Member of GHM GROUP

English

Operating manual

Web Data Logger

HD50 series

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TABLE OF CONTENTS

1 INTRODUCTION

The data loggers of the **HD50** series allow indoor monitoring of various physical quantities. The data loggers are available for the monitoring of:

- Temperature
- Humidity
- Atmospheric pressure
- Differential pressure
- Carbon dioxide (CO_2)
- Illuminance
- Particulate Matter (PM1.0, PM2.5, PM4.0, PM10)

The models that measure relative humidity and temperature calculate absolute humidity, Dew Point, wet bulb temperature, mixing ratio and partial vapour pressure.

Models with 4 input channels, with terminal header connections, are available for the connection of standard analog sensors:

- Transmitters with 0÷20 or 4÷20 mA current output and -50÷50 mV, 0÷50 mV, 0÷1 V or 0÷10 V voltage output
- Pt100 / Pt1000 temperature sensors and K, J, T, N, E type thermocouples
- Sensors with potentiometric output

This allows extending the monitoring capability to countless other quantities, in addition to those listed above.

The versions with LCD can be equipped with a **custom LCD** (option **L**) or with a **graphic LCD** (option **G**).

Three LEDs on the front panel indicate the status of power supply, LAN/WLAN local network connection and alarm.

The data loggers can be connected to a local network via the **Wi-Fi** or **Ethernet** interface. The data logger allows the simultaneous operation of two communication protocols: proprietary and **Modbus TCP/IP**. The data logger manages up to 10 "TCP/IP Client" simultaneously. If the local network is connected to Internet, the data can be regularly sent to an **FTP** address, to the **Cloud** and via **e-mail**.

For each detected quantity, two alarm thresholds can be set by the user. Exceeding a threshold is signaled acoustically, by means of the internal buzzer, visually, by lighting the alarm LED on the front panel, and remotely, by sending alarm **e-mails**. An alarm hysteresis and a delay in the generation of the alarm can be configured for each detected quantity.

Thanks to the integrated web server, you can configure the data logger and view the real time measurements from any PC, tablet or smartphone connected to the same local network of the data logger by simply using a web browser.

The **HD35AP-S** and **HDServer1** PC software allow configuring the data logger, downloading the data into a database and viewing the measurements. The HD35AP-S software allows connecting one data logger at a time, while the HDServer1 software allows detecting automatically all the data loggers connected to the network and the simultaneous connection to all the data loggers. The **HD35AP-CFR21** software option (available with both HD35AP-S and HDServer1) allows the protection of recorded data and configuration in response to **FDA 21 CFR part 11** recommendations.

The internal clock can be regularly synchronized with a NIST reference server.

2 DESCRIPTION

HD50G...TCV

HD50G1N4r1ZTV

HD50GH

1. LCD (custom for HD50**L**… models, graphic for HD50**G**… models).

2. Fixing flange.

3. LEDs.

4. Fixed temperature/RH probe (HD50…**TV** and HD50…**TCV** models) or M12 connector for temperature/RH probe with cable (HD50…**TC** models).

5. M12 connector for illuminance probe (only HD50…**I**… models).

6. CO_2 fixed probe (only HD50…**B**… models).

7. Differential pressure inputs (only HD50…**4r**… models). The polarity is indicated next to the inputs.

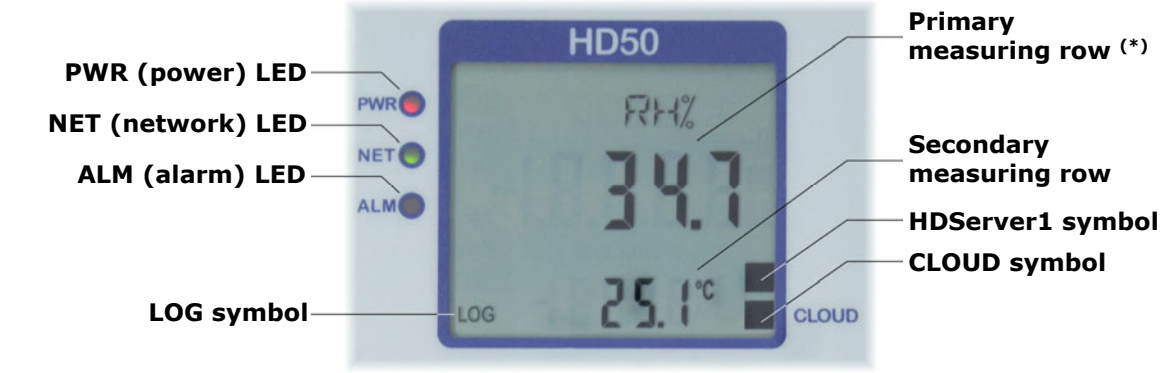
8. RJ45 connector for Ethernet connection.

9. Power supply input (terminal header for HD50…**H**, M8 connector for other models).

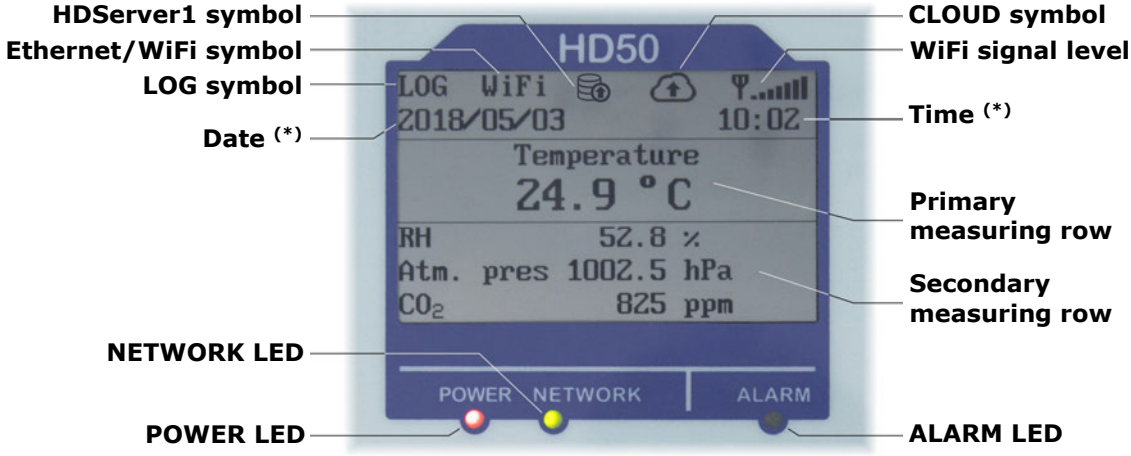
10. Terminal header inputs (only HD50…**H**).

The atmospheric pressure (only HD50…**4b**… models) and Particulate Matter (only HD50…**PM** models) sensors are internal.

DISPLAY:



Custom LCD



Graphic LCD

(*) The primary unit of measurement in the custom display and the date/time in the graphic display are replaced by the IP address of the data logger for 10 seconds every minute. The IP address is also displayed after a reset or reconfiguration of the data logger network parameters.

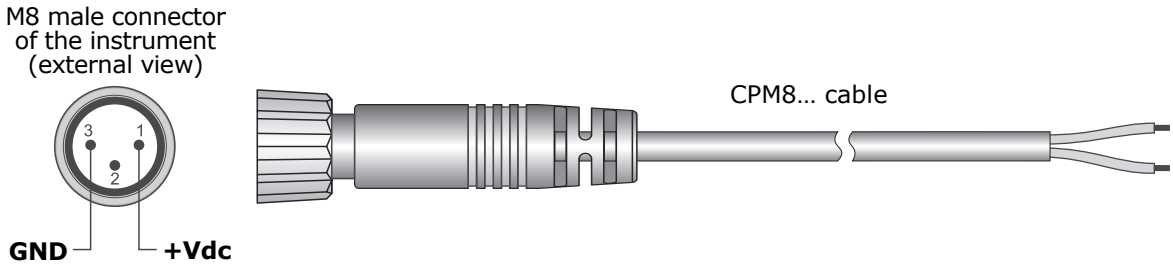
- **PRW** or **POWER** LED: indicates the presence of the external power supply.
- **NET** or **NETWORK** LED: indicates the status of the connection to the local network.
- **ALM** or **ALARM** LED: lights up when a measurement is in alarm.
- **LOG** symbol: indicates that logging is active.
- **CLOUD** symbol: indicates that the data logger is configured to send the data to the Cloud. It blinks until the connection with the server is established.
- **HDServer1** symbol: indicates that the data logger is configured to send the data to the HDServer1 software operating in a PC (server) of the local network. It blinks until the connection with the software is established.
- **Ethernet/WiFi** symbol: indicates whether the Ethernet or Wi-Fi interface is active.

3 INSTALLATION

Wall mount the instrument by using the supplied flanges.

WARNING: to the data loggers using the HP3517… T/RH probe must be connected the probe with the same serial number as the data logger (if purchased together). The replacement of the probe requires recalibration of the instrument in line with the new probe.

3.1 POWER SUPPLY M8 CONNECTOR



M8 connector	Function	Wire color
1	Power supply positive (+Vdc)	Brown
2	Not used	
3	Power supply negative (GND)	Blue

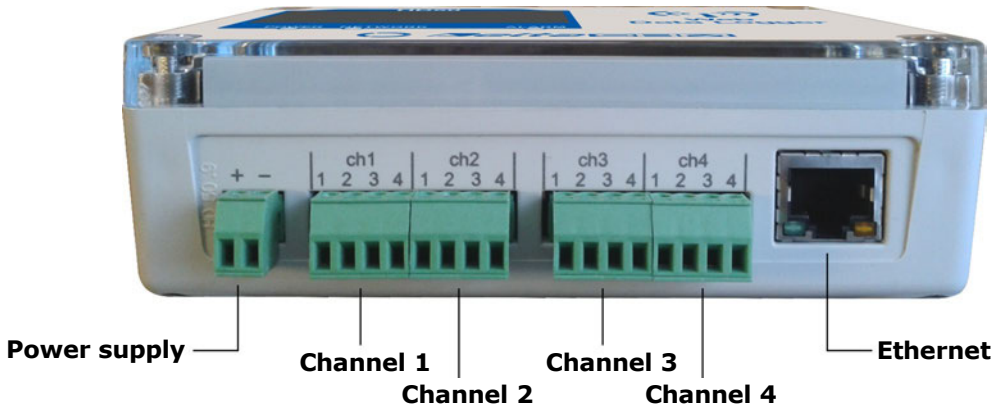
The optional **SWD10M8** power supply and **POE-SPLT12M8** PoE splitter are available.

3.2 CONFIGURATION

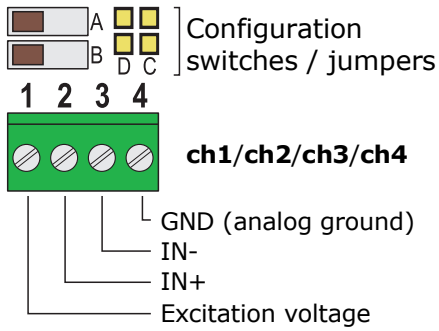
The parameters of the instrument (logging parameters, alarm thresholds, quantities to be acquired, network settings, etc.) can be configured by connecting the instrument to the PC via Ethernet or Wi-Fi local network (see chapter 4) and using the web server feature of the data logger (see chapter 5) or the HD35AP-S application software (see the instructions of the software). Some basic parameters (alarms, logging interval, user code, …) can also be set with the HDServer1 application software.

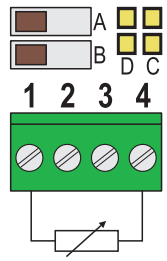
3.3 HD50GH CONNECTIONS

In the HD50GH model, each of the 4 analog inputs can be configured as a Pt100/Pt1000, thermocouple, 0/4…20 mA (the shunt resistance is inside), -50…50 mV, 0…50 mV, 0…1 V, 0…10 V or potentiometric input.

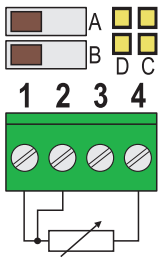


To configure an input, open the housing of the instrument by unscrewing the 4 front screws and set the two switches (A and B) and the two jumpers (C and D) located above the input terminals as shown below. Next, complete the inputs configuration using the web server feature of the data logger (see the panel *SETTINGS >> INPUTS* in paragraph 5.1) or the HD35AP-S software (see the section *Data loggers configuration >> Inputs setup* of the instructions of the software).

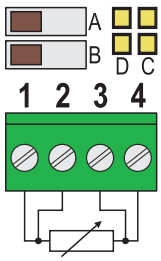




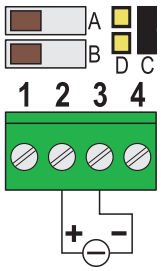
Pt100 / Pt1000
2 wires



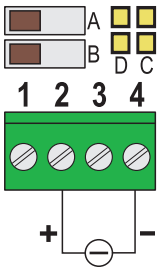
Pt100 / Pt1000
3 wires



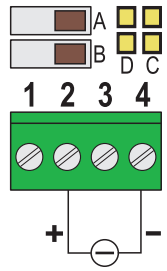
Pt100 / Pt1000
4 wires



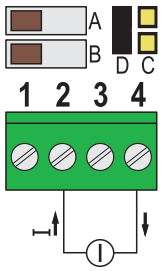
0…50 mV
-50…50 mV



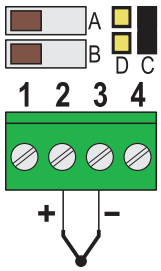
0…1 V



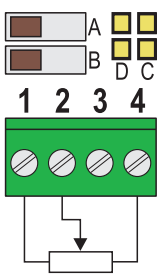
0…10 V



0…20 mA
4…20 mA



Thermocouple
K,J,T,N,E



Potentiometer

- The switches A and B are set to the right only in the configuration 0…10 V; in the other cases, the switches A and B are set to the left.
- If a channel is configured as current input, close the jumper D; in the other configurations, leave the jumper D open. The current input accepts any value in the range from 0 to 20 mA.
- If a channel is configured as -50…50 mV, 0…50 mV or thermocouple input, close the jumper C; in the other configurations, leave the jumper C open.
- The thermocouple inputs are **not** isolated. Do not connect the internal USB port when not isolated thermocouple probes are connected, to avoid ground loops.

4 CONNECTION TO THE NETWORK

The data logger can be connected to the local network via **Ethernet** (default) or **Wi-Fi** (the two interfaces are alternatives, they can not be used simultaneously).

For the Ethernet mode, connect the RJ45 connector of the data logger to a socket of the local network via a standard Ethernet cable.

The data loggers are preset to get a dynamic IP address from the network DHCP server. The data loggers with LCD display the IP address (see pag. 5). For the data loggers without LCD, the IP address can be displayed on the PC by using the **HDServer1** software, which can automatically detect the data loggers connected to the network. A static IP address can be set by using the web server feature of the data logger (see chapter 5) or the HD35AP-S application software.

To connect the data logger to a Wi-Fi network, you must first change the setting of the data logger interface by connecting the data logger to the PC via Ethernet and using the web server feature of the data logger (see the panel *CONNECTIVITY >> NETWORK* in paragraph 5.3) or the HD35AP-S software. Alternatively, connect the data logger to the PC via USB through the internal mini-USB connector (open the housing of the instrument by unscrewing the 4 front screws, the mini-USB connector is located to the right of the display) and use the HD35AP-S software.

