

t026 TTEPRHSO

Transducer of Solar Radiation, Temperature and
RH% air



User Manual and maintenance

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1 Introduction

TTEPRHSO is a compact sensor with extreme versatility that allows for the simultaneous measurement of air temperature, relative humidity and global solar radiation thanks to the coexistence of the three relative transducers inside. The remarkable performances are guaranteed by the high levels of accuracy and the long-term stability makes the recalibrations of each single sensitive component less necessary and frequent. The transducer element for temperature measurement consists of a Pt100 platinum thermo-resistance with response curve according to DIN 43760 class 1/3 standards. Relative humidity is calculated through a laser-cut polymer-capacitive transducer, while a silicon cell supplies data on solar radiation by generating a voltage proportional to the incident radiation. The body of the sensor is made of anti-corrosion aluminum alloy, and is enclosed within a series-disc protective shield, made of non-hygroscopic plastic material with low thermal capacity, suitably treated against ultraviolet rays. The sensor is supplied with power and signal cable (4 m).

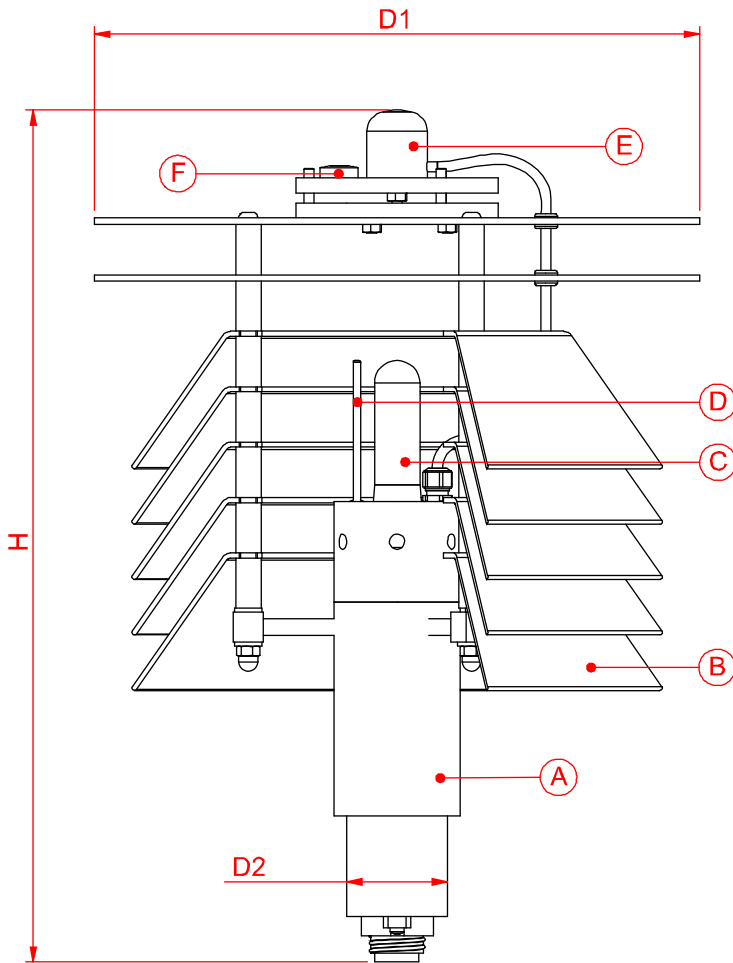
Ordering Codes:

RS485 Modbus output: t026I-TTEPRHSO-S

SDI-12 output: t026m-TTEPRHSO-D

2 Technical specification

Measurement performance			
Transducer	Pt100 1/3 DIN 43760		
Measurement range	-30 ÷ 60 °C		
Accuracy (natural output)	1/3 DIN 43760		
Resolution	0.03		
Relative Humidity [%]			
Transducer	Capacitive		
Measurement range	0 ÷ 100 %		
Accuracy (natural output)	± 2		
Resolution	0.01		
Repeatability	0.15		
Hysteresis	± 1		
Long-term stability	< 0.25 a year		
Solar Radiation [W/m²]			
Transducer	Silicon cell		
Measurement range	0 ÷ 1300 W/m ²		
Spectral range	0.36 ÷ 1.12 µm		
Resolution	0.2mV/W/m ²		
Directional response	± 5% a 75°		
Long-term stability	< 2% a year		
Operating conditions			
Temperature	-30 ÷ 60 °C		
Humidity	0 % ÷ 100 RH%		
Outputs			
RS485 – Modbus / SDI – 12	Temperature, Humidity, dew point and frost point, solar radiation.		
Power supply and consumption			
Voltage supply (unnatural release versions)	7 ÷ 30 Vdc		
Power consumption	Min	Typical	Max
RS485 MODBUS / SDI-12		1	3
Mechanical specifications			
Protective body	ABS plastic material, and stainless-steel screws		
Electrical connections	P67 / 7 male poles		



Dimension:

H1 – maximum height: ~ 340 mm

D1 – maximum diameter: 240 mm

Element:

A – sensor stem

B – anti UV plastic protection

C – relative humidity sensor

D – temperature sensor

E – solar radiation sensor

F – leveling bubble

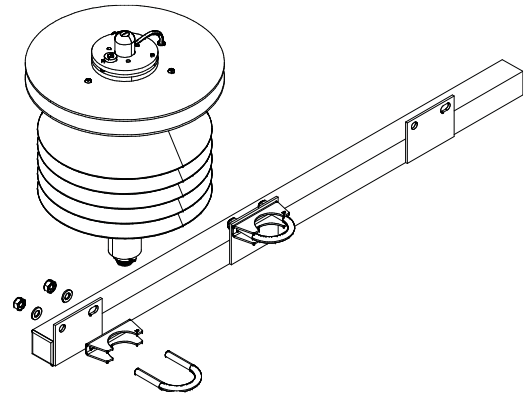
Weight: 1,4 kg

3 Installation and maintenance

3.1 Installation

The sensor must be installed on special brackets which distance it sufficiently from reflected heat sources (for example the same support pole of the station) which could influence its correct measurement.

For correct installation, the sensor should be placed at a distance from the closest obstacle (pylons, trees, buildings) equal to 10 times the height of the obstacle itself, this to minimize the effects of alteration of the normal air flow.



The TTEPRHSO transducer is normally positioned (according to WMO standards) at a height of about 2 or 10 meters from the ground level. The transducer must be mounted perfectly level and oriented in such a way that no obstacle can obscure it with shadow areas. For this reason, in a monitoring station, it must be placed in a SOUTH direction if it is installed in the NORTHERN hemisphere, vice versa in NORTH if it is installed in the SOUTH hemisphere. To minimize the azimuthal error it is necessary to orient the sensor in an appropriate way. Orientation is determined by the axis formed by the transducer cable and the bubble level. In the NORTHERN hemisphere the level must be oriented towards SOUTH while, in the SOUTH hemisphere, it must be oriented towards NORTH.



3.2 Maintenance

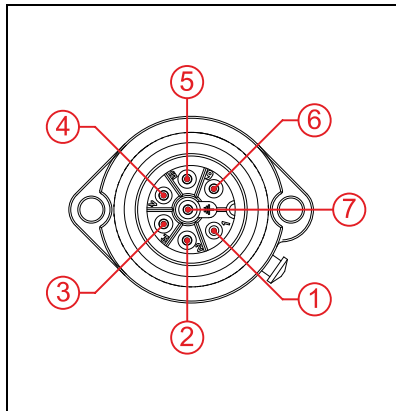
The temperature sensitive element does not require particular maintenance operations, it is advisable to periodically check the factory calibration with sample instruments.

While that of the relative humidity is subject to degradation in relation to the time spent in the external environment and the air quality conditions to which it is subjected: in severe pollution conditions the sensitive element should be replaced after 5÷8 months, while in "normal" conditions its good functionality can last up to a year.

