control solutions
TERACOM



TSH300v3
Modbus RTU humidity and temperature sensor

USER MANUAL

www.teracomsystems.com

1. Short description

TSH300v3 (successor to the TSH300) is a combined temperature and humidity sensor featuring an RS-485 interface with support for the Modbus RTU protocol. The device does not require an external power supply, as it is powered directly through the interface.
The sensor incorporates advanced signal processing components and provides a fully calibrated digital output. It uses a capacitive element for measuring relative humidity, while temperature is monitored via a band-gap sensor. Both measurements are processed through a 12-bit analog-to-digital converter (ADC), ensuring superior signal accuracy and quality.
The TSH300v3 is supplied with a 1-meter standard patch cable with RJ45 connectors.

2. Features

- Configurable communication settings;
- Up to 32 devices on the RS-485;
- LED communication status indicator;
- Firmware update via the RS-485 interface.

3. Applications

- Humidity and temperature logging in server rooms and data centers
- Environmental quality monitoring and assessment
- Monitoring in building management systems (BMS)
- Humidity and temperature logging for mobile operator facilities, vineyards, greenhouses, and more.

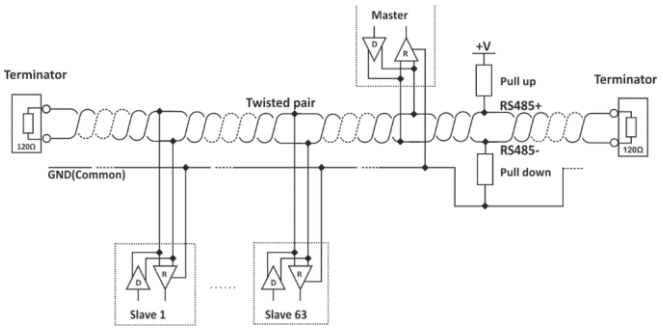
4. Specifications

- Physical characteristics
  Dimensions: 85 x 35.1 x 23.5mm
  Weight: 40g
- Environmental limits
  Operating temperature range: -20 to 60°C
  Operating relative humidity range: 10 to 90% (non-condensing)
  Recommended operating range: 20% to 80% RH (non-condensing), within -10°C to 60°C
  Prolonged operation outside of these ranges may result in sensor drift, with a slow recovery time.
  Long term drift typical: ±0.25%RH/year, ±0.05°C/year
  Higher drift may occur in contaminant-heavy environments (e.g., vaporized solvents, adhesives).
  Storage temperature range: -20 to 60°C
  Storage relative humidity range: 10 to 90% (non-condensing)
  Ingress protection: IP20
- Power requirements
  Operating voltage range (including -15/+20% according to IEC 62368-1): 4.5 to 26VDC
  Current consumption: 5mA@5VDC
- Humidity measurements
  Accuracy (min): ±3.0%RH (in 20 to 80 %RH range)
  Accuracy (max): ±5.0%RH (in 10 to 90 %RH range)
  Resolution: 0.1%RH
- Temperature measurements
  Accuracy (min): ±0.4°C (in -10 to +60°C range)
  Accuracy (max): ±0.6°C (in -20 to +60°C range)
  Resolution: 0.1°C
- RS-485 interface
  Maximum number of bus transceivers: 32
  Response time ≤ 50ms
  Master response timeout: ≥ response time + answer time
  The answer time depends on the number of bits and the baud rate.

5. Installation

Two-Wire MODBUS definition according to modbus.org:

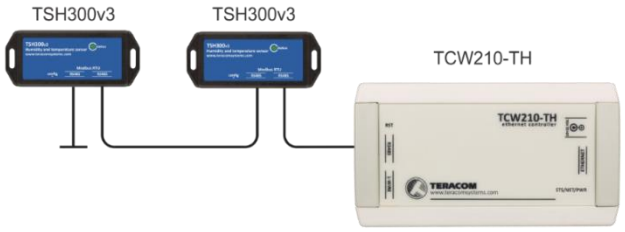
“A MODBUS solution over a serial line should implement a “Two-Wire” electrical interface in accordance with EIA/TIA-485 standard. On such a “Two-Wire” topology, at any time one driver only has the right for transmitting. In fact, a third conductor must also interconnect all the devices of the bus - the common.”



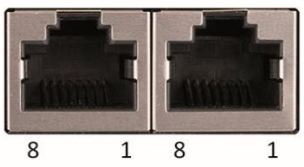
A daisy-chain (linear) topology must be used to connect multiple sensors. For interconnection, use UTP or FTP cables with RJ-45 connectors, following the ANSI/TIA/EIA T568B wiring standard. It is recommended to use standard LAN patch cables for optimal reliability and ease of installation.

Attention:

The last sensor in the chain must have a 120-ohm termination resistor installed in its free RJ-45 socket. The terminator is included with the controller.



6. Pinout



Pin	Description	UTP wires color
1	not connected (most right)	Orange/White Tracer
2	not connected	Orange
3	not connected	Green/White Tracer
4	RS485-	Blue
5	RS485+	Blue/White Tracer
6	not connected	Green
7	+VDD	Brown/White Tracer
8	GND	Brown

7. Installation tips

The location and mounting position of sensors directly affect the accuracy of the measurements. To ensure reliable results, follow these guidelines:

- Install the sensor approximately 1.2–1.4 meters above the floor, away from heating and cooling sources;
- Avoid placing the sensor near windows to prevent interference from solar radiation;
- Choose a location with good air circulation.
- Mount the sensor on a wall with ventilation holes oriented vertically (up/down) to allow proper airflow around the sensing element.

