

STBB – AIR THERMOMETER WITH WET AND DRY BULBS (PSYCHROMETER). Rev.2 010718



Description

The dry bulb and wet bulb thermometers consist of 2 precision transducers, one with the thermistor in the air and one with the thermistor wet by a special gauze partially immersed in a container of distilled water.

Both thermistors are ventilated by an air intake fan and are interfaced by a microprocessor for measuring management.

The two dry and wet bulbs are mounted inside special protection screens from solar radiation, made of aluminium and treated with special radiant white paints that guarantee easy cleaning and maintenance of the white colour over time.

The shields are in turn protected by the sensor support which acts as a cover for the shields, preventing snow and other depositions from above: in this way shields remain cleaner and whiter, avoiding blackening that causes alterations in the measurement of temperature.

Working principle

Both temperature sensors are made with a Platinum resistance thermometer (Pt 100Ω @ 0 ° C). The change in resistance of the Pt100 is transformed into a linear current signal with temperature.

The wet bulb temperature is the temperature to which the water is brought in conditions of equilibrium of convective exchange and mass of air in fully developed turbulent motion. To correctly calculate the wet bulb temperature measurement, the transducer is wrapped with a gauze soaked in water and invested by a continuous flow of air.

The absolute humidity of a room can be obtained from the wet bulb temperature value. The instrument that uses the two dry bulb and wet bulb thermometers is commonly called a **psychrometer**.

Main applications

- ✓ **Meteorology** - Meteo-climatic measurements
- ✓ **Agrometeorology** and Irrigation systems
- ✓ **Hydrogeology**
- ✓ **Research**
- ✓ **Environmental monitoring in general**

Technical data

Models	STBB-I	STBB-N
Range of both bulbs	-40...+60 °C	
Transducer	Pt100 1/3DIN	
Output	4...20mA	3 wires Pt100
Sensor and fan power	12Vdc	
Consumption		
- sensor:	4...20mA (max load 150Ohm)	None
- fan:	<50mA@12vdc	<50mA@12vdc
Accuracy	±0.2°C	
Repeatability	±0.1°C	
Long term stability	< 0,04 °C/year	
Response time @ 63% of the final change	< 8s	
Maintenance	Check/replacing of gauze and water topping up in the bottle. Periodic cleaning of the air filter in the ventilation system	



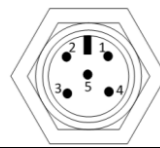
Correct installation of the sensor

Wet bulb container autonomy	>20 days
Working temperature	0...+85°C
Connector	Plug IP68 (cable excluded)
Mounting	Universal bracket for mounting on horizontal or vertical pipes ømax:42mm
Materials	White painted aluminum, ABS and stainless steel
Dimensions and weight	260 x 105 x h260mm, 530g

Accessories

Cable	Shielded for outdoor. Available lengths: 4, 12, 22m (others upon request)	
Cod. CSxx (xx=meters of cable)	Sensor cable with open wires (sensor and datalogger side)	
Cod. CSDxx	Sensor- datalogger cable with connector (sensor side) and terminal (datalogger side)	
BC250	250cc PEHD bottle with threaded neck for containing <u>distilled water</u>	

Electrical Connection

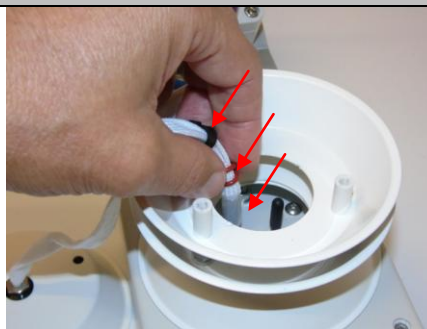
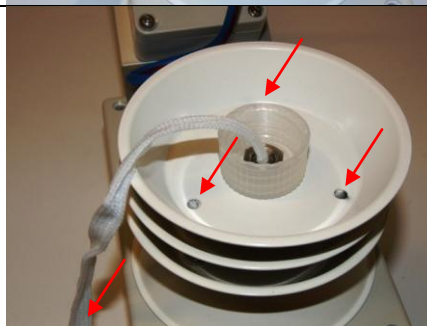
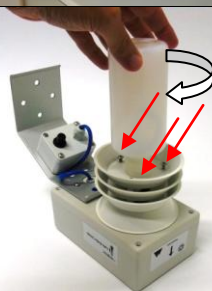
Vers. psychrometer	STBB-N	STBB-I
Output (TBS=dry bulb temperature, TBB=wet bulb temperature)	Out1 (TBS): 3 wires Pt100 Out2 (TBB): 3 wires Pt100	Out1 (TBS): 4...20mA Out2 (TBB): 4...20mA (where 4mA=-40°C; 20mA=+60°C)
Shunt resistance load		150Ω typ.
IP68 connector on the sensor 	Pin1: High Pt100 TBS [I+ 1mA] Pin2: High Pt100 TBS [V+] Pin3: Low Pt100 TBS [V- Gnd] Pin4: High Pt100 TBB [I+ 1mA] Pin5: High Pt100 TBB [V+] Pin6: Low Pt100 TBB [V- Gnd] Pin7: Gnd Pin8: +Vdc (12Vdc)	
IP68 connector on the sensor 		Pin1: Iout+ (TBS) Pin2: Pin3: Iout+ (TBB) Pin4: Gnd Pin5: +Vdc (12Vdc)

Installation

Application	Height of mounting	Localization e orienting
Air temperature (wet and dry bulbs)	0,5...2 m from the ground	It's recommended above grass or natural surface (when the grass were absent); not install the sensor above asphalt surfaces or that can radiate heat; besides not install where the airflow were stagnant or in presence of hard airflow (eg. close to doors, canyons, etc...). Distance from possible obstacles >1,5m. SIGNAL TRANSMISSION Transducer electronic is developed to obtain a signal that grows linearly with increasing of the humidity and temperature. In presence of cables that transmit high currents or machines that generate electromagnetic noises is need install the sensor cable in separate cable duct or at a specified distance to shield the noises. In the voltage model it's recommended to use always a shielded cable.

Maintenance

Warning: Before transporting the sensor, empty all the liquid present in the bottle, otherwise the sensor could be seriously damaged!

Replacement of cotton gauze		Operations in sequence		Operazioni in sequenza
	1 Unscrew the bottle - Empty the water from the bottle		5 Insert the gauze retainer, the 2 silicone o-rings and the transparent heat shrink tubing in sequence on the end of the new cotton gauze - Insert the gauze on the TBB sensor	
	2 Turn the sensor over - Undo the three screws of the first screen plate - Gently remove the plate		6 Gently slide the 2 o-rings on the TBB sensor to lock the gauze to the sensor - Insert the gauze into the plate	
	3 Remove the gauze gently from the wet bulb temperature sensor (longer stem)		7 Gently slide the plate holding the end of the gauze that will be inserted into the bottle - Match the 3 holes of the plate with the threaded holes of the sensor	
	4 The sensor must appear as in the figure (longer stem = TBB wet bulb temperature)		8 Tighten the three screws of the first screen plate - Insert the gauze into the bottle - Screw the bottle back on	