

User Guide

1-Wire Temperature Sensor PRO

PUR-Cable

-waterproof-

Performance characteristics

- High-quality, industrial connection cable
- Wide temperature range
- Largely chemically resistant
- Largely water resistant
- Resistant to alkalis and acids (low concentrations)
- Thermally mouldable for spiral cables
- Integrated backup capacitor for professional applications
- 1-Wire serial number printed on cable flags



Sensors OK or OKS

Typical fields of application

- Industrial applications
- Temperature sensor, pressure sensor, humidity sensor
- Sensors and measurement technology
- Laboratory equipment, scientific equipment
- Spiral cables ("spiral cables")



Sensors with RJ11/12 or RJ 45 connectors

1 Introduction

Before putting the 1-Wire Temperature Sensor Pro into operation, please read these operating instructions carefully until the end, especially the safety instructions section.

2 Product Description

This product is available in different versions, which differ in cable length and connection or connector plug.

RJ11/12 connector: Sensor with modular connector RJ11/12

RJ45 connector: Sensor with modular connector RJ45

OK stands for: Open cable ends

OKS stands for: Open cable ends with serial number flags

The temperature sensor with PUR connection cable and stainless steel sensor tube is chemically resistant and may be immersed in liquids in the area of the sensor tube which do not attack stainless steel (1.4571). In the area of the cable outlet, however, the sensors should not come into permanent contact with the liquid. The temperature sensor is ideally suited for high-quality applications in industry and measurement technology.

For a larger number we recommend to use our 1-Wire Hub. The sensors can be optimally operated with our 1-wire controllers and form a high-quality measuring system. The temperature sensors can be operated in a 1-wire network with standard three wire system (ground, 5V and data) or alternatively in parasitic mode (two wire system).

Sensor:

A calibration of the temperature sensors is not necessary. Each temperature sensor has an individual serial number.

Connection cable:

High-quality, shielded connection cable for industrial applications, available in three-pole version. Cable with conductor cross-section 0.14 mm², high-quality insulation made of extremely temperature- and chemical-resistant TPE (neoprene). Color wire identification according to DIN 47100, RoHS compliant. The cable was specially developed for our Temperature Sensors in order to cover a wide temperature range with maximum resistance to environmental influences.

3 Auto-E-Connect® Support

The ESERA **Auto-E-Connect®** 1-Wire Plug and Play system will be used for the 1-Wire Bus supported. This enables fully automatic configurations of 1-Wire sensors and actuators on the 1-Wire bus. It is optimized for industrial applications and enables significant added value beyond the sensor and chip data.



The Auto-E-Connect function automatically recognizes ESERA chips, sensors and actuators, starts suitable libraries and outputs fully formatted data.

The Auto-E-Connect functionality will be available from mid 2020 via 1-Wire Controllers, 1-Wire Gateways and 1-Wire ECO from ESERA available.

Further information on ESERA Auto-E-Connect can be found on the ESERA website, ESERA Config-Tool 3, or in the download area for this article in the ESERA Webshop.

4 Article Overview

These operating instructions apply to the following part numbers and versions:

Article number	Cable length	Pin assignment	Description
11106-2	2m	see point 6.1	Temperature Sensor Pro with RJ11/12 connector
11106-4	4m	see point 6.1	Temperature Sensor Pro with RJ11/12 connector
11106-5	5m	see point 6.1	Temperature Sensor Pro with RJ11/12 connector
11106-10	10m	see point 6.1	Temperature Sensor Pro with RJ11/12 connector
11106-15	15m	see point 6.1	Temperature Sensor Pro with RJ11/12 connector
11106-2	2m	see point 6.2	Temperature Sensor Pro with RJ45 connector
11106-5	5m	see point 6.2	Temperature Sensor Pro with RJ45 connector
11106-10	10m	see point 6.2	Temperature Sensor Pro with RJ45 connector
11106-1-OKS	1m	see point 6.3 or 6.4	Temperature Sensor Pro with open cable ends and serial number flags
11106-2-OKS	2m	see point 6.3 or 6.4	Temperature Sensor Pro with open cable ends and serial number flags
11106-3-OKS	3m	see point 6.3 or 6.4	Temperature Sensor Pro with open cable ends and serial number flags
11106-5-OKS	5m	see point 6.3 or 6.4	Temperature Sensor Pro with open cable ends and serial number flags
11106-10-OKS	10m	see point 6.3 or 6.4	Temperature Sensor Pro with open cable ends and serial number flags
11106-1-OK	1m	see point 6.3 or 6.4	Temperature Sensor Pro with open cable ends
11106-2-OK	2m	see point 6.3 or 6.4	Temperature Sensor Pro with open cable ends
11106-3-OK	3m	see point 6.3 or 6.4	Temperature Sensor Pro with open cable ends
11106-5-OK	5m	see point 6.3 or 6.4	Temperature Sensor Pro with open cable ends
11106-10-OK	10m	see point 6.3 or 6.4	Temperature Sensor Pro with open cable ends

