

t043 TP500 / TP1000

Precipitation Transducer, collecting area 500/1000 cm²



User Manual and maintenance

Summary

1	Introduction	3
2	Technical specificaion	4
3	Installation and maintenance	6
3.1	Installation	6
3.2	Maintenance	6
4	Electrical connection	7
4.1	Connector output	7
4.2	Connection cable	7
4.3	Data reading in serial (RS485 Modbus and SDI-12)	7
4.3.1	RS485 Modbus mode	8
4.3.2	SDI-12 mode	8
5	Generic information	9
5.1	Safety	9
5.2	Appropriate use of the equipment	10
5.3	Storage	10
5.4	Moving	10
5.5	Disposal information	10
6	Revision history	11

1 Introduction

TP rain gauges are high-precision sensors designed to measure cumulative precipitation and precipitation intensity. The measurement principle is based on a tipping bucket mechanism designed to minimize friction generated by the oscillating action. This system has made it possible to achieve high standards of accuracy across the entire measurement range. The sensor is available in both a contact/pulse output version (TP500-N and TP1000-N) and a version with correction electronics (TP500-E and TP1000-E) to compensate for the mechanical error intrinsically caused by the tipping bucket operation, ensuring high accuracy even at high precipitation intensities. In particular, through numerous laboratory tests, an algorithm has been developed that allows the measured cumulative precipitation value to be modified, aligning it with the theoretical value according to the intensity of the rain.

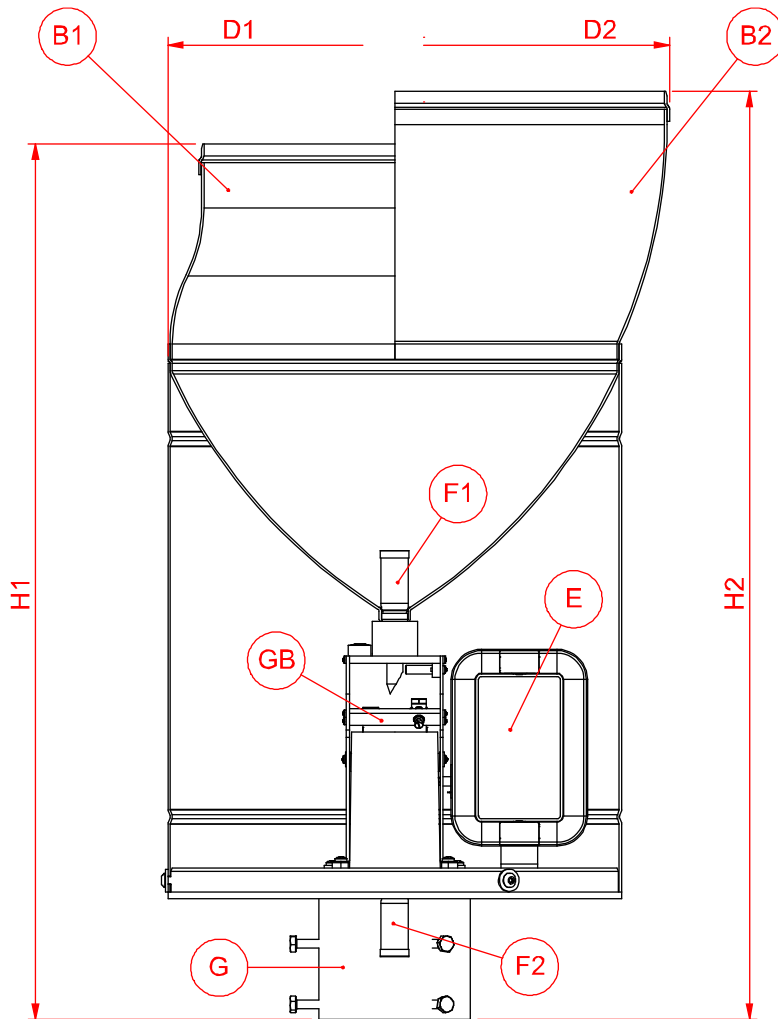
The sensor body is made of aluminum alloy and is finally heat-coated with a special anti-UV paint that guarantees high durability and resistance to atmospheric agents. All available models are supplied with a power and signal cable (12 m).

