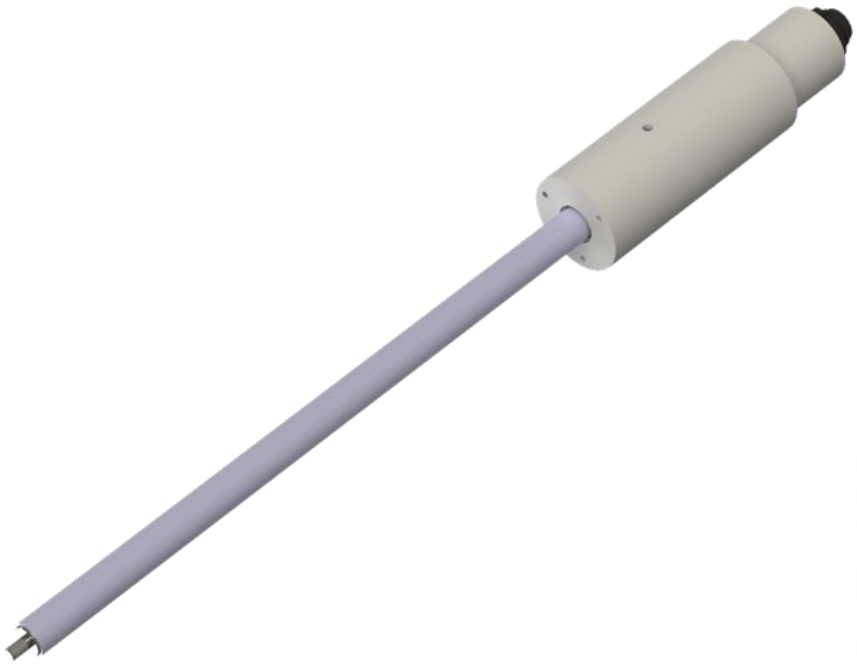
100 years Since 1925 SIAP+MICROS Environmental Monitoring Solutions

t002 TTT

Ground Temperatue Transducer



User Manual and maintenance

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Summary

1 Introduction

TTT is a high-quality temperature sensor that has been manufactured on purpose by Siap+Micros for soil temperature measurement. It is suitable for agrometeorological applications and generally flexible to be used in every environmental monitoring. The sensor is extremely accurate and it is composed of a 30 cm long graduated plastic rod, equipped with a sensing element mounted on the rod edge. By inserting the rod into the ground, TTT can easily provide the value of soil temperature with respect to a specific variable requested deepness. The protective body is made of high-quality plastic. The sensing element is based on a Pt100 Platinum thermo-resistance calibrated with a response curve in accordance with Class 1/3 DIN 43760 standard. Furthermore, thermo-resistance is installed into a stainless-steel tube, which protects it from corrosion and ensures at the same time an excellent sensibility to temperature. The sensor is supplied with power and signal cable (12m).

Ordering Codes:

Natural output: t002-TTT-N

Current output: t002a-TTT-I

Tension output: t002b-TTT-V

RS485 Modbus output: t002c-TTT-S

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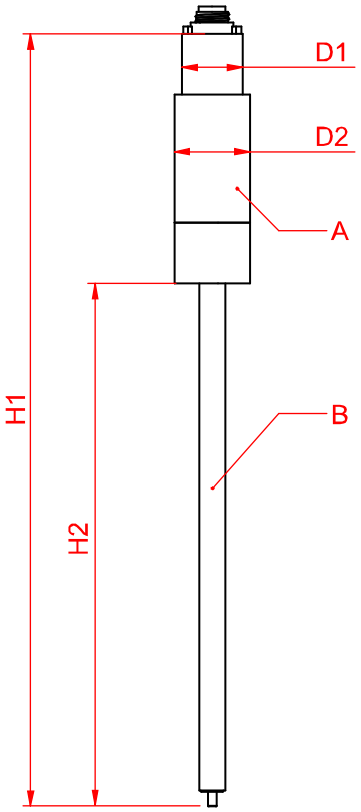
Measurement performance			
Transducer	Pt100 1/3 DIN 43760		
Measurament range	-30 ÷ 60 °C		
Accuracy (natural output)	1/3 DIN 43760		
Accuracy (current, tension, serial outputs)	1/3 DIN 43760 ± 0.1		
Resolution	0.03		
Operating conditions			
Temperature	-30 ÷ 60 °C		
Humidity	0 ÷ 100 RH%		
Outputs			
Natural	Pt100 with 4 wires		
Current	4 ÷ 20 mA ↔ -30 ÷ 60 °C		
Tension	0 ÷ 2 V ↔ -30 ÷ 60 °C		
RS485 MODBUS	Temperature		
Power supply and Consumption			
Voltage supply	7 ÷ 30 Vdc		
Power consumption	Min	Typical	Max
4 ÷ 20 mA	5		25
0 ÷2 V / RS485 MODBUS		1	3
Mechanical specifications			
Protective body	ABS plastic and stainless-steel screws		
Electrical connections	4 male poles IP67		