The data logger can be accessed from any PC of the local network. To download the data in a database, the **HD35AP-S** (it allows connecting one data logger at a time) or **HDServer1** (it allows connecting several data loggers simultaneously) application software and the **MySQL** database management system (included in the HD35AP-S and HDServer1 software packages) must be installed.

Thanks to the availability of two TCP/IP virtual ports, each of which can operate with proprietary (for the connection with HD35AP-S software) or **MODBUS TCP/IP** protocol, and ten sockets (in total, to be divided between the two ports), the data logger allows the simultaneous operation of two communication protocols (proprietary and Modbus TCP/IP) and manages up to **10 "TCP/IP Client"** simultaneously. The default setting of the ports is the following:

- Port number = 5100 for proprietary protocol (8 sockets)
- Port number = 502 for Modbus TCP/IP protocol (2 sockets)

If the local network is connected to Internet, the data can be regularly sent to an **FTP** address, to the **Cloud** and via **e-mail** (as attachments).

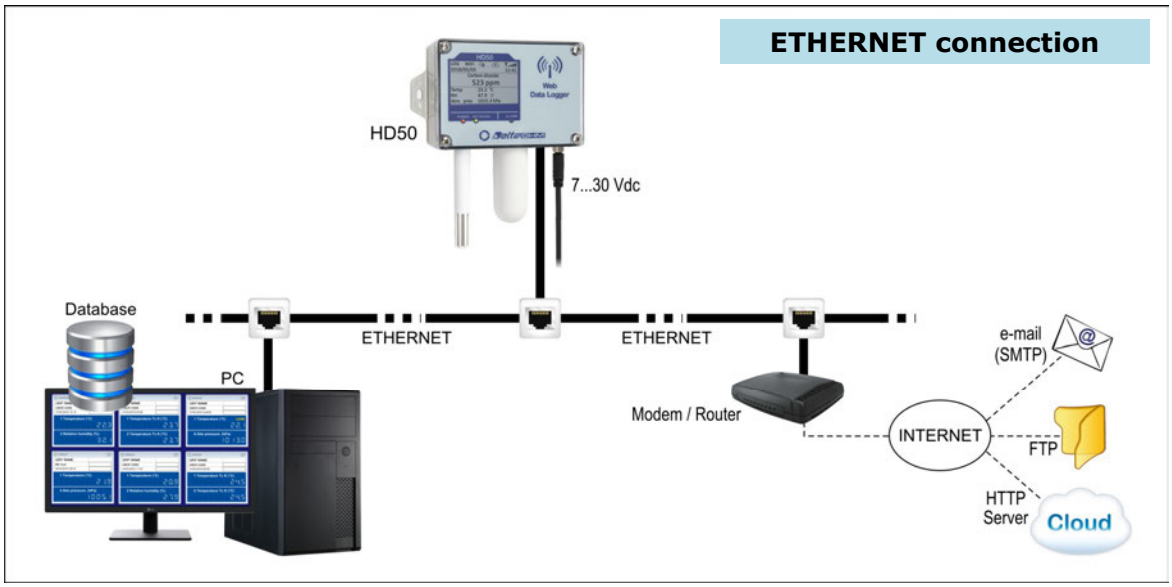
Note: if the communication with the Cloud is used, the maximum number of "clients" with proprietary or **MODBUS TCP/IP** protocol is nine.

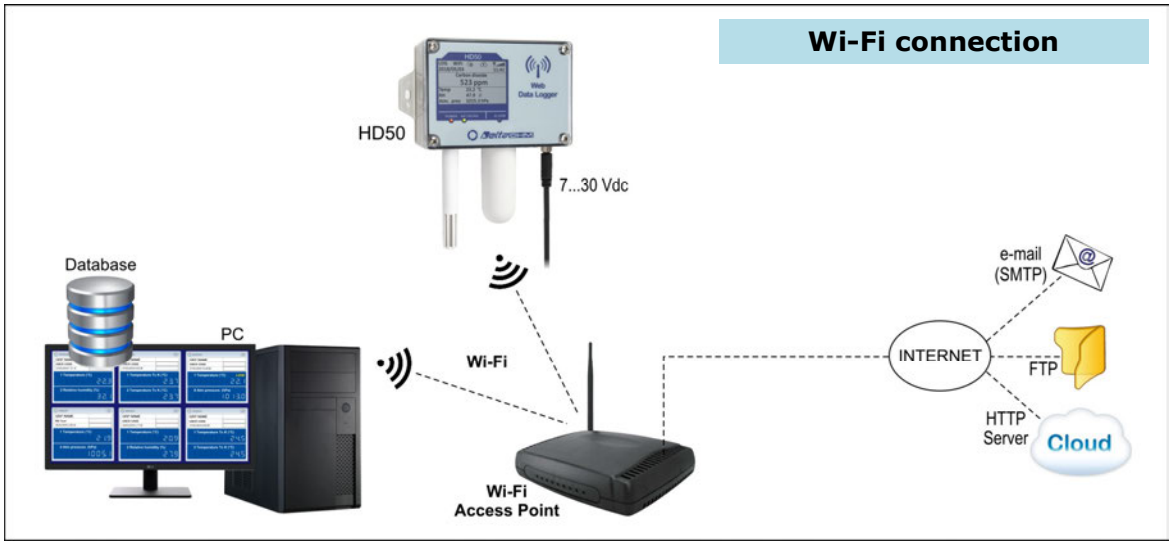
To configure the TCP/IP ports and the sending of data over the Internet, use the web server feature of the data logger (see chapter 5) or the HD35AP-S software.

Restoring the factory LAN/WLAN configuration:

It is always possible to restore the default LAN/WLAN settings by following these steps:

1) Open the housing of the instrument by unscrewing the 4 front screws.
2) Place the short jumper over the NET RST push-button (to the left of the display) between the "2" and "3" indications.
3) Press the NET RST push-button.
4) After the reset, replace the short jumper between the "2" and "1 (NORMAL)" indications.





4.1 HD35AP-CFR21 SOFTWARE OPTION

The **HD35AP-CFR21** option allows, in addition to the features of the basic software (both HD35AP-S and HDServer1), the protection of recorded data and instrument configuration in response to **FDA 21 CFR part 11** recommendations. In particular become available:

- The traceability of activities (Audit Trail) performed with the software; for example, which users connected and what changes were possibly made to the configuration of the instrument.
- The management of users access for the instrument configuration and viewing of data in the database. Each user can be assigned a different password for using the software. There are also three levels of access (Administrator, Super-user and standard User); for each level, the allowed operations can be defined.

The HD35AP-CFR21 option works with USB hardware key to be connected to any PC connected to the same local network of the PC in which the basic software is installed.

Note: if the HD35AP-CFR21 option is used, the data logger integrated web server allows viewing measurements and configuration, but not the modification of the data logger configuration, because the settings changed via web server cannot be traced.

5 WEB SERVER

The data logger has an integrated web server through which you can configure the data logger and view the real time measurements from any PC, tablet or smartphone connected to the same local network of the data logger by simply using a web browser.

To connect to the web server, type the IP address of the data logger in the address bar of the web browser of your device (PC, tablet, smartphone, …).

Note: the data loggers with LCD display the IP address (see pag. 5); for the data loggers without LCD, the IP address can be displayed on the PC by using the **HDServer1** software, which can automatically detect the data loggers connected to the network.

Note: if a port number other than the standard HTTP (80) has been set in the data logger, the port number must be specified after the IP address (*IPaddress:port number*).

In the web server starting window, enter the user name and the password supplied with the data logger, then press *Submit*.

Structure of the web server menu:

SETTINGS	
INFO	Data logger general information
CONFIGURATION	Modbus address, user code and belonging group
MEASURES	Selection of the quantities to be displayed
LOGGING	Logging settings
ALARMS	Alarm thresholds and hysteresis
UNITS	Units of measurement
CHANNELS/INPUTS	Selection of the quantities to be displayed with the Monitor function (except HD50GH) or configuration of the input channels (only HD50GH)
MONITOR	
MEASURES	Display of the real time measurements
CHART	Graphs of the measurements acquired by the Monitor function
SETUP	Settings of the graphs of the measurements
TABLE	Numeric table of the measurements acquired by the Monitor function
CONNECTIVITY	
NETWORK	LAN/WLAN settings(Wi-Fi or Ethernet choice, IP address, etc.)
WIFI	List of the Wi-Fi networks to which the data logger connects
EMAIL	Settings for sending e-mails
FTP	Settings for sending data via FTP
CLOUD	Settings for sending data to the Cloud
SERVER	Settings for the connection with the HDServer1 software
CLOCK	Setting of the automatic clock synchronization
FILES	
LOAD	Import of data files
CHART	Graphs of imported measurements
SETUP	Settings of the graphs of imported measurements
TABLE	Numeric table of imported measurements

5.1 SETTINGS MENU

The SETTINGS menu allows viewing the data logger general information and configuring the Modbus address, the user code, the belonging group, the logging parameters, the alarms and the units of measurement. It also allows choosing the measurements to be stored in the internal memory and displayed in real time (Monitor) and in what order.

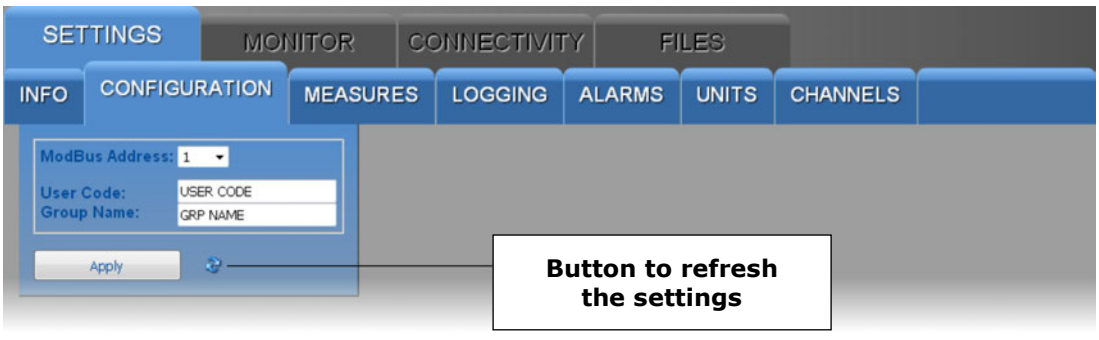
- **INFO panel**

Displays the general information of the instrument:

- model, serial number
- user code
- belonging group
- Wi-Fi signal level (only if the Wi-Fi interface is active)
- behaviour when the internal memory is full (cyclic overwriting or not)
- logging status
- buzzer activation status
- Modbus address, firmware version
- logging interval
- measurement interval
- calibration date

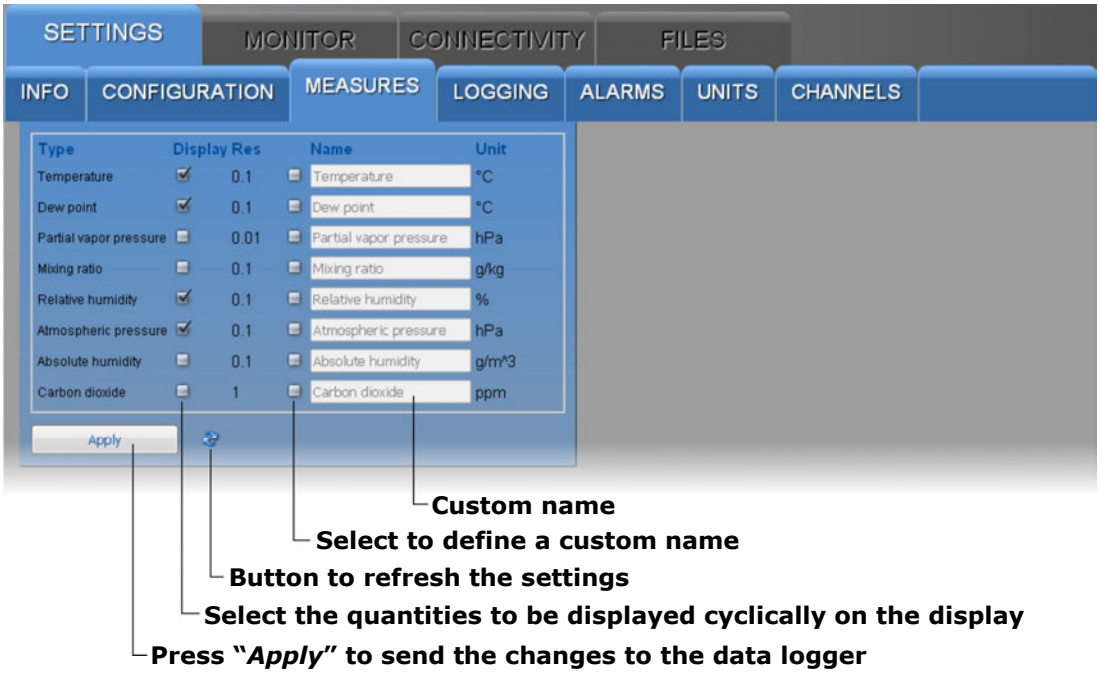
- **CONFIGURATION panel**

Setting of Modbus address, user code and belonging group (defining a group is useful for identifying subsets of devices, for example the devices installed in the same environment). Press "*Apply*" to send the changes to the data logger.



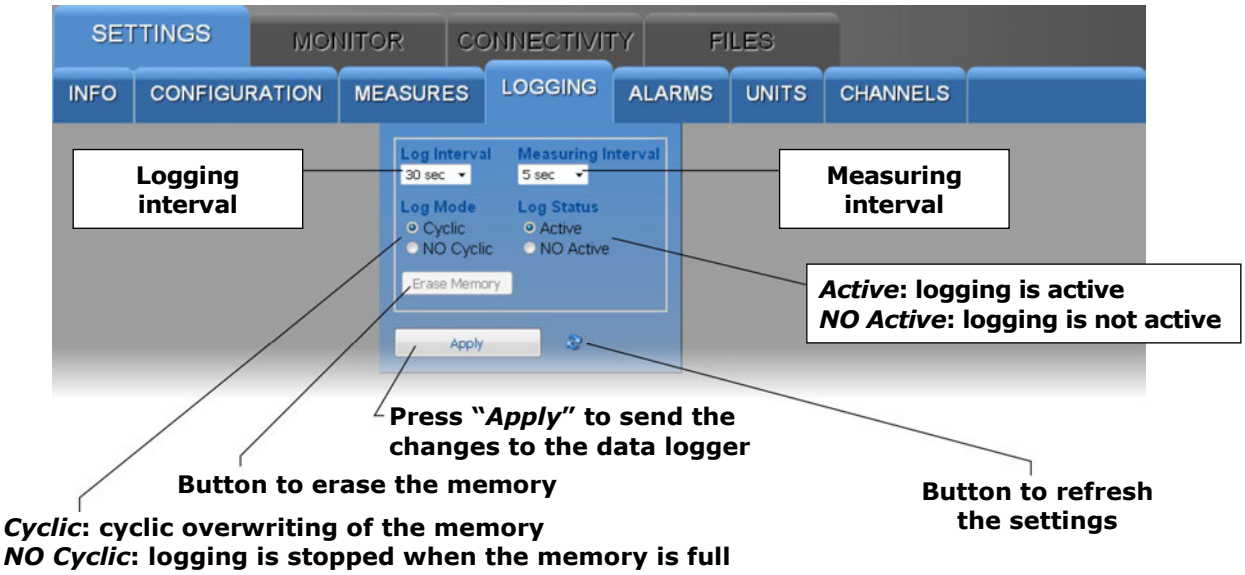
• **MEASURES panel**

Selection of the quantities to be displayed cyclically on the data logger display. For each quantity, a custom name can be defined. In the panel, the resolution and the unit of measurement of each quantity are also indicated. The quantities available depend on the data logger model type.



