OCTOGON

MANUAL

TEMD

SCREW-IN RESISTANCE TEMPERATURE SENSOR

Operating manual



Document	Version	Date	Applies to
Operating manual	V00x	10/2026	TEMD, Pt100, Ex ia, 4 ... 20 mA / 0 ... 10 V

This operating manual describes transport, safety and explosion protection, mounting, connection, operation, fault recovery and maintenance of the TEMD screw-in resistance temperature sensor.

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1 General

1.1 For information

– This operating manual gives important handling instructions for the resistance thermometer. Compliance with all safety and handling instructions in this manual is a requirement for safe work.

– Qualified personnel has to have read and understood this operating manual before mounting and start-up of the sensor.

– This operating manual is part of the product. Please keep this manual at a place accessible for all users and on-site.

– Please comply with the local regulations and safety instructions for the field of application of this sensor.

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

– The resistance thermometer TEMD described in this manual is 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, noncompliance with this operating manual, unauthorised modifications to the TEMD 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 the operation of the device or cause unintentional reactions.
Danger – electrical power	Failure to comply with the safety instructions risks serious or fatal injury caused by electrical power.
Warning – hot surface	Possible dangerous situations caused by hot surfaces or liquids, which can lead to burns. Please avoid hot surfaces and liquids.
U+	Positive supply connection
U–	Negative supply connection

1.3 Device

Feature	Version
Design	screw-in resistance temperature sensor
Sensor	Pt100, 2-wire, class A / B / AA (B1/3 DIN)
Output	4 ... 20 mA, 2-wire or 0 ... 10 V / 0.5 ... 10 V / 2 ... 10 V, 3-wire
Explosion protection	ATEX, IECEx (see section 4.2)
Manufacturer type	METS-WTEx

2 Transport, packaging, storage

2.1 Transport

Check the device for any damage that may have been caused during transportation. Report obvious damage at once.

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, returns).

2.3 Storage

For long-term storage, please avoid the following influences:

- Direct sunlight or proximity to hot objects
- Mechanical vibration, mechanical shock (rough mounting)
- Soot, steam, dust and corrosive gases

If possible, store the device inside its original packaging or equivalent.

3 Safety instructions

Warning Select the correct resistance thermometer based on measurement range, design, suitable material in contact with medium (corrosion) and specific measurement conditions before mounting, start-up and operation.

Information Further important safety instructions are in the individual chapters.

3.1 Intended use

The resistance thermometer TEMD is suitable for temperature measurement in liquid and gaseous media. It has a maximal range of –50 … +425 °C and can be used under a pressure of up to 25 bar.

The sensor is designed solely for the use and intended purpose as described in this operating manual.

The technical specifications as described in this operating manual are mandatory. Inappropriate handling or operating the device outside of its technical specifications requires an immediate shutdown and inspection by the manufacturer.

When the device is transported from a cold into a warm environment, condensation can cause a device malfunction. Wait for device temperature and room temperature to equalize before a new start-up attempt.

The manufacturer shall not be liable for claims of any kind 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 temperature sensor, 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 Select the appropriate temperature sensor with regard to version and application requirements before mounting or start-up. Comply with the relevant national regulations (e. g. standards) and comply with the applicable standards and directives for special applications (e. g. with dangerous media such as acetylene, flammable gases or liquids and toxic gases or liquids, or with refrigerating systems and compressors).

Non-compliance with the relevant regulations can cause serious injuries and property damage!

Warning Electrostatic discharge (ESD) protection is required.

The proper use of grounded worktops and personal wristbands is required when working with open circuits (PCBs) to prevent damage to sensitive electronic components caused by electrostatic discharge.

Danger – electrical power Danger to life due to electric current. If live parts are touched, there is an immediate danger of death.

Installation and mounting of electrical equipment may only be carried out by qualified electricians.

Operation with a defective power supply unit (e.g. short-circuit from mains voltage to output voltage) can cause life-threatening voltages on the unit.