Ordering Codes:

Collecting area	500 cm ²	1000 cm ²
Reed contact output:	t043 TP500-N	t043 TP1000-N
Rain gauge with electronic correction. Available outputs: RS-485 Modbus, SDI-12, contact, optional current or voltage.	t043 TP500-E	t043 TP1000-E
Opzional:		
Certificate EN17277, Classe A	t043-TP500-CERT	t043-TP1000-CERT

2 Technical specificaion

Measurement performance			
Collecting area	500 o 1000 cm ²		
Conversion constant	0.2 mm/impulso		
Amount resolution	0.2 mm		
Intensity resolution (-E versions)	0.1 mm/h		
Amount range	0 ÷ ∞ mm		
Intensity range (-E versions)	0 ÷ 500 mm/h		
Amount accuracy (-N version)	< 3 % @ < 150 mm/h < 6 % @ < 300 mm/h		
Amount accuracy (-E versions)	< 3 % @ < 300 mm/h		
Intensity accuracy (-E versions)	< 3 % @ < 300 mm/h		
Operating conditions			
Temperature	0 ÷ 70 °C		
Rainfall intensity	0 ÷ 500 mm/h		
Outputs			
Contatto reed	0.2 mm/impulse		
RS-485 Modbus / SDI-12	Raw amount [mm], Adjusted intensity [mm/h], Adjusted amount [mm]		
Tension	0 ÷ 2 V ↔ 0 ÷ 500 mm/h		
Current	4 ÷ 20 mA ↔ 0 ÷ 500 mm/h		
Power supply and Consumption			
Voltage supply	10 ÷ 15 Vdc		
Power consumption	Min	Typical	Max
RS-485 Modbus / SDI-12 / 0÷2 V		1	3
4÷20 mA	5		25
Mechanical specifications			
Materials	Corrosion-resistant metal alloys and stainless steel fasteners		
Finishing touch	RAL 9003 thermosetting polyester powder varnishing		
Electrical connections	IP67 / 7 pole male connector		



Dimension:

H1 - height TP500: 585 mm

H2 - height TP1000: 615 mm

D1 – max diameter TP500 300 mm

D2 - max diameter TP1000 356 mm

Element:

B1 – Collecting area 500 cm²

B2 – Collecting area 1000 cm²

F1 – input filter

F2 – exhaust filter

GB – action group

E – management electronics (TP with non-natural output)

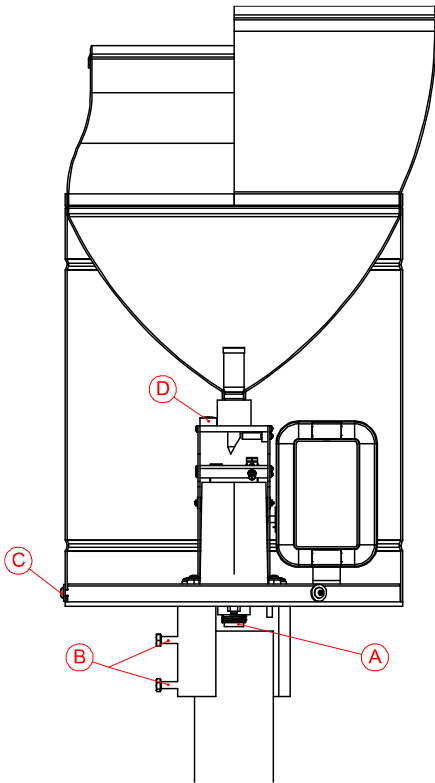
G – shank support

Weight: TP500 3,7 kg

TP1000 3,8 kg

3 Installation and maintenance

3.1 Installation



While installing the meteorological station it is necessary to pay attention to the characteristics of the place as the conformation of the land and the proximity to any obstacles can affect the quality of the data that will be collected. In particular, it must be kept in mind that any vertical obstacle such as trees and buildings create an air turbulence equal to ten times their height. For this reason, by way of example, a weather station must maintain a minimum distance of 100 meters from 10 meter high obstacles.

