



**TRH-100**  
**AMBIENT TEMPERATURE , RELATIVE HUMIDITY**  
**INDICATOR / TRANSMITTER**



## MAIN FEATURES

- *Single Transmitter to measure Ambient Temperature and Relative Humidity.*
- *Ambient Temperature Range is 0-100 deg. C (typical).*
- *RH range 0-100% (typical).*
- *2 Output Relays output (Optional).*
- *0 – 10VDC , Output signal (typical) for each one of the two parameters. Could be changed to 0-5VDC or 4-20mA if specified.*
- *RS485 interface using the Modbus RTU command. (Optional).*
- *Fully calibrated.*
- *Low power consumption*
- *Excellent long term stability*

## DESCRIPTION

The **TRH-100** is an advanced Transmitter calibrated in the factory. The calibration coefficients are stored in the transmitter's microcontroller memory, which are used by the sensor's internal signal detecting process.

The 0-10VDC output signal (typical) for the Ambient temperature and the Relative Humidity makes system integration quick and easy (Could be changed to 0-5VDC or 4-20mA if specified).

**TRH-100** is RS485 interface using the Modbus RTU command. (Optional).

Its size, low power consumption and up to 20 meter signal transmission making it the best choice for various applications, including those most demanding ones. It is convenient to connect and special packages can be provided according to users' request.

The **TRH-100** features a 2-line LCD display on the front cover one line for Temperature display and the other line for Relative Humidity Display.

The **TRH-100** offers possibility of Offset adjustment for both Temperature and RH read out .

## TECHNICAL DATA

### Display

2-line X 16 Character LCD display

### Ranges

Temperature	0-100 deg. C.
Relative Humidity	0-100 %

**Accuracy**

Temperature           +- 0.5 deg. C.  
Relative Humidity      +- 3 RH%

**Repeatability**

Temperature           +- 0.1 deg. C.  
Relative Humidity      +- 0.1 RH%

**Input Power**

From 12 VDC up to 40VDC .

**Output signal**

Signal span 0 – 10VDC , for each of the 2 signals. (0-5VDC or 4-20mA if specified).

**Digital Communication**

RS485 interface using the Modbus RTU command. (Optional).

**Relay Output**

2 Relays with voltage free contacts to be programmed internally (Optional)

**Characteristic**

Linear

**Isolation voltage**

500 Vac

**Operating Range**

-40 – 123 °C  
0 - 100 %RH

**Storage temp.**

-40-70°C

**Response time**

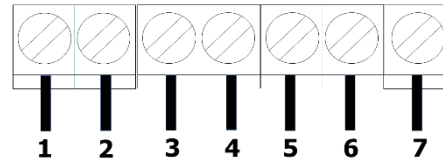
$\tau$  (63%) (5 sec typical)

**ELECTRICAL CONNECTIONS**
**Cable Connection**

PIN 1 – Input Power . (12 – 40VDC)

PIN 2 – Ground

PIN 3 – Output Signal for Temperature concentration



PIN 4 – Output Signal for RH%

PIN5 - Ground

PIN6 – RS485 (B)

PIN7 – RS485 (A)

**OFFSET PROGRAMMING**

Open the top cover you shall be able to see the two programming push buttons

**Buttons:**

- “Λ+V”                    *Press both to enter setting mode or to SAVE*
- “Λ”                            *Increase the value*
- “V”                            *Decrease the value*

**Enter Password**

- Press “Λ+V” , display shows “1230”.
- Press “Λ” to change password to “1234”
- Press “Λ+V” together to enter
- (Press Λ+V twice or enter wrong password will logout setting mode.)

**Ambient Temperature Offset Setting**

- Display shows “T\_OFF”.
- Press “Λ” to increase, press “V” to decrease.
- Press “Λ+V” to save and enter next level.

**Relative Humidity Offset Setting**

- Display shows “RH\_OFF”.
- Press “Λ” to increase, press “V” to decrease.
- Press “Λ+V” to save and EXIT programming.

- Display shows "DONE"

## CALIBRATION PROGRAMMING

Open the top cover you shall be able to see the two programming push buttons

### ***Enter Password***

- Press "Λ+V" , display shows "1230".
- Press "Λ" to change password to "1236"
- Press "Λ+V" together to enter
- (Press Λ+V twice or enter wrong password will logout setting mode.)
- Display shows "CALIBRATION".
- Temp. and RH. Offset will be with Zero value preparing for calibration.

### ***Ambient Temperature 1<sup>st</sup> point calibration***

- Display shows "T\_REF1 = Value of the measured Temp."
- Display shows "TEMP = Value of the measured Temp."
- Press "Λ" to increase, press "V" to decrease the value of T\_REF1 to the desired temperature.
- Press "Λ+V" to save and enter next level.

### ***Ambient RH% 1<sup>st</sup> LOW point calibration***

- Display shows "RH\_REF1 = Value of the measured RH."
- Display shows "RH = Value of the measured RH."
- Press "Λ" to increase, press "V" to decrease the value of RH\_REF1 to the desired RH value.
- Press "Λ+V" to save and enter next level.

### ***Ambient RH% 1<sup>st</sup> HIGH point calibration***

- Apply Hi R. humidity to the transmitter (normally 100%).
- Display shows "RH\_REF2 = Value of the measured RH."
- Display shows "RH = Value of the measured RH."
- Wait for some time till stability is reached.
- Press "Λ" to increase, press "V" to decrease the value of RH\_REF2 to the desired RH value.
- Press "Λ+V" to save.
- NOTE: if you want to skip this calibration point , Press "Λ+V" to save and enter next level. The indication will show (SENSOR PROBLE as the difference between RH\_REF2 and the actual RH is quite high).

