

# **HD2817T...**

## **ENGLISH**

Our instruments' quality level is the results of the product continuous development. This can bring about differences between the information written in this manual and the instrument that you have purchased. We cannot entirely exclude errors in the manual, for which we apologize.

The data, figures and descriptions contained in this manual cannot be legally asserted. We reserve the right to make changes and corrections without prior notice.

## **HD2817T...**

### **Transmitter, indicator, ON/OFF regulator, temperature and humidity datalogger**

The HD2817T... series instruments are transmitters, indicators, ON/OFF regulators with datalogger function. They measure temperature and humidity.

They are fitted with an LCD backlit graphic display 128x64 pixel.

The main characteristic of these instruments is the ***interchangeable probe***. The user can virtually change the probe without interrupting the process. Then the probe can be calibrated or repaired.

We have models with horizontal (S.TO), vertical (S.TV) or separate (S.TC) probes, connected to the instrument using cables of different lengths. The S.TO and S.TV probes are made of AISI304 steel, the S.TC probes can be made of AISI304 steel or POCAN plastic material.

To measure the dew point in compressed air systems, the probe S.TC2.480.2 can be connected to the HD2817T...

The probe, factory calibrated and ready for use, is fitted with a **SICRAM2** module storing its calibration information and allowing its interchangeability.

The devices measure:

- Temperature in Celsius or Fahrenheit degrees
- Relative humidity

and calculate:

- Absolute humidity
- Mixing ratio
- Dew point
- Wet bulb temperature

All models are fitted with current or voltage analogue outputs.

We supply models with two working relays and an alarm relay, user configurable.

All models have a multistandard RS232/RS485 output and an auxiliary RS232C serial output.

You can connect several network devices through the RS485 serial port.

The HD2817T... models use a wide LCD backlit graphic display (128x64 pixel) showing three physical quantities simultaneously or a real time graph of any of the measured quantities.

The **datalogger** function allows recording of the measurements detected by the instrument, according to a frequency set by the user.

The instrument configuration is permanently stored. The internal clock is protected against a mains power failure by a special Lithium battery.

When making the order, you can select the power supply between 24Vac/dc or universal 90...240Vac.

## **1. Instrument versions and available probes**

### **Relay**

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<b>HD2817Tx-D0</b>	None
<b>HD2817Tx-DR</b>	2 working relays with exchange contact, 1 alarm relay with normally open contact.

### **Type of probe**

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<b>HD2817T.xx</b>	Instrument with vertical probe S.TV or probe with cable S.TC.
<b>HD2817TO.xx</b>	Instrument with horizontal probe S.TO.

### **Probes complete with SICRAM2 module for HD2817T.xx instruments**

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<b>S.TV</b>	Vertical probe L = 130 mm
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The material of the S.TC... series probe can be chosen between AISI304 steel or POCAN plastic material.

<b>S.TC1.2</b>	Probe L = 135 mm with 2 m cable
<b>S.TC1.2P</b>	Probe L = 135 mm with 2 m cable in POCAN
<b>S.TC1.5</b>	Probe L = 135 mm with 5 m cable
<b>S.TC1.5P</b>	Probe L = 135 mm with 5 m cable in POCAN
<b>S.TC1.10</b>	Probe L = 135 mm with 10 m cable
<b>S.TC1.10P</b>	Probe L = 135 mm with 10 m cable in POCAN
<b>S.TC2.2</b>	Probe L = 335 mm with 2 m cable
<b>S.TC2.2P</b>	Probe L = 335 mm with 2 m cable in POCAN
<b>S.TC2.5</b>	Probe L = 335 mm with 5 m cable
<b>S.TC2.5P</b>	Probe L = 335 mm with 5 m cable in POCAN
<b>S.TC2.10</b>	Probe L = 335 mm with 10 m cable
<b>S.TC2.10P</b>	Probe L = 335 mm with 10 m cable in POCAN

Probe with cable for measuring humidity in pipes

<b>S.TC2.480.2</b>	Cable length 2m. Measuring range: -40...+60°C, -40...+60°C DP. 1/4" Italian standard Quick-fit. Working pressure up to 16bar. Measuring chamber in AISI 304.
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### **Probes complete with SICRAM2 module for HD2817TO.xx instruments**

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<b>S.TO1</b>	Horizontal probe L = 135 mm
<b>S.TO2</b>	Horizontal probe L = 335 mm

## 2. Upon first start up

Some notes about **first start up** are reported below. For the details see the various chapters in the manual.

- **Before** turning on, the probe should be connected to the instrument.
- Apply the correct voltage to the instrument. A wrong voltage can cause permanent damages to the instrument that are not covered by the warranty.
- In order to install and connect the instrument, please see the chapters "*Installation and connection*" and "*Terminal board description*".
- To use the analog outputs and relays, please see the chapters "*Current and voltage analog outputs*" and "*Instruments fitted with relay outputs*", respectively.
- For the connection to a PC or network of instruments, please see the chapter "*Serial communication and instrument network*".
- Check the instrument date and time as described in the following chapter.

## 3. Initial setting or date and time update

When you power up the instrument, the date and time check takes about one minute.

The following screen will appear:

2008/01/01 12:00:00

**TIME/DATE**

year/mm/dd hh:mm

2008/01/01 12:00:00

<UP> <DOWN> change

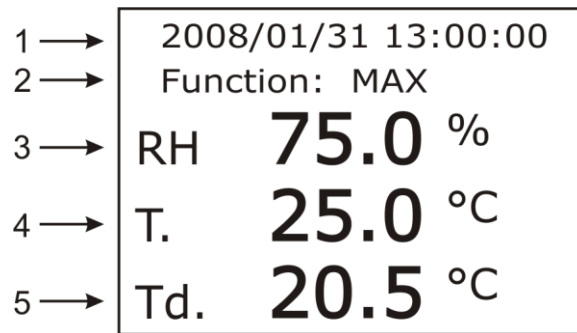
<ENTER> confirm

<ESC> exit

- The date and time are correct: press MENU to go directly to measurement mode.
- The date and time are not correct:
  1. Use the ▲ ▼ arrows to modify the year, already selected, and press ENTER.
  2. You will get to the month setting. Change it using the ▲ and ▼ arrows and confirm with ENTER.
  3. Repeat for the other items: day, hour, minutes. After the last confirmation you will exit the setting page and return to the menu main screen.
  4. Press MENU to return to measurement mode.

For the next date and time setting, please see the "*TIME/DATE*" menu item description in the chapter "Description of the menu".

## 4. Description of the display



**The display constantly shows three measurements (lines 3, 4 and 5 in the figure) associated to the A1, A2 and A3 analog outputs, respectively:**

the physical quantity associated to the analog output A1 is shown on line (3),  
the physical quantity associated to the analog output A2 is shown on line (4),  
the physical quantity associated to the analog output A3 is shown on line (5).

Each line can show relative humidity, absolute humidity, mixing ratio, dew point, wet bulb temperature or temperature.

The temperature can be expressed in Celsius or Fahrenheit degrees.

The first display line (1) shows the current date and time.

The auxiliary indications are shown on line (2): e.g. MAX, MIN or AVG functions when pressing the FUNC key activating the maximum, minimum and average measurements.

To change the temperature unit of measurement between Centigrade or Fahrenheit, press the UNIT key.

**To show a physical quantity in one of the three lines**, you can use the "Conf. OUT" >> "Output Analog 1-2-3" >> "Analog Output x" menu item, with x = 1, 2 or 3.

### Procedure:

1. Press the MENU key. The main menu opens.
2. Use the ▲ ▼ arrows to select "Conf\_OUT" and confirm with ENTER.
3. Use the ▲ ▼ arrows to select "Output Analog 1-2-3" and confirm with ENTER.
4. Use the ▲ ▼ arrows to select "Current/Voltage out" and confirm with ENTER.
5. Use the ▲ ▼ arrows to select the type of analog output: "4...20mA/2...10Vdc" or "0...20mA/0...10Vdc". Confirm by pressing ENTER. The asterisk will indicate your new selection. Press ESC to return to the previous menu;
6. Use the ▲ ▼ arrows to select one of the three analog outputs and confirm with ENTER. The analog output 1 controls the physical quantity shown on line (3), the analog output 2 on line (4) and the analog output 3 on line (5).
7. A screen with two items will appear: "Mode" and "Range values".
8. Use the ▲ ▼ arrows to select "Mode" and confirm with ENTER.
9. Use the ▲ ▼ arrows to select the physical quantity to be associated to the analog output and confirm with ENTER:

**RH Rel. Humidity** corresponds to relative humidity,  
**AH Abs. Humidity** corresponds to absolute humidity,  
**MR Mixing ratio** corresponds to mixing ratio,  
**Td Dew Point Temp.** corresponds to dew point,  
**T Temperature** corresponds to temperature,  
**TW Wet bulb temp.** corresponds to the wet bulb temperature.

The asterisk will indicate your new selection. Press ESC to return to the previous menu.

10. Use the ▲ ▼ arrows to select "*Range values*" and confirm with ENTER.
11. The "*Scale low value*" (*lower limit of the physical quantity*) item will blink: if necessary, change it using the ▲ ▼ arrows and confirm with ENTER.
12. You will get to the next item "*Scale high value*" (*upper limit of the physical quantity*): if necessary, change it using the ▲ ▼ arrows and confirm with ENTER.
13. Press ESC to exit.
14. If necessary, set the other two analog output, repeating the steps from 6 to 13.
15. Press MENU to return to measurement mode.

## 5. Keyboard description

The HD2817T... models are fitted with an LCD display and an eight-key keyboard.



### **Vertical ZOOM key**

In graphic mode, it enlarges or reduces the graph's vertical scale.



### **Horizontal ZOOM key**

In graphic mode, it enlarges or reduces the graph's horizontal scale.



### **Up arrow**

When used in the menu, it selects an item from a list or increases the selected parameter value.



### **Down arrow**

When used in the menu, it selects an item from a list or decreases the selected parameter value.



### **UNIT key**

It changes the temperature unit of measurement between Centigrade or Fahrenheit. By repeatedly pressing the UNIT key, the desired unit of measurement can be displayed.  
In graphic mode, it allows selection of a new physical quantity.



### **ESC key**

When used in the menu, it goes up one level in the menu hierarchy from a sub-level to an upper level. To go directly from any level to measurement mode, press MENU.



### **ENTER/FUNC key**

This key has a double function:

- As ENTER key, in the menu, it confirms the selected item.
- As FUNC key, in standard view, it enables the MAX (maximum), MIN (minimum), AVG (average) sequence for the displayed measurement.  
To reset the previous measurements and restart with a new calculation, press ENTER/FUNC until the message "CLR Func?" appears, then use the arrows to select YES and confirm using ENTER.

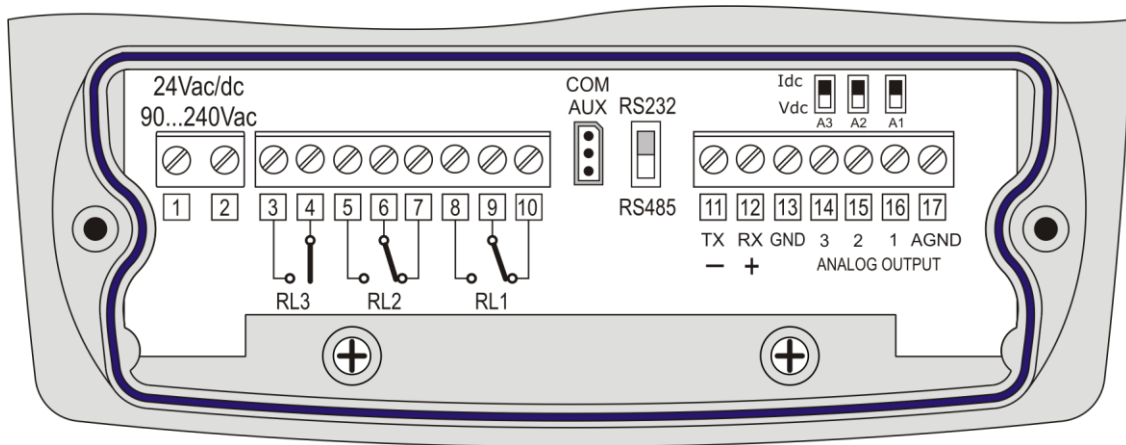


### **MENU key**

It allows to access the instrument menu main screen. In the menu, it returns to normal measurement.

## 6. Terminal board description

The terminal board is located in the lower part of the instrument, protected against dust and splashes by two doors: the first external, snap-locked, the second internal, fixed with two screws.



Number	Function	Notes		
1 – 2	Power input	When making the order, you can select the power supply between 90...240Vac or 24Vac/dc		
3 – 4	Alarm relay RL3	For the settings, please see the chapter “ <i>Instruments fitted with relay outputs</i> ”		
5 – 6 – 7	Working relay RL2	The relay can be associated to any quantity measured by the instrument (relative humidity or correlated measurements, temperature). For the settings, please see the chapter “ <i>Instruments fitted with relay outputs</i> ”		
8 – 9 – 10	Working relay RL1	The relay can be associated to any quantity measured by the instrument (relative humidity or correlated measurements, temperature). For the settings, please see the chapter “ <i>Instruments fitted with relay outputs</i> ”		
11 – 12 – 13	RS232C or RS485 serial connection	The communication protocol selection (RS232C or RS485) is performed by using the switch on the left of terminal 11. For the settings, please see the chapter “ <i>Serial communication and instrument network</i> ”		
		Terminal	RS232C mode	RS485 mode
		11	To be connected to TX line of PC (pin 3 of connector DB9)	To be connected to line B (negative of the pair)
		12	To be connected to RX line of PC (pin 2 of connector DB9)	To be connected to line A (negative of the pair)
		13	To be connected to GND line of PC (pin 5 of connector DB9)	To be connected to GND line

Number	Function	Notes
14 – 15 – 16 – 17	Current and voltage analog outputs	The analog outputs can be associated, independently, to any quantity measured by the instrument: relative humidity, absolute humidity, mixing ratio, dew point, wet bulb temperature, temperature.  For the settings, please see the chapter “ <i>Current and voltage analog outputs</i> ”.
		<b>Terminal</b> <b>Function</b>
		14   Positive output 3. The negative pole is terminal 17.
		15   Positive output 2. The negative pole is terminal 17.
		16   Positive output 1. The negative pole is terminal 17.
		17   A GND negative pole common to analog outputs.

### AUX-COM connector

The AUX-COM connector (for cable RS27) is an auxiliary RS232C serial port. It is used to temporarily connect the instrument to a PC with the DeltaLog12 software.

## 7. Measurement probe and calibration of the relative humidity sensor

The instrument only accepts **SICRAM2** type temperature and relative humidity measurement probes. These probes are fitted with an electronic circuit that converts the signal and stores their calibration information.

Thanks to their factory calibration, the probes are interchangeable, directly and immediately.

The probes can be sent to our factory for calibration or repair.

Saturated solutions are available for the humidity probe's checking and calibration.

For the calibration of the humidity sensor, DeltaLog12 software is to be used: see procedure reported in the software's instruction manual.

The calibration of the temperature sensor by the user is not required.

The interchangeable probe allows reducing the instrument down time virtually to zero, in case of faulty probe.

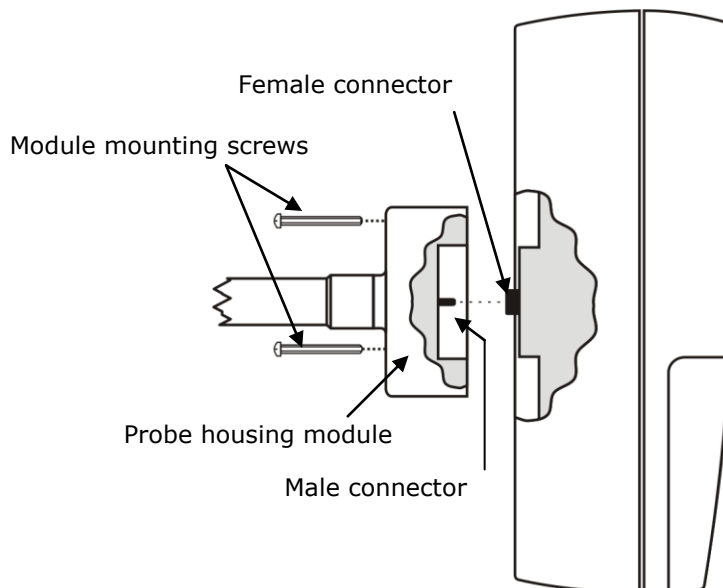
The replacement can be performed without stopping the activity, thanks to the "suspend" functioning mode.