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 comply 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

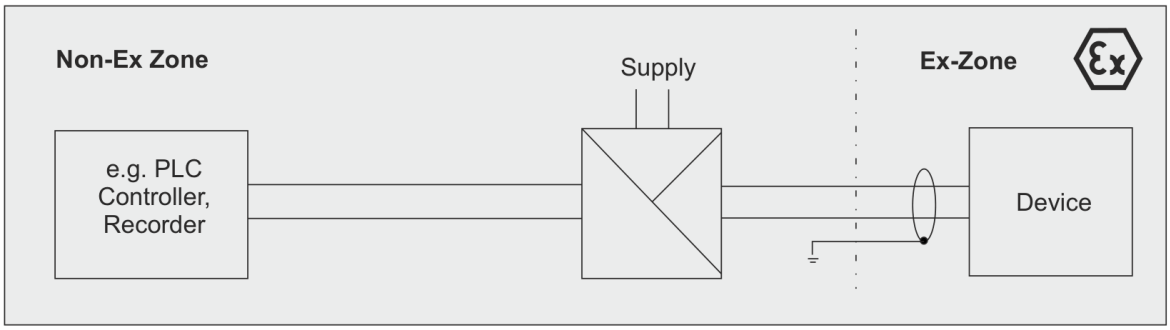
II 1 G Ex ia IIC T6..T1 Ga
II 1/2 G Ex ia IIC T6..T1 Ga/Gb
II 2 G Ex ia IIC T6..T1 Gb

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 TEMD 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)
Connections	+ / - (I_{out})	+ / -
Voltage U_i	30 VDC	30 VDC
Current I_i	110 mA	110 mA
Power P_i	1 W	1 W
Effective internal capacitance C_i	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
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	-20 °C ... +75 °C	-50 °C ... +425 °C
T2	-20 °C ... +75 °C	-50 °C ... +275 °C
T3	-20 °C ... +75 °C	-50 °C ... +180 °C
T4	-20 °C ... +75 °C	-50 °C ... +115 °C
T5	-20 °C ... +(95 °C - P_i x 45 K/W), max. 75 °C	-50 °C ... +80 °C
T6	-20 °C ... +(80 °C - Pi x 45 K/W), max. 75 °C	-50 °C ... +65 °C

Voltage Output (3-Wire)

Temperature Class	Environmental Temperature	Medium Temperature
T1	-20 °C ... +50 °C	-50 °C ... +425 °C
T2	-20 °C ... +50 °C	-50 °C ... +275 °C
T3	-20 °C ... +50 °C	-50 °C ... +180 °C
T4	-20 °C ... +50 °C	-50 °C ... +115 °C
T5	-20 °C ... +(95 °C - Pi x 55 K/W), max. 50 °C	-50 °C ... +80 °C
T6	-20 °C ... +(80 °C - Pi x 55 K/W), max. 50 °C	-50 °C ... +65 °C

5 Start-up, operation

5.1 Function

The TEMD is screwed directly into the process via the 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 evaluated.

5.2 Before mounting

Information

- Check if a fully assembled temperature sensor has been supplied.
- Inspect the measurement amplifier for possible transport damage. If transport damage is detected, inform the transport company and supplier immediately.
- Keep the packaging, as it offers optimal protection during transportation.
- Ensure the process connection thread and the connection contacts are protected from damage.

5.3 Product label (example)

Field	Meaning	Field	Meaning
Type	Product code	Art.No.	Article number
SN	Serial number	Man.	Year of manufacture

5.4 Mounting process connection

Tools: Open-end wrench SW27, screw driver

The resistance thermometers are designed for being screw fitted directly into the process. The insertion length, along with the flow velocity and viscosity of the process media, may reduce the maximum viable load of the thermowell.

Installation on pipes:

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

You will have to provide a sealing element which corresponds to the application. Exceptions may be instruments with self-sealing threads (e.g. a NPT-thread).

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

Screw in or unscrew the instrument only via the flats 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 case as working surface for screwing in or unscrewing the instrument.

When screwing the transmitter in, ensure that the threads are not jammed.