5 Technical Data sensor

1-Wire devices: DS18S20
 Operating voltage: 3 - 5,5V=
 Current consumption: ca. 1mA
 Connection cable: depending on model
 Ambient conditions:
 Temperature, operation: -40°C to +125°C*

*It should be noted that the operating temperature of the entire cable sensor is limited by the connecting cable. The sensor element (DS18S20) installed inside the cable sensor has a temperature range of -55°C to +125°C.

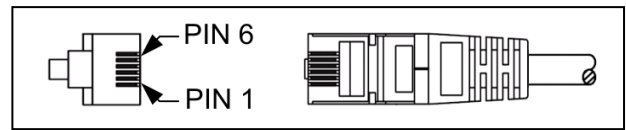
6 Technical Data Connecting cable

TPE-Cable Semoflex	
Type	Semoflex TPE Special cable, shielded
Version	3 x 0,14 mm ²
Cable diameter	4,6 ± 0,10 mm
Thermal resistance	Short-term: -40°C to +150°C Duration: -40°C to +130°C
Nominal voltage	300 V
Test voltage	1.500 V
Conductor resistance	< 149 Ohm
Bending radius	10 x cable diameter
Construction:	
Conductor	18 x 0,10 mm Cu bare (Kl.6)
wire insulation	TPE-E (Ø 1,00 mm nominal)
wire colour	according to DIN 47 100
Banding	Fleece-banding
Shielding	copper braiding bare, coverage approx. 80 % TPE-O, black
outer sheath	
printing	SEMOFLEX TPE -40°C...130°C
applied standards	VDE 0295 Kl.6 EU Directive RoHS 2002/95/EC 2000/53/EC 2002/525/EC CEE IEC 228 73/23/CEE 93/68/CEE
We reserve the right to make changes to technical data in the interest of technological progress!	

6.1 Pin assignment sensors with RJ11/12 connector

The Western connector is assigned as follows (view of the cable, i.e. the contact surfaces of the connector):

PIN-Number	Cable color	Function
1	braiding	shield
2	white	ground, GND
3	not connected	
4	brown	1-Wire data
5	green	Plus 3 - 5,5VDC
6	not connected	



6.2 Pin assignment sensors with RJ45 connector

The RJ45 modular connector is assigned as follows (view of the cable, i.e. the contact surfaces of the connector):

PIN-Number	Cable color	Function
1		Cable shielding
2		Plus 3 - 5,5VDC
3		ground, GND
4		1-Wire data
5		ground, GND
6		not connected
7		not connected
8		not connected

6.3 Pin assignment OK, OKS sensors up to delivery 2019

The sensor cable is assigned as follows (view of the cable i.e. the contact surfaces of the connector):

Cable color	Function
braiding	shielding
white	ground, GND
brown	1-Wire data
green	Plus 3 - 5,5VDC

6.4 Pin assignment OK, OKS sensors from delivery 2020

The sensor cable is assigned as follows (view of the cable i.e.the contact surfaces of the connector):

Cable color	Function
braiding	shielding
white	ground, GND
green	1-Wire Data
brown	Plus 3 - 5,5VDC

7 1-Wire network, wiring

No special requirements are placed on the cable used for short connection lengths. With unshielded cable, a longer connection length can be achieved in an undisturbed environment, as the capacitive bus load is lower. A total length of 60 m and more can be easily achieved without additional measures.

In a disturbed environment, the cable should be shielded in order to improve the system's sensitivity to interference. The higher capacitive load reduces the maximum possible connection length.

The special thing about the wiring of the sensors is the "BUS technology": All sensors are operated in parallel on a three-core cable, which is used for both power supply and data communication.

We recommend using CAT5 or CAT6 network cables for the cabling.

Note: Basics and tips for the 1-Wire bus system can be found in the ESERA Online Shop at

<https://www.esera.de/1-wire-grundlagen/>

8 Measuring accuracy

The sensors have a typical measuring accuracy of ± 0.5 °C in the temperature range from -10°C to +85°C ambient temperature. There may be deviations in the measuring accuracy towards the upper and lower measuring range limits. For more information, please refer to the Maxim DS18S20 or DS18B20 chip data sheet, which can be found on our website or on the Maxim Semiconductor website.