**In the HD2817TO.xx models, the probe is fixed on the instrument back using three screws.**

### To replace the horizontal probe:

- Start the suspend function.
- Unscrew the three screws fixing the probe housing module to the instrument.
- Extract the probe from the instrument connector: the probe to be replaced can be removed.
- Connect the new probe to the instrument.
- Fix the module to the instrument back using the three screws.
- The replacement is complete.

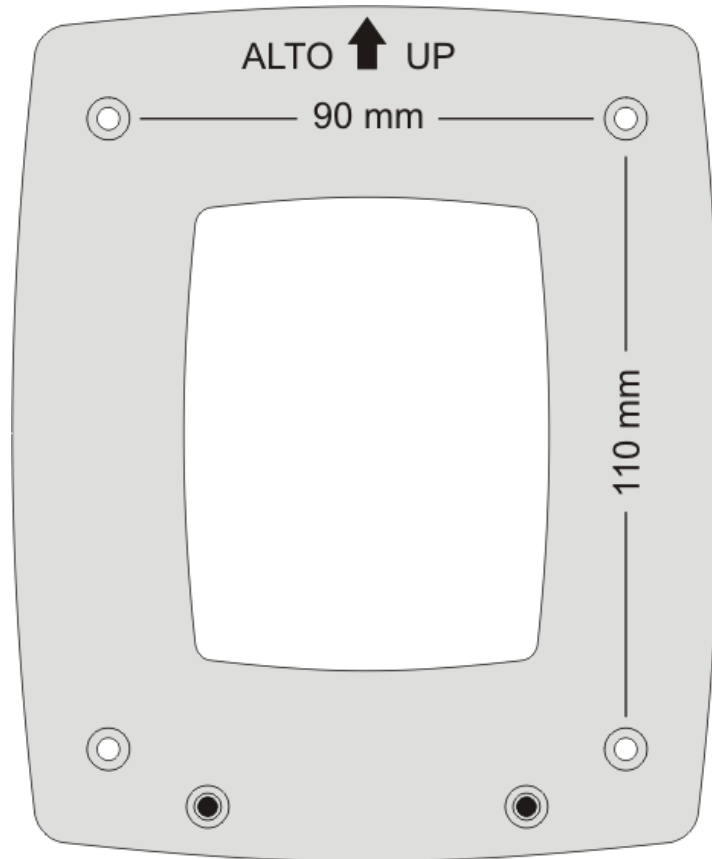
Note: if necessary, the suspension time can be reset to 60 seconds by pressing the ▲ arrow.



## 8. Installation and connections

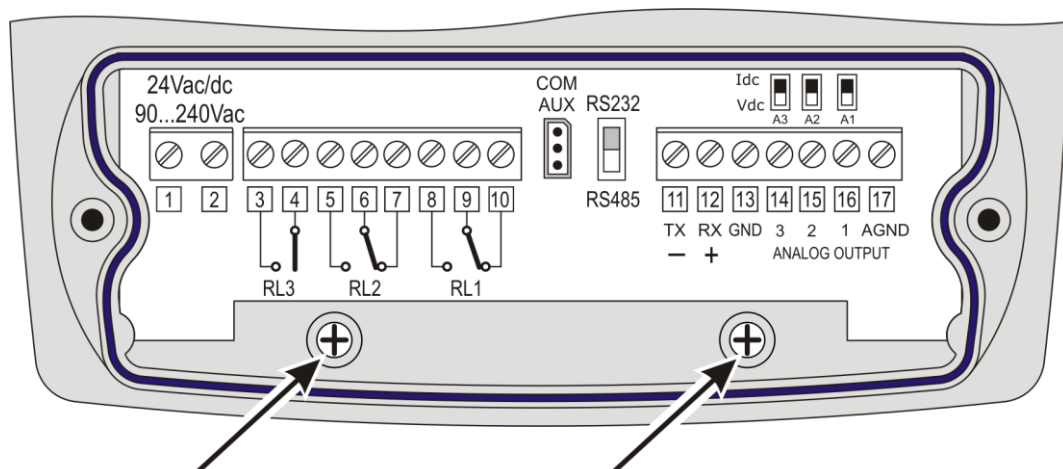
The instrument is set to work indoors.

For wall mounting, the instrument is fitted with a plate to be fixed to the wall. The instrument is attached through a cavity, near the arrow.



As shown in the figure, 4 holes are needed at 90 mm horizontally and 110 mm vertically. The holes have a  $\varnothing 4,5$  mm diameter.

In order to separate the plate from the instrument bottom, open the two front doors to access the instrument terminal board. Unscrew the two screws shown in the following figure and pull the instrument toward yourself.



Fix the plate to the wall using four screws. Lock the instrument in the cavity located at the top and screw again the two screws inside the terminal board housing for final fastening.

## 9. Menu description

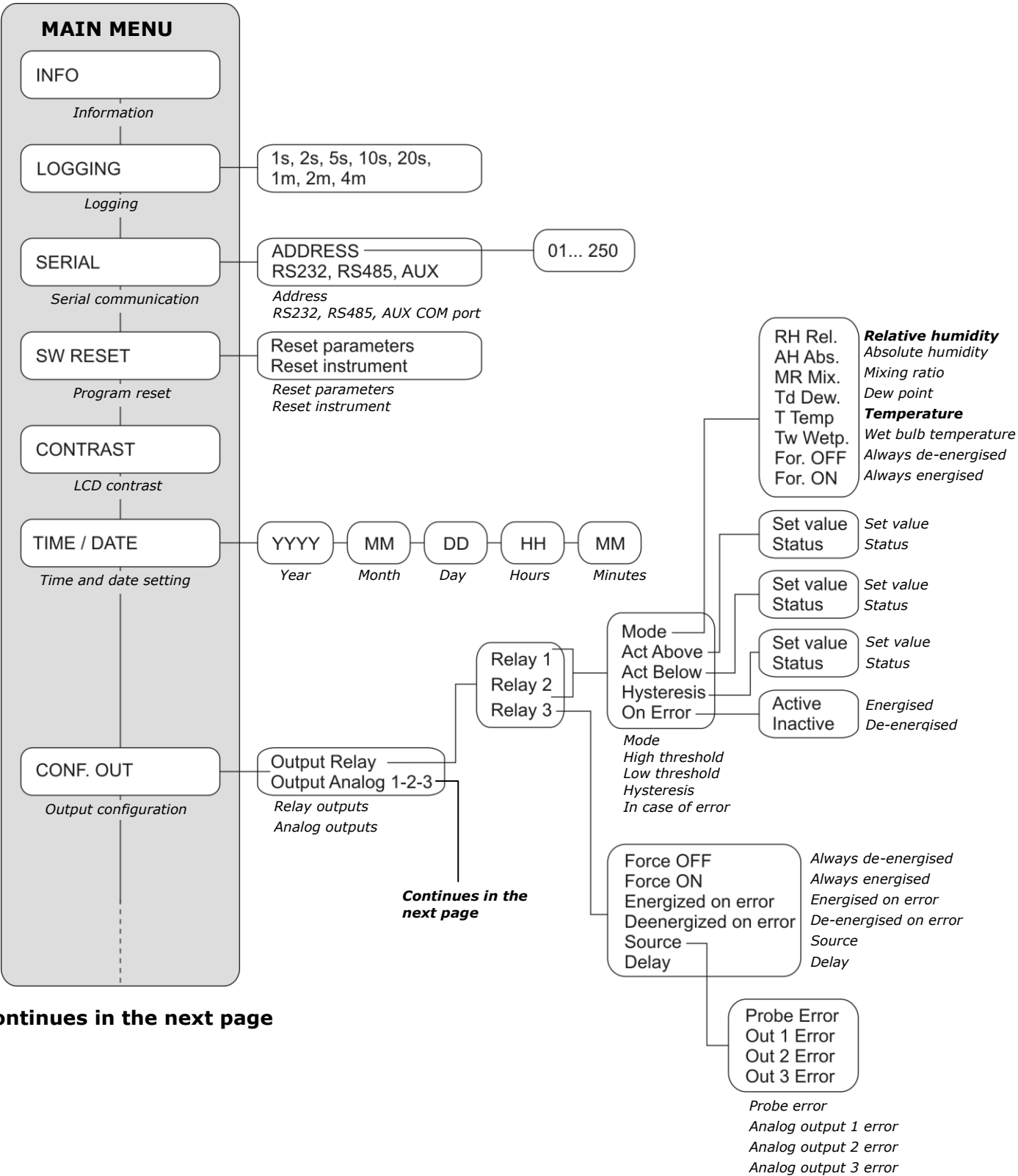
The MENU key allows accessing the set of items that regulate the instrument functioning.

- The menu is nest-structured: with main categories and submenus.
- To select a menu item, use the ▲ ▼ arrows until you select the item to be modified: using ENTER you can access the selected item.
- To move up one level from any point in the menu, you can press ESC.
- To exit the menu and return directly to measurement, press MENU.

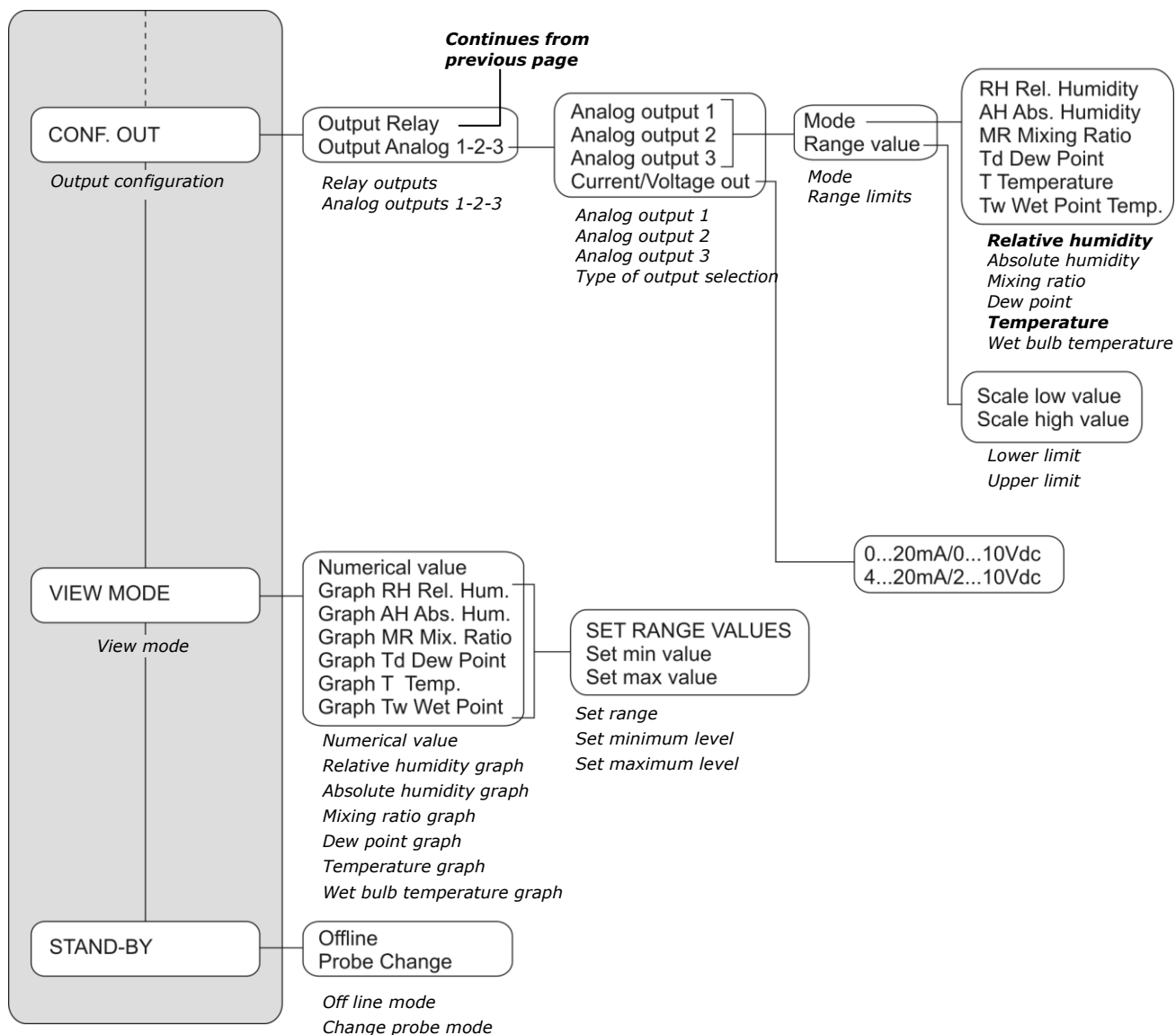
In measurement mode, the MENU key is used to access the menu main screen.

<b>2008/01/31 12:00:00</b>	
<b>MAIN MENU</b>	
Info	Time/Date
Logging	Conf. OUT
Serial	View mode
SW Reset	Stand-by
Contrast	
<ESC> exit	

The following diagram describes the instrument menu structure.



## Continues from previous page



The menu items are listed in this order:

## A. INFO

INFO
User ID=000000000000
Model HD28xxxTxxxxxxx
Smart transmitter
Firm.Ver.=xx.xx
Firm.Date=2008/01/31
Ser. Number=12345678
Probe Ser.=12345678

The **INFO** item provides information on version and firmware date, serial number and calibration date, probe serial number, instrument alphanumeric ID.

The **User ID** is a code to identify the instrument and appears in the printouts and in the stored data. It can be changed using the DeltaLog12 software. Press ESC to return to the menu basic screen.

## B. LOGGING

LOGGING LOG INTERVAL
select LOG interval mm : ss now set at: 00 : 01  <UP> <DOWN> change <ESC> exit

The *LOGGING* item sets the interval in seconds and minutes between two loggings.

The available interval are: 1, 2, 5, 10, 20, 60 seconds, 2 and 4 minutes.

The set interval influences the graphic mode (please see the description of the "VIEW MODE" item, later in this chapter).

Use the ▲ ▼ arrows to change the interval and press ENTER to confirm and return to the menu main screen.

For the logging function details, please see the chapter "*The logging function*".

## C. SERIAL (*Serial communication*)

SERIAL
ADDRESS 001 * RS232 RS485 AUX <UP> <DOWN> select <ENTER> confirm <ESC> exit

C.1. The first item "*ADDRESS xxx*" sets the instrument address so as to use it within a network. The numbers from 001 (factory default) to 250 are available. The number 000 and the numbers 251 to 255 are reserved. To change the address, use the ▲ ▼ arrows to select the "*ADDRESS xxx*" item and confirm with ENTER. The "*ADDRESS xxx*" message will blink. Use the ▲ ▼ arrows to change its value and confirm with ENTER.  
For the details, please see the paragraph "*Serial communication and instrument network*".

The other items select the serial communication port and the relevant protocol: use the ▲ ▼ arrows to select one of the protocols and confirm with ENTER. An asterisk will appear near the enabled item.

C.2. "*RS232*" enables the port at terminals 11 – 12 – 13 and sets it as an RS232C port.

C.3. "*RS485*" enables the port at terminals 11 – 12 – 13 and sets it as an RS485 port.

C.4. "*AUX*" enables the COM AUX auxiliary port as an RS232C serial port.

To use the first two ports, you need to shift the dip-switch located between the AUX COM connector and terminal 11.

