

RELATIVE HUMIDITY, TEMPERATURE AND BAROMETRIC PRESSURE SENSOR (RHTP)

The well-crafted Evvos RHTP probe, combines meteorological grade barometric pressure sensor, relative humidity, and air temperature measurements. It is designed to provide high-quality environmental data, real-time measurements, and calculation of multiple parameters.



Applications

- Environmental monitoring
- Weather forecasting solutions
- Industrial data acquisition
- Precision agriculture/farming
- Cold chain and HVAC applications
- Internet of things

Primary parameters

- Relative humidity
- Air temperature
- Barometric pressure

Secondary parameters

- Absolute humidity
- Dew point
- Wet-bulb temperature
- Vapour pressure
- Saturated vapour pressure
- Atmospheric pressure at sea level
- Heat index
- Mixing ratio
- Specific enthalpy
- Boiling point of water
- Speed of sound in air
- Water activity in air

Highlights

- Stainless steel enclosure and filter cap engineered to shield sensing elements in harsh environments
- Waterproof protection and sealed in raisin internal electronics
- UV-protected and oil-resistant flexible cable
- Multiple electrical interfacing options - SDI-12 (v.1.4), RS-485 (Modbus), UART, USB
- Low-power consumption suitable for battery-powered applications

Description

The RHTP sensor is a robust, high-accuracy, digital probe. It measures multiple environmental parameters. Due to its low power consumption, versatile electrical interfacing options, and wide power supply range, the probe is compatible with a variety of battery-operated dataloggers and industrial data acquisition systems. A stainless-steel enclosure in combination with weatherproof electronic circuitries, and durable cable, ensure proper long-term operation even in harsh outdoor and industrial conditions. All primary parameters are sensed by physical sensors. The secondary parameters are calculated, based on values measured by the probe's physical sensors.

The enhanced accuracy version of the probe provides high accuracy measurement of relative humidity and air temperature without user-defined calibration.

Measured Parameters and Units

Environmental Parameters

Parameter	Unit	Description
air_temperature	°C / °F	Air temperature (dry-bulb temperature)
relative_humidity	%	Relative humidity of air
barometric_pressure	hPa	Barometric pressure
sea_level_pressure	hPa	Reduced to sea level atmospheric pressure
dew_point	°C	Dew point (Dew temperature)
absolute_humidity	g/m ³	Absolute humidity of air
vapor_pressure	hPa	Vapor pressure in humid air
saturated_vapor_pressure	hPa	Saturated vapor pressure in humid air
heat_index	°C	Physiological heat index in humid air
speed_of_sound	m/s	Speed of sound in humid air
mixing_ratio	g/kg	Mixing ratio of moisture in air
specific_enthalpy	kJ/kg	Thermodynamic specific enthalpy of humid air
water_activity	-	Water activity in humid air
water_boiling_point	°C	Boiling point of water
wet_bulb_temperature	°C	Thermodynamic wet-bulb temperature

Diagnostic Technical Parameters

MCU_voltage	mV	Voltage supply for the on-board microcontroller
SEN_voltage	mV	Voltage supply for the sensor circuits
VIN_voltage	mV	Voltage supply for the probe
MCU_temperature	°C	Temperature of the on-board microcontroller
HEAT_set_time	s	User-defined ON time for the on-board heater
HEAT_remaining_time	s	Instantaneous remaining ON time for the on-board heater after its activation
HEAT_initial_temperature	°C	RH-sensor temperature at heater ON start
HEAT_delta_temperature	°C	RH-sensor increase of temperature during heating
COOL_remaining_time	s	Instantaneous remaining cooling time for the RH-sensor after heater automatically shuts OFF
COOL_initial_temperature	°C	RH-sensor temperature at heater automatic OFF event
COOL_delta_temperature	°C	RH-sensor decrease of temperature during cooling

SDI-12 Specific Symbols and Parameters

break_duration	us	Duration the SDI-12 break symbol as generated by the master and as measured by the probe
a	-	SDI-12 address of a probe
n	-	Count of parameters to be returned by a probe
ttt	s	Time between issuing Start measurement Command and Read Measurement Command
±	-	Positive/negative sign of a numerical value
<CR>	-	Carriage return ASCII character as per SDI-12 convention
<LF>	-	Line feed ASCII character as per SDI-12 convention

Examples of Reading Environmental Data

Command	Description	Issued by
0M!	Issue a Start Measurement Command aM!. It starts measurements of all environmental parameters except wet_bulb_temperature	user
00023	Wait for 2 sec. conversion time while command 0M! is being executed.	probe
0D0!	Issue Read Data Commands starting with aD0!	user
0+26.67+58.23+997.51	[addr][air_temperature °C][relative_humidity][barometric_pressure]	probe
0D1!	Keep issuing aDx!-commands to read more parameters	user
0+2660+5820+99750	Compatibility mode integer format: [addr][air_temperature][relative_humidity][barometric_pressure]	probe
0D2!		user
0+26.67+17.76+28.00+80.01	[addr][air_temperature °C][dew_point][heat_index][air_temperature °F]	probe
0D3!		user
0+58.23+14.706+12.953	[addr][relative_humidity][absolute_humidity][mixing_ratio]	probe
0D4!		user
0+997.51+20.35+34.96	[addr][sea_level_pressure][vapour_pressure][sat_vapour_pressure]	probe
0D5!		user
0+348.77+59.849+0.5820+99.56	[addr][speed_of_sound][specific_enthalpy][water_activity][water_boiling_point]	probe

Examples of Reading wet_bulb_temperature

Command	Description	Issued by
0M!	Issue a Start Measurement Command aM!. It starts measurements of all environmental parameters except wet_bulb_temperature	user
00023	Wait for 2 sec. conversion time while command 0M! is being executed.	probe
0M6!	Issue a Start Measurement Command aM6! to start measurement of wet_bulb_temperature	user
00054	Wait for 5 sec. conversion time while command 0M6! is being executed.	probe
0D6!	Issue Read Data Command aD6! To read wet_bulb_temperature	user
0+20.50+26.73+17.57+159	[addr][wet_bulb_temperature °C][air_temperature °C][dew_point][iterations_count]	probe

SDI-12 Command Set for RHTP – Summary

Command	Description	Note
Standard SDI-12 Commands		
?!	Address Query Command	
a!	Identification Command	
aAb!	Change Address Command	
aV!	Verification Command	
aM!, aMx!	Start Measurement Command	x=1÷6
aC!, aCx!	Start Concurrent Measurement Command	x=1÷6
aR!, aRx!	Read Continuous Measurement Command	x=0÷14
aDx!	Read Data Command	x=0÷6
aIM!, aIMx!, aIC!, aICx!, aICC!, aICCx!	Identify Measurement Command	As per SDI-12 specification v1.4 x=1÷6
RHTP Specific Commands		
aXH!, aXH?, aXHx!	Heater control and status command set	x=0÷9
aXSx!, aXSCx!, aXSN!, aXSF!, aXSR!	Statistics control and status command set	x=0÷14
aXT!, aXT?	Test data command set	
aXPH!, aXPV, aXPS!, aXPR!	Sea level pressure configuration and read command set	
aXL[][]!	User-defined calibration configuration and read command set	
aXR!	Probe software reset command	