



TH-DG-ex TH-DG-in

TEMPERATURE AND HUMIDITY PROBE



This manual is a **TH-DG** installation guide. For further information, please download the full manual from the **CIRCUTOR** web site: www.circutor.com

IMPORTANT!



The device must be disconnected from its power supply sources (power supply and measurement) before undertaking any installation, repair or handling operations on the device's connections. Contact the after-sales service if you suspect that there is an operational fault in the device. The device has been designed for easy replacement in case of malfunction.

The manufacturer of the device is not responsible for any damage resulting from failure by the user or installer to heed the warnings and/or recommendations set out in this manual, nor for damage resulting from the use of non-original products or accessories or those made by other manufacturers.

1. DESCRIPTION

TH-DG is a single-device temperature and relative humidity probe, with RS-485 communication and Modbus/RTU communications protocol

There are 2 models available:

- ✓ **TH-DG-in**, for indoor installations.
- ✓ **TH-DG-ex**, for outdoor installations.

2. INSTALLATION

TH-DG is designed for wall mounting using screws.

IMPORTANT!



Take into account that when the device is connected, the terminals may be hazardous to the touch, and opening the covers or removing elements may provide access to parts that are dangerous to the touch. Do not use the device until it is fully installed

3. MEASUREMENTS

The **TH-DG** measures and calculates temperature, relative humidity, absolute humidity and dewpoint. In addition, the device records maximum and minimum values for each value measured by the transducer

3.1. Temperature

Temperature = Temperature measured

3.2. Relative humidity

Relative humidity = Relative humidity measured

3.3. Dewpoint

$$Td = \frac{T_n}{\log\left(P_{ws} \cdot \frac{RH}{10000 \cdot A}\right)}$$

Coefficients for calculating dewpoint

T	A	m	Tn
< 0 °C	6.119866	7.926104	250.4138
0 ... 50 °C	6.1078	7.5	237.3
50 ... 100 °C	5.9987	7.3313	229.1

3.4. Absolute humidity

$$a = \frac{P_{ws} \cdot RH}{100 \cdot (T + 273,2)}$$

- T = temperature (°C)
- RH = relative humidity (%)
- Td = dewpoint temperature (°C)
- Pws = saturated vapour pressure (mbar)
- A = absolute humidity

4. RS-485 COMMUNICATION

The device uses RS-485 communication and Modbus/RTU protocol. If more than one analyser is connected to an RS-485 serial communication bus, each one must be assigned a different peripheral number or address (from 01 to 247). The RS-485 connection is carried out with a twisted pair communication cable with mesh shielding, at least two wires and a maximum distance between the master and the last device of 1,200 metres and up to 32 serial devices per bus.

4.1. Modbus functions

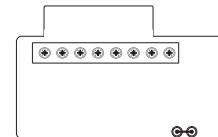
MODBUS (Hex)	Description
03 (03 Hex)	Reading of n records
16 (10 Hex)	Writing of n records
17 (11 Hex)	Identification of slave devices

4.2. Factory parameters

MODBUS (Hex)	Value
Peripheral number	1
Communication speed	9600 bps
Mode	8 / N / 1
Average measurement time	30 seconds

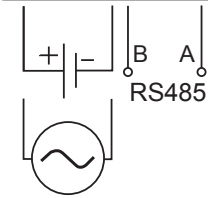
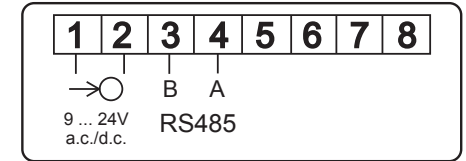
4.3. Default parameters

To force the default configuration, insert a jumper in the position indicated on the device's printed circuit board:

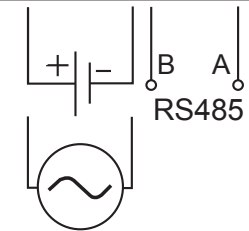
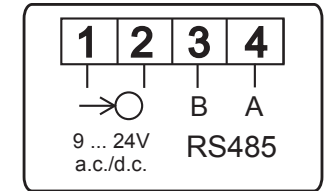


The default parameters are peripheral 247 (Decimal), 9600/8/N/1. The changes must be made before removing the jumper, otherwise the device will return to its previous configuration.