## D. SW RESET (Program reset)

SW RESET
Reset parameters Reset instrument  <UP> <DOWN> select <ENTER> confirm <ESC> exit

It is formed by two sub-functions:

- D.1. "*Reset parameters*": it performs a complete reset and restores the instrument to the original factory conditions, restoring all menu parameters. The date and time are not changed as they are managed by an independent circuit fitted with backup battery. The memory data are not erased.
- D.2. "*Reset instrument*": it turns the instrument off and on. The menu parameters are not changed. It work as disconnecting and reconnecting it to the mains.

Use the ▲ ▼ arrows to select the desired item and confirm with ENTER. When asked for confirmation, use the ▲ ▼ arrows to select "YES" and confirm with ENTER.

## E. CONTRAST

CONTRAST
Set contrast with arrows  <UP> <DOWN> change <ESC> exit

It adjusts the display contrast to suit different light conditions.

Use the ▲ ▼ arrows to change the contrast and press ENTER to confirm. The ESC key is used to return to the menu main screen.

## F. TIME / DATE (Time and date setting)

2008/01/31 12:00:00 <b>TIME / DATE</b> year/mm/dd hh:mm 2008/01/31 12:00:00  <UP> <DOWN> change <ENTER> confirm <ESC> exit
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The “*TIME/DATE*” item allows access to modify the instrument date and time. An internal circuit fitted with backup battery ensures the correct functioning of the clock even in case of mains power failure.

- Date and time are expressed as year/month/day, hours/minutes/seconds.
- Use the ▲ ▼ arrows to modify the year, already selected, and press ENTER to confirm.
- You will get to the month setting. Change it using the ▲ ▼ arrows and confirm with ENTER.
- Repeat for the other items. The seconds start from 00 when pressing ENTER to confirm the minutes.
- After confirmation of the minutes you will exit the setting page and return to the menu main screen.

## G. CONF. OUT (*Output configuration*)

OUTPUT CONFIGURATION
Output Relay Output Analog 1-2-3
<UP> <DOWN> select <ENTER> confirm <ESC> exit

The “*Output configuration*” item is composed of two sub-functions concerning the management of relays (*Output Relay*) and analog outputs (*Output Analog 1-2-3*). The two following paragraphs will outline in detail the relay and analog output settings: for a general description on how to use of analog outputs and relays, please see the chapters “*Instruments fitted with relay outputs*” and “*Current and voltage analog outputs*”.

### G.1 Relay configuration

To set the three relays, select the *CONF. OUT >> Output Relay* menu item. You will get to the screen with these three relays:

OUTPUT RELAY
Relay RL1 Relay RL2 Relay RL3
<UP> <DOWN> select <ENTER> confirm <ESC> exit/cancel

Use the ▲ ▼ arrows to select the relay to be configured and confirm with ENTER.

### Relay RL1 (Working relay RL1)

It is used to set the functioning parameters of the RL1 working relay.

The following screen will appear:

RELAY RL1
<b>Mode:</b> T Temp. <b>Act Above:</b> 100.0 °C <b>Act Below:</b> 25.0 °C <b>Hysteresis:</b> 1.0 °C <b>On Error:</b> Inactive <UP> <DOWN> select <ESC> exit/cancel

Use the ▲ ▼ arrows to select the line to be modified and press ENTER to access the corresponding submenu.

**Mode** It defines the physical quantity associated to the RL1 relay. To change the quantity, use the ▲ ▼ arrows to select the line *Mode* and confirm with ENTER. The RELAY RL1 MODE menu will open.

RELAY RL1 MODE	
For. OFF	T Temp.
* RH Rel.	Tw Wet bulb
AH Abs.	
MR Mix.	
Td Dew	For. ON
<ESC> exit/cancel	

The current item is indicated by an asterisk ("RH Rel." in the example): to change it, use the ▲ ▼ arrows to select the new item and press ENTER. The asterisk will indicate your new selection. Press ESC to return to the previous menu.

You can associate the following quantities to the RL1 relay:

- **RH Rel.** corresponds to relative humidity,
- **AH Abs.** corresponds to absolute humidity,
- **MR Mix.** corresponds to mixing ratio,
- **Td Dew.** corresponds to dew point,
- **T Temp.** corresponds to temperature,
- **Tw Wetp.** corresponds to the wet bulb temperature
- **For. OFF** (Force OFF) blocks the relay in the OFF state.
- **For. ON** (Force ON) blocks the relay in the ON state.

The last two items are useful during system maintenance and instrument configuration.

**Act above** (*high threshold*) When the measurement increases, it represents the threshold (*set value*) that shifts the relay from de-energised to energised when exceeded. The contact to terminals 9 and 10 goes from closed to open. The contact to terminals 8 and 9 goes from open to closed. The trigger threshold can be disabled, by setting the "*status = inactive*".

<p align="center"><b>RELE RL1</b> <b>ACTIVE ABOVE</b></p>
<p>set value: 100.0°C status: active</p> <p>&lt;UP&gt; &lt;DOWN&gt; change &lt;ESC&gt; exit/cancel</p>

To change the threshold value, press ENTER to select the *set value* line and use the ▲ ▼ arrows to set the desired value. Press ENTER to go to the *status* line. Use the ▲ ▼ arrows to select *active* in order to enable the trigger threshold, *inactive* to disable it.

**Act below** (*low threshold*) When the measurement decreases, it represents the threshold that shifts the relay from de-energised to energised when exceeded. The contact to terminals 9 and 10 goes from closed to open. The contact to terminals 8 and 9 goes from open to closed. The trigger threshold can be disabled, by setting the "*status = inactive*".

<p align="center"><b>RELE RL1</b> <b>ACTIVE BELOW</b></p>
<p>set value: 25.0°C status: active</p> <p>&lt;UP&gt; &lt;DOWN&gt; change &lt;ESC&gt; exit/cancel</p>

To change the trigger point value, press ENTER to select the *set value* line and use the ▲ ▼ arrows to set the desired value. Press ENTER to go to the *status* line. Use the ▲ ▼ arrows to select *active* in order to enable the trigger threshold, *inactive* to disable it.

**Hysteresis** It represents the value of the relay RL1 hysteresis applied to both thresholds defined above.

<p align="center"><b>RELE RL1</b> <b>HYSTERESIS</b></p>
<p>set value: 1.0°C status: enable</p> <p>&lt;UP&gt; &lt;DOWN&gt; change &lt;ESC&gt; exit/cancel</p>

To change the hysteresis width, press ENTER to select the *set value* line and use the ▲ ▼ arrows to set the desired value.

Press ENTER to go to the *status* line. Use the ▲ ▼ arrows to select *active* in order to enable the hysteresis, *inactive* to disable it.

**On Error** This parameter controls the relay RL1 behaviour if the physical quantity associated to the relay goes in error.

The error occurs, e.g. when the measurement exceeds the functioning limits indicated in the technical information, when the probe becomes faulty or gets disconnected.

This parameter can be set to "Active" or "Inactive":

- If *On\_Error=Inactive* (factory default), in case of error, the relay de-energises independently of its current condition. The contact 9 – 10 closes, the contact 8 – 9 opens.
- If *On\_Error=Active*, in case of error, the relay energises independently of its current condition. The contact 9 – 10 opens, the contact 8 – 9 closes.

This parameter does not depend from other settings (upper or lower threshold, hysteresis, ...) and neither from the relay's state when the error occurs.

RELE RL1 ON ERROR
* Active Inactive
<UP> <DOWN> select <ESC> exit/cancel

The current mode is indicated by an asterisk ("Active" in the example): to change it, use the ▲ ▼ arrows to select the new item and press ENTER. The asterisk will indicate your new selection. Press ESC to return to the previous menu.

### Relay RL2 (Working relay RL2)

It is used to set the functioning parameters of the RL2 working relay.

The following screen will appear:

RELAY RL2
<b>Mode:</b> RH Rel.
<b>Act Above:</b> 80.0 %
<b>Act Below:</b> 20.0 %
<b>Hysteresis:</b> 5.0 %
<b>On Error:</b> Inactive
<UP> <DOWN> select <ESC> exit/cancel

Use the ▲ ▼ arrows to select the line to be modified and press ENTER to access the corresponding submenu.

**Mode** It defines the physical quantity associated to the RL2 relay. To change the quantity, use the ▲ ▼ arrows to select the line *Mode* and confirm with ENTER. The RELAY RL2 MODE menu will open.

RELAY RL2 MODE	
For. OFF	T Temp.
* RH Rel.	Tw wetp.
AH Abs.	
MR Mix.	
Td Dew	For. ON
<ESC> exit/cancel	

The current item is indicated by an asterisk ("RH Rel." in the example): to change it, use the ▲ ▼ arrows to select the new item and press ENTER. The asterisk will indicate your new selection. Press ESC to return to the previous menu.

You can associate the following quantities to the RL2 relay:

- **RH Rel. corresponds to relative humidity,**
- **AH Abs.** corresponds to absolute humidity,
- **MR Mix.** corresponds to mixing ratio,
- **Td Dew.** corresponds to dew point,
- **T Temp. corresponds to temperature,**
- **Tw Wetp.** corresponds to the wet bulb temperature
- **For. OFF** (Force OFF) blocks the relay in the OFF state.
- **For. ON** (Force ON) blocks the relay in the ON state.

The last two items are useful during system maintenance and instrument configuration.

**Act above** (*high threshold*) When the measurement increases, it represents the threshold (*set value*) that shifts the relay from de-energised to energised when exceeded.

The contact to terminals 6 and 7 goes from closed to open. The contact to terminals 5 and 6 goes from open to closed.

The trigger threshold can be disabled, by setting the "*status = inactive*".

RELE RL2 ACTIVE ABOVE
set value: 80.0%
status: active
<UP> <DOWN> change
<ESC> exit/cancel

To change the threshold value, press ENTER to select the *set value* line and use the ▲ ▼ arrows to set the desired value.

Press ENTER to go to the *status* line. Use the ▲ ▼ arrows to select *active* in order to enable the trigger threshold, *inactive* to disable it.

**Act below** (*low threshold*) When the measurement decreases, it represents the threshold that shifts the relay from de-energised to energised when exceeded.

The contact to terminals 6 and 7 goes from closed to open. The contact to terminals 5 and 6 goes from open to closed.

The trigger threshold can be disabled, by setting the "*status = inactive*".

<p align="center"><b>RELE RL2</b> <b>ACTIVE BELOW</b></p>
<p>set value: 20.0%</p> <p>status: active</p> <p>&lt;UP&gt; &lt;DOWN&gt; change</p> <p>&lt;ESC&gt; exit/cancel</p>

To change the trigger point value, press ENTER to select the *set value* line and use the ▲ ▼ arrows to set the desired value.

Press ENTER to go to the *status* line. Use the ▲ ▼ arrows to select *active* in order to enable the trigger threshold, *inactive* to disable it.

**Hysteresis** It represents the value of the relay RL2 hysteresis applied to both thresholds defined above.

<p align="center"><b>RELE RL2</b> <b>HYSTERESIS</b></p>
<p>set value: 5.0%</p> <p>status: enable</p> <p>&lt;UP&gt; &lt;DOWN&gt; change</p> <p>&lt;ESC&gt; exit/cancel</p>

To change the hysteresis width, press ENTER to select the *set value* line and use the ▲ ▼ arrows to set the desired value.

Press ENTER to go to the *status* line. Use the ▲ ▼ arrows to select *active* in order to enable the hysteresis, *inactive* to disable it.

**On Error** This parameter controls the relay RL2 behaviour if the physical quantity associated to the relay goes in error.

The error occurs, e.g. when the measurement exceeds the functioning limits indicated in the technical information, when the probe becomes faulty or gets disconnected.

This parameter can be set to "Active" or "Inactive":

- If *On\_Error=Inactive* (factory default), in case of error, the relay de-energises independently of its current condition. The contact 6 – 7 closes, the contact 5 – 6 opens.
- If *On\_Error=Active*, in case of error, the relay energises independently of its current condition. The contact 6 – 7 opens, the contact 5 – 6 closes.

This parameter does not depend from other settings (upper or lower threshold, hysteresis, ...) and neither from the relay's state when the error occurs.

<p align="center"><b>RELE RL2</b> <b>ON ERROR</b></p>
<p>* Active</p> <p>Inactive</p> <p>&lt;UP&gt; &lt;DOWN&gt; select</p> <p>&lt;ESC&gt; exit/cancel</p>

The current mode is indicated by an asterisk ("Active" in the example): to change it, use the ▲ ▼ arrows to select the new item and press ENTER. The asterisk will indicate your new selection. Press ESC to return to the previous menu.

### Relay RL3 (Working relay RL3)

It is used to set the functioning parameters of the RL3 working relay.

Select the menu item *CONF. OUT >> Output Relay*. You will get to the screen with the three relays:

OUTPUT RELAY
Relay RL1
Relay RL2
Relay RL3
<UP> <DOWN> select
<ENTER> confirm
<ESC> exit/cancel

Use the ▲ ▼ arrows to select the "Relay RL3" item and confirm with ENTER.

The following screen will appear:

RELAY RL3
Force OFF
Force ON
* Energized on error
Deenergized on error
Source: Probe
Delay: 0 sec
<ESC> exit/cancel

The first four items define the possible **functioning modes** of the alarm relay:

**Force OFF** It blocks the relay in the de-energised state, the contact between the terminals 3 and 4 is always open.

**Force ON** It blocks the relay in the energised state, the contact between the terminals 3 and 4 is always closed.

**Energized on error** The functioning of relay RL3 is controlled by the error condition of one or more parameters, selected among those listed below at the *Source* item.

By selecting this functioning mode, the relay RL3 energises and the contact between terminals 3 and 4 closes, in case one or more selected parameters go in error. In normal conditions, if the selected parameters are not in error, the relay is de-energised and the contact between the terminals 3 and 4 is open.

**De-energized on error** The functioning of relay RL3 is controlled by the error condition of one or more parameters, selected among those listed below at the *Source* item.

By selecting this functioning mode, the relay RL3 de-energises and the contact between terminals 3 and 4 opens, in case one or more selected parameters go in error. In normal conditions, if the selected parameters are not in error, the relay is energised and the contact between the terminals 3 and 4 is closed.

The current mode is indicated by an asterisk ("Energized on error" in the example): to change it, use the ▲ ▼ arrows to select the new item and press ENTER. The asterisk will indicate your new selection.

**Source** It lists the alarm sources for the “*Energized on error*” and “*Deenergized on error*” functioning modes.

RELAY RL3
SOURCE OF ALARM
* Probe Error
* Out 1 Error
Out 2 Error
* Out 3 Error
<ESC> exit/cancel

*Probe error* is triggered when a probe error occurs, e.g. when the measurement exceeds the functioning limits indicated in the technical information, when the probe becomes faulty or gets disconnected.

*Out 1 Error* is triggered when the analog output 1 goes in error because the set high or low limits are exceeded.

*Out 2 Error* is triggered when the analog output 2 goes in error because the set high or low limits are exceeded.

*Out 3 Error* is triggered when the analog output 3 goes in error because the set high or low limits are exceeded.

You can select multiple error sources, as illustrated in the example: the occurrence of any of them triggers the alarm and switches the relay RL3.

An asterisk before the name indicates that the item is enabled. Use the ▲ ▼ arrows to invert its state and press ENTER. Repeat for all items. Press ESC to return to the previous menu.

**Delay** It represents the delay before generating an alarm.

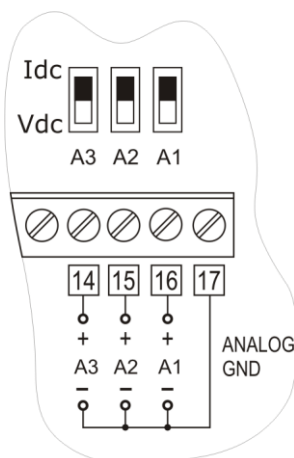
RELAY RL3 DELAY TIME
delay: 10 (sec)
<UP> <DOWN> change
<ENTER> confirm
<ESC> exit/cancel

To modify the delay time, set a new value using the ▲ ▼ arrows and press ENTER to confirm. Press ESC to return to the previous menu.

## G.2 Analog output configuration

The three physical quantities associated to the A1, A2 and A3 analog outputs appear, respectively, in the first, second and third line of the display.

