



CONTROL SOLUTIONS

**TERACOM**



**TSH300v3**  
**Modbus RTU humidity and temperature sensor**  
Version 1.15/October 2024

## **USER MANUAL**

[www.teracomsystems.com](http://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

- RS-485 interface supporting up to 32 nodes
- LED indicator for communication status
- Configurable bitrate and other communication parameters
- Firmware updates via the RS-485 interface.

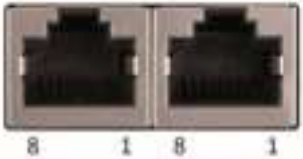
## 3. Applications

- 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:  $\pm 0.25\% \text{RH/year}$ ,  $\pm 0.05^\circ \text{C/year}$   
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):  $\pm 3.0\% \text{RH}$  (in 20 to 80 %RH range)  
Accuracy (max):  $\pm 5.0\% \text{RH}$  (in 10 to 90 %RH range)  
Resolution: 0.1%RH
- Temperature measurements  
Accuracy (min):  $\pm 0.4^\circ \text{C}$  (in -10 to +60°C range)  
Accuracy (max):  $\pm 0.6^\circ \text{C}$  (in -20 to +60°C range)  
Resolution: 0.1°C
- Interface  
Response time  $\leq 50 \text{ms}$   
Master response time-out  $\geq \text{Response time} + \text{Answer time}$   
The answer time depends on the number of bits and the baud rate
- Warranty  
Warranty period: 3 years

## 5. 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               |

## 6. Installation

A daisy-chain (linear) topology should be used for connecting multiple sensors. UTP/FTP cables with RJ-45 connectors are required for interconnection, following the standard ANSI/TIA/EIA T568B wiring scheme. It is recommended to use standard patch LAN cables.

### Attention:

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



## 7. Installation tips

The last sensor in the chain must have a 120-ohm terminator installed in its free RJ-45 socket.

- The terminator is delivered with the controller.

## 8. Status indicator

The device status is indicated by a single LED located on the front panel:

- If the LED blinks at 1-second intervals, the sensor is operating properly;
- If the LED blinks at 3-second intervals, there is no communication with the controller;
- If the LED does not blink, the device is not powered.