Dimension:

H1 – maximum height: 450 mm (TTT-N)

500 mm (TTT-I/V/S)

H2 – stainless-steel tube height: 300 mm

D1 – fixing diameter: 40 mm

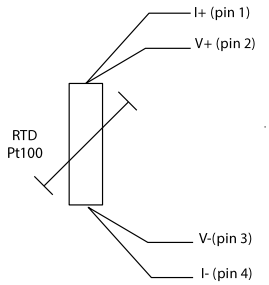
D2 – maximum diameter : 50 mm

Element:

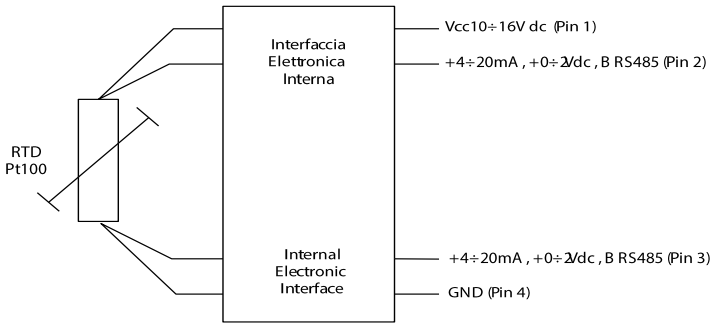
A – sensor shaft with possible electronics

B – rod to be buried

2.1 Operation scheme



TTEP-N Natural output version



TTEP-I/V/S 4÷20mA, +0÷2Vdc RS485 output version

The internal sensitive element is a 4-wire Pt100 inserted in a stainless steel body positioned at the head of the buried pipe. In the natural version the output is brought directly to the output connector. In the other versions, an electronic interface shows the other different types of output on the connector.

3 Installation and maintenance

3.1 Installation

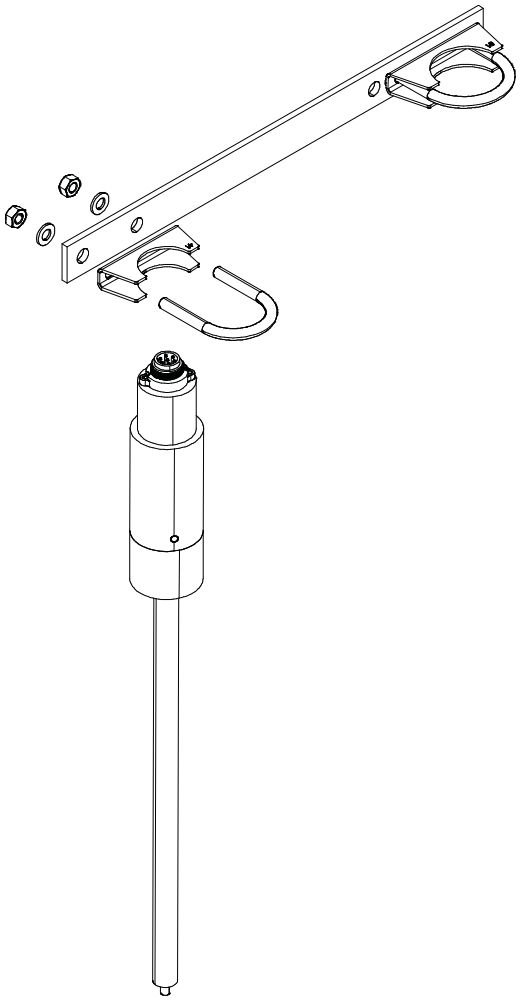
The Siap+Micros Soil Temperature sensor is made up of a stem and a rod to be buried where, at the top, here is the temperature probe embedded in a stainless steel tip.