• **LOGGING panel**

Setting of logging interval, measuring interval, logging status (active or not active), memory management mode when it is full (cyclic overwriting or stop logging).

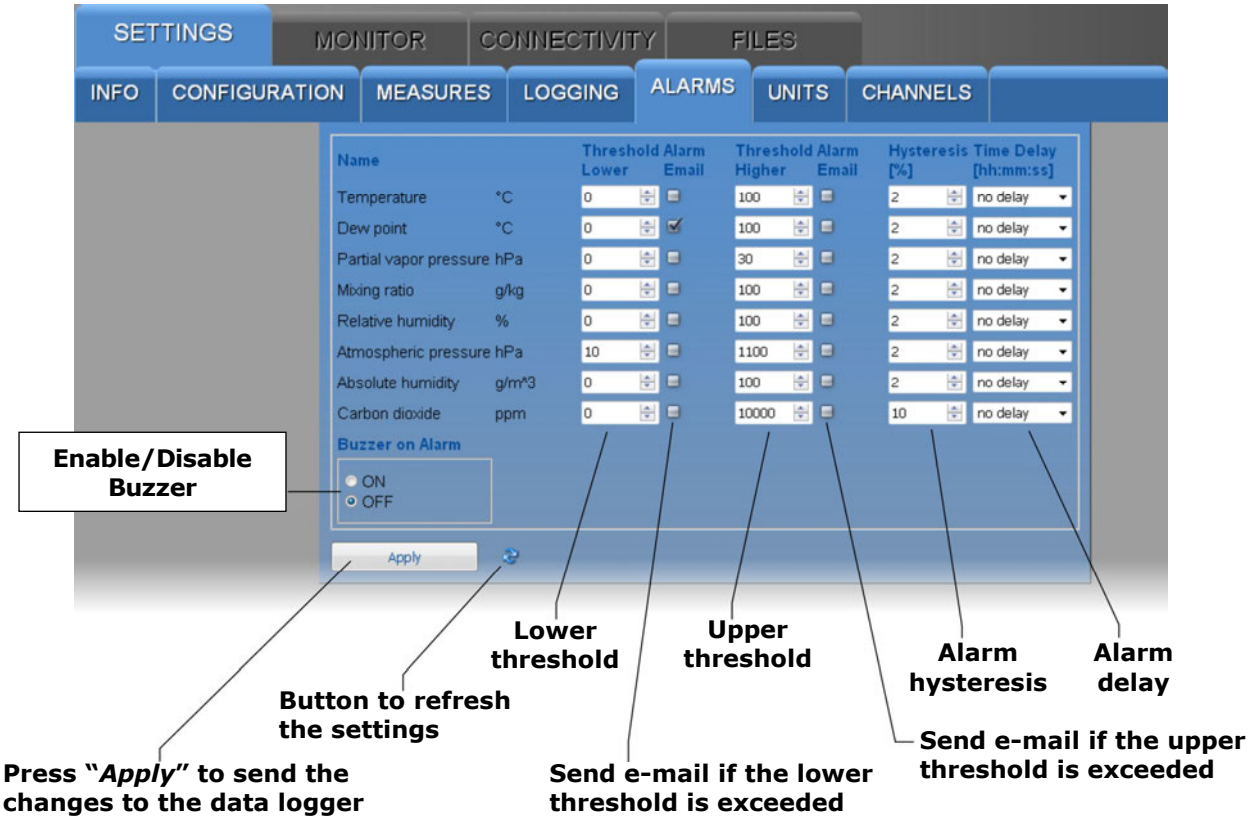


If the logging interval is greater than the measuring interval, the average of the measurements acquired during the logging interval will be stored.

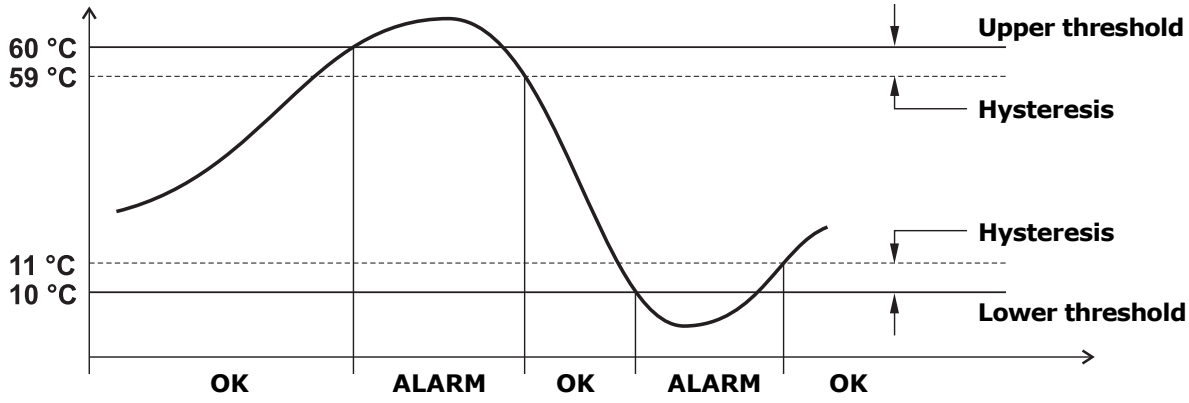
The "*Erase Memory*" button allows erasing the data in the data logger memory.

• **ALARMS panel**

Setting of the alarm thresholds for each of the available quantities. The alarm is generated if the measured value falls below the lower threshold or rises above the upper threshold. The hysteresis and the delay time of the alarm can be configured.



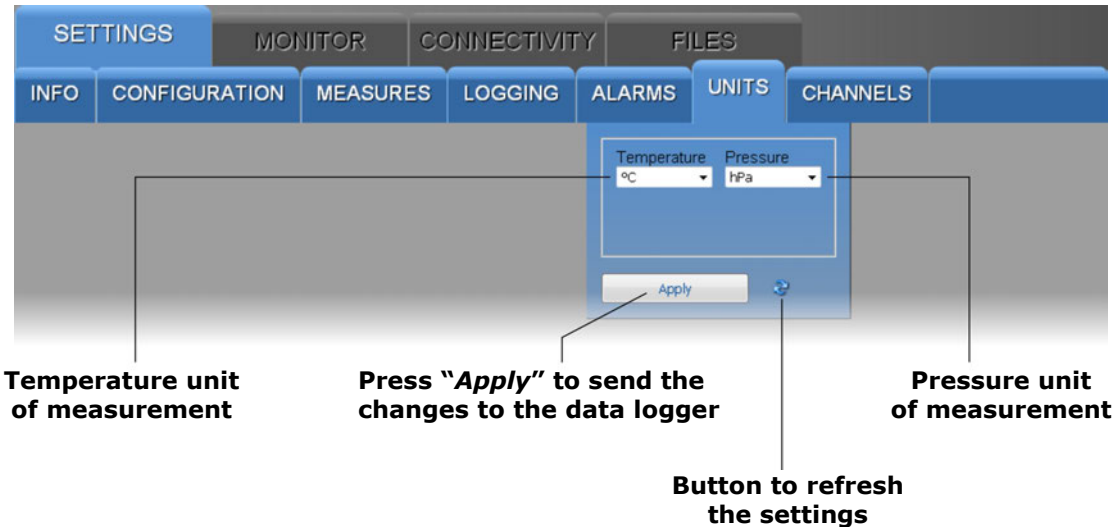
The amplitude of the hysteresis is in percentage (0...100%) of the difference between the two alarm thresholds. For example, if the hysteresis is 2%, the lower threshold is 10 °C and the upper threshold is 60 °C, the hysteresis in °C is equal to (60-10)x2/100= 1 °C.



The alarm is generated after the set delay time (or immediately if the "*no delay*" option is selected). If the alarm condition disappears before the delay time has elapsed, the alarm is not generated.

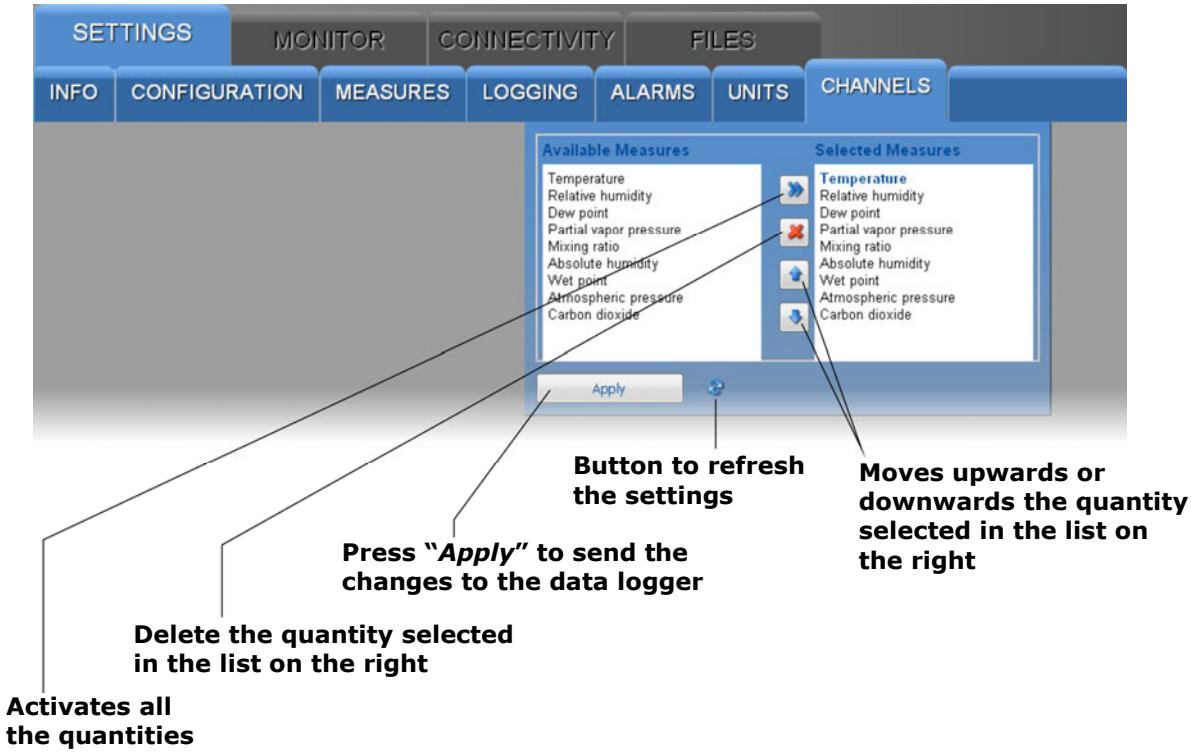
• **UNITS panel**

Setting of the temperature (°C or °F) and pressure (mbar, bar, Pa, hPa, kPa, atm, mmHg, mmH_2O, inHg, inH_2O, kgf/cm^2 or PSI) units of measurement.



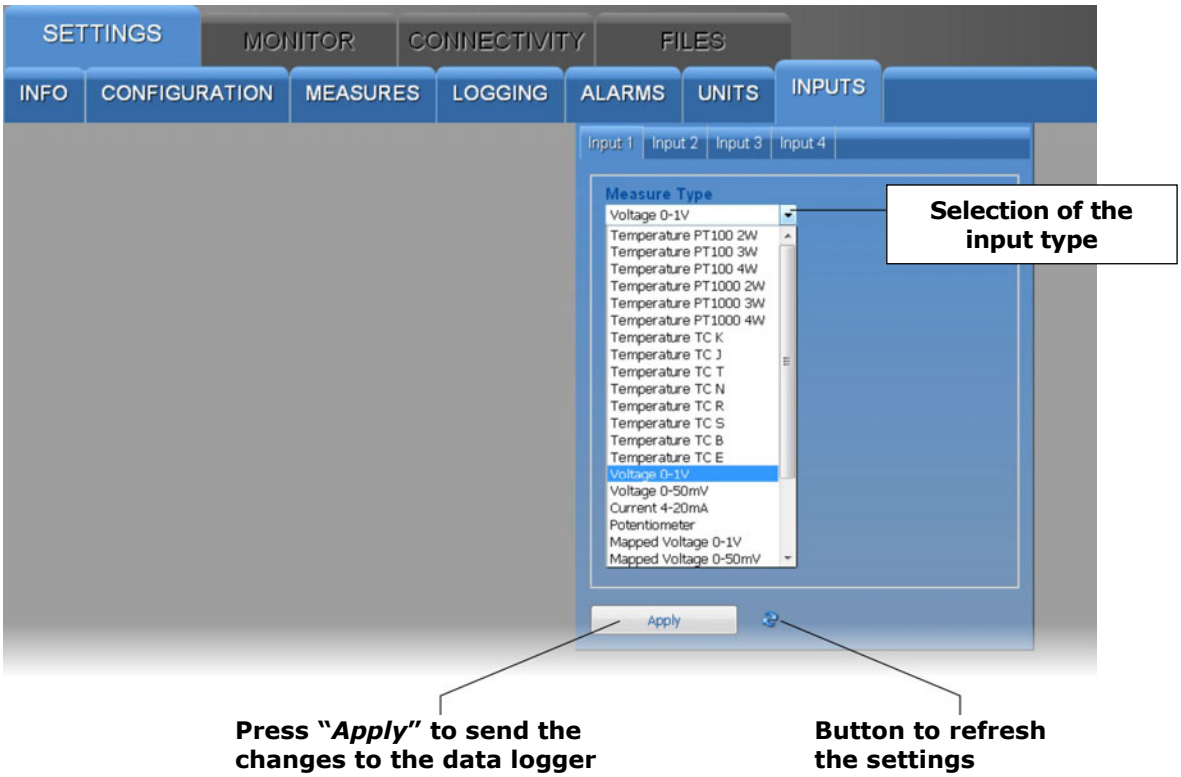
• **CHANNELS panel** (not present in HD50GH model)

Allows choosing the measurements to be stored in the internal memory and displayed in real time with the Monitor function and in what order. The panel has two lists: the quantities available (to the left) and the quantities to be displayed (to the right). The quantities are displayed in the order in which they appear in the list on the right.



• **INPUTS panel** (present only in HD50GH model)

Allows configuring the inputs of the HD50GH model. For each of the four inputs (Input 1, Input 2, Input 3, Input 4) select the input type.