The three dip-switches on the card above the terminals 14, 15 and 16, allow to select if the output is a **current "Idc"** or **voltage "Vdc"**, per each analog output.



To set the three analog outputs, select the "CONF. OUT >> Output Analog 1-2-3" menu item. The following screen will appear:

OUTPUT 1 - 2 - 3
Analog Output 1
Analog Output 2
Analog Output 3
Current/Voltage out
<UP> <DOWN> select
<ENTER> confirm
<ESC> exit/cancel

The "Current/Voltage out" function allows to select the type of analog output: "0...20mA/0...10Vdc" or "4...20mA/2...10Vdc".

- Selecting "0...20mA/0...10Vdc", the output is 0...20mA if the dip-switch on the card is set to "Idc" or 0...10Vdc if the dip-switch on the card is set to "Vdc".
- Selecting "4...20mA/2...10Vdc", the output is 4...20mA if the dip-switch on the card is set to "Idc" or 2...10Vdc if the dip-switch on the card is set to "Vdc".

OUTPUT 1 - 2 - 3
CURRENT/VOLTAGE OUTPUT
* 4...20mA/2...10Vdc
0...20mA/0...10Vdc
<UP> <DOWN> select
<ENTER> confirm
<ESC> exit/cancel

The active mode is indicated by an asterisk ("4...20mA/2...10Vdc" in the example): to set the other mode, use the ▲ ▼ arrows to select it and press ENTER. The asterisk will indicate your new selection.

Press ESC to return to the previous menu.

OUTPUT 1 - 2 - 3
Analog Output 1 Analog Output 2 Analog Output 3 Current/Voltage out <UP> <DOWN> select <ENTER> confirm <ESC> exit/cancel

To configure your analog output parameters, e.g. the analog output 1, use the ▲ ▼ arrows to select it and press ENTER.

A screen with two items will appear:

OUTPUT 1
<b>Mode:</b> T Temp. <b>Range values</b>  <UP> <DOWN> select <ENTER> confirm <ESC> exit/cancel

**Mode** It is the physical quantity associated to the analog output, and is shown on corresponding line of the display. To change it, use the ▲ ▼ arrows to select the *Mode* line and press ENTER: The *Output 1 - Mode* menu will open.

OUT 1 SOURCE
RH Rel. Humidity AH Abs. Humidity MR Mixing Ratio Td Dew Point * T Temperature Tw Wet bulb temp. <ESC> exit/cancel

The current quantity is indicated by an asterisk ("*T Temperature*" in the example): to change it, use the ▲ ▼ arrows to select the new item and press ENTER. The asterisk will indicate your new selection. Press ESC to return to the previous menu.

You can select the following per each of the three outputs:

- **RH Rel. humidity,**
- **AH Abs. humidity,**
- **MR Mixing Ratio,**
- **Td Dew Point,**
- **T Temperature,**
- **Tw Wet bulb temperature**

**Range values** It allows setting the lower and upper limits of the physical quantity associated to the analog output. Use the ▲ ▼ arrows to select the *Range values* line and press ENTER: the *Output 1 - ... Range* menu will open.

<b>OUT 1</b> <b>TEMPERATURE RANGE</b>
Scale low value: 20.0 °C
Scale high value: 100.0 °C
<ENTER> select
<ESC> exit/cancel

*Scale low value* represents the lower limit of the measured physical quantity, e.g. temperature, corresponding to the bottom scale value of the analog output (4mA, 0Vdc or 2Vdc according to the selected type of output).

*Scale high value* represents the upper limit of the measured physical quantity, e.g. temperature, corresponding to the top scale value of the analog output (20mA or 10Vdc according to the selected type of output).

Press ENTER to toggle between the items: the selected item will blink. Use the ▲ ▼ arrows to change it, and press ENTER to confirm the value and go to the other item. Press ESC to exit.

### **Repeat for the other two analog outputs.**

Press MENU to return to measurement mode.

## **H. VIEW MODE**

The graphic display shows simultaneously three numeric variables, or the graph, in real time, of one of the available quantities.

**The graph represents a curve of average values:** each display point (pixel) is the average calculated over a period according to the sampling interval set in the menu (MENU >> "Logging" >> "Log interval"), as shown in the table below.

<i>Logging interval (sec)</i>	<i>Samples per pixel</i>	<i>Interval shown on the display</i>
1	20	30 minutes
2	40	1 hour
5	75	2 hours
10	150	4 hours
20	300	8 hours
60 (1 minute)	900	24 hours
120 (2 minutes)	1800	48 hours
240 (4 minutes)	7200	192 hours

For example, by selecting a 1-second logging interval, each point or pixel represents the average calculated on 20 consecutive samples (equal to 20 seconds as the instrument performs a measurement every second). The entire display shows a portion of the graph of 30 minutes.

If the logging interval is 240 seconds (4 minutes), each pixel is calculated over an average of 7200 consecutive samples, equal to 7200 seconds. The entire display shows a portion of the graph of 192 hours.

To display the graph of a physical quantity, proceed as follows:

- Select the menu item *MENU >> View Mode* and press ENTER.

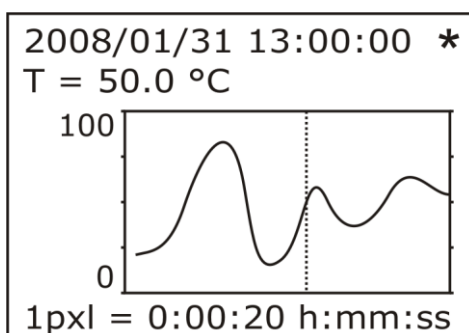
- The display mode setting screen will open. "Numerical value" is the standard numeric display. The other "Graph ..." items are reserved to graphic display.

Select VIEW or ESC
Numerical Values
Graph RH Rel. Hum.
Graph AH Abs. Hum.
Graph SH Mix. Ratio
Graph Td Dew Point
* Graph T Temp.
Graph T wet bulb temperature
<ESC> exit

- The current display is indicated by an asterisk: use the ▲ ▼ arrows to select the new item and press ENTER.  
By selecting "Numerical Values" and pressing ENTER, you will return directly to standard numeric display.  
Otherwise, you will access the next screen to define the graph minimum and maximum limits.

GRAPHS SET RANGE VALUES
Graph T Temp.
set min: 0.0°C
set max: 100.0 °C
<ESC> exit

- To change the minimum value, press ENTER to select the "set min" line and use the ▲ ▼ arrows to set the desired value.
- Press ENTER to go to the "set max" line. Use the ▲ ▼ arrows to set the desired value.
- Press MENU to exit and display the graph.



The graph has these characteristics:

- The display width is 96 pixel: each pixel, as described above, represents the average calculated on a certain number of measurements. This number depends on the set logging interval.

- A cursor is added over the graph. Initially, it is located on the graph's right edge. When time goes by, the graph moves toward the left and the current data appear on the right vertical axis.
- The indications on the two lines define date, time and value of the measurement on the cursor. Use the ▲ ▼ arrows to move the cursor from its initial position.
- The lower line indicates the time interval represented by each pixel: it goes from a minimum of 20 seconds to a maximum of 2 hours (7200 seconds).
- Since to draw a new graph point you need from a minimum of 20 seconds to a maximum of 2 hours (7200 seconds), the graph may appear "frozen", generating the doubt that the instrument is not working. The asterisk on the right is blinking to indicate that the instrument is working correctly.
- The graph can be expanded on the horizontal axis, using the ZOOM ⇔ key. The horizontal zoom expands the pixel near the cursor, displaying its samples. According to the available space, also the nearby pixels are expanded up to a maximum of 96 points.
- The graph can be expanded on the vertical axis, using the ZOOM ⇕ key. When first pressing the key, the "fit to screen" function is performed, that is, the vertical axis is expanded or reduced so as to display the entire graph to its maximum width. When pressing the key again the graph is further expanded up to the maximum resolution.
- You can change the physical quantity displayed on the graph using the UNIT key, without accessing the menu.

## I. STAND-BY

The *stand-by* item has two functions: *Offline* and *Probe Change*.

STAND-BY
Offline Probe Change  <UP> <DOWN> select <ENTER> confirm <ESC> exit

- I.1. "*Offline*" This mode turns off the instrument: the relays are de-energised, the analog outputs are set to zero (0mA and 0V) and logging is stopped.  
To enable it, use the ▲ ▼ arrows to select the "*Off-line*" item and confirm with ENTER.  
The following is displayed: "*STAND BY - <ENTER> exit stand-by*".  
To reactivate the instrument, hold down ENTER for about 10 seconds.
- I.2. "*Probe Change*" ("*Suspend*" mode) You can use it to correctly replace a probe. It avoids stopping the process and, when returning to normal state, the instrument reads the new probe calibration parameters.  
Use the ▲ ▼ arrows to select the *Probe Change* item and confirm with ENTER. The instrument freezes the current state on all outputs and allows one minute to replace the probe. The time is indicated by a timer on the display (*Time out*) and by a progressively accelerated beep.

Probe Change
Time out: 60 s Output: Hold state You can change probe

During this time, replace the probe and wait for the timer to reach zero. The instrument will read the measurements supplied by the new probe. The analog outputs and relays are re-enabled.

**Note:** the "suspend" time can be extended 60 seconds by pressing the ▲ arrow. The time can be reduced to 3 seconds by pressing any key except the ▲ arrow and ENTER.

## 10. Current and voltage analog outputs

The instruments have 3 analog outputs that can be configured as voltage or current outputs: 0...20mA, 4...20mA, 0...10Vdc or 2...10Vdc.

Each analog output can be associated to one of the following physical quantities:

- Relative Humidity RH,
- Absolute Humidity AH,
- Mixing Ratio MR,
- Dew Point TD.
- Temperature T,
- Wet bulb temperature Tw

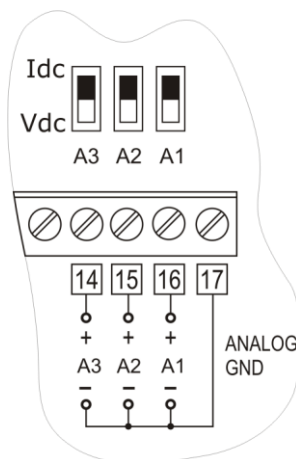
**The physical quantities associated to the three A1, A2 and A3 analog outputs appear, respectively, in the first, second and third line of the display.**

The relationship between measurement range of the input physical quantity and the analog output range (0...20mA, 4...20mA, 0...10Vdc, 2...10Vdc) can be configured from the menu.

To configure the outputs:

16. Use the dip-switches A1, A2, A3

17. Set the "CONF. OUT" >> "Output Analog 1-2-3" menu item on the instrument or use the PC through the DeltaLog12 software.



The various combination are outlined in the following table in which the relevant output is reported according to the menu choice.

"Current/Voltage out" menu item	0...20mA/0...10Vdc		4...20mA/2...10Vdc	
Position of dip-switches A1, A2, A3	Idc	Vdc	Idc	Vdc
Selected output	0...20mA	0...10Vdc	4...20mA	2...10Vdc

You can simultaneously use current and voltage outputs provided that they belong to the same group selected from the menu, e.g. the 0...20mA and 0...10Vdc or the 4...20mA and 2...10Vdc outputs. You cannot select the 0...20mA and 4...20mA or 0...10Vdc and 2...10Vdc outputs.

**In case of error, e.g. sensor fault or violation of the measurement range set from the menu, the corresponding analog output shifts to 22mA (current) or 11Vdc (voltage).**

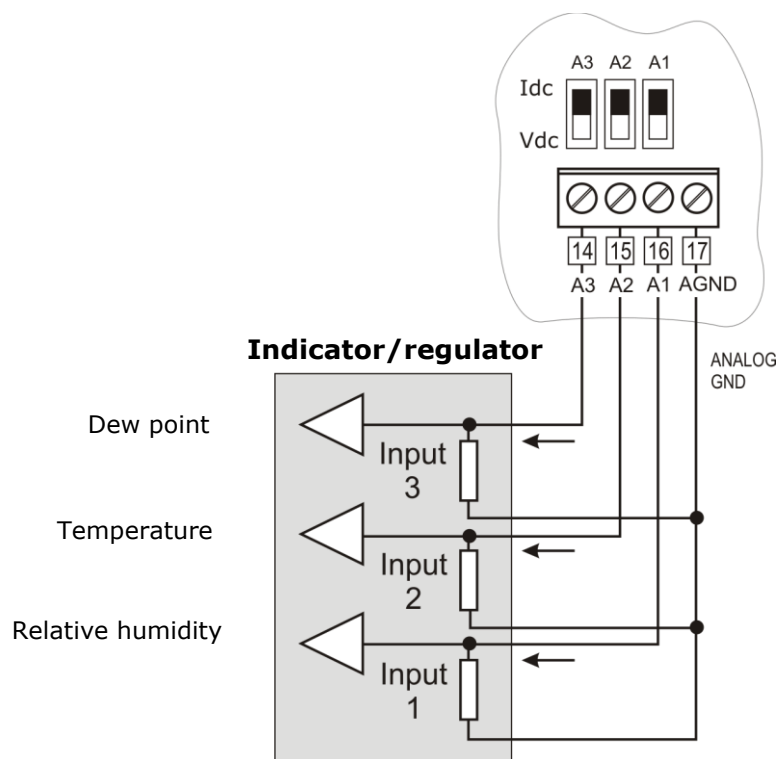
For correct functioning, **abide by the load resistance specifications concerning the analog outputs reported in the technical information.**

## 10.1. Numerical example

Let's suppose you need to connect the HD2817T to a three-input indicator/regulator using the three 4...20mA current outputs for relative humidity, temperature and dew point, and that the ratio between the physical quantities input range and the 4...20mA output range is the one reported in the following table:

Input	Analog output
0...100%RH	A1 = 4...20mA
0...150°C	A2 = 4...20mA
-20...+80°C Td	A3 = 4...20mA

### Procedure



1. Connect the HD2817 to the indicator/regulator as illustrated in the picture.
2. Set the dip-switches A1, A2, A3 to "**Idc**" (current).
3. Press MENU, use the ▲ ▼ arrows to select "*CONF. OUT*" and confirm with ENTER.
4. Use the ▲ ▼ arrows to select "*Output Analog 1-2-3*" and confirm with ENTER.
5. Use the ▲ ▼ arrows to select "*Current/Voltage out*" and confirm with ENTER.
6. Use the ▲ ▼ arrows to select "*4...20mA/2...10Vdc*" and confirm with ENTER.
7. Press ESC to return to the previous menu.
8. To set the A1 output, use the ▲ ▼ arrows to select "*Out Analog 1*" and press ENTER.
9. Use the ▲ ▼ arrows to select the "*Mode*" line and press ENTER: the *Out 1 - Mode* menu will open.
10. Use the ▲ ▼ arrows to select the "*RH Rel. Humidity*" item and press ENTER. An asterisk will appear near the selected item. Press ESC to return to the previous menu.
11. Use the ▲ ▼ arrows to select the "*Range values*" line and press ENTER: the "*Out 1 - RH Range*" menu will open.
12. The value near *Scale low value* will blink: use the ▲ ▼ arrows to set the value **0.0** and confirm with ENTER.