## 9. 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.

## 10. Firmware update

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

## 11.Modbus address table

| Register name                      | R/W | FC    | PDU Address (Decimal) | Logical Address (Decimal) | Offset (Decimal) | Data size           | Default | Valid values                           |
|------------------------------------|-----|-------|-----------------------|---------------------------|------------------|---------------------|---------|----------------------------------------|
| RS-485 address                     | R/W | 03/06 | 10                    | 40011                     | 40001            | 16-bit uns. integer | 1       | 1-247                                  |
| Baud rate*                         | R/W | 03/06 | 11                    | 40012                     | 40001            | 16-bit uns. integer | 19200   | 2400, 4800, 9600, 19200, 38400, 57600  |
| Parity, data, stop bits *          | R/W | 03/06 | 12                    | 40013                     | 40001            | 16-bit uns. integer | 1       | 1=E81, 2=O81, 3=N81                    |
| Data order                         | R/W | 03/06 | 13                    | 40014                     | 40001            | 16-bit uns. integer | 1       | 1=MSWF (MSW, LSW)<br>2=LSWF (LSW, MSW) |
| Device code                        | R   | 03    | 14                    | 40015                     | 40001            | 16-bit uns. integer |         | 0x00CD                                 |
| FW version                         | R   | 03    | 15                    | 40016                     | 40001            | 16-bit uns. integer |         |                                        |
| Vendor URL                         | R   | 03    | 18                    | 40019                     | 40001            | 64 bytes UTF-8      |         | teracomsystems.com                     |
| Float test value (MSWF)            | R   | 03    | 82                    | 40083                     | 40001            | 32-bit float        |         | -9.9(0xC11E6666)                       |
| Float test value (LSWF)            | R   | 03    | 84                    | 40085                     | 40001            | 32-bit float        |         | -9.9(0xC11E6666)                       |
| Signed integer test value          | R   | 03    | 86                    | 40087                     | 40001            | 16-bit sig. integer |         | -999(0xFC19)                           |
| Signed integer test value (MSWF)   | R   | 03    | 87                    | 40088                     | 40001            | 32-bit sig. integer |         | -99999(0xFFFFE7961)                    |
| Signed integer test value (LSWF)   | R   | 03    | 89                    | 40090                     | 40001            | 32-bit sig. integer |         | -99999(0xFFFFE7961)                    |
| Unsigned integer test value        | R   | 03    | 91                    | 40092                     | 40001            | 16-bit uns. integer |         | 999(0x03E7)                            |
| Unsigned integer test value (MSWF) | R   | 03    | 92                    | 40093                     | 40001            | 32-bit uns. integer |         | 99999(0x0001869F)                      |
| Unsigned integer test value (LSWF) | R   | 03    | 94                    | 40095                     | 40001            | 32-bit uns. integer |         | 99999(0x0001869F)                      |
| Temperature °C                     | R   | 03    | 100                   | 40101                     | 40001            | 32-bit float        |         |                                        |
| Humidity %RH                       | R   | 03    | 102                   | 40103                     | 40001            | 32-bit float        |         |                                        |
| Dew point °C                       | R   | 03    | 104                   | 40105                     | 40001            | 32-bit float        |         |                                        |
| Temperature °F                     | R   | 03    | 200                   | 40201                     | 40001            | 32-bit float        |         |                                        |
| Humidity %RH                       | R   | 03    | 202                   | 40203                     | 40001            | 32-bit float        |         |                                        |
| Dew point °F                       | R   | 03    | 204                   | 40205                     | 40001            | 32-bit float        |         |                                        |
| Temperature °C x 100               | R   | 03    | 400                   | 40401                     | 40001            | 16-bit sig. integer |         |                                        |
| Humidity %RH x 100                 | R   | 03    | 401                   | 40402                     | 40001            | 16-bit uns. integer |         |                                        |
| Dew point °C x 100                 | R   | 03    | 402                   | 40403                     | 40001            | 16-bit sig. integer |         |                                        |
| Temperature °F x 100               | R   | 03    | 500                   | 40501                     | 40001            | 16-bit sig. integer |         |                                        |
| Humidity %RH x 100                 | R   | 03    | 501                   | 40502                     | 40001            | 16-bit uns. integer |         |                                        |
| Dew point °F x 100                 | R   | 03    | 502                   | 40503                     | 40001            | 16-bit sig. integer |         |                                        |
| Temperature multiplier **          | R/W | 03/16 | 2101                  | 42102                     | 40001            | 32-bit float        | 1.000   |                                        |
| Temperature offset °C **           | R/W | 03/16 | 2103                  | 42104                     | 40001            | 32-bit float        | 0.000   |                                        |
| Temperature offset °F **           | R   | 03    | 2105                  | 42106                     | 40001            | 32-bit float        | 0.000   |                                        |
| Humidity multiplier **             | R/W | 03/16 | 2111                  | 42112                     | 40001            | 32-bit float        | 1.000   |                                        |
| Humidity offset **                 | R/W | 03/16 | 2113                  | 42114                     | 40001            | 32-bit float        | 0.000   |                                        |

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

\*\* Measured sensor values can be adjusted using a multiplier and an offset.

The corrections are calculated as follows:

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

Corrected Humidity = Measured Humidity × Humidity Multiplier + Humidity Offset

Using a multiplier and an offset allows precise adjustments to the sensor readings, ensuring accurate temperature and humidity values.

It is important to note that the multiplier and offset are applicable exclusively in degrees Celsius. After obtaining the corrected temperature in Celsius, it can be converted to Fahrenheit.

The PDU address refers to the actual address bytes used in a Modbus Protocol Data Unit.

The displayed logical decimal addresses are calculated using an offset of 40001 for holding registers.

MSWF - Most significant word first - (bits 31 ... 16), (bits 15 ... 0); LSWF - Least significant word first - (bits 15 ... 0), (bits 31 ... 16);

If a floating-point value is not available, the returned value is "NaN" (Not a Number), e.g. in case of measurement error.

If a 16-bit signed integer value is unavailable, the returned value is "-32768", e.g. in case of measurement error.