The available input types are:

- *Temperature PT100 …*: Pt100 sensor (2W=2 wires, 3W=3 wires, 4W=4 wires)
- *Temperature PT1000 …*: Pt1000 sensor (2W=2 wires, 3W=3 wires, 4W=4 wires)
- *Temperature TC …*: thermocouple (K, J, T, N, R, S, B or E type)
- *Voltage 0-1V*: 0…1 V voltage input
- *Voltage 0-50mV*: 0…50 mV voltage input
- *Current 4-20mA*: 4…20 mA current input
- *Potentiometer*: potentiometric input
- *Mapped Voltage 0-1V*: 0…1 V voltage input with associated physical quantity
- *Mapped Voltage 0-50mV*: 0…50 mV voltage input with associated physical quantity
- *Mapped Current 4-20mA*: 4…20 mA current input with associated physical quantity
- *Mapped Potentiometer*: potentiometric input with associated physical quantity
- *Voltage 0-10V*: 0…10 V voltage input
- *Mapped Voltage 0-10V*: 0…10 V voltage input with associated physical quantity
- *Voltage -50-50mV*: -50…50 mV voltage input
- *Mapped Voltage -50-50mV*: -50…50 mV voltage input with associated physical quantity

If the input is not used, select *Not Defined* (last option of the list).

Note: select *Current 4-20mA* or *Mapped Current 4-20mA* also for 0…20 mA input signals.

If a *Mapped* input type is selected, additional fields appear to define the correspondence between the input signal and a physical quantity.

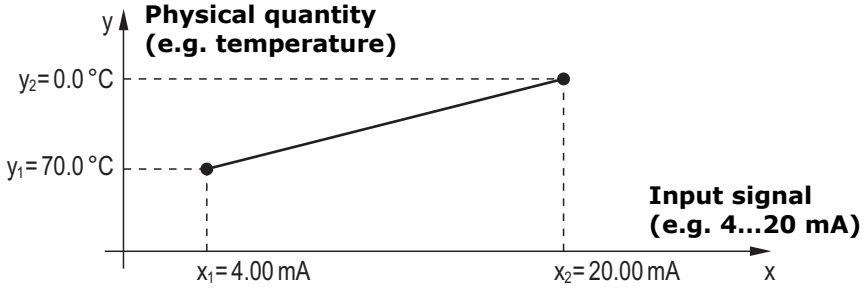
Select the unit of measurement and the resolution of the physical quantity associated to the input. Enter in the fields *X1*, *X2*, *Y1* and *Y2* the coordinates of the linear relation between the input signal and the physical quantity:

X1 = value of input signal in the first point (e.g. 4.00 mA)

Y1 = value of the physical quantity corresponding to the input value X1 (e.g. 0.0 °C)

X2 = value of input signal in the second point (e.g. 20.00 mA)

Y2 = value of the physical quantity corresponding to the input value X2 (e.g. 70.0 °C)



Press the key *Set* to apply to the measure an offset equal to the opposite of the currently measured value (the current measure becomes equal to zero). Press the key *Clear* to cancel the applied offset.

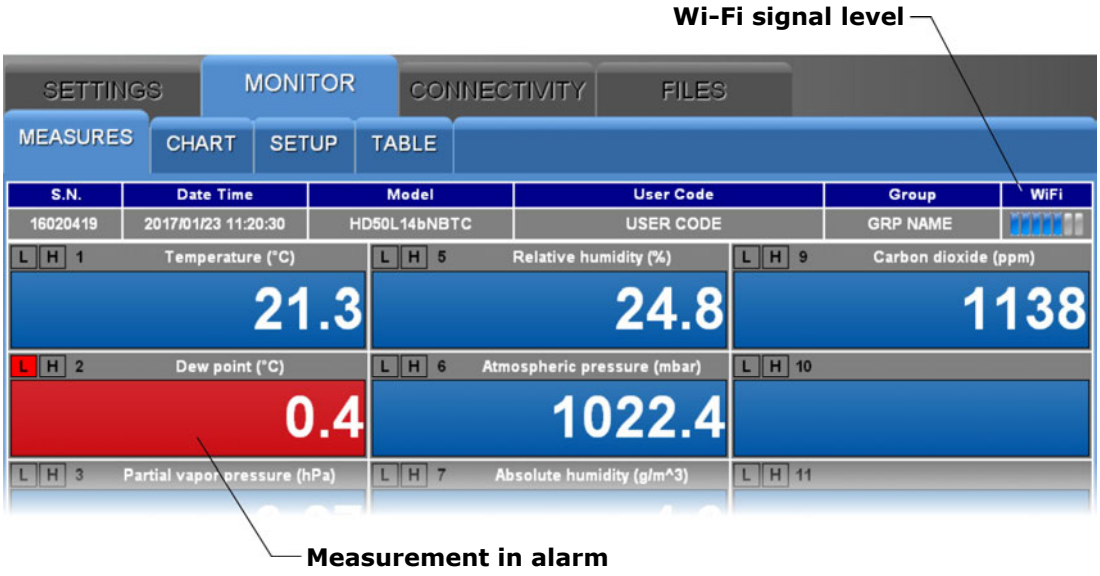
If a *Mapped* input type is selected, the data logger doesn't store the input value in V or mA, but the corresponding value of the physical quantity associated to the input.

5.2 MONITOR MENU

The MONITOR menu allows viewing the real time measurements, both in graphic and table form. The measurements and the corresponding date/time are updated at intervals equal to the logging interval. The measurements acquired by the Monitor function can be saved in a log file and exported in CSV format.

- **MEASURES panel**

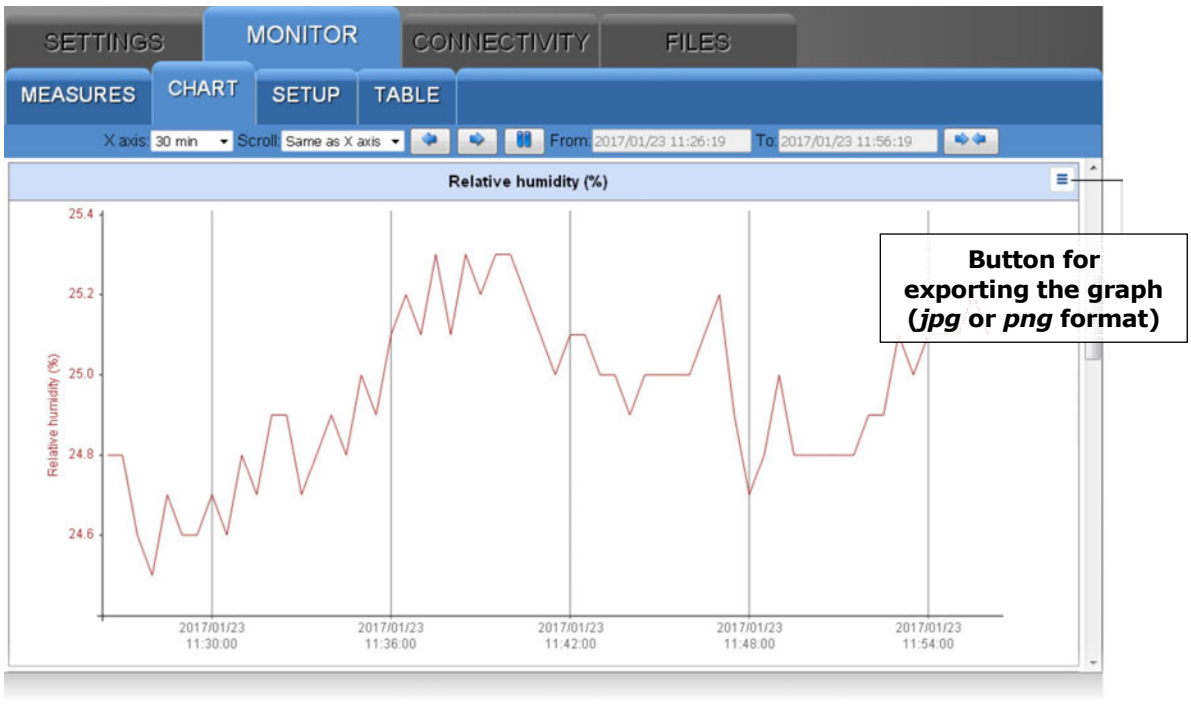
Displays the current value of the quantities (only those selected for logging).

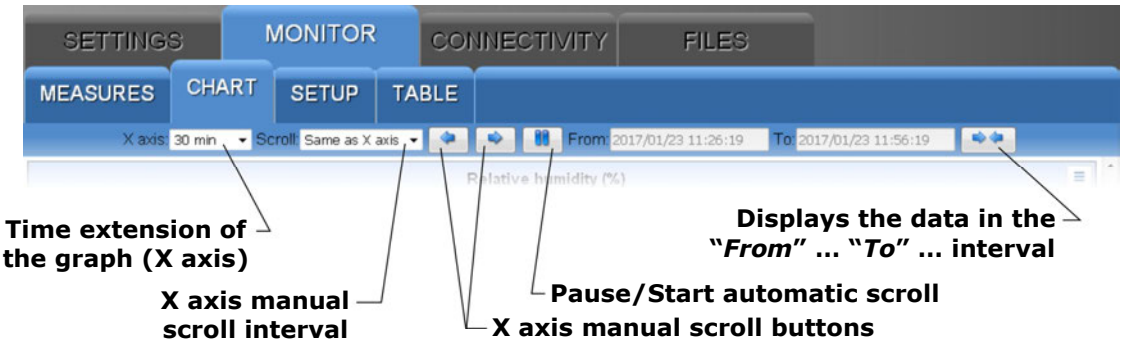


The measurements in alarm are highlighted with a red background. The **L** and **H** symbols indicate whether the lower (L) or higher (H) threshold has been exceeded.

- **CHART panel**

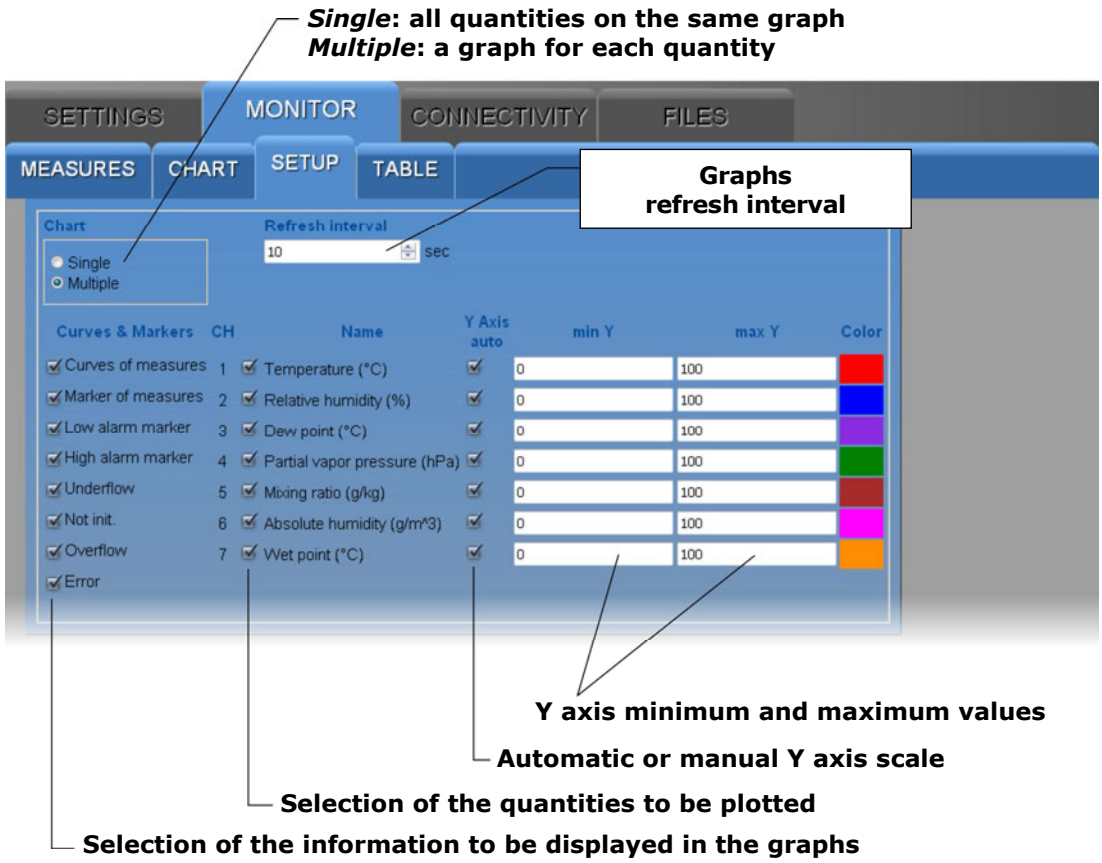
Displays the graphs of the measurements acquired by the Monitor function. The quantities can be displayed on the same graph or in separate graphs (see the SETUP panel).





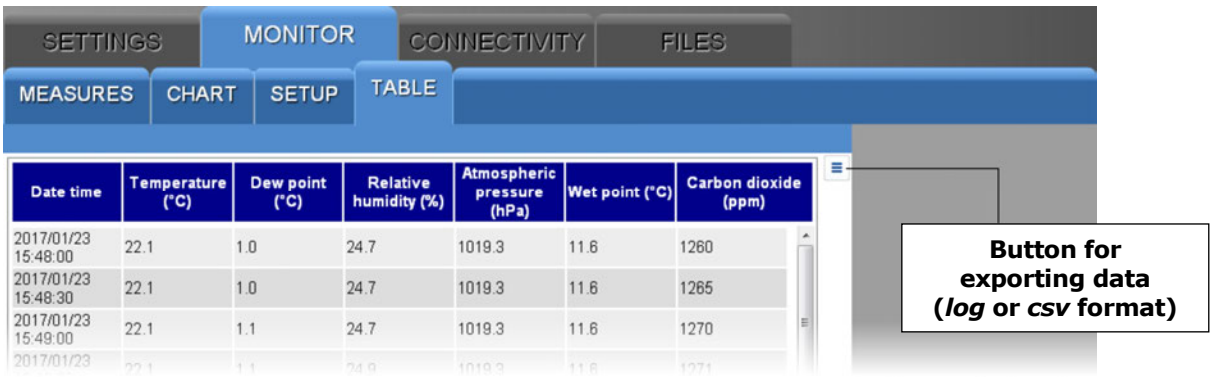
• SETUP panel

Setting of the quantities and information to be displayed in the graphs.



• TABLE panel

Displays in numerical form the measurements acquired by the Monitor function.