If necessary, comply with instructions concerning threaded holes and welding sockets.

5.5 Electrical connection

Attention Connect the instrument to earth via the process connection.

The protection class specified only applies while the instrument is connected with the female connectors that provide the corresponding ingress protection.

Ensure that the cable diameter you select fits to the cable gland of the connector. Ensure that the cable gland of the mounted connector is positioned correctly and that the sealings are available and undamaged. Tighten the threaded connection and check the correct position of the sealings to ensure device protection.

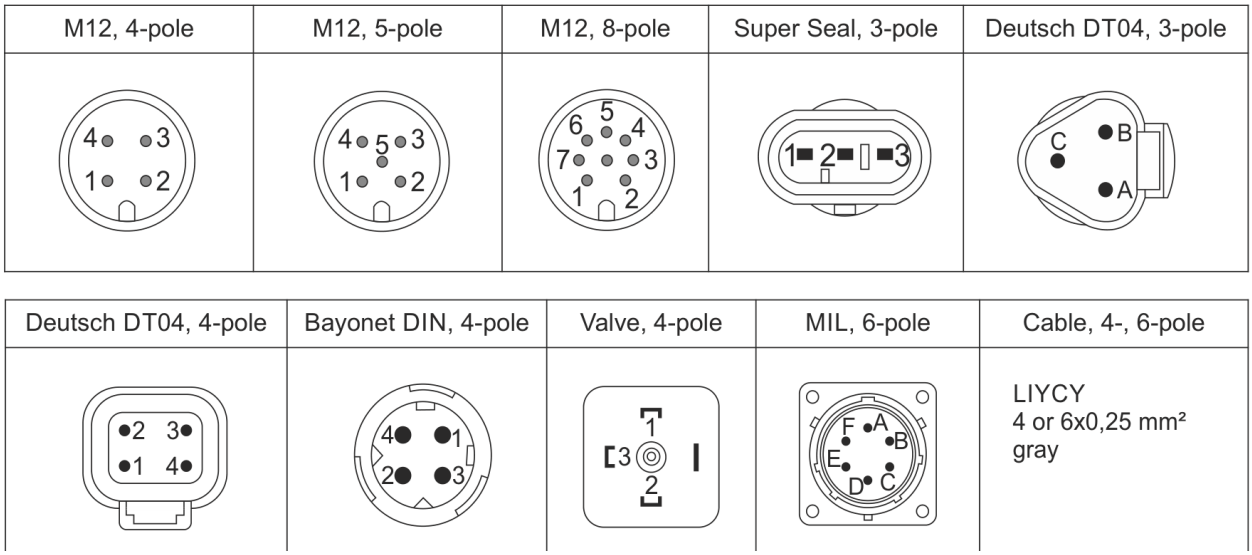
Ensure no moisture can seep in at the cable outlets.

Route the cable without applying a force or torque to the device.

5.6 Pin assignment

Connection type	2-Wire +	OUT	–	3-Wire AC +	OUT	–	3-Wire DC +	OUT	–
M12, 4-pole	1	X	3	1	2	3	1	2	3
M12, 5-pole	1	X	3	1	2	3	1	2	3
M12, 8-pole	1	X	3	1	3	8	1	3	8
Super Seal, 3-pole	1	X	3		n/a		1	2	3
Deutsch DT04, 3-pole	A	X	B		n/a		A	C	B
Deutsch DT04, 4-pole	1	X	3	1	2	3	1	2	3
Bayonet, 4-pole	1	X	3	1	2	3	1	2	3
Valve, 4-pole	1	X	2	1	3	2	1	3	2
MIL, 6-pole	A	X	C	A	E	C	A	E	C
Cable, n-pole	ye	X	wh	ye	gn	wh	ye	gn	wh

Note: X = NC (not connected/unused)



View: plug pins of plugs (at device). Cable: LIYCY, 4 or 6 × 0.25 mm², gray.