## OUTPUT SIGNAL CALIBRATION PROGRAMMING

Open the top cover you shall be able to see the two programming push buttons

### ***Enter Password***

- Press "Λ+V" , display shows "1230".
- Press "Λ" to change password to "1238"
- Press "Λ+V" together to enter
- (Press Λ+V twice or enter wrong password will logout setting mode.)
- Display shows "OUTPUT CALIBRATION".
- Temp. and RH. Offset will be with Zero value preparing for calibration.

### ***Ambient Temperature ZERO point Output calibration***

- Display shows "T\_ZERO = Value of the stored digital value related to the 0 volt or 4 mA."
- Measure the Temperature Output signal , should read 0VDC or 4 mA .
- Press "Λ" to increase, press "V" to decrease the value of the stored digital value related to Zero to adjust the output.
- Press "Λ+V" to save and enter next level.

### ***Ambient Temperature SPAN point Output calibration***

- Display shows "T\_SPAN = Value of the stored digital value related to the 10 volt or 20 mA."
- Measure the Temperature Output signal , should read 10VDC or 20 mA .
- Press "Λ" to increase, press "V" to decrease the value of the stored digital value related to span to adjust the output.
- Press "Λ+V" to save and enter next level.

### ***Ambient RH% ZERO point Output calibration***

- Display shows "RH ZERO = Value of the stored digital value related to the 0 volt or 4 mA."
- Measure the RH% Output signal , should read 0VDC or 4 mA .
- Press "Λ" to increase, press "V" to decrease the value of the stored digital value related to Zero to adjust the output..
- Press "Λ+V" to save and enter next level.

### ***Ambient RH% SPAN point Output calibration***

- Display shows "RH SPAN = Value of the stored digital value related to the 10 volt or 20 mA."
- Measure the RH% Output signal , should read 10VDC or 20 mA .
- Press "Λ" to increase, press "V" to decrease the value of the stored digital value related to span to adjust the output.
- Press "Λ+V" to save.

## MODBUS (OPTIONAL)

### **RTU Mode**

Modbus network is set for RTU (Remote Terminal Unit) mode, each eight-bit byte in a message contains two four-bit hexadecimal characters.

### **READING DATA FROM TRH-100 "SLAVE HOLDING REGISTER"**

#### ***Request From Master***

The request message specifies the starting register and quantity of registers to be read.

Example of a request to read 0...1 (register 40001 to 40002) from slave device 1:

Field Name	RTU (hex)
Slave Address	01
Function	03
Starting Address Hi	00
Starting Address Lo	00
Quantity of Registers Hi	00
Quantity of Registers Lo	02
Error Check Lo	C4
Error Check Hi	0B

#### ***Response from Slave "TRH-100"***

The register data in the response message are packed as two bytes per register, with the binary contents right justified within each byte. For each register the first byte contains the high-order bits, and the second contains the low-order bits.

Two more registers are reserved for any more data might be required to be transmitted like calculated Dew Point (if needed).

Example of a response to the request: Temp. = 21.55 oC %RH – 75.25

Field Name	RTU (hex)
Slave Address	01
Function	03
Byte Count	0C
Temp. Data Hi	00
Temp. Data Lo	21
Temp. Decimal Data Hi	00
Temp. Decimal Data Lo	55
%RH Data Hi	00
%RH Data Lo	75
%RH Decimal Data Hi	00
%RH Decimal Data Lo	25
RESERVED Data1 Hi	00
RESERVED Data1 Lo	00
RESERVED Data2 Hi	00
RESERVED Data2 Lo	00
Error Check Lo	DA
Error Check Hi	31

**Write Single Register (Slave Address)**

***Request From Master***

Example of a request to change Slave Address device from 1 to 3:

Field Name	RTU (hex)
Slave Address	01



Function	06
Register Address Hi	00
Register Address Lo	00
Write Data Hi	00
Write Data Lo	03
Error Check Lo	9A
Error Check Hi	9B

***Response from Slave "TRH-100"***

Field Name	RTU (hex)
New Slave Address	03
Function	06
Coil Address Hi	00
Coil Address Lo	00
New Slave Address Hi	00
New Slave Address Lo	03
Error Check Lo	C9
Error Check Hi	CB

**Read Single Register (Slave Address)**

***Request From Master***

Example of a request to read Slave Address :

Field Name	RTU (hex)
Read Slave Address	FF
Function	07
Register Address Hi	00
Register Address Lo	00
Register Address Hi	00
Register Address Lo	00

Error Check Lo	A1
Error Check Hi	D4

***Response from Slave "TRH-100"***

Field Name	RTU (hex)
Read Slave Address	FF
Function	07
Register Address Hi	00
Register Address Lo	00
Slave Address Hi	00
Slave Address Lo	01
Error Check Lo	60
Error Check Hi	14

## HOW TO ORDER

**TRH-100 – AA – BB – CC – DD – EE**

AA – TEMPERATURE RANGE , PLEASE WRITE DIRECTLY  
0 – 100 OC (TYPICAL)

BB – RH RANGE , PLEASE WRITE DIRECTLY  
0% – 100% (TYPICAL)

CC – OUTPUT VOLTAGE  
0 – 10 VDC (TYPICAL)  
0 – 5 VDC  
4-20 MA  
MODBUS RS-485  
OTHERS (PLEASE SPECIFY)

DD – SUPPLY VOLTAGE  
12 VDC (TYPICAL)

EE – OPTIONS (PLEASE SPECIFY)