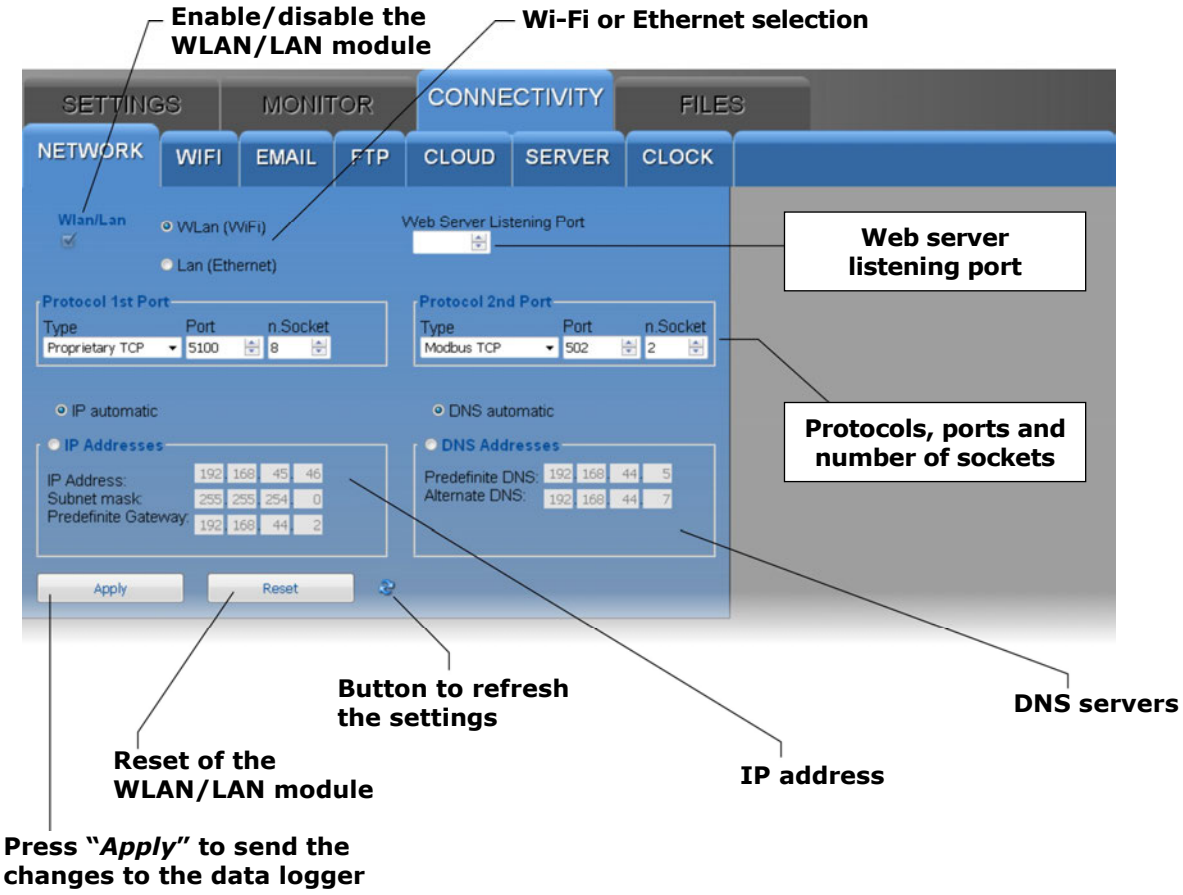


5.3 CONNECTIVITY MENU

The CONNECTIVITY menu allows configuring the network (Wi-Fi or Ethernet) and the sending of data via e-mail, FTP or to the Cloud (if the network has an Internet connection). It also allows setting the automatic clock synchronization and the time zone.

• NETWORK panel

Setting of the network interface type (Wi-Fi or Ethernet), of the protocols, of the TCP/IP ports, of the IP address and of the DNS server address.



Note: if the data logger IP address is changed, the new address must be entered in the web browser to connect to the web server.

If a port number other than the standard HTTP (80) is set as web server listening port, the port number must be specified after the IP address in the web browser. For example, if 40 is set as listening port number of a data logger with IP address 192.168.1.2, in the web browser you need to type 192.168.1.2:40.

The WLAN/LAN module has two TCP/IP ports. For each of the two ports, set the following:

- the *protocol* : select *Proprietary TCP* (proprietary protocol) or *Modbus TCP*.
- the *port number* : the numbers set by default are 5100 for the proprietary protocol and 502 for the Modbus TCP/IP protocol.
- the *number of sockets* of the port : the number of sockets corresponds to the maximum number of connections that can be active at the same time through the port. In total **there are 10 sockets to be divided between the two ports** (for example, if 8 sockets are assigned to the first port, the second port can have a maximum of 2 sockets).

Note: if the communication with the Cloud is used, the maximum number of "clients" with proprietary or **MODBUS TCP/IP** protocol is nine.

Note: actually, the number of MODBUS TCP/IP connections that can be active at the same time is equal to the set number of sockets less one, because a socket is always kept free to accept new connection requests (if all the sockets are active, the socket corresponding to the oldest request is released when a new connection is accepted).

WARNING: if the WLAN/LAN module configuration is changed, the new settings are not immediately activated, but only after the reset of the module. To immediately activate the new settings, press *Reset*.

Enter the IP address manually (**static IP** address) or select "*IP automatic*" to obtain the address automatically (**dynamic IP** address) via DHCP protocol (Dynamic Host Configuration Protocol).

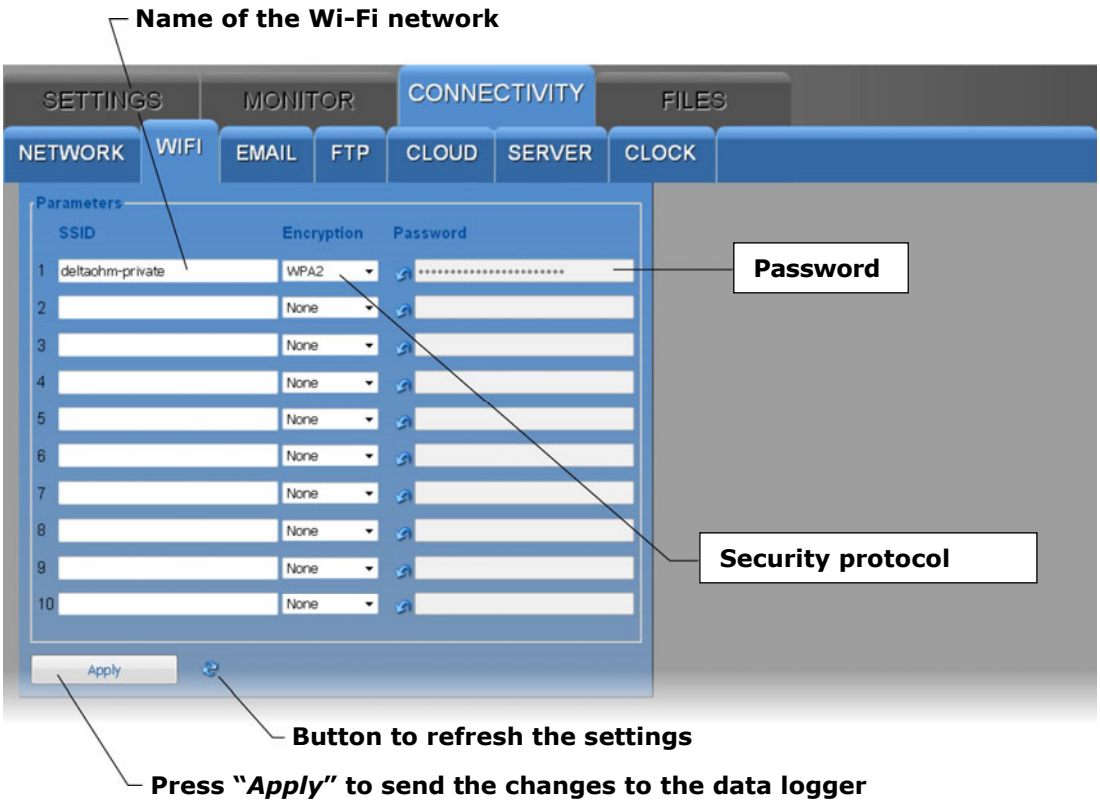
Note: it is suggested to use a static IP for the communication with the HD35AP-S software, with a web browser or via MODBUS TCP/IP protocol, because the client devices (PC, PLC, …) do not automatically detect any changes in the IP address of the data logger.

Similarly, select whether to manually enter the addresses of the **DNS** (Domain Name System) **servers** or obtain the server address automatically.

To set the properties in the NETWORK panel you should consult the local network administrator.

• WIFI panel

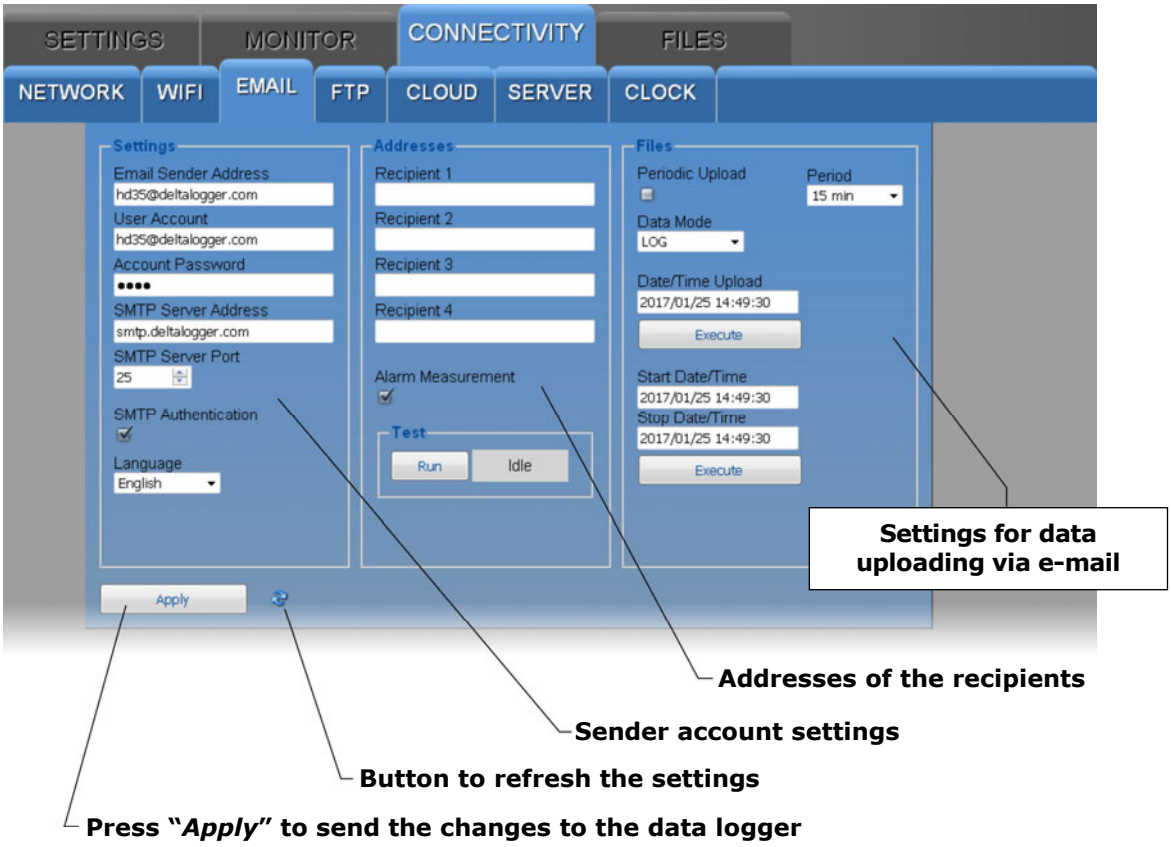
List of the Wi-Fi networks to which the data logger connects. For each network, the network name (SSID), the security protocol (WEP64, WEP128, WAP, WAP2 or none) and the password to access the network must be entered.



• **EMAIL panel**

Setting of the e-mail account used to send data and alarms via e-mail, of the e-mail adresses of the recipients and of the e-mail data uploading modes.

The data can be sent automatically at regular intervals or you can manually request the data memorized within a determined interval of time. The data can be uploaded in *LOG* (for entering in the database and displaying with the Monitor function of the web server) and/or *CSV* (for importing in Excel®) format.



The *Settings* section of the EMAIL panel consists of the following fields:

- *Email Sender Address* : enter the e-mail address of the account that will be used to send the e-mails, that address is what will appear as the sender of the e-mails sent to the recipients.
- *User Account* : enter the user name of the account.
- *Account Password* : enter the password of the account.
- *SMTP Server Address* : enter the outgoing mail server name supplied by your e-mail service provider.
- *SMTP Server Port* : enter the outgoing mail server port number supplied by your e-mail service provider (standard=25).
- *SMTP Authentication* : select the checkbox in order to authenticate e-mails sent.
- *Language* : select the language to be used for sending e-mails.

In the *Addresses* section of the EMAIL panel enter the e-mail addresses of the recipients (*Recipient 1, 2, 3* and *4*). To enable the sending of alarm e-mails, select the *Alarm Measurement* check box. Press the *Run* key to send a test e-mail to the entered recipients; the box next to the *Run* key displays the progress of the test and the final result.

In the *Files* section of the EMAIL panel:

- Select the *Periodic Upload* check box to enable the periodic sending of data via e-mail, then choose the data sending interval in the *Period* field. The available intervals are: 15 min, 30 min, 1 hour, 2 hours, 4 hours, 8 hours, 12 hours, 1 day, 2 days, 4 days, 1 week.
- In the *Data Mode* field, select the format of the data sent via e-mail (*LOG*=format for the database and displaying with the Monitor function of the web server, *CSV*=format for Excel®).
- To require the sending via e-mail of all the data memorized subsequently to a given instant, indicate the instant in the *Date/Time Upload* field and press *Execute*.
- To require the sending via e-mail of all data memorized in a determined interval of time, indicate the interval starting instant in the *Start Date/Time* field and the interval ending instant in the *Stop Date/Time* field, then press *Execute*.

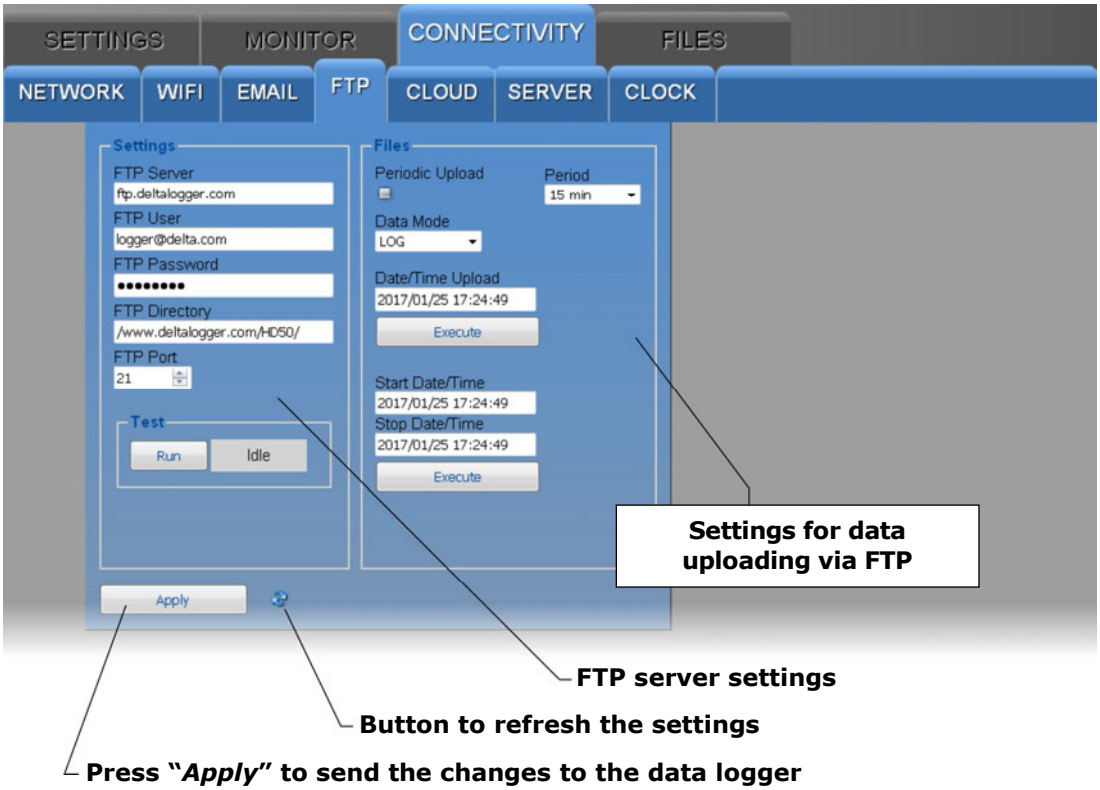
***Note*: sending e-mail and MODBUS TCP/IP communication are mutually exclusive activities. The e-mails are not sent if a MODBUS TCP/IP communication is active.**

***Note*: only SMTP protocol is supported and not SMTPs (SMTP over SSL/TLS).**

• FTP panel

Setting of the FTP server and of the FTP data uploading modes.