A verification of the effectiveness of the measurement can be evaluated by checking the humidity data in a rainy situation: if the value varies between 97% and 99% it can be considered that the sensitive element is still in good condition. It is good practice to periodically check the measurements with standard reference instruments (for example psychrometers).

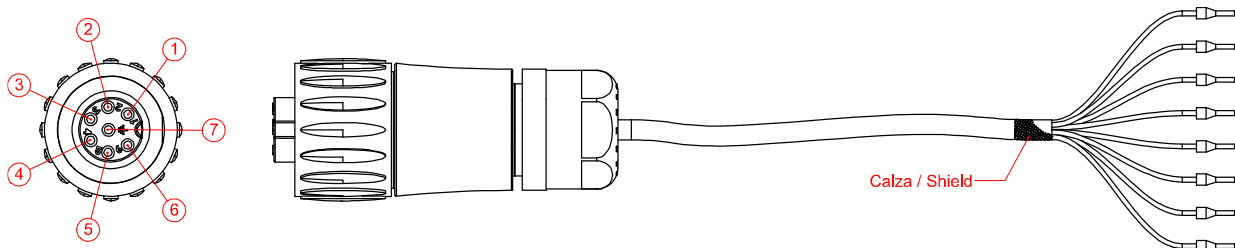
4 Electrical connection

4.1 Connector output

	Pin	TTEPRHSO-S RS485	TTEPRHSO-D SDI-12
	1	A-RS485	A-RS485
	2	B-RS485	B-RS485
	3	+0÷2 Vdc	SDI-12 (data)
	4	+4÷20 mA	+4÷20 mA
	5	-0÷2 Vdc -0÷20 mA	-4÷20 mA
	6	Vcc	SDI-12 (Vcc)
	7	GND	GND

4.2 Connection cable

The connection cables supplied with the sensor are made with circular connectors with housing, 8x0.22 mmq cable, shielded and with ferrules for connection to the data logger terminals. The braid is connected to the general ground lead.



Pin	1	2	3	4	5	6	7	7
Cable	Red	White	Green	Black	Orange	Yellow	Blue	Brown
TTEPRHSO-S RS485	A-RS485	B-RS485	+0÷2 Vdc	+4÷20 mA	-0÷2 Vdc -4÷20 mA	Vcc	GND	GND
TTEPRHSO-D SDI-12	A-RS485	B-RS485	SDI-12 (data)	+4÷20 mA	-4÷20 mA	SDI-12 (Vcc)	GND	GND

4.3 Data reading in serial (RS485 Modbus and SDI-12)

Sensors with RS485 Modbus or SDI-12 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
3	1	°C	Temperature	Relative Humidity	Dew Point	Frost Point	Solar Radiation	Diagnostic	Supply Voltage
	3	%							
	5	°C							
	7	°C							
	9	Wm ²							

4.3.2 SDI-12 mode

Serial port settings: 1200 baud, even parity, 7 data bit, 1 bit di stop

Supported commands (a = 3, sensor address)

?! Address Query

a! Send Identification

aM! Start Measurement

aC! Start Concurrent Measurement

aD0! Send Data

a	Position	Units	Decimals	Position 1	Position 2	Position 3	Position 4	Position 5	Position 6	Position 7
3	1	°C	2	Temperature	Relative Humidity	Dew Point	Frost Point	Solar Radiation	Diagnostic	Supply Voltage
	2	%	0							
	3	°C	2							
	4	°C	2							
	5	Wm ²	1							

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.

All the information content in this document are the current available at the printing phase. Siap+Micros S.p.A. reserve the rights to change the specifications without any advance notice

7 **Declaración de conformidad**



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
TTEPRHSO-D Transducer with serial output (SDI-12) of temperature, relative humidity and solar radiation	PSM-t026m-TTEPRHSO-D

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
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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
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Date
 31-01-2023

CEO
 Alex Stevanin