The part to be buried, in its standard version, is made of PVC and has a length of 30 cm, other lengths can be made on request, in order to meet monitoring needs.

The temperature probe is inserted into the steel tip on the end of the sensor rod.

The sensor rod must be inserted into a vertical hole, previously made in the ground to be monitored, in an area free from obstacles or other materials that distort the measurement. The depth of the insertion can be controlled by the metric scale located on the side of the shaft; once positioned, cover the small excavation made with the previously loosened earth.

The sensor stem, with a diameter of 40 mm, can be supported by a support pole with a diameter of 48/50mm, with the appropriate brackets with U-bolts.



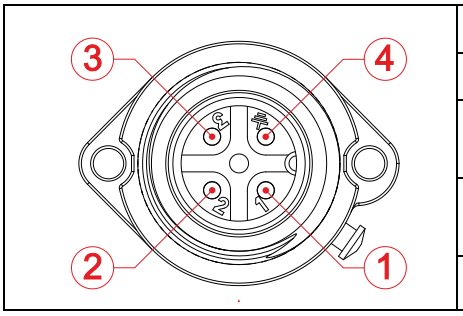
3.2 Maintenance

The device does not require any particular maintenance, except for periodic checks on the correct functioning and integrity of the exposed parts.

For constant verification of the measurement over time, it is advisable to periodically check the sensor in the factory by comparing it with standard reference instruments.

4 Electrical connection

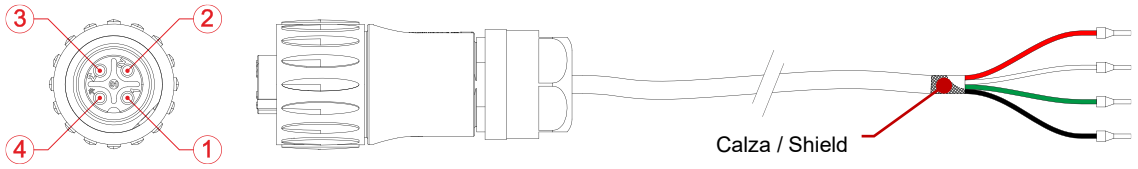
4.1 Connector output



Pin	Naturale output	I / V / S output
1	I+	Vcc
2	V+	+4÷20 mA ; +0÷2 Vdc B-RS485
3	V-	-4÷20 mA ; -0÷2 Vdc A-RS485
4	I-	GND

4.2 Connection cable

The connection cable supplied with the sensor is made with circular connectors with housing, 4x24 AWG shielded cable and ferrules for connection to the data logger terminals. The sock is connected to the black cable.



Pin	**1**	**2**	**3**	**4**
Cable	Red	White	Green	Black+Shield
Signal	I+	V+	V-	I-
	Vcc (alim.)	+4÷20 mA +0÷2 Vdc B-RS485	-4÷20 mA -0÷2 Vdc A-RS485	GND (alim.)

4.3 Read serial data (RS485 Modbus)

Sensors with RS485 Modbus output send data only upon specific request from the PC, data logger or PLC. Below are the correct communication parameters of the device performing the interrogation.

4.3.1 RS485 Modbus mode

Serial port settings: 9600 baud, no parity, 8 data bit, 1 bit di stop

Compatible with ModBus RTU protocol, functions supported: “03 – read Holding Registers” e “04 – Read Input Registers”.

Tipo dati: “2 registers swapped float IEEE 754 in the form CDAB where A is the most significant byte of the float and D is the less significant byte of the float (swapped float)”.

ID	Registers	Units	Reg. 1-2	Reg. 3-4	Reg. 5-6	Reg. 7-8	Reg. 9-10	Reg. 11-12	Reg. 13-14
6	1	°C	Temperature	-	-	-	-	Diagnostic	Supply Voltage

5 Generic information

The qualitative level of our instruments is the result of a continuous evolution of the product. This may cause differences between what is reported in the manual and the instrument you have purchased.

Siap+Micros S.p.A. reserves the right to modify without notice technical specifications and dimensions to adapt them to the needs of the product.