The data can be sent automatically at regular intervals or you can manually request the data memorized within a determined interval of time. The data can be uploaded in *LOG* (for entering in the database and displaying with the Monitor function of the web server) and/or *CSV* (for importing in Excel®) format.



The *Settings* section of the FTP panel consists of the following fields:

- *FTP Server* : enter the FTP server name supplied by the service provider.
- *FTP User* : enter the user name to access the FTP service.
- *FTP Password* : enter the password for the FTP service.
- *FTP Directory* : enter the path of the folder in the FTP server where the files coming from the data logger will be transferred.
- *FTP Port* : enter the FTP server port number supplied by the service provider (standard=21).

Press the *Run* key to send a test file via FTP; the box next to the *Run* key displays the progress of the test and the final result.

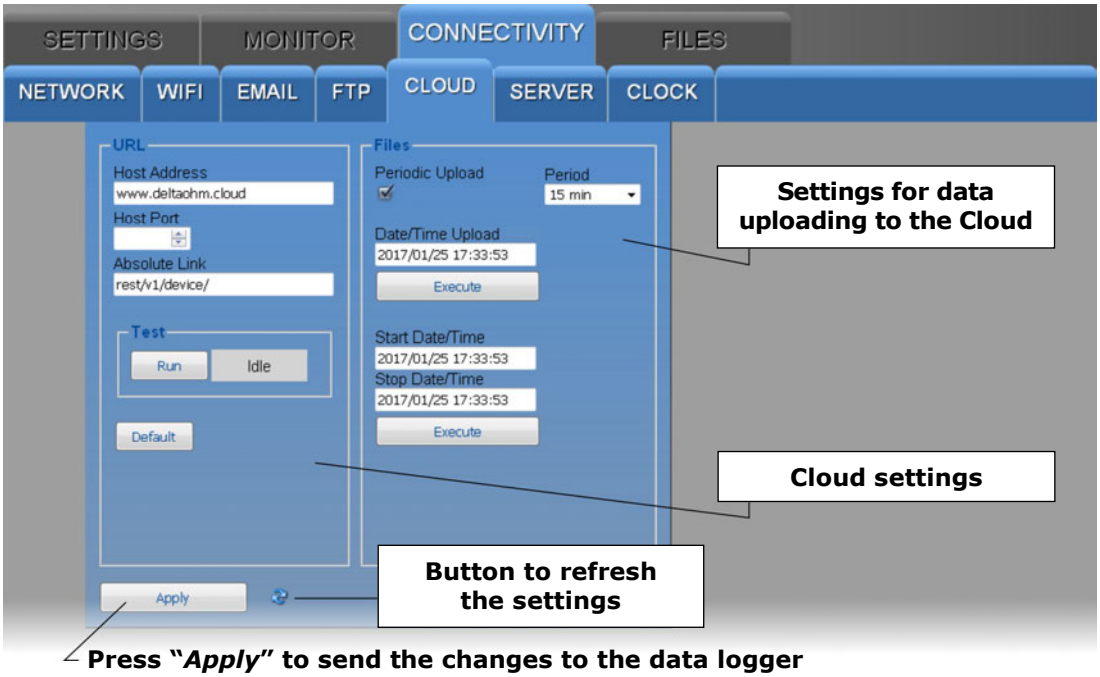
In the *Files* section of the FTP panel:

- Select the *Periodic Upload* check box to enable the periodic sending of data via FTP, then choose the data sending interval in the *Period* field. The available options are: Real Time, 15 min, 30 min, 1 hour, 2 hours, 4 hours, 8 hours, 12 hours, 1 day, 2 days, 4 days, 1 week.
- In the *Data Mode* field, select the format of the data sent via FTP (*LOG*=format for the database and displaying with the Monitor function of the web server, *CSV*=format for Excel®).
- To require the sending via FTP of all the data memorized subsequently to a given instant, indicate the instant in the *Date/Time Upload* field and press *Execute*.
- To require the sending via FTP of all data memorized in a determined interval of time, indicate the interval starting instant in the *Start Date/Time* field and the interval ending instant in the *Stop Date/Time* field, then press *Execute*.

• CLOUD panel

Setting of the Cloud and of the Cloud data uploading modes.

The data can be uploaded to the Cloud automatically at regular intervals or you can manually request the data memorized within a determined interval of time. The data are sent using the Cloud Delta OHM protocol.



The *URL* section of the CLOUD panel consists of the following fields:

- *Host Address* : enter the Cloud name supplied by the service provider (for ex. "www.deltaohm.cloud").
- *Host Port* : enter the server port number supplied by the service provider (if the standard HTTP port 80 is used, it is not necessary to indicate it).
- *Absolute Link* : enter the path in the server where the data coming from the data logger will be uploaded.

Press the *Run* key to test the sending of data to the Cloud; the box next to the *Run* key displays the progress of the test and the final result.

The *Default* key restores the factory settings for the Cloud.

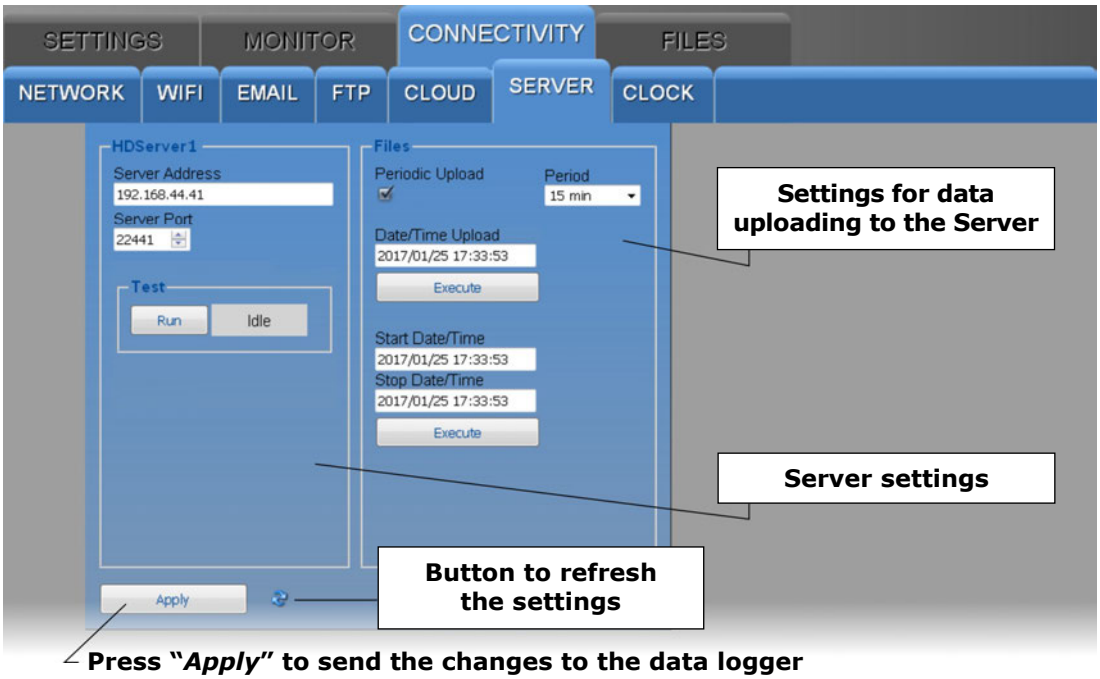
In the *Files* section of the CLOUD panel:

- Select the *Periodic Upload* check box to enable the periodic sending of data to the Cloud, then choose the data sending interval in the *Period* field. The available options are: Real Time, 15 min, 30 min, 1 hour, 2 hours, 4 hours, 8 hours, 12 hours, 1 day, 2 days, 4 days, 1 week.
- To require the sending to the Cloud of all the data memorized subsequently to a given instant, indicate the instant in the *Date/Time Upload* field and press *Execute*.
- To require the sending to the Cloud of all data memorized in a determined interval of time, indicate the interval starting instant in the *Start Date/Time* field and the interval ending instant in the *Stop Date/Time* field, then press *Execute*

• SERVER panel

Setting of the IP address of the PC in which the server function of the **HDServer1** software is active and to which the data can be sent for storage into the database.

The data can be uploaded to the server automatically at regular intervals or you can manually request the data memorized within a determined interval of time.



The *HDServer1* section of the SERVER panel consists of the following fields:

- *Server Address* : enter the IP address of the PC in which the server function of the HDServer1 software is active.
- *Server Port* : enter the port number of the PC in which the server function of the HDServer1 software is active.

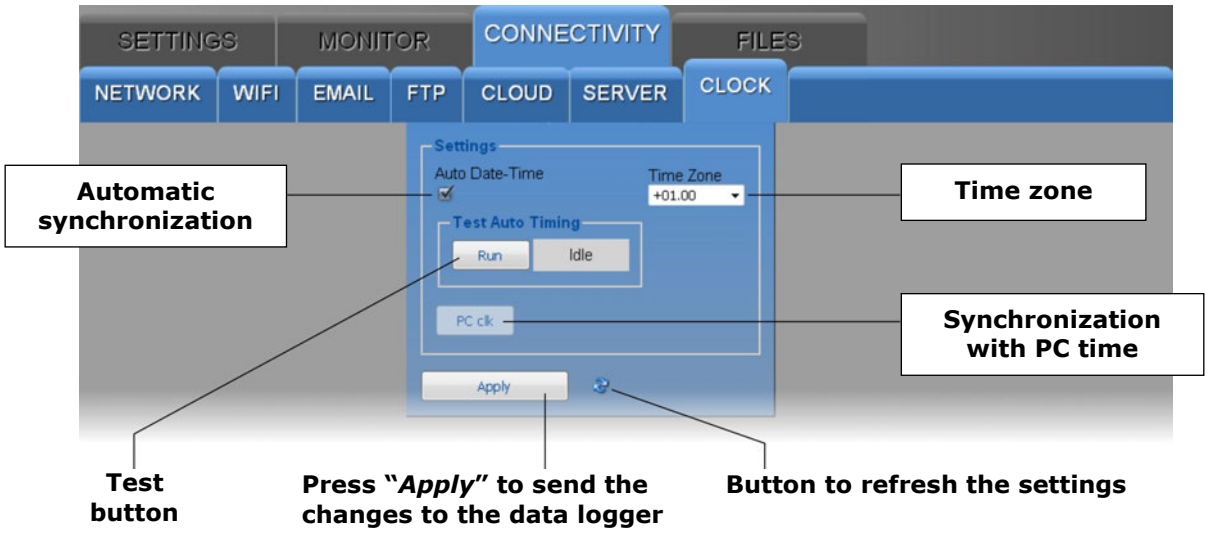
Press the *Run* key to test the communication with the HDServer1 software; the box next to the *Run* key displays the progress of the test and the final result.

In the *Files* section of the SERVER panel:

- Select the *Periodic Upload* check box to enable the periodic sending of data to the HDServer1 software, then choose the data sending interval in the *Period* field. The available options are: Real Time, 15 min, 30 min, 1 hour, 2 hours, 4 hours, 8 hours, 12 hours, 1 day, 2 days, 4 days, 1 week.
- To require the sending to the HDServer1 software of all the data memorized subsequently to a given instant, indicate the instant in the *Date/Time Upload* field and press *Execute*.
- To require the sending to the HDServer1 software of all data memorized in a determined interval of time, indicate the interval starting instant in the *Start Date/Time* field and the interval ending instant in the *Stop Date/Time* field, then press *Execute*

• CLOCK panel

Setting of clock synchronization and time zone.



Select the *Automatic Date-Time* check box to keep the clock synchronized with a NIST reference server (if the data logger is connected to the Wi-Fi or Ethernet local network and the Internet connection is available). Press the *Run* key to check the automatic synchronization; the box next to the *Run* key displays the progress of the test and the final result.

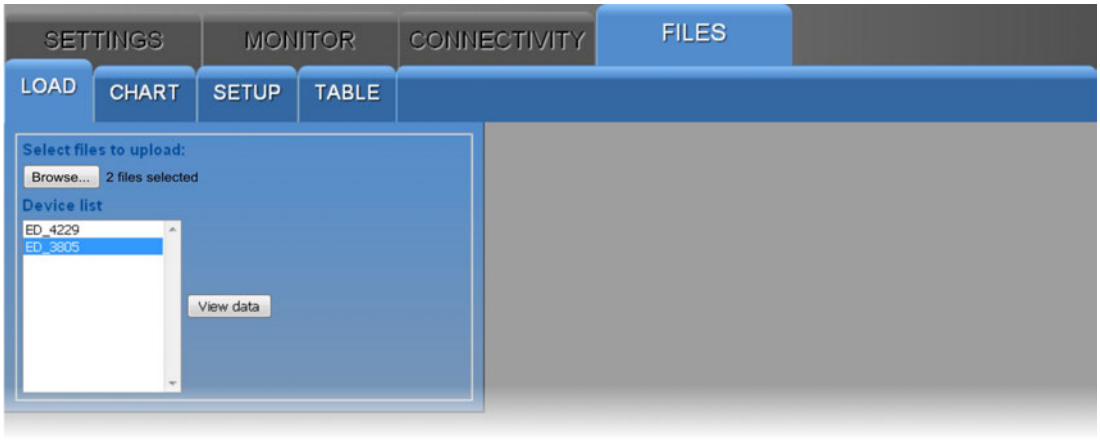
To set the clock with the PC date and time, deselect the *Automatic Date-Time* check box and press the *PC clk* key.

5.4 FILES MENU

The FILES menu allows importing and viewing the files with the data sent by the data logger via e-mail and/or FTP, or the data acquired in the past with the MONITOR function of the web server and saved in the PC, tablet or smartphone.

• LOAD panel

Select the files with the data to be imported.



Press the *Browse…* key and select the files to be imported (multiple files can be selected). The data loggers corresponding to the imported files appear in the *Device list*: select a data logger and press *View data* to display the data.

• CHART panel

Displays the graphs of the imported measurements. See the CHART panel of the MONITOR menu.

• SETUP panel

Setting of the quantities and information to be displayed in the graphs of the imported measurements. See the SETUP panel of the MONITOR menu.

• TABLE panel

Displays numerically the imported measurements. See the TABLE panel of the MONITOR menu.