13. The value near *Scale high value* will blink: use the ▲ ▼ arrows to set the value **100.0** and confirm with ENTER.
14. Press ESC twice; you will return to the menu "Output Analog 1-2-3".
15. To set the A2 output, use the ▲ ▼ arrows to select "Out Analog 2" and press ENTER.
16. Use the ▲ ▼ arrows to select the "Mode" line and press ENTER: the *Out 2 - Mode* menu will open.
17. Use the ▲ ▼ arrows to select the "T Temperature" item and press ENTER. An asterisk will appear near the selected item. Press ESC to return to the previous menu.
18. Use the ▲ ▼ arrows to select the *Range values* line and press ENTER: the "Out 2 - Temperature Range" menu will open.
19. The value near *Scale low value* will blink: use the ▲ ▼ arrows to set the value **0.0** and confirm with ENTER.
20. The value near *Scale high value* will blink: use the ▲ ▼ arrows to set the value **150.0** and confirm with ENTER.
21. Press ESC twice; you will return to the menu "Output Analog 1-2-3".
22. To set the A3 output, use the ▲ ▼ arrows to select "Out Analog 3" and press ENTER.
23. Use the ▲ ▼ arrows to select the "Mode" line and press ENTER: the *Out 3 - Mode* menu will open.
24. Use the ▲ ▼ arrows to select the "Td Dew Point" item and press ENTER. An asterisk will appear near the selected item. Press ESC to return to the previous menu.
25. Use the ▲ ▼ arrows to select the *Range values* line and press ENTER: the "Out 3 - Td Range" menu will open.
26. The value near *Scale low value* will blink: use the ▲ ▼ arrows to set the value **-20.0** and confirm with ENTER.
27. The value near *Scale high value* will blink: use the ▲ ▼ arrows to set the value **80.0** and confirm with ENTER.
28. Press MENU to exit the menu and return to measurement mode.

The procedure is complete.

## 11. Instruments fitted with relay outputs

The HD2817T...-DR models are fitted with three relays with ON/OFF or control and alarm functions.

The RL1 and RL2 relays have a free potential exchange contact, the RL3 alarm relay has a free potential normally open contact.

The three relays can be configured independently. You can associate one of the six available physical quantities (temperature, relative humidity, absolute humidity, mixing ratio, dew point, wet bulb temperature) to the RL1 and RL2 relays.

The RL3 relay is employed for the alarms.

**To set the relays parameters, you can use the *CONF. OUT >> Output Relay* menu item.**

When the relays are de-energised, the state of the contacts is that reported in the silk screen on the terminal board: it is the same when the instrument is not powered or in "off-line" mode. Please account for this during configuration of the instrument.

In "suspend" mode the contacts are maintained in the same position in which they were when the suspend mode occurred.

Relay idle, with instrument non powered or in OFF-LINE mode	Contact
RL1	9 – 10 Closed contact
	9 – 8 Open contact
RL2	6 – 7 Closed contact
	5 – 6 Open contact
RL3	3 – 4 Open contact

To simplify the system maintenance operations or to check the correct configuration, the relays can be blocked in the ON or OFF fixed position from the menu.

A special menu item ("*On Error*") controls the behaviour of the RL1 and RL2 relays, if the measurement associated to each one goes in error. The error can occur when the measurement exceeds the functioning limits indicated in the technical information, and when the probe becomes faulty or gets disconnected.

### 11.1. Working relays RL1 and RL2

The following parameters should be set per each working relay (**RL1** and **RL2**):

1) The quantity associated to the relay functioning ("*Mode*" in the menu).

Per each relay you can select one of these items (between parenthesis the indication shown on the display):

- Relative Humidity (**RH Rel.**)
- Absolute Humidity (**AH Abs.**)
- Mixing Ratio (**MR Mix.**)
- Dew Point (**Td Dew.**)
- Temperature (**T Temp.**)
- Wet bulb temperature (**Tw Wetb.**)
- (Force OFF) blocks the relay in a de-energised state (**For. OFF**)
- (Force ON) blocks the relay in an energised state (**For. ON**)

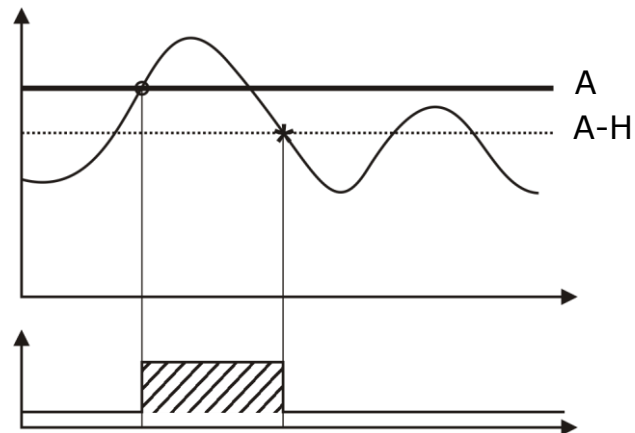
The last two items are useful during system maintenance and instrument configuration.

- 2) The trigger threshold **Act above** (*high tripping point*): when the measurement **increases**, it represents the threshold (*ACTIVE ABOVE* in the menu) that shifts the relay from de-energised to energised when exceeded. The contacts 5-6 and 8-9 will close, the contacts 6-7 and 9-10 will open. The trigger threshold can be disabled.
- 3) The trigger threshold **Act below** (*low tripping point*): when the measurement **decreases**, it represents the threshold (*ACTIVE BELOW* in the menu) that shifts the relay from de-energised to energised when exceeded. The contacts 5-6 and 8-9 will close, the contacts 6-7 and 9-10 will open. The trigger threshold can be disabled.
- 4) The hysteresis value applies to both thresholds defined above (*Hysteresis* in the menu). The hysteresis prevents the relay from toggling between the states when the measurement comes close to the set threshold. The relay is energised when the measurement reaches one of the two trigger thresholds. When the measurement returns toward the value of the set threshold, the relay does not shift on the threshold value but on the threshold  $\pm$  **hysteresis value**.  
*Notes:*
  - a) You can disable the hysteresis, but we recommend to maintain it to avoid any malfunctioning near the relay trigger point.
  - b) The hysteresis width should be lesser than the difference between the two trigger thresholds *Act above (high threshold)* and *Act below (low threshold)*.
  - c) If the *Act above (high)* threshold is lesser than the *Act below (low)* threshold, the hysteresis works contrariwise: the relay **de-energises** when the measurement exceeds the threshold and not, as in the opposite case, the threshold  $\pm$  the hysteresis.
- 5) Behaviour of the relay if the associate physical quantity goes in error (*ON ERROR* in the menu).
  - a) The error can occur when the measurement exceeds the functioning limits indicated in the technical information,
  - b) When the probe becomes faulty or gets disconnected.
  - c) Selecting "*ON ERROR = Inactive*", in case of error of the controlled quantity, the relay de-energises.
  - d) Selecting "*ON ERROR = Active*", in case of error of the controlled quantity, the relay energises.

### Functioning examples of the working relays RL1 and RL2.

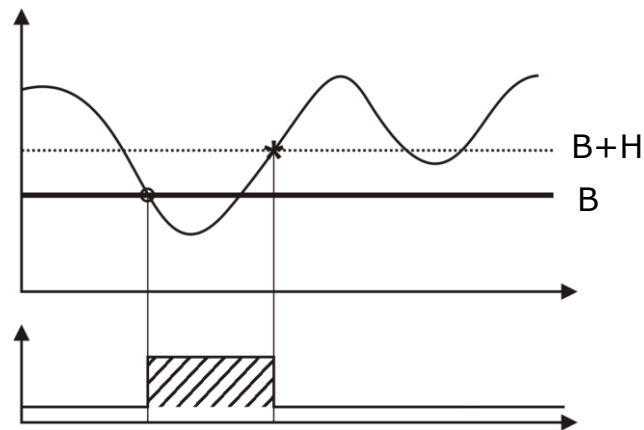
If the thresholds are enabled or not and depending from the set trigger level of each, you can have four different functioning modes.

#### 1. Only the *Act above* (high) threshold is enabled.



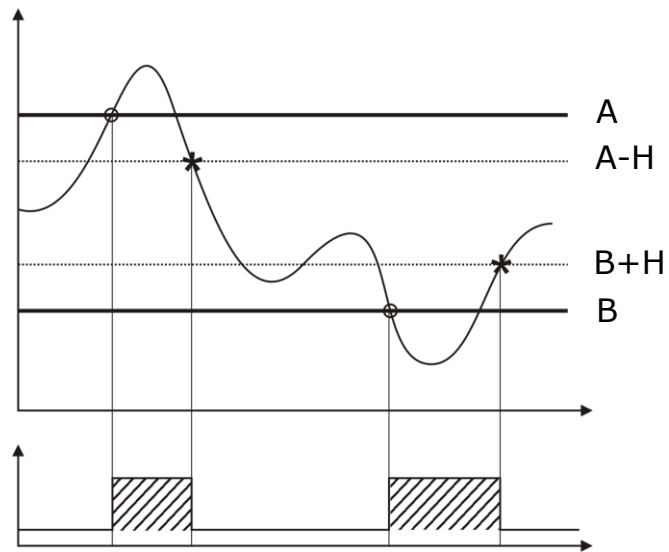
The relay is energised when the associate measurement exceeds threshold **A**, and de-energised when the measurement falls below threshold **A - H**.

#### 2. Only the *Act below* (low) threshold is enabled.



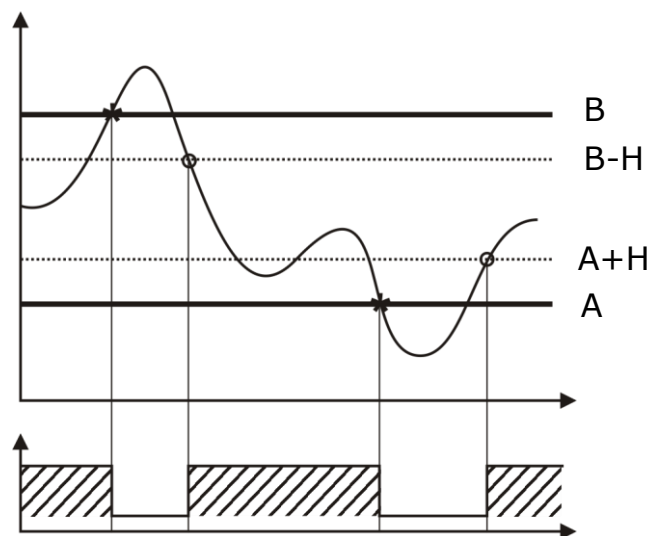
The relay is energised when the associate measurement falls below threshold **B**, and de-energised when the measurement exceeds threshold **B + H**.

3. Both thresholds are enabled, the *Act above* (high) threshold is higher than the *Act below* (low) threshold.



The relay is energised when the associate measurement is outside the thresholds **A** and **B**, and de-energised when the measurement is within the thresholds **A - H** and **B + H**.

4. Both thresholds are enabled, the *Act above* (high) threshold is lesser than the *Act below* (low) threshold.



The relay is energised when the associate measurement is within the thresholds **A+H** and **B-H**, and de-energised when exceeding the thresholds **A** and **B**.

The configured relay can be used to control a quantity and generate an alarm, if the measurement falls outside the set range, the sensor becomes faulty or in case of mains failure.

## 11.2. Numerical example

Let's suppose you need to set the relay RL1 as in figure 3 of the previous paragraph. The parameters to be set are summarized in the following table:

Parameter	Value
Control physical quantity	Temperature
High threshold	A = 100.0°C
Low threshold	B = 50.0°C
Hysteresis	H = 5.0°C

### Procedure

1. Press MENU, use the ▲ ▼ arrows to select "Conf. Out", confirm with ENTER.
2. On the next screen, use the ▲ ▼ arrows to select the "Output Relay" item and confirm with ENTER.
3. Use the ▲ ▼ arrows to select the relay 1 "Relay RL1" and confirm with ENTER.
4. Use the ▲ ▼ arrows to select the first line "Mode", confirm with ENTER.
5. Use the ▲ ▼ arrows to select the physical quantity associated to the relay RL1: "T. Temp.", confirm with ENTER. An asterisk will appear near the "T. Temp." item. Press ESC to return to the previous menu.
6. Use the ▲ ▼ arrows to select the "Act Above" line and access the high threshold setting, confirm with ENTER.
7. Press ENTER to select the "Set value" line, and use the ▲ ▼ arrows to set the 100.0 value. Press ENTER to go to the "Status" line. Use the ▲ ▼ arrows to select "Active". Press ESC to return to the previous menu.
8. Use the ▲ ▼ arrows to select the "Act Below" line and access the low threshold setting, confirm with ENTER.
9. Press ENTER to select the "Set value" line, and use the ▲ ▼ arrows to set the 50.0 value. Press ENTER to go to the "Status" line. Use the ▲ ▼ arrows to select "Active". Press ESC to return to the previous menu.
10. Use the ▲ ▼ arrows to select the "Hysteresis" line and access the hysteresis setting, confirm with ENTER.
11. Press ENTER to select the "Set value" line, and use the ▲ ▼ arrows to set the 5.0 value. Press ENTER to go to the "Status" line. Use the ▲ ▼ arrows to select "Active". Press ESC to return to the previous menu.
12. Use the ▲ ▼ arrows to select the "On Error" line to set the relay behaviour in case of temperature measurement error.
13. Use the ▲ ▼ arrows to select "Inactive" and confirm with ENTER.
14. Press MENU to exit the menu and return to measurement mode.

The procedure is complete.

## 11.3. Alarm relay RL3

The alarm relay RL3 is energised in case of malfunctioning of one or more sensors and/or malfunctioning of one or more analog outputs.

Possible alarm causes are:

- Sensor error (temperature or humidity),
- Probe not communicating with the instrument (possible SICRAM2 module fault),
- Unexpected type of probe (wrongly connected, e.g. a SICRAM module probe instead of a SICRAM 2 module probe),
- Probe disconnected,
- Faulty probe,
- Error of one or more analog outputs because the set limits have been exceeded. An analog output gives an error if the associate quantity falls outside the set measurement limits: for example, if the limits of output 2, associated to temperature, are 0°C = 4mA and 100°C =

20mA, and the measured temperature exceeds 100°C or is lesser than 0°C, an error is generated.

You can select multiple error sources: any of them can trigger the alarm.

You can set a delay before generation of an alarm (*Delay*). During this time the relay does not switch and no alarm is signalled. The alarm time is expressed in seconds. If you set this parameter to 0, there is no trigger delay. For example, if you set 10 seconds, the alarm triggers after 10 seconds if the error condition persists during this time.

Position of the relay RL3 contact in case of alarm:

- Mode "*Energized on error*": in normal conditions the relay contact is open. In case of alarm, the contact will close.
- Mode "*De-energized on error*": in normal conditions the relay contact is closed. In case of alarm, the contact will open. This condition can be used to check the correct power supply of the instrument: indeed, as soon as it is interrupted, the instrument turns off and the relay RL3 contact opens. The opening can generate an alarm through an external device.
- Mode "*Force OFF*": it blocks the relay contact in the always-open state.
- Mode "*Force ON*": it blocks the relay contact in the always-closed state.

## 12. The logging function

**The logging function is always on.** The instrument can store 9000 samples. The memory is arranged in circular mode: once full, the most recent data will overwrite the oldest ones. There is no memory clearing command.

Each sample stores date and time, temperature, relative humidity, absolute humidity, mixing ratio, dew point, and wet bulb temperature value of the three analog outputs and state of the three relays (if present).

When modifying the logging interval the current logging session is ended and a new one is started.

The sessions are numbered from 0 to 255, the number is incremented until 255, then it restarts from 0. The progressive index is used to mark the different sessions.

The following brings about a session change:

- Modifying the log interval
- Modifying the date and time
- Suspend mode
- Off-line mode
- Power failure

After a power failure, the instrument can restart logging, from the session after the power failure, **provided that the internal clock battery is not discharged**. If the clock battery is discharged, the instrument will start from the initial page zero, overwriting the existing data. In this case, this date is wrong.

The available logging interval are: 1, 2, 5, 10, 20, 60, 120, 240 seconds.

**Each stored data represents the AVERAGE of the measurements performed every second during the logging interval.** For example, by selecting a 20 second logging interval, each stored data is the average over 20 seconds. Therefore, the instrument does not log the immediate quantity measured at the end of the interval, but the average on the entire interval. **The instrument performs a measurement every second.** In the example, you will get an average over 20 samples.

The state of each relay is stored as follows: "0" if, during the logging interval, the relay is always de-energised, "1" if it is always energised, "V" for both conditions.

The memory capacity goes from a minimum of 2 hours and 30 minutes to a maximum of 25 days, as reported in the table below.