Connections



TH-DG-ex



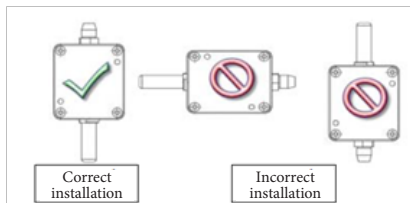
TH-DG-in

Technical features

Power supply		
Rated voltage	9 ... 24 V ~ / V ---	
Consumption	TH-DG-ex	TH-DG-in
	< 0.5 VA	0.3 VA
Relative Humidity Probe		
Measurement range (non-condensing) (HR)	0 ... 100 %	
Basic error	± 2% for HR: 10 ... 90% ± 3% for the rest	
Hysteresis	± 1%	
Calculated values	Absolute humidity (a) [g/m ³]	
Temperature Probe		
Measurement range (T)	- 20 ... 60°C	
Basic error	± 0.5% of the rang	
Calculated values	Dewpoint temperature (Td) [°C]	
RS-485 communications		
Protocol	Modbus	
Baud rate	4800 - 9600 - 19200 - 38400 - 57600 bps	
Mode	RTU: 8N2, 8E1, 8O1, 8N1	
Maximum response time	300 ms	
Environmental features		
Operating temperature	-30°C...+85°C	
Relative Humidity (non-condensing)	5 ... 95 %	
Maximum altitude	2000 m	
Wind speed	0.5 m/s	
Preheating time	15 min	
Protection degree	TH-DG-ex	TH-DG-in
	IP 65	IP 20
Mechanical features		
Weight	125 g	
Installation	Wall mounting	
Security requirements EN 61010-1		
Installation category	III	
Pollution level	2	
Max voltage between neutral and earth	50 V	
Standars		
EN 61000-6-2, EN 61000-6-4		

Work position (Model TH-DG-ex)

- Unexposed applications directly in contact with water = all
- Exposed applications directly in contact with water = with the sensor's camera mounted downwards



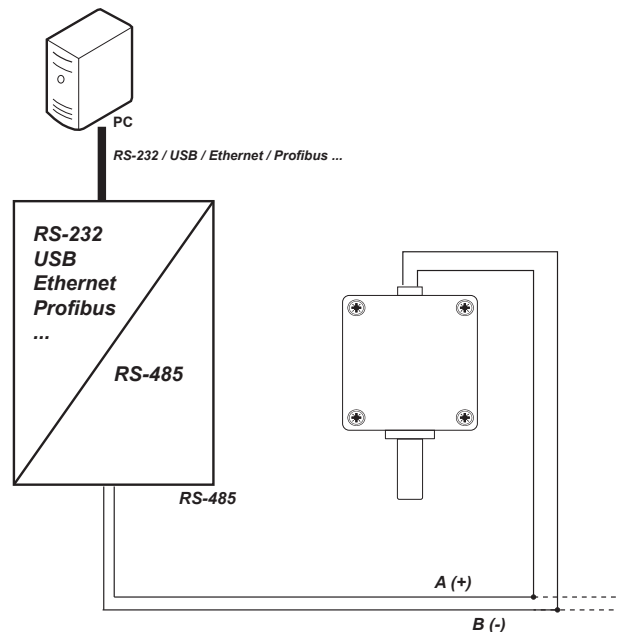
Notes:

- In case of water vapour condensation on the surface of the sensor, the measurement error may not exceed the basic error when drying the structure of the sensor.
- Admissible condensation of water vapour when optional sensor protectors are used.
- For air flows <0.5 m/s, the temperature and humidity measurement error may be higher than the basic error.

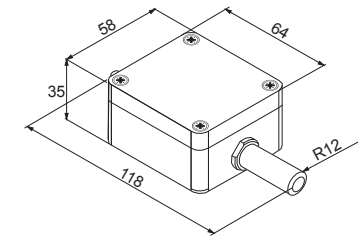
Modbus memory map

Dec.	Name	Description	Type
4000	Identifier	0xAA	Integer 16 bits
4001	Peripheral no.	1...247 (Dec)	Integer 16 bits
4002	Baud rate	0: 4800 bps - 1: 9600 bps 2: 19200 bps - 3: 38400 bps	Integer 16 bits
4003	Communication data	0: 8/N/1 - 1: 8/N/2 2: 8/E/1 - 3: 8/O/1	Integer 16 bits
4004	Communication change validation	0: No modification 1: Save changes	Integer 16 bits
4005	Average measurement time	In seconds	Integer 16 bits
4006	Deleted maximum and minimum values	0: No modification 1: Deleted	Integer 16 bits
7000	Identifier	0xAA Identifier	Float 16 bits
7002	Temperature	Temperature °C	Float 16 bits
7004	Relative humidity	Relative humidity %	Float 16 bits
7006	Dewpoint	Dewpoint °C	Float 16 bits
7008	Absolute humidity	Absolute humidity g/m ³	Float 16 bits
7010	Temperature	Minimum °C	Float 16 bits
7012	Temperature	Maximum °C	Float 16 bits
7014	Relative humidity	Minimum %	Float 16 bits
7016	Relative humidity	Maximum %	Float 16 bits
7018	Dewpoint	Minimum °C	Float 16 bits
7020	Dewpoint	Maximum °C	Float 16 bits
7022	Absolute humidity	Minimum g/m ³	Float 16 bits
7024	Absolute humidity	Maximum g/m ³	Float 16 bits

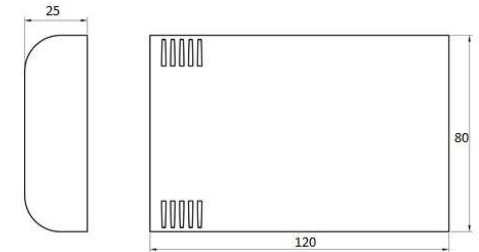
RS-485 Connections



Dimensions



TH-DG-ex



TH-DG-in

Technical service

CIRCUTOR SAT: 902 449 459 (SPAIN) / (+34) 937 452 919 (out of Spain)
 Vial Sant Jordi, s/n
 08232 - Viladecavalls (Barcelona)
 Tel: (+34) 937 452 900 - Fax: (+34) 937 452 914
 e-mail : sat@circutor.com