6 MODBUS

The device general information can be read through the function code **0x2B/0x0E**:

- Manufacturer (Delta OHM)
- Model
- Firmware version

The complete list of MODBUS registers is shown below. According to the device model, some of the listed registers could not be present if not significant for that particular model (e.g., CO_2 measurement will not be available if it is not measured by the data logger). If you try to read a register that is not present, the instrument returns the fixed value 32767. In case of doubt on the registers actually available in a particular model, use the function " *Download the list of MODBUS registers of the device* " included in the *Settings* sections of HD35AP-S software (see software instructions).

The following conventions have been used in the tables:

- Type: **b** = bit, **B** = 8 bits (Byte), **W** = 16 bits without sign (Word), **SW** = 16 bits with sign
- **(x10)** = decimal value expressed as an integer (e.g., if the content of the register is 184, the value is to be intended as 18,4).
- **(x100)** = centesimal value expressed as an integer (e.g., if the content of the register is 500, the value is to be intended as 5,00).

The commands for requesting units of measurement return an index according to the correspondence indicated in the table below:

Indexes of the units of measurement

Index	Unit of meas.	Index	Unit of meas.	Index	Unit of meas.	Index	Unit of meas.	Index	Unit of meas.
0	°C	14	inchH_2O	28	V	42	inch/h	56	µmol/(m^2s)
1	°F	15	kgf/cm^2	29	mV	43	counts/h	57	mm/day
2	%UR	16	PSI	30	mA	44	mW/m^2	58	kV
3	g/m^3	17	m/s	31	ppm	45	m	59	A
4	g/kg	18	km/h	32	Hz	46	s	60	kA
5	mbar	19	ft/s	33	%	47	µW/lumen	61	cm/s
6	bar	20	mph	34	degrees	48	dB	62	klux
7	Pa	21	knot	35	lux	49	dBA	63	m^3
8	hPa	22	W/m^2	36	m^2/s	50	kWh	64	g/m^2s
9	kPa	23	µW/cm^2	37	g (*)	51	l/s	65	µg/m^3
10	atm	24	Wh/m^2	38	mm	52	l/min	66	µm
11	mmHg	25	kWh/m^2	39	inch	53	gallon/min		
12	mmH_2O	26	J/m^2	40	counts	54	m^3/min		
13	inchHg	27	µJ/cm^2	41	mm/h	55	m^3/h	255	Not defined

(*) Gravity acceleration

Discrete Inputs - Read-only parameters

Address	Type	Discrete Input description
7	b	If 1, at least a quantity is in alarm.

Coils - Read/Write parameters

Address	Type	Coil description
1	b	Logging status: 0=active, 1=inactive
2	b	Logging mode: 0=non cyclic, 1=cyclic
3	b	Set 1 to delete the device logging memory. Bit zeroing is automatic.
4	b	Buzzer activation in case of measurement alarm: 0=no, 1=yes
9	b	Protection of configuration with password: 0=no, 1=yes Changing the parameter requires the Administrator password (see Holding Register 10036).
71	b	Type of calibration in use: 0=factory, 1=user
72	b	Set 1 to perform the differential pressure calibration at zero. Bit zeroing is automatic.
73	b	Differential pressure self-calibration status: 0=off, 1=on

Input Registers - Read-only parameters

Address	Type	Input Register description
Measured values and status of measurement alarms		
0	SW	**TEMPERATURE** with **NTC10K** sensor of channel **1** in the set measurement unit (x10).
1	B	Alarm for temperature with NTC10K sensor of channel 1: 0=OFF, 1= lower threshold alarm, 2= higher threshold alarm
2	SW	**RELATIVE HUMIDITY** in % (x10).
3	B	Relative humidity alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
4	SW	**DEW POINT** in the set measurement unit (x10).
5	B	Dew Point alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
6	SW	**PARTIAL VAPOR PRESSURE** in hPa (x100).
7	B	Partial vapor pressure alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
8	SW	**MIXING RATIO** in g/Kg (x10).
9	B	Mixing ratio alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
10	SW	**ABSOLUTE HUMIDITY** in g/m^3 (x10).
11	B	Absolute humidity alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
12	SW	**WET BULB TEMPERATURE** in the set measurement unit (x10).
13	B	Wet bulb temperature alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
16	SW	**TEMPERATURE** with **NTC10K** sensor of channel **2** in the set measurement unit (x10).
17	B	Alarm for temperature with NTC10K sensor of channel 2: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
20	SW	**ILLUMINANCE** in lux (low range, models HD50...I...).
21	B	Illuminance (low range, models HD50...I...) alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
24	SW	**ATMOSPHERIC PRESSURE** in the set measurement unit (the multiplier depends on the set unit).
25	B	Atmospheric pressure alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
32	SW	**CO_2** in ppm.

Address	Type	Input Register description
33	B	CO_2 alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
50	SW	**TEMPERATURE** with **NTC10K** sensor of channel **3** in the set measurement unit (x10).
51	B	Alarm for temperature with NTC10K sensor of channel 3: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
64	SW	**TEMPERATURE** with **Pt100 sensor** of HP3517E… probe in the set measurement unit (x10).
65	B	Alarm for temperature with Pt100 sensor of HP3517E… probe: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
80	SW	**ILLUMINANCE** in lux (high range, models HD50...I2...).
81	B	Illuminance (high range, models HD50...I2...) alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
84	SW	**DIFFERENTIAL PRESSURE** in the set measurement unit (the multiplier depends on the set unit).
85	B	Differential pressure alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
176	SW	**PM1.0** in µg/m^3 (x10).
177	B	PM1.0 alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
178	SW	**PM2.5** in µg/m^3 (x10).
179	B	PM2.5 alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
180	SW	**PM4.0** in µg/m^3 (x10).
181	B	PM4.0 alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
182	SW	**PM10** in µg/m^3 (x10).
183	B	PM10 alarm: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
184	SW	**TYPICAL PARTICLE SIZE** in µm (x100).
185	B	Typical particle size: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
Measured values and status of measurement alarms for configurable inputs (HD50GH)		
1000 + 200 x (**N**-1)	SW	**TEMPERATURE** with 2-wire **Pt100 sensor** of channel **N** in the set measurement unit (x10).
1001 + 200 x (**N**-1)	B	Alarm for temperature with 2-wire Pt100 sensor of channel **N**: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1002 + 200 x (**N**-1)	SW	**TEMPERATURE** with 3-wire **Pt100 sensor** of channel **N** in the set measurement unit (x10).
1003 + 200 x (**N**-1)	B	Alarm for temperature with 3-wire Pt100 sensor of channel **N**: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1004 + 200 x (**N**-1)	SW	**TEMPERATURE** with 4-wire **Pt100 sensor** of channel **N** in the set measurement unit (x10).
1005 + 200 x (**N**-1)	B	Alarm for temperature with 4-wire Pt100 sensor of channel **N**: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1006 + 200 x (**N**-1)	SW	**TEMPERATURE** with 2-wire **Pt1000 sensor** of channel **N** in the set measurement unit (x10).
1007 + 200 x (**N**-1)	B	Alarm for temperature with 2-wire Pt1000 sensor of channel **N**: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1008 + 200 x (**N**-1)	SW	**TEMPERATURE** with 3-wire **Pt1000 sensor** of channel **N** in the set measurement unit (x10).
1009 + 200 x (**N**-1)	B	Alarm for temperature with 3-wire Pt1000 sensor of channel **N**: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.

Address	Type	Input Register description
1010 + 200 x (**N**-1)	SW	**TEMPERATURE** with 4-wire **Pt1000 sensor** of channel **N** in the set measurement unit (x10).
1011 + 200 x (**N**-1)	B	Alarm for temperature with 4-wire Pt1000 sensor of channel **N**: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1012 + 200 x (**N**-1)	SW	**TEMPERATURE** with **TC_K** sensor of channel **N** in the set measurement unit (x10).
1013 + 200 x (**N**-1)	B	Alarm for temperature with TC_K sensor of channel **N**: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1014 + 200 x (**N**-1)	SW	**TEMPERATURE** with **TC_J** sensor of channel **N** in the set measurement unit (x10).
1015 + 200 x (**N**-1)	B	Alarm for temperature with TC_J sensor of channel **N**: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1016 + 200 x (**N**-1)	SW	**TEMPERATURE** WITH **TC_T** sensor of channel **N** in the set measurement unit (x10).
1017 + 200 x (**N**-1)	B	Alarm for temperature with TC_T sensor of channel **N**: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1018 + 200 x (**N**-1)	SW	**TEMPERATURE** with **TC_N** sensor of channel **N** in the set measurement unit (x10).
1019 + 200 x (**N**-1)	B	Alarm for temperature with TC_N sensor of channel **N**: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1026 + 200 x (**N**-1)	SW	**TEMPERATURE** with **TC_E** sensor of channel **N** in the set measurement unit (x10).
1027 + 200 x (**N**-1)	B	Alarm for temperature with TC_E sensor of channel **N**: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1028 + 200 x (**N**-1)	SW	Input value in **mV** of channel **N** (x10). Only if channel **N** is configured as **0...1 V** input.
1029 + 200 x (**N**-1)	B	Alarm for channel **N** if the channel is configured as 0…1 V input: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1030 + 200 x (**N**-1)	SW	Input value in **mV** of channel **N** (x100). Only if channel **N** is configured as **0...50 mV** input.
1031 + 200 x (**N**-1)	B	Alarm for channel **N** if the channel is configured as 0…50 mV input: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1032 + 200 x (**N**-1)	SW	Input value in **mA** of channel **N** (x100). Only if channel **N** is configured as 4…20 mA input.
1033 + 200 x (**N**-1)	B	Alarm for channel **N** if the channel is configured as 4…20 mA input: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1034 + 200 x (**N**-1)	SW	Position of **potentiometer** in % of channel **N**. Only if channel **N** is configured as potentiometric input.
1035 + 200 x (**N**-1)	B	Alarm for channel **N** if the channel is configured as potentiometric input: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1036 + 200 x (**N**-1)	SW	Value of quantity associated to channel **N** if the channel is configured as mapped 0…1 V input.
1037 + 200 x (**N**-1)	B	Alarm for quantity associated to channel **N** if the channel is configured as mapped 0…1 V input: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1038 + 200 x (**N**-1)	SW	Value of quantity associated to channel **N** if the channel is configured as mapped 0…50 mV input.
1039 + 200 x (**N**-1)	B	Alarm for quantity associated to channel **N** if the channel is configured as mapped 0…50 mV input: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1040 + 200 x (**N**-1)	SW	Value of quantity associated to channel **N** if the channel is configured as mapped 4…20 mA input.

Address	Type	Input Register description
1041 + 200 x (**N**-1)	B	Alarm for quantity associated to channel **N** if the channel is configured as mapped 4…20 mA input: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1042 + 200 x (**N**-1)	SW	Value of quantity associated to channel **N** if the channel is configured as mapped potentiometric input.
1043 + 200 x (**N**-1)	B	Alarm for quantity associated to channel **N** if the channel is configured as mapped potentiometric input: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1044 + 200 x (**N**-1)	SW	Input value in **mV** of channel **N**. Only if channel **N** is configured as **0...10 V** input.
1045 + 200 x (**N**-1)	B	Alarm for channel **N** if the channel is configured as 0…10 V input: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1046 + 200 x (**N**-1)	SW	Value of quantity associated to channel **N** if the channel is configured as mapped 0…10 V input.
1047 + 200 x (**N**-1)	B	Alarm for quantity associated to channel **N** if the channel is configured as mapped 0…10 V input: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1050 + 200 x (**N**-1)	SW	Input value in **mV** of channel **N** (x100). Only if channel **N** is configured as **-50...50 mV** input.
1051 + 200 x (**N**-1)	B	Alarm for channel **N** if the channel is configured as -50…50 mV input: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
1052 + 200 x (**N**-1)	SW	Value of quantity associated to channel **N** if the channel is configured as mapped -50…50 mV input.
1053 + 200 x (**N**-1)	B	Alarm for quantity associated to channel **N** if the channel is configured as mapped -50…50 mV input: 0=OFF, 1=lower threshold alarm, 2=higher threshold alarm.
Measurement units and resolution		
5000	W	Unit of measurement for **TEMPERATURE** with **NTC10K** sensor of channel **1**: 0=°C, 1=°F.
5004	W	**DEW POINT** measurement unit: 0=°C, 1=°F.
5012	W	**WET BULB TEMPERATURE** measurement unit: 0=°C, 1=°F.
5016	W	Unit of measurement for **TEMPERATURE** with **NTC10K** sensor of channel **2**: 0=°C, 1=°F.
5021	SW	**ILLUMINANCE** resolution: -2=100, -1=10, 0=1
5024	W	**ATMOSPHERIC PRESSURE** measurement unit: see the table of indexes
5025	SW	**ATMOSPHERIC PRESSURE** resolution: …, -2=100, -1=10, 0=1, 1=0.1, 2=0.01, …
5050	W	Unit of measurement for **TEMPERATURE** with **NTC10K** sensor of channel **3**: 0=°C, 1=°F.
5064	W	Unit of measurement for **TEMPERATURE** with **Pt100** sensor of HP3517E… probe: 0=°C, 1=°F.
5084	W	**DIFFERENTIAL PRESSURE** measurement unit: see the table of indexes
5085	SW	**DIFFERENTIAL PRESSURE** resolution: …, -2=100, -1=10, 0=1, 1=0.1, 2=0.01, …
6000 + 200 x (**N**-1)	W	Unit of measurement for **TEMPERATURE** with **2-wire Pt100** sensor of channel **N**: 0=°C, 1=°F.
6002 + 200 x (**N**-1)	W	Unit of measurement for **TEMPERATURE** with **3-wire Pt100** sensor of channel **N**: 0=°C, 1=°F.
6004 + 200 x (**N**-1)	W	Unit of measurement for **TEMPERATURE** with **4-wire Pt100** sensor of channel **N**: 0=°C, 1=°F.