Logging interval (sec)	Storage capacity
1	2 hours and 30 minutes
2	5 hours
5	12 hours and 30 minutes
10	1 day and 1 hour
20	2 days and 6 hours
60	4 days and 4 hours
120	8 days and 8 hours
240	25 days

The sessions in the memory can be downloaded to a PC using the DeltaLog12 software: during download, the system continues to log the new measurements, without interruption.

To protect the logged data and avoid overwriting, you can stop logging using the DeltaLog12 software. After the download, you can restart logging using the DeltaLog12 software.

### **Setting the log interval and dump log**

Press the MENU key.

Use the ▲ ▼ arrows to select "*Logging*", press ENTER.

Use the ▲ ▼ arrows to change the log interval, press ENTER to confirm.

Press MENU to return to measurement mode.

### **Dump LOG**

The logged data download is performed by connecting the instrument to a PC using the DeltaLog12 software: please see the chapter "*Serial communication and instrument network*" and the DeltaLog12 software manual.

### 13. "Suspend" and "Off-line" functioning modes

The HD2817T... instruments have three different functioning modes:

- 1) **Standard** functioning,
- 2) **Suspend** mode functioning,
- 3) **Off-line** mode functioning.

#### 1) **Standard mode**

It is the normal functioning mode: continuous measurement, data logging, analog outputs, and active relays...

#### 2) **"Suspend" mode**

The so-called *suspend* mode is mainly used to replace the probe without stopping the control system. This state expires automatically after 60 seconds indicated by a beep, progressively accelerated.

While this function is active, the instrument maintains the measurement and output (analog outputs and relays) values at the moment of the suspension. Logging is interrupted and resumed at the end of the suspension, with a new logging session.

When returning to normal state, the instrument will read the new probe calibration parameters.

The "*suspend*" state allows replacement with a new probe, without causing anomalies or alarms in the control system.

The *suspension* procedure is enabled from the menu item "MENU >> Stand-by >> Probe Change". The suspension time can be extended 60 seconds by pressing the ▲ arrow.

The time can be reduced to 3 seconds by pressing any key except the ▲ arrow and ENTER.

The suspension procedure can also be started using the DeltaLog12 software.

From the PC you can also set the suspend time, if the standard one minute time is not enough.

**Note:** in order to provide reliable data, when performing the replacement, the new probe should be thermally preconditioned in the measurement environment.

#### 3) **"Off-line" mode**

This state is the same as interrupting power to the instrument: the relays are de-energised, the analog outputs are set to zero (0mA e 0V), and logging is stopped.

The *Off-line* procedure is enabled from the menu item "MENU >> Stand-by >> Off-line".

You can use the DeltaLog12 software to activate this mode.

To exit the *Off-line* mode, hold down ENTER for about 10 seconds or use the special function of the DeltaLog12 software.

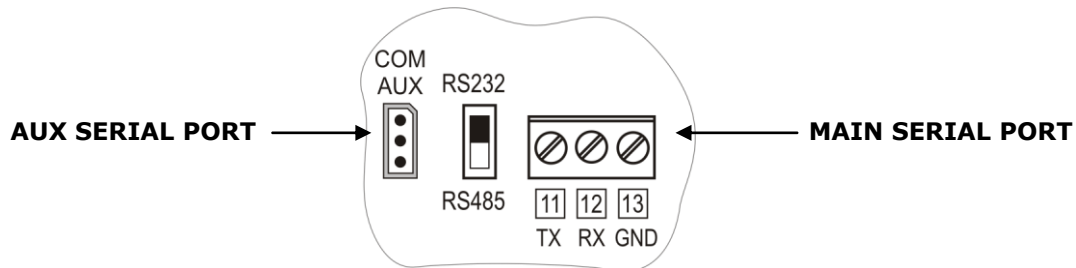


**WARNING: The Off-line mode is the same as interrupting power to the instrument but does not entail physical disconnection from the mains. The instrument remains under voltage: during each intervention on the system, follow the normal security procedures that include disconnection from the mains.**

## 14. Serial communication and instrument network

The instrument is fitted with a main multistandard serial communication port RS232C/RS485 and an auxiliary AUX COM serial port RS232C.

The main port is connected to terminals 11, 12 and 13, the auxiliary AUX COM port has its own 3-pole connector near terminal 10.



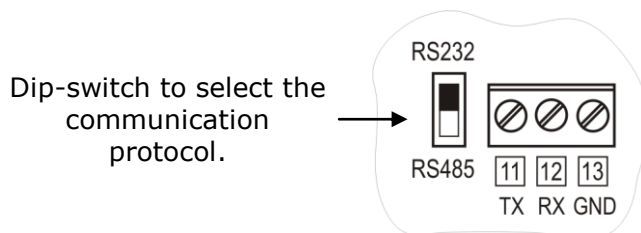
For fixed connection to a PC, instrument management, RS485 network connection, etc. you will use the standard port. The auxiliary port is used for temporary connections, e.g. instrument configuration. By using the auxiliary port, you don't have to disconnect and reconnect the cables fixed to the terminal board.

Thanks to the RS485 protocol it is possible to connect more than one instrument to form a network managed by the DeltaLog12 software provided.

### 14.1. Protocol selection

The **communication protocol** (RS232C or RS485) is selected by shifting the dip-switch on the board between terminals 10 and 11.

The selection of the main **physical port** RS232C, RS485 or auxiliary RS232C AUX COM is performed from the menu "MENU >> SERIAL" or using the DeltaLog12 software.

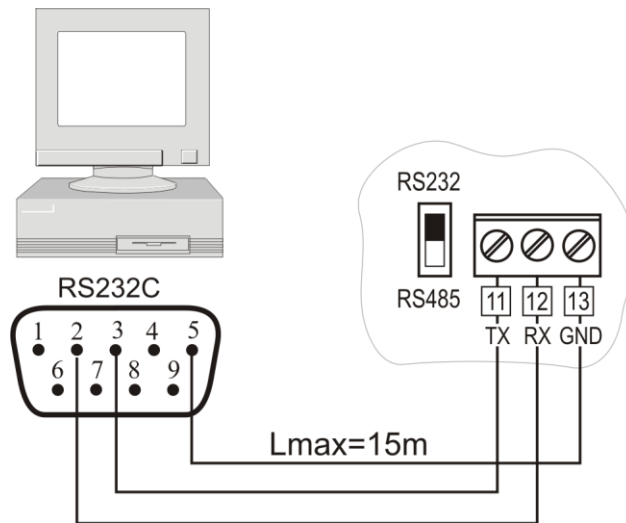


To ease configuration, the instruments are set up in the factory for communication through the AUX COM port.

- Upon turning on, the instrument switches the serial port to AUX COM for one minute. This allows sending, through the AUX COM port, the command selecting the desired configuration.
- If no command is received, after one minute, the instrument loads the last stored configuration.
- **WARNING:** The instrument supports only one communication channel at a time. Consequently, if the instrument is used into an RS485 network or is connected to an external device or to a PC through RS232, when the AUX COM port is selected, it won't be detected in the network and will not reply to the commands sent by other network devices.

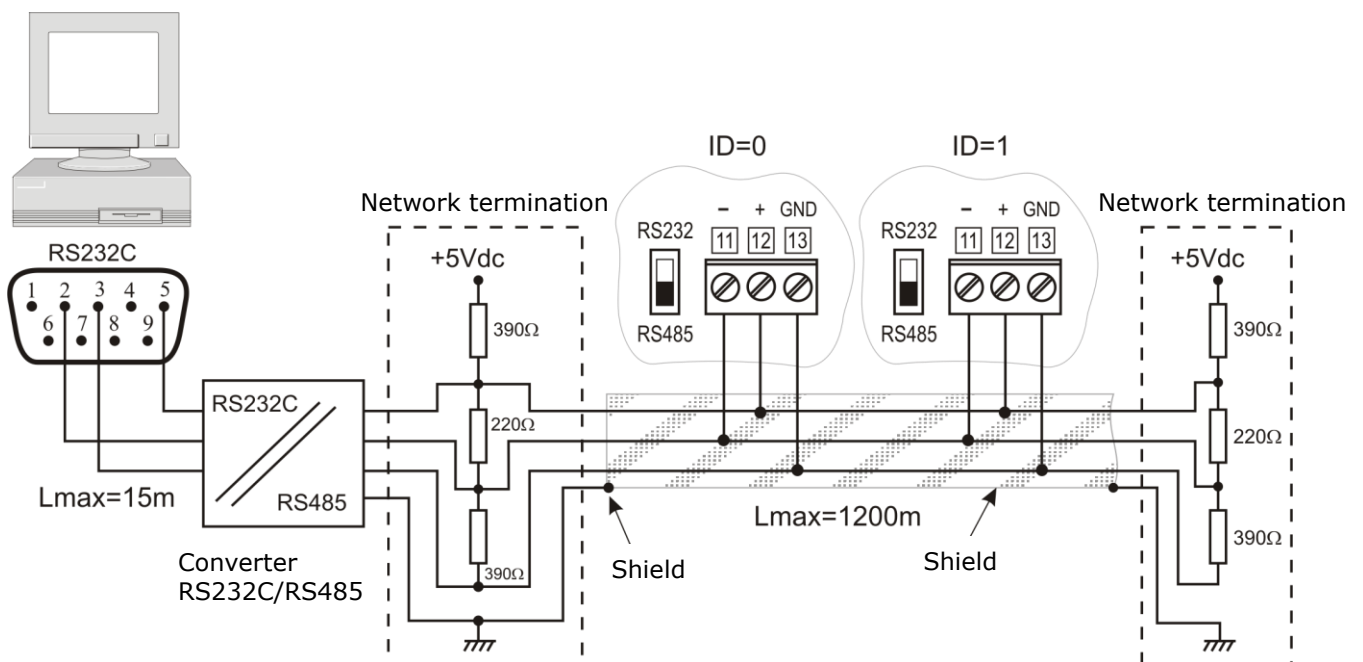
## 14.2. Connection types

The instrument can be connected directly to a PC through the RS232C serial port. The maximum distance between instrument and PC is 15 m.



**Connection PC / instrument with the RS232C serial communication protocol.**

To cover longer distances (up to 1200 m) you should use the RS485 serial output. This port allows creation of a network according to the diagram in the following figure. To manage this network and download the data you should use the DeltaLog12 software.



**Connection PC / instrument with the RS485 communication protocol for distances up to 1200 m using the RS232C/RS485 converter.**

A network is formed by a maximum of **250** devices tandem-connected through a **shielded** twisted pair cable for signals and a third wire for grounding.

The cable should be "type A" with these characteristics: impedance  $150\Omega$ , capacity  $C < 30pF/m$ , section  $> 0.34mm^2$ , loop resistance  $< 110\Omega/km$ , wire diameter  $> 0.64mm$ .

To guarantee the best performance, a special **termination** should be used, as indicated in the dotted boxes in the figure. The cable shield should be connected at both ends of the line.

If you need to connect over 32 instruments, insert a signal repeater between a group and the next one. **At the beginning and at the end of each segment you should apply the line terminator.**

The data line should be kept separate from any power line in order to avoid interferences on the transmitted signal.

Each instrument should be identified by **a unique address**. On the first start up, the instrument address is automatically set to "001": this number can be changed and stored to insert new network components from the menu item "MENU >> SERIAL >> ADDRESS" or directly from DeltaLog12 through the AUX COM port. The addresses from 1 to 250 are allowed, the address 0 and the addresses from 251 to 255 are reserved.

### 14.3. Description of the connection to a PC

The necessary steps to connect the instrument to a PC in order to download the data from the memory, read the measurements detected from the instrument or set the instrument parameters directly from the PC, are outlined below.

#### **Procedure**

1. Connect to the terminals 11-12-13 as reported in the previous paragraph diagrams: for the RS485 protocol connection, you need to insert an RS232/RS485 converter.
2. Select the type of protocol by shifting the dip-switch on the left of terminal 11 to RS232 or RS485.
3. Open the menu using the *MENU* button.
4. Use the ▲ ▼ arrows to select "*Serial*" and confirm with ENTER.
5. Use the ▲ ▼ arrows to select "*RS232*" or "*RS485*" and confirm with ENTER. An asterisk will appear near the selected item.
6. If you are installing an RS485 network, assign a different address to each instrument: use the ▲ ▼ arrows to select "*Address*" and confirm with ENTER. The "*Address*" message will blink. Use the ▲ ▼ arrows to assign an address number and confirm with ENTER.
7. Press MENU to exit the menu and return to measurement mode.
8. Turn on the PC on which you have installed the DeltaLog12 software.
9. Start DeltaLog12, connect the PC to the instrument using the specific connection command of DeltaLog12. Follow the instructions given in the software on-line help about: network instrument management, memory download, instrument configuration, continuous measurement reading.

## 15. Backup battery replacement

The instrument is fitted with a backup battery that ensures the correct functioning of the clock even in case of mains power failure.

The battery operates only when the instrument is not powered by the mains.

**There is no control on the battery's charge status, therefore it should be replaced at least every four years.**

It is a coin BR2032 3V Lithium battery. The battery housing is located on the back of the display card.

**Before replacing the battery, turn off the instrument disconnecting the power cable.**



Instrument internal view

### Procedure

1. Separate the instrument from the mounting plate (please see the chapter "*Installation and connection*").
2. Unscrew the 6 screws on the back.
3. Lift the front from the back making sure the flat cables that connect the various instrument parts are not disconnected.
4. Extract the flat battery from its housing.
5. Put the new battery in, **making sure the polarity is correct: the negative pole is turned downwards.**
6. Close the instrument back using the 6 screws.
7. Refit the instrument on the mounting plate.

## **16. Instrument signals and faults**

The table shows the instrument error indications.

<b>Display indication</b>	<b>Explanation</b>
<b>PROB ERR</b>	This message appears if the probe SICRAM2 is disconnected or a probe with SICRAM module has been inserted when not admissible for that instrument. If the probe is disconnected, the "Prob comm lost" message is displayed in the upper line of the display.
<b>CAL LOST</b>	Program error: it appears after turning on for a few seconds. Contact the instrument's supplier.
<b>OVER</b>	Measurement overflow: it indicates that the probe is measuring a value exceeding the measuring range.
<b>ERR</b>	This message appears near the single measurement, it indicates a measurement error (faulty sensor, broken cable,...).

## **17. Functioning notes and operating security**

### **Authorized use**

Comply with the technical specifications outlined in the "*Technical characteristics*" chapter. Its use is authorized only in conformity with the instructions written in this manual. Any different use is considered improper.

### **General instructions on security**

This instrument has been manufactured and tested according to safety regulation EN 61010-1 concerning electronic measurement instruments and was delivered ex factory in perfect security conditions.

Its regular functioning and operating security can be ensured only if all the normal safety measures as well as the specifications described in this manual are complied with.

Its regular functioning and operating security can be ensured only within the climatic conditions specified in the chapter "*Technical characteristics*".

Do not use or store the instrument in ways and/or places in which there are:

- Quick environment temperature changes that could cause condensation.
- Corrosive or inflammable gases.
- Direct vibrations or shocks against the instrument.
- High intensity electromagnetic fields, static electricity.

If the instrument is moved from a cold to a hot environment or vice versa, the condensation can disturb its functioning. In this case, you need to wait for the instrument to reach the environment temperature before using it.

### **User obligations**

The user of the instrument must ensure that the following regulations and directives concerning the handling of hazardous materials are complied with:

- CEE directives on job safety
- National laws on job safety
- Accident prevention regulations

## 18. Appendix – The communication protocol

The communication parameters are common to all RS232 and RS485 ports and are:

- Baud rate: 9600 Baud,
- Parity: None,
- Data bits: 8,
- Stop bits: 2,
- Protocol: Xon-Xoff.

The serial command "KBH" allows setting the Baud rate to 57600. This choice is not permanent, upon the next power on the Baud rate is restored to 9600.

Each command sent to the instrument is preceded by the address string **AxxZ**, where xx is the address assigned to the instrument, and terminated by the Carriage Return (ASCII 0D).

When the AUX COM communication port is selected, the instrument replies to any address. This way the communication through the AUX COM can occur without setting the instrument address, for example always using the string A00Z.

