

t012 TTS

Surface Temperature Transducer



User Manual and maintenance

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1 Introduction

TTS is a sensor which specifically allows to measure the temperature above the soil, preferably at a height of 10 cm, and it is typically used for agrometeorological monitoring. It is besides very versatile being suitable for many different applications, even in harsh and unfavorable environmental conditions. The sensing element is based on a Pt100 Platinum resistance calibrated with response curve in accordance with Class 1/3 DIN 43760 standard. It has been designed in order to give very reliable performances in the long run, ensuring accurate output data. This sensor is provided with a protective robust screen, which allows to detect the temperature without being influenced by solar radiation. The position of the sensor inside the screen prevents it from being hit by sunlight. The sensor's body is made of high-quality plastic, the protection shield is made of ABS (a resistant plastic material and non-hygroscopic), and UV stabilized material with low thermal characteristics that ensure long-term stability. The sensor is supplied with power and signal cable (12m)

Ordering Codes:

Natural output: t012-TTS-N

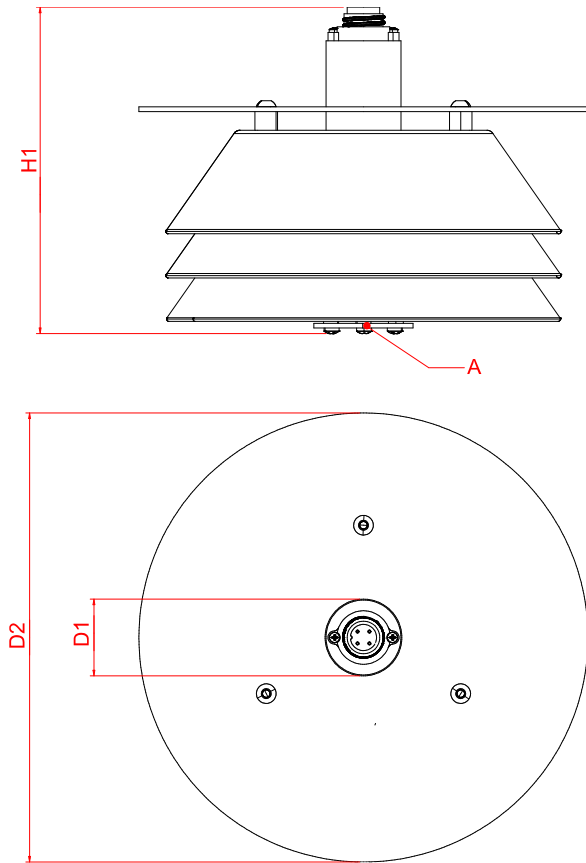
Current output: t012-TTS-I

Tension output: t012-TTS-V

RS485 Modbus output: t012-TTS-S

2 Technical specificaion

Measurement performance			
Transducer	Pt100 1/3 DIN 43760		
Measurement 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 %		
Outputs			
Natural	Pt100 4 wires		
Current	4 ÷ 20 mA ↔ -30 ÷ 60 °C		
Tension	0 ÷ 2 V ↔ -30 ÷ 60 °C		
RS485 MODBUS	Temperature		
Power supply and Consumption			
Power consumption	7 ÷ 30 Vdc		
Power consumption	Min	Typical	max
4 ÷ 20 mA	5		25
0 ÷ 2 V / RS485 MODBUS		1	3
Mechanical specifications			
Protective body	Plastic material (ABS) and stainless-steel screws		
Electrical connections	IP67 / 4-pole male connector		



Dimension:

H1 – maximum height: 180 mm

D1 – maximum diameter: 240 mm

D2 - shank diameter for fixing: 40 mm

Element:

A – sensing element Pt100

Weight: 1 kg

2.1 Operation scheme

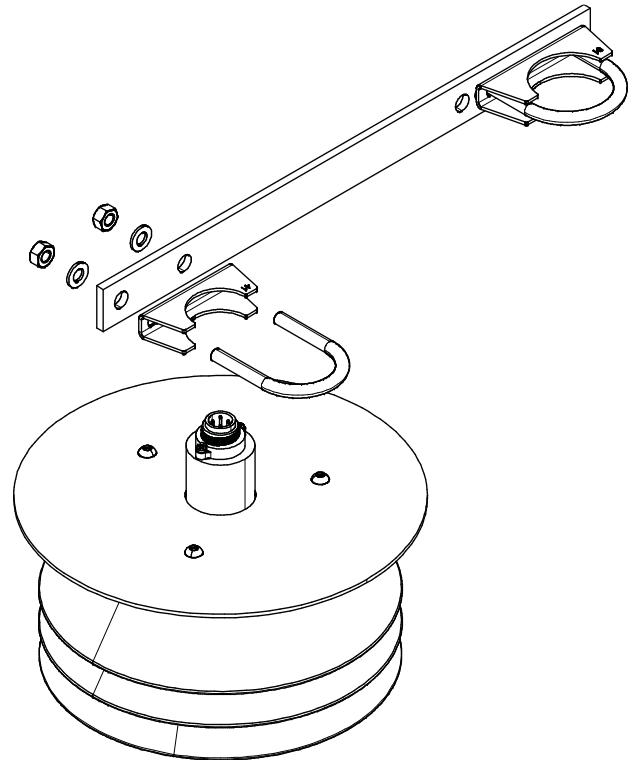
The sensing element is a 4-wire Pt100 placed at the end of the sensor directly in contact with the ground surface. In the natural version the output is brought directly to the output connector. In the other versions, an electronic interface shows the other different types of output on the connector.

3 Installation and maintenance

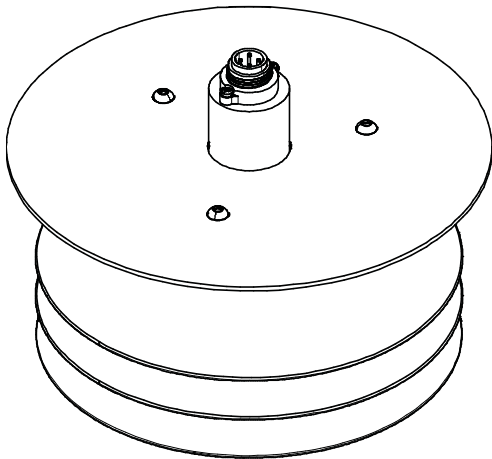
3.1 Installation

The sensor must be placed in direct contact with the ground, free from elements that influence the correct measurement of the temperature and installed on special arms that distance it sufficiently from reflected heat sources (for example the same support pole of the station) that can influence it the correct measure.

The sensor can be fixed to the plastic stem ($\varnothing 40$) with the special arm equipped with jumpers.



3.2 Maintenance

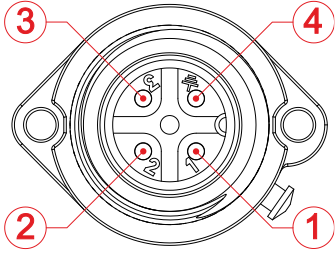


The device does not require any particular maintenance, apart from periodic cleaning of the protective shelter with water and a non-aggressive detergent and a normal non-abrasive sponge (so as not to damage the surface by scratching it), in order to keep it clean from dirt that could obstruct the normal natural ventilation of the sensor by decreasing the correct measurement of the air temperature.

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.

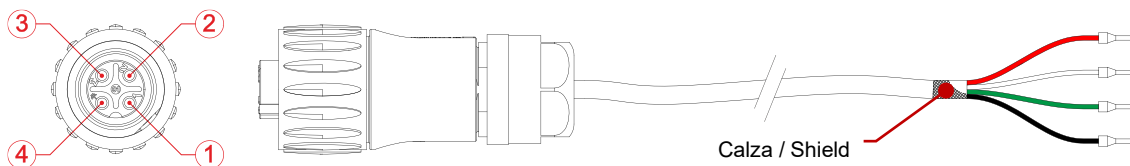
4 Electrical connection

4.1 Connector output

	Pin	Natural output	I / V / S / SDI12 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 (power supply)	+4÷20 mA +0÷2 Vdc B-RS485	-4÷20 mA -0÷2 Vdc A-RS485	GND (power supply)

4.3 Reading data in serial communication (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".

Data type: "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.

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