However, as with all temperature measurements, the physical background must be taken into account to avoid measurement errors, which significantly affect the precision of the measurement setup:

8.1 Thermal Contact Resistance Target Sensor

This measurement error occurs primarily with surface measurements. Good thermal contact can be remedied by mounting the sensor in a hole, using heat-conducting paste or using heat-conducting adhesive.

8.2 Thermal heat dissipation Sensor ambient temperature

For surface measurements, the measuring arrangement should be thermally insulated from the environment, for example by foam or mineral wool.

8.3 Thermal heat dissipation Sensor connecting wires

This measurement error can be minimized, for example, by making the connecting cable as thin as possible and made of thermally poorly conductive material or by tempering the connecting cable with the measured object. In principle, the highest measuring accuracy can be achieved by immersion in liquids or in a mounting hole. On the other hand, an additional measurement error should be taken into account for measurements on surfaces.

9 Operating conditions

The sensor is intended for temperature measurement of gases or solids.

The Dallas temperature sensors are semiconductor sensors. The unshoused sensors are designed for temperature measurements in the range of -55 ... +125 °C are suitable.

These temperature values are limit data and must not be exceeded, otherwise the component may be damaged.

10 Disposal instructions

Do not dispose of the device in domestic waste! Electronic devices are to be disposed of according to the Directive on waste electrical and electronic equipment (WEEE) on local authorities and collection points for waste electronic equipment!



11 Safety instructions

When using products that come into contact with electrical voltage, the valid VDE regulations must be observed, especially VDE 0100, VDE 0550/0551, VDE 0700, VDE 0711 and VDE 0860

- All final or wiring work must be carried out with the power turned off.
- Before opening the device, always unplug or make sure that the unit is disconnected from the mains.
- Components, modules or devices may only be put into service if they are mounted in a contact proof housing. During installation they must not have power applied.
- Tools may only be used on devices, components or assemblies when it is certain that the devices are disconnected from the power supply and electrical charges stored in the components inside the device have been discharged.
- Live cables or wires to which the device or an assembly is connected, must always be tested for insulation faults or breaks.
- If an error is detected in the supply line, the device must be immediately taken out of operation until the faulty cable has been replaced.
- When using components or modules it is absolutely necessary to comply with the requirements set out in the accompanying description specifications for electrical quantities.
- If the available description is not clear to the non-commercial end-user what the applicable electrical characteristics for a part or assembly are, how to connect an external circuit, which external components or additional devices can be connected or which values these external components may have, a qualified electrician must be consulted.
- It must be examined generally before the commissioning of a device, whether this device or module is basically suitable for the application in which it is to be used.
- In case of doubt, consultation with experts or the manufacturer of the components used is absolutely necessary.

- For operational and connection errors outside of our control, we assume no liability of any kind for any resulting damage.
- Kits should be returned without their housing when not functional with an exact error description and the accompanying instructions. Without an error description it is not possible to repair. For time-consuming assembly or disassembly of cases charges will be invoiced.
- During installation and handling of components which later have mains potential on their parts, the relevant VDE regulations must be observed.
- Devices that are to be operated at a voltage greater than 35 VDC / 12mA, may only be connected by a qualified electrician and put into operation.
- Commissioning may only be realized if the circuit is built into a contact proof housing.
- If measurements with an open housing are unavoidable, for safety reasons an isolating transformer must be installed upstream or a suitable power supply can be used.
- After installing the required tests according to DGUV / regulation 3 (German statutory accident insurance, https://en.wikipedia.org/wiki/German_Statutory_Accident_Insurance) must be carried out.

12 Warranty

ESERA GmbH guarantees that the goods sold at the time of transfer of risk to be free from material and workmanship defects and have the contractually assured characteristics. The statutory warranty period of two years begins from date of invoice. The warranty does not extend to the normal operational wear and normal wear and tear. Customer claims for damages, for example, for non-performance, fault in contracting, breach of secondary contractual obligations, consequential damages, damages resulting from unauthorized usage and other legal grounds are excluded. Excepting to this, ESERA GmbH accepts liability for the absence of a guaranteed quality resulting from intent or gross negligence. Claims made under the Product Liability Act are not affected.

If defects occur for which the ESERA GmbH is responsible, and in the case of replacement goods, the replacement is faulty, the buyer has the right to have the original purchase price refunded or a reduction of the purchase price.

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