The instrument only replies to commands and queries preceded by the correct address string. For example, A01ZP0 is the "Ping" to which the instrument with the address 01 has to reply with the confirmation character.

A confirmation character usually precedes the reply strings generated by the instrument (with some exceptions).

The instrument **response character** is:

"&" when in normal mode,

"\$" when in suspend mode,

"#" when in OFF-LINE mode.

For example, the command AxxZK1 receives back a string containing the performed measurement. If the string is preceded by "\$", it means the instrument is sending an old measurement, "frozen" at the moment of suspension. But some commands are not enabled or effective in OFF-LINE mode (e.g. the command K1).

If the commands are not correctly addressed, no response is obtained.

The correctly addressed commands, but wrongly formulated or illegal, get back a "?".

A detailed description of the connection to a PC is reported in the chapter "*Description of the connection to a PC*".

### 18.1. Permanent changes of the functioning mode

All commands requiring permanent changes of the functioning mode should be preceded by the request to enable modifications "**AxxZYU**", otherwise they will get back the rejection character ("?"). This includes date and time setting, logging interval, etc.

The modification enablement expires after about 8 minutes. The enablement expiration is not notified, but is renewed each time a next enablement serial command is sent. In case of doubt, you can simply place the enablement string before the desired command.

**Warning:** to prevent the internal device managing serial communication from stopping, the instrument resets it when the line is idle for **two minutes**.

It could happen that a command gets skipped because it occurred during reset. Due to this, the communication protocol should provide for command reiteration before generating a fault signal.

As the normal response latency does not exceed one second, the reiteration should occur after a two-second timeout.

**The querying of multiple instruments of a network can occur every second.**

## 18.2. Print command "K1"

The "**K1**" command starts the continuous printing of instant data, that is, not averaged over the logging interval.

You can set an automatic print interval using the **WAAx** command. (The index x defines the interval, as reported below.)

x interval index	Print interval in seconds
0	Print single request
1	1
2	2
3	5
4	10
5	20
6	60
7	120
8	240

To obtain a continuous printing you should send the two WAAx commands (with x=1, 2, 3, etc.) and then K1.

Notes:

1. In RS485 mode, the WAAx command should not be used if multiple instruments are connected on the same line.
2. The print interval index, set using WAAx, is not recorded in the permanent memory and the instrument, after turn off and turn on, restarts with the index at 0, that is, ready for single print.
3. Due to the response time limits (a query per second and maximum 5 records in 2 seconds), you should dimension the number of instruments in the network according to the update speed required by the application. For example, if an update every minute is enough, you can connect up to 60 instruments in order to get a response in "real" time.
4. The measurements obtained using the K1 command are immediate measurements, not averaged over the set interval, while the stored measurements are averaged according to the logging interval.
5. The reading of the memory is performed using the KRxxxx yyyy command. You will get the printing of pages from xxxx to yyyy inclusive.  
The RM command gives the current logging page. The most recently complete page, already available for printing, is the previous one. The system does not prevent the reading of the current page: as the instrument memory is arranged in circular mode (endless loop), the current page is partly formed by the last stored data and partly by the information stored during a previous session that have not yet been overwritten.

### 18.3. List of serial commands

Command	Response (*)	Description
DA080102030410	&	Setting the system data in the format "yymmddhhmmss", hexadecimal. It should be preceded by the YU command to enable user calibration.
FA	&070812092A2B	Reading the instrument clock date
FC	&0708120A2B02	Reading the factory calibration date
FS	&XXX	Instrument status. If the instrument is in Log mode, the first letter is L, in Print mode the second is P, if the probe is in error the third is E
G0	HD28_17T_DR	Instrument name
G1	M=Smart transmitter	Instrument type
G2	SN=12345678	Instrument serial number
G3	Firm.Ver.=01-00	Firmware version and revision
G4	Firm.Date=2008/01/31	Firmware date
G5	cal 2008/01/31 09:15:20	Calibration date and time
G6	Probe=Sicram2 RH-Pt100	Type of probe
G7	Probe SN=11119999	Probe serial number
G8	F=2008/01/02 02:33:09; U=2008/10/11 12:13:14	Probe calibration date (factory-user)
GB	User ID=0000000000000000	User code (set with T2xxxxxxxxxxxxxxxxxx)
GE	T; 0x05; 300.0; 59.5; 1.0; RH; 0x06; 39.5; -10.0; 1.0; 0xBF; 0	Characteristics of relay 1, 2, 3 The following are reported on each relay: status code (see table **), high threshold Active above, low threshold Active below, hysteresis.
GH	T; 0.0; 100.0; RH; 0.0; 100.0; Td; 0.0; 100.0	Characteristics of analog outputs 1, 2, 3
K0	&	Stop continuous printing
K1	&	Start continuous printing (single print if print interval=0)
K4	&	Start log
K5	&	Stop log
KBH		Change baud rate to 57600 (not permanent!)
KBx		Set baud rate to 9600 (any except H)
Koff	#	Enable OFF-LINE mode
Kon	#	Disable OFF-LINE mode
KRxxxx yyyy	Print	Print log from page xxxx to page yyyy
KSxx	&	Start SUSPEND mode according to xx=03...60 second interval. From the keyboard, you can increase the time to 60s or reduce it to 3s when changing the probe.
P0	&	Ping
RAA		Read print interval
RAB		Read log interval
RM		Read active page pointer (number of the page going to be written)
RX		Read 0-20 or 4-20 mode
RY		Read RS485 address
RZA		Read humidity measurement units
RZB		Read temperature measurement units

Command	Response (*)	Description
T2yyyyyyyyyyyyyyyyyy	&	Write user code. It should be preceded by the YU command to enable user calibration.
WAA <sub>n</sub>	&	Setting PRINT interval. "n" is a decimal number 1...8 that represents the position of the interval in the list 1, 2, 5, 10, ..., 240 seconds.
WAB <sub>n</sub>	&	Setting LOG interval. "n" is a decimal number 1...8 that represents the position of the interval in the list 1, 2, 5, 10, ..., 240 seconds.
WB <sub>n</sub>	&	Measurement associated to relay 1 (0=always OFF, 1=RH%, 2=AH, 3=mix ratio, 4=dew point, 5=temp, 6= TW, 9=always ON)
WC <sub>n</sub>	&	Trigger code, relay 1 (see table **)
WD <sub>nnn.n</sub>	&	High threshold "active above" value, relay 1
WE <sub>nnn.n</sub>	&	Low threshold "active below" value, relay 1
WF <sub>nnn.n</sub>	&	Hysteresis value, relay 1
WG <sub>n</sub>	&	Measurement associated to relay 2 (0=always OFF, 1=RH%, 2=AH, 3=mix ratio, 4=dew point, 5=temp, 6=TW, 9=always ON)
WH <sub>n</sub>	&	Trigger code, relay 2 (see table **)
WI <sub>nnn.n</sub>	&	High threshold "active above" value, relay 2
WJ <sub>nnn.n</sub>	&	Low threshold "active below" value, relay 2
WK <sub>nnn.n</sub>	&	Hysteresis value, relay 2
WL <sub>n</sub>	&	Trigger code, relay 3 (see table ***)
WM <sub>n</sub>	&	Trigger delay, relay 3
WN000 <sub>n</sub>	&	Measurement associated to analog output 1 (1=RH%, 2=AH, 3=mix ratio, 4=dew point, 5=temp, 6=TW)
WO <sub>nnn.n</sub>	&	Lower limit of the physical quantity corresponding to the analog output 1 bottom scale
WP <sub>nnn.n</sub>	&	Upper limit of the physical quantity corresponding to the analog output 1 top scale
WQ000 <sub>n</sub>	&	Measurement associated to analog output 2 (1=RH%, 2=AH, 3=mix ratio, 4=dew point, 5=temp, 6=TW)
WR <sub>nnn.n</sub>	&	Lower limit of the physical quantity corresponding to the analog output 2 bottom scale
WS <sub>nnn.n</sub>	&	Upper limit of the physical quantity corresponding to the analog output 2 top scale
WT <sub>n</sub>	&	Measurement associated to analog output 3 (0=RH%, 1=AH, 2=mix ratio, 3=dew point, 4=temp)
WU <sub>nnn.n</sub>	&	Lower limit of the physical quantity corresponding to the analog output 3 bottom scale
WV <sub>nnn.n</sub>	&	Upper limit of the physical quantity corresponding to the analog output 3 top scale
WW <sub>n</sub>	&	Interface selection 0=RS232, 1=RS485, 2=AUX
WX <sub>z</sub>	&	z=0 or 4, offset choice 4mA
WY <sub>xx</sub>	&	Setting instrument address. Hexadecimal number xx= 01...FA (01...250)
WZB <sub>x</sub>	&	Write temperature units: °C (x=0), °F (x=1)
YU	USER CAL MODE ON	User calibration enablement. It expires if the serial port is idle for 5 minutes or because of a wrong command.
YX	CAL MODE OFF	User calibration disablement string. Any wrong command disables user calibration.

(\*) Response & is replaced by \$ or # according to the instrument current functioning mode.

**(\*\*) Table of status codes of RL1 and RL2 relays**

Bit									
7	6	5	4	3	2	1	0		Meaning
1	1	1	1	1	1	1	1	0xFF	Force energised
0	0	0	0	0	0	0	1	0x01	Active_ below (low threshold)
0	0	0	0	0	0	1	0	0x02	Active_ above (high threshold)
0	0	0	0	0	0	1	1	0x03	Active_ on_ both (both are active)
0	0	0	0	0	0	0	0	0x00	Idle
0	0	0	0	0	1	x	x	0x04	Hysteresis
0	0	0	0	1	x	x	x	0x08	Force energised on error (please see the item ON ERROR in the menu)

**(\*\*\*) Table of status codes of RL3 relay**

Bit									
7	6	5	4	3	2	1	0		Meaning
0	1	x	x	x	x	x	x		Force de-energised
1	1	x	x	x	x	x	x		Force energised
0	0	x	x	x	x	x	1		Normally de-energised, energised on probe 1 error
1	0	x	x	x	x	x	1		Normally energised, de-energised on probe 1 error
0	0	x	x	x	x	1	0		Normally de-energised, energised on probe 2 error
1	0	x	x	x	x	1	0		Normally energised, de-energised on probe 2 error
0	0	x	x	x	x	1	1		Normally de-energised, energised on probe 1 or 2 error
1	0	x	x	x	x	1	1		Normally energised, de-energised on probe 1 or 2 error
x	x	x	x	x	1	x	x		Analog output 1 out of range
x	x	x	x	1	x	x	x		Analog output 2 out of range
x	x	x	1	x	x	x	x		Analog output 3 out of range

## 19. Technical information (@ 24Vdc and 20°C)

Inputs		
Temperature	Sensor	Pt100 Class 1/3 DIN
	Sensor working range	-50 ... +200°C (-58 ... +392°F)
Humidity	Relative humidity %RH	0 ... 100%RH
	Temperature sensor working range	-50 ... +150°C (Special configurations on request up to 180°C)
	Dew Point TD	-50 ... +100°C
	Absolute humidity	0 ... 600g/m <sup>3</sup>
	Mixing ratio	0 ... 2000g/kg of dry air
	Wet bulb temperature	-50 ... +100°C
Accuracy of the measured physical quantities	Pt100 Temperature	±0.25°C
	Relative humidity %RH	±1.5 %RH (0...90 %RH), ±2.0 %RH for the remaining range for T=15...35 °C
		± (1.5 + 1,5% of the measured value) %RH for the remaining temperature range
Accuracy of the calculated physical quantities	Please see also the tables on the next paragraph	Accuracy of the Dew Point @T=20°C ± 2°C DP (-40...-20°C DP) ±1,5°C DP (-20...0°C DP) ±1°C DP (0...20°C DP)
Response time		3min with strainer (at 20°C and 0.5m/s)

Outputs		
Communications	Type	RS232C and Multidrop RS485
	Baud rate	9600 baud 57600 baud not permanent
Physical quantities	Measured	Temperature, relative humidity
	Calculated	Absolute humidity, mixing ratio, dew point, wet bulb temperature
Analog outputs	Number	3
	Type of outputs	4...20mA; 0...20mA 0...10Vdc; 2...10Vdc
	Load resistance	Current output: 500Ω max Voltage output: 100kΩ min
	Resolution	16bit
	Accuracy of analog outputs	±0.05% f.s. @20°C
	In case of measurement error (out of functioning limits, faulty or disconnected probe,...)	Idc = 22mA Vdc = 11V
Relay	Working relay	2 x 3A/250Vac resistive load, 1 exchange contact
	Alarm relay	1 x 3A/250Vac resistive load, 1 normally open contact

<b>Instrument</b>		
Power	Versions	24Vdc / 24Vac 50...60Hz, $\pm 10\%$
	Average consumption	90 ... 240Vac 50...60Hz 3W
Datalogger	Storage capacity	9000 samples in 256 sessions max
	Type of memory	Circular memory
	Logged parameters	Temperature, relative humidity, absolute humidity, mixing ration, dew point, wet bulb temperature analog outputs 1, 2 and 3, status of relays 1, 2, 3
	Logging interval	1, 2, 5, 10, 20, 60 seconds, 2 and 4 minutes
Internal clock	Type	In real time with lithium backup battery
	Accuracy	$\pm 1\text{min/month}$
Software		DeltaLog12 for Windows® from 98
Display	Graphic, backlit	128x64 pixel
Electronics environment conditions	Functioning temperature	-20...+60°C
	Relative humidity	0...90%RH - without condensation
	Sensor working static pressure	12 bar max
	Storage temperature	-30...+80°C
Case	W x H x D	143x154x61
	Weight	600g
	Material	ABS
	Protection degree	Electronic IP65

For TC2.480.2 probe for measuring humidity in pipes, apply the above specifications with the following exceptions:

<b>S.TC2.480.2</b>		
Temperature	Measuring range	-40 ... +60°C
Humidity	Dew Point TD	-40 ... +60°C DP
Environmental conditions	Operating temperature	-40...+60°C
	Operating pressure	16 bar max

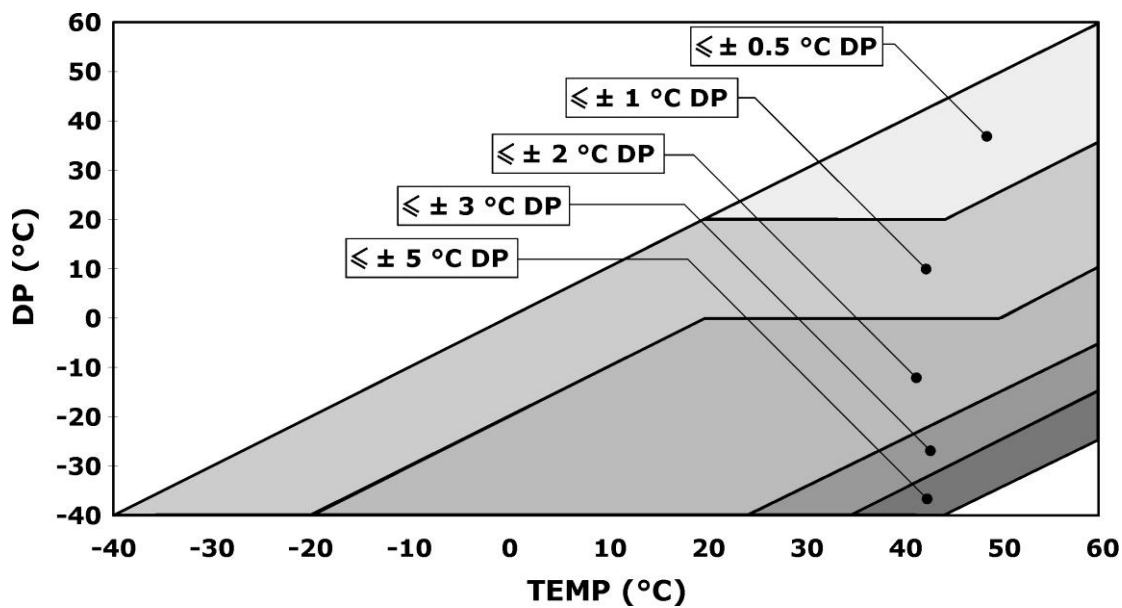
## 19.1. Accuracy of the calculated physical quantities

The accuracy of the calculated physical quantities depends on the calibration accuracy of relative humidity and temperature.