5.6.1 Connection example 2-wire

Current / voltage via the two-wire connection:

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

5.6.2 Connection example 3-wire

TEMD	Connection
1 (+, V_{CC})	to + (V_{CC}) of the supply
2 (OUT)	to + (IN) of the evaluation unit (e.g. SPS)
3 (–)	to – of the supply and to – of the evaluation unit

5.7 Configuration

The TEMD 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.

5.8 Function test

Information The output signal must be proportional to the temperature. If this is not the case, this can be a sign for a sensor defect. Please read under Fault recovery (section 6) for further information.

Warning

- Please open the process connections only when unpressurized.
- Attention: Please comply with the operating parameters as per the technical data (section 8).
- Attention: Surfaces of device components can become hot during device operation. Please take care when attempting to touch the temperature sensor.

5.9 Fault detection / fault current

The device detects sensor break, sensor short circuit (sensor element <> measurement amplifier) and temperatures outside of the measurement range and shows them as a fault current in the loop circuit.

The current output is proportional to the temperature in a range of 3.8 up to 20.5 mA. If the measured temperature would equal a current value of below 3.8 mA, the device will put out a fault current of 3.6 mA. The same will happen in case of sensor short circuit. If the current rises above 20.5 mA, a fault current of 21 mA will be put out. The same is the case for sensor break.

Measuring signal (% of range)	Current output
below –1.25 % or sensor short circuit	3.6 mA (fault current)
–1.25 %	3.8 mA
0 %	4.0 mA
100 %	20.0 mA
103.125 %	20.5 mA
above 103.125 % or sensor break	21.0 mA (fault current)

Current output and measuring signal.

6 Fault recovery

Warning

- Please open connections only when unpressurized.
- Take precautions for rest media in dismounted temperature sensors. Rest media can lead to danger for persons, environment and installations.
- Shut down the temperature sensor and protect against accidental start-up if faults can't be eliminated.

Failure	Potential cause	Procedure
No output signal	Cable break	Check passage
	Mechanical load too high or overtemperature	Replace the sensor with a suitable design
No/false output signal	Incorrectly wired	Comply with pin assignment (see product label / manual)
Erroneous measured values	Sensor drift caused by overtemperature	Replace the sensor with a suitable design
	Sensor drift caused by chemical effect	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 times 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, surface measurements 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. with a thicker conductor cross section
Corrosion	Composition of medium not as expected, modified composition or wrong material for thermowell	Analyse medium and then select a more suitable material.
Signal interference	EMC interference sources in the environment, e.g. converter	Shield sensor, shield wire, remove interference source, increase distance to interference source
	Earth circuits	Eliminate potentials, supply isolators or galvanically isolated measuring amplifiers

Note: Unjustified reclamations can incur additional costs.

7 Maintenance, dismounting, return, cleaning, disposal

7.1 Maintenance

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

7.2 Dismounting

Warning Rest media in dismounted instruments can result in a risk to personnel, the environment and equipment. Take sufficient precautionary 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 after the system has been depressurised.

7.3 Return

Warning Before the return of an instrument, see chapter 7.4.

When returning the instrument, use the original packaging or a suitable package.

To avoid a damage, use for example antistatic plastic film, shock-absorbent material, or marking as highly sensitive measuring instrument.

7.4 Cleaning

Attention

- Before cleaning the instrument disconnect the electrical connection.
- Clean the instrument with a moist cloth.
- Electrical connections must not come into contact with 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 instruments can cause a risk to persons, the environment and equipment. Take sufficient precautionary measures.