The rain gauges of the TPxxx family must be installed according to WMO standards, with the precipitate collection mouth at 2 metres. For their installation, two types of poles are typically used, one for burying and supported by a foundation plinth or one with a base for installation on slabs, terraces, etc.

The electrical connection is made through the cable to the connector (A) located on the lower part of the rain gauge. Mechanically, the rain gauge is installed by positioning it on the top of the support pole ($\varnothing 70\text{mm}$) without the upper part, cone and mouth, which can be removed by unscrewing the 3 side fixing

screws (C). Subsequently, insert the rain gauge on the pole and fix it by tightening the 6 screws on the base (B), the same screws are also used to check the horizontality of the calibrated mouth of the rain gauge by checking the leveling with the spirit level inside (D).

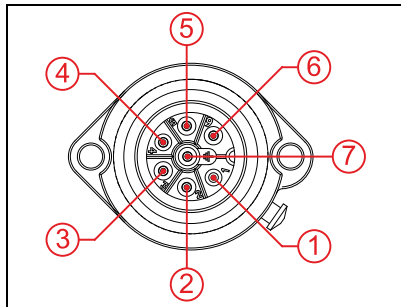
Before putting the rain gauge into operation, remember to "release" the rocker from its locking elastic.

3.2 Maintenance

When using the TPxxx rain gauges, it is necessary to pay attention to keeping the upper inlet clean to prevent any bodies from obstructing the passage of water, compromising its operation. Indeed dust, leaves, etc. can reduce the flow capacity of the water through the duct that leads to the oscillating bucket. It is advisable to clean the upper cone, the filter present on it and the one on the lower part, in pre-established periods with clean water, unscrewing it from the body of the rain gauge. Finally, it is advisable to clean the nozzle located immediately above the measuring scale with a brush.

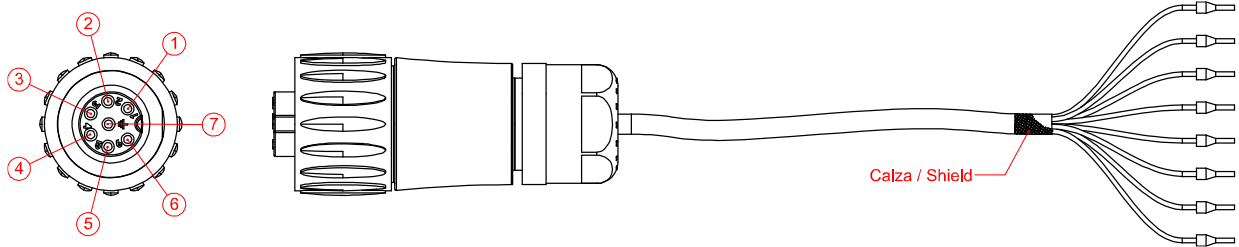
4 Electrical connection

4.1 Connector output

	Pin	TPxxx-N	TPxxx-E
	1	Contact	Contact
	2	Contact	Contact
	3	n.c.	A-RS485
	4	n.c.	B-RS485
	5	n.c.	SDI-12
	6	n.c.	Vcc
	7	n.c.	GND

4.2 Connection cable

The connection cable supplied with the sensor is made with circular connectors with housing, shielded 8x0.22mmq cable and ferrules for connection to the data logger terminals. The sock is connected to the black cable.



Pin	1	2	3	4	5	6	7	7
Cable	Red	White	Green	Black	Orange	Yellow	Blue	Brown
TPxxx-N	Contact	Contact	n.c.	n.c.	n.c.	n.c.	n.c.	n.c.
TPxxx-E	Contact	Contact	A-RS485	B-RS485	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, supported functions: “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
17	1	mm	Total amount of rain	Rain intensity	Correct total amount of rain for intensity			Diagnostic	Supply Voltage
	3	mm/h							
	5	mm							

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
H	1	mm	3	Total amount of rain	Rain intensity	Correct total amount of rain for intensity	Diagnostic	Supply Voltage		
	2	mm/h								
	3	mm								

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
<i>1.0</i>	<i>05/06/2023</i>	<i>Current version of the document.</i>
<i>2.0</i>	<i>10/12/2025</i>	<i>Model Update</i>

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