### Dew point TD accuracy (°C) expressed as a function of the relative humidity

	Relative humidity (%)					
	10	30	50	70	90	100
Temperature (°C)						
-20	0.92	0.49	0.30	0.22	--	--
0	1.05	0.56	0.35	0.25	0.20	0.18
20	1.18	0.75	0.45	0.34	0.27	0.23
50	1.27	0.88	0.56	0.42	0.33	0.30
100	1.30	1.17	0.76	0.58	0.47	0.42

### Dew point TD accuracy (°C),



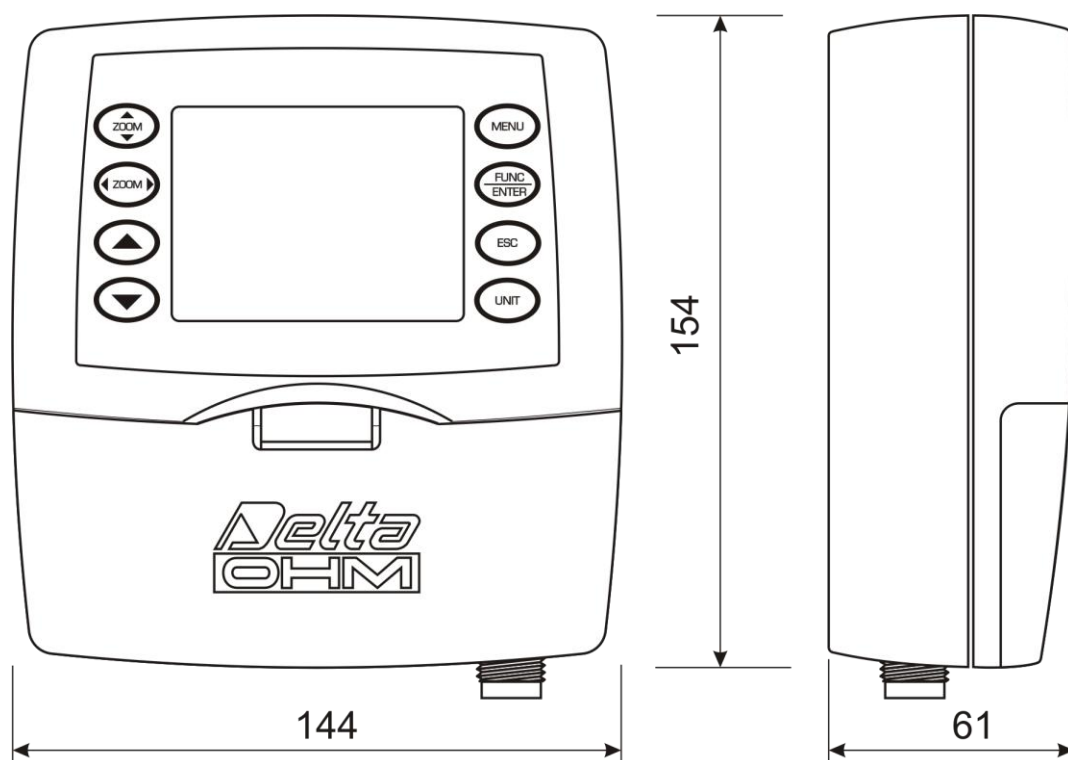
**Absolute humidity accuracy (g/m<sup>3</sup>)**

		Relative humidity (%)					
		10	30	50	70	90	100
Temperature (°C)	-20	0.015	0.020	0.025	0.030	---	---
	0	0.08	0.10	0.11	0.13	0.14	0.15
	20	0.28	0.33	0.40	0.44	0.50	0.55
	50	1.36	1.56	1.74	1.92	2.13	2.19
	100	9.37	10.2	11.3	12.3	13.2	13.5

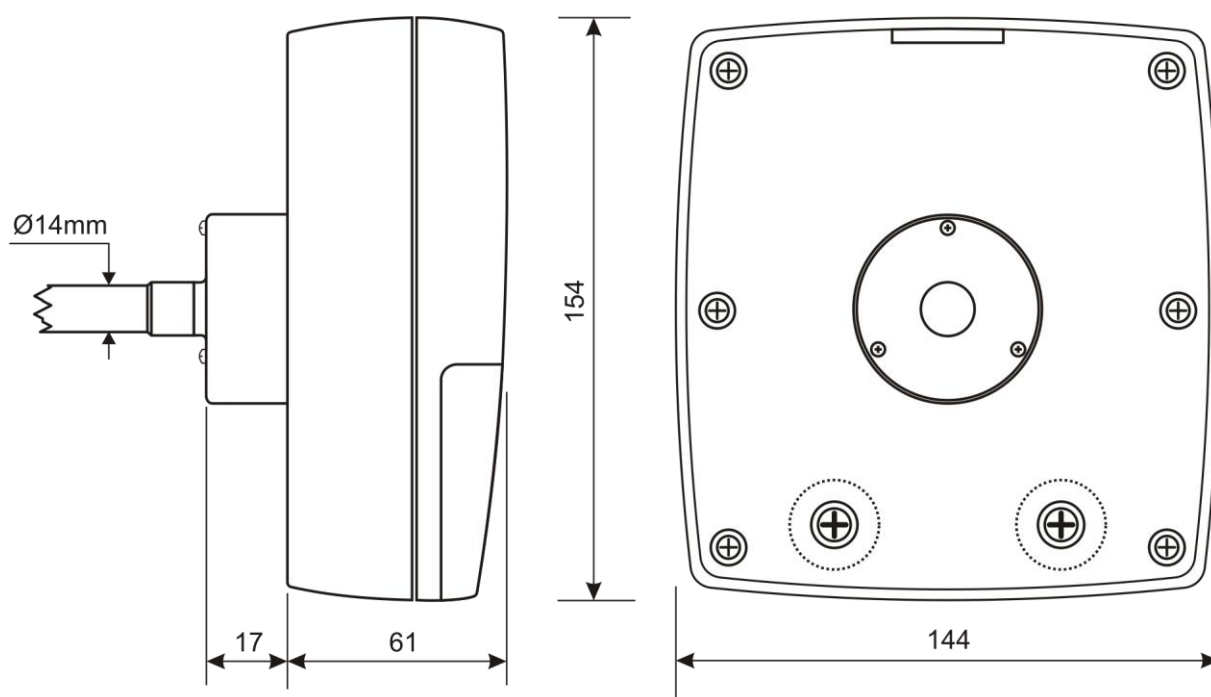
**Mixing ratio accuracy (g/kg)**

		Relative humidity (%)					
		10	30	50	70	90	100
Temperature (°C)	-20	0.014	0.017	0.020	0.024	---	---
	0	0.06	0.08	0.09	0.10	0.12	0.13
	20	0.24	0.29	0.34	0.39	0.44	0.45
	50	1.28	1.54	1.85	2.20	2.53	2.66
	100	12.5	23.2	46.2	136.0	---	---

## 20. Sizes



**HD2817T.xx versions for vertical probe or with cable**



**HD2817TO... version for horizontal probe**

## 21. Order codes

**HD2817T...** Transmitter, indicator, ON/OFF regulator, temperature and humidity datalogger. Fitted with three analog outputs: current output (0...20mA and 4...20mA), voltage output (0...10Vdc and 2...10Vdc). RS232/RS485 serial outputs for PC connection. **It uses SICRAM2** interchangeable probes with microprocessor for calibration information recording. **It displays the data on a backlit graphic display.** You can select the power supply between 24 Vac/dc or universal 90...240Vac. It includes DeltaLog12 software, user manual.

**When making the order, please specify power supply, type of probe and accessories.**

### Models with vertical probe (S.TV) or separate probe with cable (S.TC)

**HD2817T.D0** Model without relay.

**HD2817T.DR** Model with two working relays and an alarm relay, configurable.

### Models with horizontal probe (S.TO)

**HD2817TO.D0** Model without relay.

**HD2817TO.DR** Model with two working relays and an alarm relay, configurable.

### Probes with SICRAM2 module, interchangeable, for temperature and humidity, vertical S.TV or with cable S.TC

**S.TV** Vertical probe. Rod length 130mm.

The material of the S.TC... series probe can be chosen between AISI304 steel or POCAN plastic material.

**S.TC1.2** Probe with cable. Rod length 135mm, cable length 2m.

**S.TC1.2P** Probe with cable. Rod length 135mm, cable length 2m. In POCAN.

**S.TC1.5** Probe with cable. Rod length 135mm, cable length 5m.

**S.TC1.5P** Probe with cable. Rod length 135mm, cable length 5m. In POCAN.

**S.TC1.10** Probe with cable. Rod length 135mm, cable length 10m.

**S.TC1.10P** Probe with cable. Rod length 135mm, cable length 10m. In POCAN.

**S.TC2.2** Probe with cable. Rod length 335mm, cable length 2m.

**S.TC2.2P** Probe with cable. Rod length 335mm, cable length 2m. In POCAN.

**S.TC2.5** Probe with cable. Rod length 335mm, cable length 5m.

**S.TC2.5P** Probe with cable. Rod length 335mm, cable length 5m. In POCAN.

**S.TC2.10** Probe with cable. Rod length 335mm, cable length 10m.

**S.TC2.10P** Probe with cable. Rod length 335mm, cable length 10m. In POCAN.

**S.TC2.480.2** Probe with cable for the measurement of humidity in the air pipes. Cable length 2m. 1/4" Italian standard Quick-fit. Measuring chamber in AISI 304.

**Probes with SICRAM2 module, interchangeable, for temperature and humidity, horizontal S.TO**

**S.TO1** Horizontal probe for instrument HD2817TO.xx. Rod length 135mm.

**S.TO2** Horizontal probe for instrument HD2817TO.xx. Rod length 335mm.

**Accessories**

**RS27** Connection cable RS232 serial (null modem) with 9-pole female connector for PC and three-pole connector for AUX COM port.

**CP27** Connection cable / converter AUX COM port to USB.

**DeltaLog12** Further copy of the software for connection to a PC, memory download, instrument configuration, network instrument management. For Windows® from 98.

**HD75** 75%RH saturated solution to check and calibrate the relative humidity sensor, complete with ring for Ø 14mm and Ø 26mm probes.

**HD33** 33%RH saturated solution to check and calibrate the relative humidity sensor, complete with ring for Ø 14mm and Ø 26mm probes.

**HD11** 11%RH saturated solution to check and calibrate the relative humidity sensor, complete with ring for Ø 14mm and Ø 26mm probes.

**HD9008.21.1** Flange with brace, hole Ø 26mm to install S.TC probes vertically, distance from the wall 250mm. The S.TC series probes need the HD9008.26/14 adapter from Ø 26mm to Ø 14mm.

**HD9008.21.2** Flange with brace, hole Ø 26mm to install S.TC probes vertically, distance from the wall 125mm. The S.TC series probes need the HD9008.26/14 adapter from Ø 26mm to Ø 14mm.

**HD9008.26/14** Adapter from Ø 26mm to Ø 14mm for HD9008.21.1 and HD9008.21.2 braces for S.TC series probes.

**HD9008.31** Wall flange with fairlead for Ø 14mm probe mounting.

**PG16** Fairlead in AISI304 PG16 for Ø 14mm probes.

**P5** Stainless steel grid protection for probes Ø 14 mm. M12x1 thread.

**P6** 20µm sintered protection made of stainless steel for probes Ø14 mm. M12x1 thread

**P7** 10µm sintered protection made of PFTE for probes Ø 14 mm. M12x1 thread

**P8** Stainless steel grid and Poca protection for probes Ø 14 mm. M12x1 thread

**HD2817** **Tx** . **D** **x**

**Relay**

**0** = without relay

**R** = with relay

**Type of probe**

**T** = model for vertical probe or with cable (S.TV, S.TC)

**TO** = model for horizontal probe (S.TO)

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# CERTIFICATO DI CONFORMITÀ DEL COSTRUTTORE

MANUFACTURER'S CERTIFICATE OF CONFORMITY

rilasciato da  
issued by

**DELTA OHM SRL** STRUMENTI DI MISURA

**DATA**

DATE

2011/10/11

Si certifica che gli strumenti sotto riportati hanno superato positivamente tutti i test di produzione e sono conformi alle specifiche, valide alla data del test, riportate nella documentazione tecnica.

*We certify that below mentioned instruments have been tested and passed all production tests, confirming compliance with the manufacturer's published specification at the date of the test.*

Le misure effettuate presso un Laboratorio di Taratura Accredia sono garantite da una catena di riferibilità ininterrotta, che ha origine dalla taratura dei campioni di prima linea del Laboratorio presso l'istituto metrologico nazionale.

*Measurements performed in an Accredia Calibration Laboratory are guaranteed by a uninterrupted reference chain which source is the calibration of the Laboratory first line standards at the national metrological institute.*

**Tipo Prodotto:**

Product Type:

**Trasmettitore, indicatore regolatore di temperatura e umidità**

Temperature/ Humidity transmitter, indicator and regulator

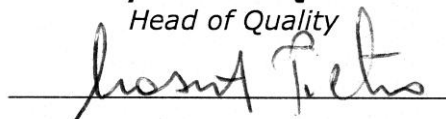
**Nome Prodotto:**

Product Name:

**HD2817T...**

**Responsabile Qualità**

Head of Quality



**DELTA OHM SRL**

**35030 Caselle di Selvazzano (PD) Italy**

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Cod. Fisc./P.Iva IT03363960281 - N.Mecc. PD044279

R.E.A. 306030 - ISC. Reg. Soc. 68037/1998

# GUARANTEE



## TERMS OF GUARANTEE

All DELTA OHM instruments are subject to accurate testing, and are guaranteed for 24 months from the date of purchase. DELTA OHM will repair or replace free of charge the parts that, within the warranty period, shall be deemed non efficient according to its own judgement. Complete replacement is excluded and no damage claims are accepted. The DELTA OHM guarantee only covers instrument repair. The guarantee is void in case of incidental breakage during transport, negligence, misuse, connection to a different voltage than that required for the appliance by the operator. Finally, a product repaired or tampered by unauthorized third parties is excluded from the guarantee. The instrument shall be returned FREE OF SHIPMENT CHARGES to your dealer. The jurisdiction of Padua applies in any dispute.



The electrical and electronic equipment marked with this symbol cannot be disposed of in public landfills. According to the UE Directive 2002/96/EC, the European users of electrical and electronic equipment can return it to the dealer or manufacturer upon purchase of a new one. The illegal disposal of electrical and electronic equipment is punished with an administrative fine.

This guarantee must be sent together with the instrument to our service centre.

IMPORTANT: Guarantee is valid only if coupon has been correctly filled in all details.

**Instrument Code:** ☐ **HD2817T**\_\_\_\_\_

**Serial number** \_\_\_\_\_

## RENEWALS

Date \_\_\_\_\_

Inspector \_\_\_\_\_

Date \_\_\_\_\_

Inspector \_\_\_\_\_

Date \_\_\_\_\_

Inspector \_\_\_\_\_

Date \_\_\_\_\_

Inspector \_\_\_\_\_

Date \_\_\_\_\_

Inspector \_\_\_\_\_

Date \_\_\_\_\_

Inspector \_\_\_\_\_



### CE CONFORMITY

Safety requirements for electrical equipment.	EN61010-1
EMC Generic standards. Immunity for industrial environments.	EN61000-6-2:2005
EMC Generic standards. Emission standards.	EN61000-6-3:2007
Electrostatic discharge immunity test.	EN61000-4-2 level 3
Radiated, radio-frequency, electromagnetic field immunity test.	EN61000-4-3 level 3
Electrical fast transient/burst immunity test.	EN61000-4-4 level 3
Immunity to conducted disturbances, induced by RF fields.	EN61000-4-6
Electromagnetic Interference - Line-conducted disturbances.	EN55022:2007 class B
Electromagnetic Interference - Radiated emissions.	IEC/CISPR 22 class B