5.1 Safety

Please read these safety instructions carefully before using this product:

- The warranty will be void if the product is used differently from the instructions described in this manual.
- Any sign of tampering will void the warranty
- Use the devices only according to the instructions (environmental management, operation, wiring, installation, etc.) provided in this manual
- The correct and safe operation of the device can only be guaranteed if the transport, storage, operation and management of the device are compliant. This also applies to product maintenance.
- The device shall not be exposed to aggressive chemicals or solvents that could damage the plastic casing and/or corrode the metal parts.
- Maintenance should only be performed by qualified and well trained personnel.

It is appropriate to carry out a careful risk assessment in relation to the context of installation and use of the device by the installer considering the possible meteorological station in its complexity without being limited to the sensor.

The instruments must be installed according to the rules of the trade, with equipment that complies with applicable regulations and using supports correctly sized by qualified technicians and designed for the specific purpose.

During installation operations, check the suitability of the surrounding environment and compliance with local safety regulations.

The manufacturer declines all responsibility in case of failure due to negligence of the instructions, tampering, uses not described in this manual, improper use, use by operators not trained.

Read the instructions and intended use carefully and be sure you understand before installing the device

Before starting the activities, check the integrity of the instrument to be installed, prepare the equipment necessary for the work and wear the necessary PPE.

Take adequate measures to prevent the access of foreign personnel (untrained and uninformed) during the installation, maintenance or replacement of the instrument.

Take precautions to avoid falling objects, both during the installation phases and during the operation of the instrument.

Do not perform any activity in bad weather conditions.

During maintenance, particularly if the station is not frequented, visually check for the absence of dangerous insects and, if not, use suitable insecticides.

Consider the presence of any animals near the station, if so, pay attention to them.

Use only SIAP+MICROS original spare parts.

The instrument is not classified suitable (according to Directive 2014/34/EU) for use in atmospheres with potential explosion risk pursuant to Directive 99/92/EC.

SIAP+MICROS strives to minimize health and safety risks in all phases of the instrument's life, including installation, use, maintenance, decommissioning and disposal.

5.2 Appropriate use of the equipment

Use the instrument for its intended purpose, do not use it for any other purpose or cause malfunctions and/or damage.

5.3 Storage

If you do not plan to use the equipment for an extended period of time (at least one year) disconnect all cables from the equipment, place it in a clear plastic bag along with a bag of desiccant salts and seal the bag with tape. Put appropriate indication on the bag of the contents and weight of the equipment by inserting the wording "HANDLE WITH CARE".

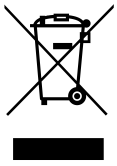
Store the instrument in an environment with a temperature between 0°C and 60°C with a humidity not exceeding 80%. Make sure that the instrument is stored in a stable position and that it cannot be damaged or moved by inexperience or carelessness. Do not stack other tools or weights. Do not place the instrument on top of other instruments and in any case ensure the solidity and stability of the underlying support.

Non esporre, stoccare lo strumento in ambienti con presenza di vapori e/o gas corrosivi.

5.4 Moving

In order to avoid any damage to the device during transportation, please keep it in upright position without shaking.

5.5 Disposal information



Electrical and electronic equipment marked with specific symbol in compliance with 2012/19/EU Directive must be disposed of separately from household waste. European users can hand them over to the dealer or to the manufacturer when purchasing a new electrical and electronic equipment, or to a WEEE collection point designated by local authorities. Illegal disposal is punished by law.

Disposing of electrical and electronic equipment separately from normal waste helps to preserve natural resources and allows materials to be recycled in an environmentally friendly way without risks to human health.

6 Revision history

The following table shows the description of the changes made to this document.

Version	Date	Updates
1.0	05/06/2023	Current version of the document.

7 Declaration of Conformity

MD 751.1 rev. 03

EU Declaration of Conformity (DoC)

Manufacturer: SIAP+MICROS S.p.A.
Via del Lavoro, 1 – 31020 S. Fior (TV) – Italy
https://www.siapmicros.com/en/

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of the declaration:

Description	Product Code/Model
TTT-S Soil Temperature Transducer, with RS485-Modbus serial output	PSM-t002c-TTT-S

The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

- **2014/30/EU** Electromagnetic Compatibility (EMC)
- **2011/65/EU** The Restriction of Hazardous Substances Directive (RoHSD)

The following harmonised standards and technical specifications have been applied:

EMC references:

EN 61326-1 2021-06	Electrical equipment for measurement, control and laboratory use - EMC requirements - General requirements

RoHSD references:

EN 63000 2016+AMD1:2022	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Date
31-01-2023

CEO
Alex Stevanin