7.5 Disposal

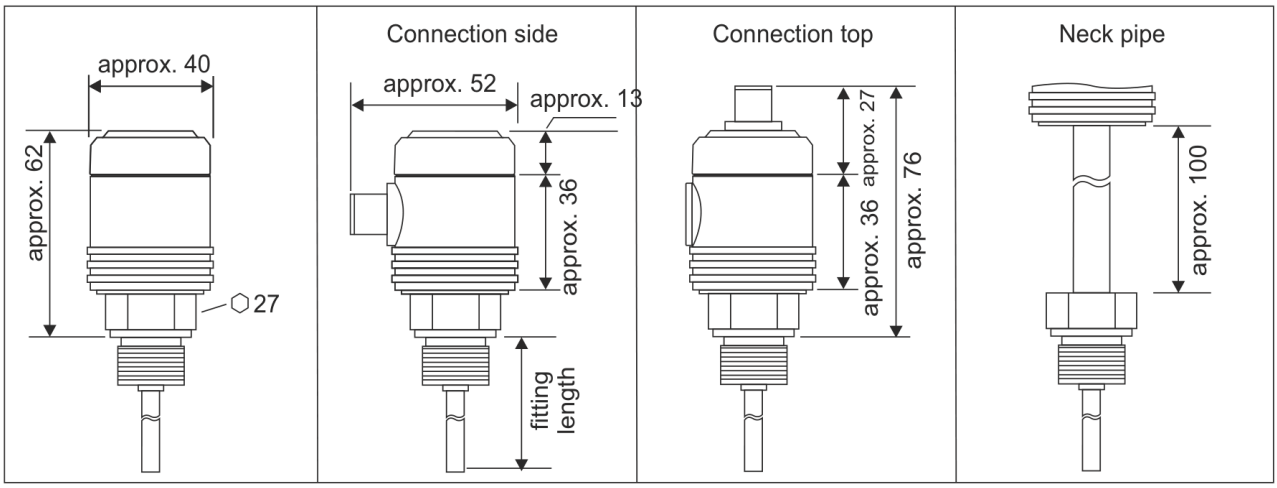
Information Dispose instrument components and packaging materials in accordance with the respective waste treatment and disposal regulations of the region or country to which the sensor is supplied.

8 Technical data

Item	Value
Input	
Sensor Pt100	–50 … 425 °C (minimum span: 50 °C), 2-wire (Other measurement ranges available on request)
Output	
Current signal	4 … 20 mA, 2-wire
Current range	3.8 … 20.5 mA
Signal on error	3.6 mA (sensor short circuit, underflow); 21 mA (sensor break, sensor open circuit, overflow)
Voltage signal	0 … 10 V, 3-wire / 0.5 … 10 V, 3-wire / 2 … 10 V, 3-wire
Notes	Functions related to signal on error are not available in versions with voltage output
Performance parameters	
Sensor Pt100	Class A / Class B / Class AA (B1/3 DIN)
Measuring amplifier: accuracy	max. 0.1 % of range + sensor error
Resolution	24 bit
Filter setting	5 … 5000 ms
Configuration	per Software (TrComm)
Turn-on delay	5 ms
Programmable features	
Measuring amplifier	Nominal measuring range / Measurement range start / Measurement range end / Adjustment, simulation of output current / Filter function / 2-point calibration
Supply	
Voltage	12 … 30 VDC
Reverse voltage protection	available (no function, no damage)
Short-circuit resistance	Yes
Environmental conditions	
Temperature operating range	–20 … +75 °C (2-wire) / –20 … +50 °C (3-wire)
Medium	–50 … +200 °C
Storage	–40 … +100 °C
Condensation	uncritical
Approval	
ATEX	TÜV 21 ATEX 201293 X
IECEx	IECEx TUN 21.0005X
Mechanics	
Dimensions	see section 9
Process connections	1/4" / 3/8" / 1/2" / 3/4" / 1" / 1/4NPT / 3/8NPT / 1/2NPT
Neck pipe	100 mm (Option)

Item	Value
Electrical connection	lateral; option: top
Plugs and cable	see section 5.6
Material thermowell	stainless steel 1.4571 (Standard 6 × 0.5 mm)
Material neck pipe	stainless steel 1.4571
Material process connection	stainless steel 1.4571
Material casing body / cover	PBT GF30 / PBT GF30
Weight	approx. 140 g (70 mm, 1/2″, M12x1)
Fitting position	any
System pressure	PN 25
Device protection	
Protection class	at least IP65 (electronics)
PCB	potted

9 Dimensions



Dimensions in mm.