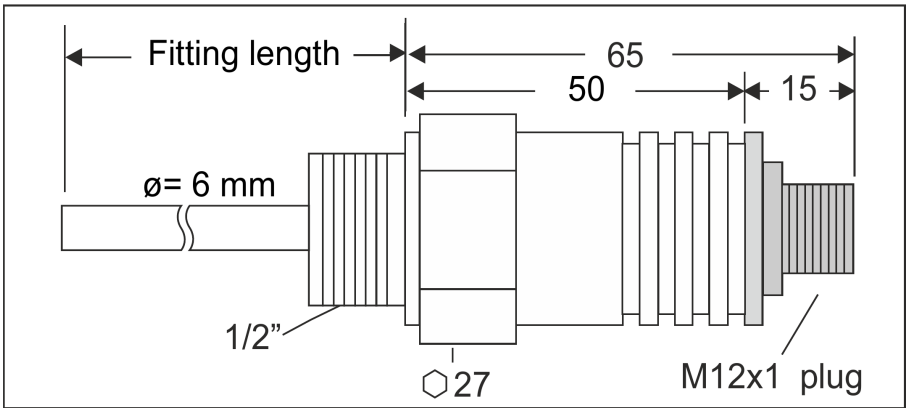
Information Dispose instrument components and packaging materials in accordance with the respective waste treatment and disposal regulations of your region or country.

8 Technical data

Item	Value
Input	
Sensor	1x Pt100 / 1x Pt1000 / 2x Pt100 / 2x Pt1000
Connection	2-wire / 3-wire / 4-wire
Accuracy	Class A
Maximum range	–50 ... +200 °C
Minimum range	50 °C
Output	
Transmitter Analog: Current	4 ... 20 mA, 2-wire
Current range	3.8 ... 20.5 mA
Signal fault	3.8 mA (sensor short circuit, underflow); 20.5 mA (sensor break, open circuit, overflow)
Transmitter Analog: Voltage	0 ... 10 V, 3-wire; 0.5 ... 10.5 V, 3-wire; 2 ... 10 V, 3-wire
Without transmitter	Connection on plug, cable lead out
Measuring amplifier	
Transmitter: Accuracy	max. 0.1 % of measurement range + sensor error
Resolution	24 bit
Filter setting	5 ... 5000 ms
Configuration	per software (TrComm)
Switch-on delay	5 ms
Supply	
Voltage	12 ... 30 VDC
Reverse voltage prot.	available (no function, no damage)
Short-circuit strength	Yes
Environmental conditions	
Operating temperature	See table Environmental conditions, section 4.5
Storage temperature	–40 ... +85 °C
Medium temperature	–50 ... +425 °C
System pressure	25 bar maximum
Condensation	< 95 % rH
Approval ATEX	TÜV 21 ATEX 201293 X
Approval IECEx	IECEx TUN 21.0005X
Mechanics	
Dimensions	see section 9
Process connection	without / 1/4" / 3/8" / 1/2" / 3/4" / 1" / 1/4NPT / 3/8NPT / 1/2NPT / 1NPT / M14x1,5
Electrical connection	see section 4.4
Sensor tube	Ø 6 mm
Material sensor tube	Stainless steel 1.4571

Item	Value
Material process connection	Stainless steel 1.4571
Material body	Stainless steel 1.4571
Material insert electr. connection	Stainless steel 1.4571
Weight	approx. 200 g (1/2", 50 mm, M12)
Fitting position	Any
Device protection	
Protection class	At least IP65 (electronics), IP68 (sensor)
Casing	Inside completely potted

9 Dimensions (in mm)



Connection M12x1 (example). Dimensions in mm.

Example M12x1	
insert metal	Standard

10 Configuration

The TEMG can be programmed with the help of the configuration and calibration software TrComm. A DEV-KMA configurator is required for programming. The TrComm software is included in the scope of delivery of the DEV-KMA, alternatively the software is also available separately on request.

For further information, see data sheet DEV-KMA.