8. Status indicator

The device status is indicated by a single LED visible below the front panel:

- Blinking every 1 second – the sensor is operating normally;
- Blinking every 3 seconds – no communication with the controller;
- No blinking (LED off) – the device is not powered.

9. Modbus register table

Register name	R/W	FC	PDU Address (Decimal)	Logical Address (Decimal)	Data type	Default	Valid values
RS-485 address	R/W	03/06/16	10	40011	uint16	1	1-247
Baud rate*	R/W	03/06/16	11	40012	uint16	19200	2400, 4800, 9600, 19200, 38400, 57600
Parity, data, stop bits *	R/W	03/06/16	12	40013	uint16	1	1=E81, 2=O81, 3=N81
Data order	R/W	03/06/16	13	40014	uint16	1	1=MSWF (MSW, LSW) 2=LSWF (LSW, MSW)
Device code	R	03	14	40015	uint16		0x00CD
FW version	R	03	15	40016	uint16		
Vendor URL	R	03	18	40019	utf8[64]		teracomsystems.com
Float test value (MSWF)	R	03	82	40083	float32		-9.9(0xC11E6666)
Float test value (LSWF)	R	03	84	40085	float32		-9.9(0xC11E6666)
Signed integer test value	R	03	86	40087	int16		-999(0xFC19)
Signed integer test value (MSWF)	R	03	87	40088	int32		-99999(0xFFFE7961)
Signed integer test value (LSWF)	R	03	89	40090	int32		-99999(0xFFFE7961)
Unsigned integer test value	R	03	91	40092	uint16		999(0x03E7)
Unsigned integer test value (MSWF)	R	03	92	40093	uint32		99999(0x0001869F)
Unsigned integer test value (LSWF)	R	03	94	40095	uint32		99999(0x0001869F)
Temperature °C	R	03	100	40101	float32		
Humidity %RH	R	03	102	40103	float32		
Dew point °C	R	03	104	40105	float32		
Temperature °F	R	03	200	40201	float32		
Humidity %RH	R	03	202	40203	float32		
Dew point °F	R	03	204	40205	float32		
Temperature °C x 100	R	03	400	40401	int16		
Humidity %RH x 100	R	03	401	40402	int16		
Dew point °C x 100	R	03	402	40403	int16		
Temperature °F x 100	R	03	500	40501	int16		
Humidity %RH x 100	R	03	501	40502	int16		
Dew point °F x 100	R	03	502	40503	int16		
Temperature multiplier **	R/W	03/06/16	2101	42102	float32	1.000	
Temperature offset °C **	R/W	03/06/16	2103	42104	float32	0.000	
Temperature offset °F **	R	03	2105	42106	float32	0.000	
Humidity multiplier **	R/W	03/06/16	2111	42112	float32	1.000	
Humidity offset **	R/W	03/06/16	2113	42114	float32	0.000	

Notes: * The settings will take effect after restarting the device by powering it off and then on again.

** Measured values can be adjusted using a multiplier and an offset.
The corrections are calculated as follows:

Corrected Humidity = Measured Humidity × Humidity Multiplier + Humidity Offset

Corrected Temperature (°C) = Measured Temperature (°C) × Temperature Multiplier + Temperature Offset (°C)

The raw temperature is always internally represented in degrees Celsius. It is exposed in registers simultaneously in both °C and °F. During calibration, the multiplier and offset must be applied using Celsius values. After calibration, these corrections are automatically applied to each new raw reading, and the results are made available in both units.

The PDU address refers to the actual register address used in the Modbus Protocol Data Unit (PDU), starting from zero.
Some Modbus masters display or require logical addresses instead of raw PDU addresses.
Logical addresses are calculated by adding an offset. For holding registers, the offset is 40001; some systems use 4001 instead as a shortened form. For a detailed explanation, see our article: Demystifying MODBUS RTU Addressing.

MSWF – Most Significant Word First: (bits 31–16), then (bits 15–0)
LSWF – Least Significant Word First: (bits 15–0), then (bits 31–16)
If a floating-point value is unavailable, the sensor returns NaN (Not a Number), for example, in case of a measurement error.
If a 16-bit signed integer value is unavailable, the returned value is -32768, also typically indicating a measurement error.

10. Factory default settings

To reset the sensor to its factory default settings, follow these steps:

- Disconnect the sensor from the bus (power supply off).
- Press and hold the "config" button.
- While holding the button, reconnect the sensor to the bus (power supply on).
- The "status" LED will turn ON for 3 seconds, then blink for 7 seconds. After 10 seconds, the LED will remain ON.
- Release the "config" button. The sensor will restart with its factory default settings.

11. Firmware update

The firmware of the sensor can be updated using a Teracom controller that supports MODBUS RTU or the MBRTU-Update software.

12. Recycling

Recycle all applicable material.



Do not dispose of with regular household refuse.