Address	Type	Input Register description
6006 + 200 x (**N**-1)	W	Unit of measurement for **TEMPERATURE** with **2-wire Pt1000** sensor of channel **N**: 0=°C, 1=°F.
6008 + 200 x (**N**-1)	W	Unit of measurement for **TEMPERATURE** with **3-wire Pt1000** sensor of channel **N**: 0=°C, 1=°F.
6010 + 200 x (**N**-1)	W	Unit of measurement for **TEMPERATURE** with **4-wire Pt1000** sensor of channel **N**: 0=°C, 1=°F.
6012 + 200 x (**N**-1)	W	Unit of measurement for **TEMPERATURE** with **TC_K** sensor of channel **N**: 0=°C, 1=°F.
6014 + 200 x (**N**-1)	W	Unit of measurement for **TEMPERATURE** with **TC_J** sensor of channel **N**: 0=°C, 1=°F.
6016 + 200 x (**N**-1)	W	Unit of measurement for **TEMPERATURE** with **TC_T** sensor of channel **N**: 0=°C, 1=°F.
6018 + 200 x (**N**-1)	W	Unit of measurement for **TEMPERATURE** with **TC_N** sensor of channel **N**: 0=°C, 1=°F.
6026 + 200 x (**N**-1)	W	Unit of measurement for **TEMPERATURE** with **TC_E** sensor of channel **N**: 0=°C, 1=°F.
6036 + 200 x (**N**-1)	W	Measurement unit of the quantity associated to channel **N** if the channel is configured as mapped 0…1 V input: see the table of indexes
6037 + 200 x (**N**-1)	SW	Resolution of the quantity associated to channel **N** if the channel is configured as mapped 0…1 V input: …, -2=100, -1=10, 0=1, 1=0.1, 2=0.01, …
6038 + 200 x (**N**-1)	W	Measurement unit of the quantity associated to channel **N** if the channel is configured as mapped 0…50 mV: see the table of indexes
6039 + 200 x (**N**-1)	SW	Resolution of the quantity associated to channel **N** if the channel is configured as mapped 0…50 mV: …, -2=100, -1=10, 0=1, 1=0.1, 2=0.01, …
6040 + 200 x (**N**-1)	W	Measurement unit of the quantity associated to channel **N** if the channel is configured as mapped 4…20 mA input: see the table of indexes
6041 + 200 x (**N**-1)	SW	Resolution of the quantity associated to channel **N** if the channel is configured as mapped 4…20 mA input: …, -2=100, -1=10, 0=1, 1=0.1, 2=0.01, …
6042 + 200 x (**N**-1)	W	Measurement unit of the quantity associated to channel **N** if the channel is configured as mapped potentiometric input: see the table of indexes
6043 + 200 x (**N**-1)	SW	Resolution of the quantity associated to channel **N** if the channel is configured as mapped potentiometric input: …, -2=100, -1=10, 0=1, 1=0.1, 2=0.01, …
6046 + 200 x (**N**-1)	W	Measurement unit of the quantity associated to channel **N** if the channel is configured as mapped 0…10 V input: see the table of indexes
6047 + 200 x (**N**-1)	SW	Resolution of the quantity associated to channel **N** if the channel is configured as mapped 0…10 V input: …, -2=100, -1=10, 0=1, 1=0.1, 2=0.01, …
6052 + 200 x (**N**-1)	W	Measurement unit of the quantity associated to channel **N** if the channel is configured as mapped -50…50 mV: see the table of indexes
6053 + 200 x (**N**-1)	SW	Resolution of the quantity associated to channel **N** if the channel is configured as mapped -50…50 mV: …, -2=100, -1=10, 0=1, 1=0.1, 2=0.01, …

Address	Type	Input Register description
General information		
10000	W	Year of last measurement.
10001	W	Month of last measurement.
10002	W	Day of last measurement.
10003	W	Hour of last measurement.
10004	W	Minutes of last measurement.
10005	W	Seconds of last measurement.
10010	W	Time, in seconds, elapsed since the last transmitted packet.
10011	W	RF signal level.
10013	W	Password level for the current connection: 0=no password, 1=user level, 2= administrator level

Holding Registers - Read/Write parameters

Address	Type	Holding Register description
Measurement alarm thresholds		
0	SW	Lower alarm threshold for **TEMPERATURE** with **NTC10K** sensor of channel **1** in the set measurement unit (x10).
1	SW	Higher alarm threshold for temperature with NTC10K sensor of channel 1 in the set measurement unit (x10).
2	SW	**RH** lower alarm threshold in % (x10).
3	SW	RH higher alarm threshold in % (x10).
4	SW	**DEW POINT** lower alarm threshold in the set measurement unit (x10).
5	SW	Dew point higher alarm threshold in the set measurement unit (x10).
6	SW	**PARTIAL VAPOR PRESSURE** lower alarm threshold in hPa (x100).
7	SW	Partial vapor pressure higher alarm threshold in hPa (x100).
8	SW	**MIXING RATIO** lower alarm threshold in g/Kg (x10).
9	SW	Mixing ratio higher alarm threshold in g/Kg (x10).
10	SW	**ABSOLUTE HUMIDITY** lower alarm threshold in g/m^3 (x10).
11	SW	Absolute humidity higher alarm threshold in g/m^3 (x10).
12	SW	**WET BULB TEMPERATURE** lower alarm threshold in the set measurement unit (x10).
13	SW	Wet bulb temperature higher alarm threshold in the set measurement unit (x10).
16	SW	Lower alarm threshold for **TEMPERATURE** with **NTC10K** sensor of channel **2** in the set measurement unit (x10).
17	SW	Higher alarm threshold for temperature with NTC10K sensor of channel 2 in the set measurement unit (x10).
20	SW	**ILLUMINANCE** (low range, models HD50...I...) lower alarm threshold in lux.
21	SW	Illuminance (low range, models HD50...I...) higher alarm threshold in lux
24	SW	**ATMOSPHERIC PRESSURE** lower alarm threshold in the set measurement unit (the multiplier depends on the set unit).
25	SW	Atmospheric pressure higher alarm threshold in the set measurement unit (the multiplier depends on the set unit).
32	SW	**CO_2** lower alarm threshold in ppm.
33	SW	CO_2 higher alarm threshold in ppm.
50	SW	Lower alarm threshold for **TEMPERATURE** with **NTC10K** sensor of channel **3** in the set measurement unit (x10).

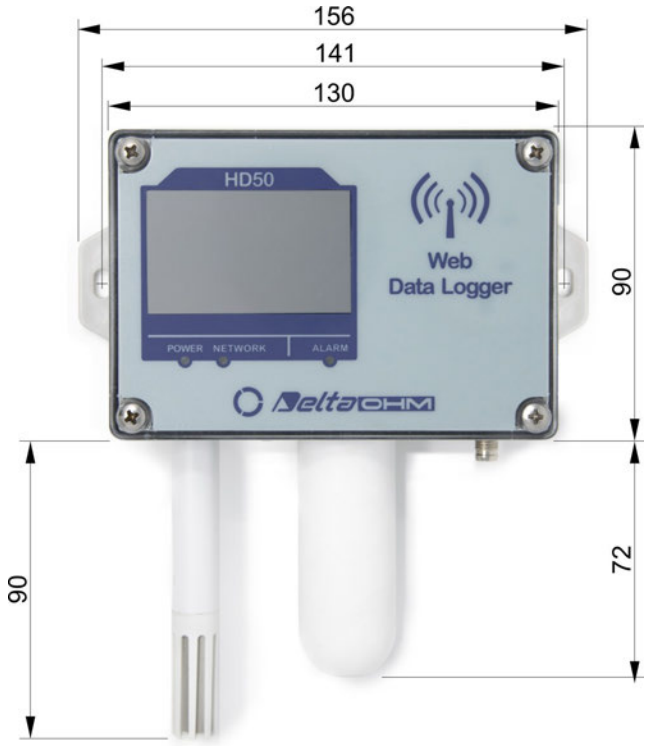
Address	Type	Holding Register description
51	SW	Higher alarm threshold for temperature with NTC10K sensor of channel 3 in the set measurement unit (x10).
64	SW	Lower alarm threshold for **TEMPERATURE** with **Pt100** sensor of HP3517E… probe in the set measurement unit (x10).
65	SW	Higher alarm threshold for temperature with Pt100 sensor of HP3517E… probe in the set measurement unit (x10).
80	SW	**ILLUMINANCE** (high range, models HD50...I2...) lower alarm threshold in lux.
81	SW	Illuminance (high range, models HD50...I2...) higher alarm threshold in lux
84	SW	**DIFFERENTIAL PRESSURE** lower alarm threshold in the set measurement unit (the multiplier depends on the set unit).
85	SW	Differential pressure higher alarm threshold in the set measurement unit (the multiplier depends on the set unit).
176	SW	**PM1.0** lower alarm threshold in µg/m^3 (x10).
177	SW	PM1.0 higher alarm threshold in µg/m^3 (x10).
178	SW	**PM2.5** lower alarm threshold in µg/m^3 (x10).
179	SW	PM2.5 higher alarm threshold in µg/m^3 (x10).
180	SW	**PM4.0** lower alarm threshold in µg/m^3 (x10).
181	SW	PM4.0 higher alarm threshold in µg/m^3 (x10).
182	SW	**PM10** lower alarm threshold in µg/m^3 (x10).
183	SW	PM10 higher alarm threshold in µg/m^3 (x10).
184	SW	**TYPICAL PARTICLE SIZE** lower alarm threshold in µm (x100).
185	SW	Typical particle size higher alarm threshold in µm (x100).
Measurement alarm thresholds for configurable inputs		
1000 + 200 x (**N**-1)	SW	Lower alarm threshold for **TEMPERATURE** with **2-wire Pt100** sensor of channel **N** in the set measurement unit (x10).
1001 + 200 x (**N**-1)	SW	Higher alarm threshold for temperature with 2-wire Pt100 sensor of channel **N** in the set measurement unit (x10).
1002 + 200 x (**N**-1)	SW	Lower alarm threshold for **TEMPERATURE** with **3-wire Pt100** sensor of channel **N** in the set measurement unit (x10).
1003 + 200 x (**N**-1)	SW	Higher alarm threshold for temperature with 3-wire Pt100 sensor of channel **N** in the set measurement unit (x10).
1004 + 200 x (**N**-1)	SW	Lower alarm threshold for **TEMPERATURE** with **4-wire Pt100** sensor of channel **N** in the set measurement unit (x10).
1005 + 200 x (**N**-1)	SW	Higher alarm threshold for temperature with 4-wire Pt100 sensor of channel **N** in the set measurement unit (x10).
1006 + 200 x (**N**-1)	SW	Lower alarm threshold for **TEMPERATURE** with **2-wire Pt1000** sensor of channel **N** in the set measurement unit (x10).
1007 + 200 x (**N**-1)	SW	Higher alarm threshold for temperature with 2-wire Pt1000 sensor of channel **N** in the set measurement unit (x10).
1008 + 200 x (**N**-1)	SW	Lower alarm threshold for **TEMPERATURE** with **3-wire Pt1000** sensor of channel **N** in the set measurement unit (x10).
1009 + 200 x (**N**-1)	SW	Higher alarm threshold for temperature with 3-wire Pt1000 sensor of channel **N** in the set measurement unit (x10).
1010 + 200 x (**N**-1)	SW	Lower alarm threshold for **TEMPERATURE** with **4-wire Pt1000** sensor of channel **N** in the set measurement unit (x10).
1011 + 200 x (**N**-1)	SW	Higher alarm threshold for temperature with 4-wire Pt1000 sensor of channel **N** in the set measurement unit (x10).

Address	Type	Holding Register description
1012 + 200 x (**N**-1)	SW	Lower alarm threshold for **TEMPERATURE** with **TC_K** sensor of channel **N** in the set measurement unit (x10).
1013 + 200 x (**N**-1)	SW	Higher alarm threshold for temperature with TC_K sensor of channel N in the set measurement unit (x10).
1014 + 200 x (**N**-1)	SW	Lower alarm threshold for **TEMPERATURE** with **TC_J** sensor of channel **N** in the set measurement unit (x10).
1015 + 200 x (**N**-1)	SW	Higher alarm threshold for temperature with TC_J sensor of channel N in the set measurement unit (x10).
1016 + 200 x (**N**-1)	SW	Lower alarm threshold for **TEMPERATURE** with **TC_T** sensor of channel **N** in the set measurement unit (x10).
1017 + 200 x (**N**-1)	SW	Higher alarm threshold for temperature with TC_T sensor of channel N in the set measurement unit (x10).
1018 + 200 x (**N**-1)	SW	Lower alarm threshold for **TEMPERATURE** with **TC_N** sensor of channel **N** in the set measurement unit (x10).
1019 + 200 x (**N**-1)	SW	Higher alarm threshold for temperature with TC_N sensor of channel N in the set measurement unit (x10).
1026 + 200 x (**N**-1)	SW	Lower alarm threshold for **TEMPERATURE** with **TC_E** sensor of channel **N** in the set measurement unit (x10).
1027 + 200 x (**N**-1)	SW	Higher alarm threshold for temperature with TC_E sensor of channel N in the set measurement unit (x10).
1028 + 200 x (**N**-1)	SW	Channel **N** lower alarm threshold in **mV** (x10). Only if channel **N** is configured as **0...1 V** input.
1029 + 200 x (**N**-1)	SW	Channel **N** higher alarm threshold in mV (x10). Only if channel **N** is configured as 0…1 V input.
1030 + 200 x (**N**-1)	SW	Channel **N** lower alarm threshold in **mV** (x100). Only if channel **N** is configured as **0...50 mV** input.
1031 + 200 x (**N**-1)	SW	Channel **N** higher alarm threshold in mV (x100). Only if channel **N** is configured as 0…50 mV input.
1032 + 200 x (**N**-1)	SW	Channel **N** lower alarm threshold in **mA** (x100). Only if channel **N** is configured as 4…20 mA input.
1033 + 200 x (**N**-1)	SW	Channel **N** higher alarm threshold in mA (x100). Only if channel **N** is configured as 4…20 mA input.
1034 + 200 x (**N**-1)	SW	Channel **N** lower alarm threshold in **%**. Only if channel **N** is configured as potentiometric input.
1035 + 200 x (**N**-1)	SW	Channel **N** higher alarm threshold in **%**. Only if channel **N** is configured as potentiometric input.
1036 + 200 x (**N**-1)	SW	Lower alarm threshold expressed as value of the quantity associated to channel **N** when the channel is configured as mapped 0…1 V input.
1037 + 200 x (**N**-1)	SW	Higher alarm threshold expressed as value of the quantity associated to channel **N** when the channel is configured as mapped 0…1 V input.
1038 + 200 x (**N**-1)	SW	Lower alarm threshold expressed as value of the quantity associated to channel **N** when the channel is configured as mapped 0…50 mV.
1039 + 200 x (**N**-1)	SW	Higher alarm threshold expressed as value of the quantity associated to channel **N** when the channel is configured as mapped 0…50 mV.
1040 + 200 x (**N**-1)	SW	Lower alarm threshold expressed as value of the quantity associated to channel **N** when the channel is configured as mapped 4…20 mA.
1041 + 200 x (**N**-1)	SW	Higher alarm threshold expressed as value of the quantity associated to channel **N** when the channel is configured as mapped 4…20 mA.
1042 + 200 x (**N**-1)	SW	Lower alarm threshold expressed as value of the quantity associated to channel **N** when the channel is configured as mapped potentiometric input.
1043 + 200 x (**N**-1)	SW	Higher alarm threshold expressed as value of the quantity associated to channel **N** when the channel is configured as mapped potentiometric input.

Address	Type	Holding Register description
1044 + 200 x (**N**-1)	SW	Channel **N** lower alarm threshold in **mV**. Only if channel **N** is configured as **0...10 V** input.
1045 + 200 x (**N**-1)	SW	Channel **N** higher alarm threshold in mV. Only if channel **N** is configured as 0…10 V input.
1046 + 200 x (**N**-1)	SW	Lower alarm threshold expressed as value of the quantity associated to channel **N** when the channel is configured as mapped 0…10 V input.
1047 + 200 x (**N**-1)	SW	Higher alarm threshold expressed as value of the quantity associated to channel **N** when the channel is configured as mapped 0…10 V input.
1050 + 200 x (**N**-1)	SW	Channel **N** lower alarm threshold in **mV** (x100). Only if channel **N** is configured as **-50...50 mV** input.
1051 + 200 x (**N**-1)	SW	Channel **N** higher alarm threshold in mV (x100). Only if channel **N** is configured as -50…50 mV input.
1052 + 200 x (**N**-1)	SW	Lower alarm threshold expressed as value of the quantity associated to channel **N** when the channel is configured as mapped -50…50 mV.
1053 + 200 x (**N**-1)	SW	Higher alarm threshold expressed as value of the quantity associated to channel **N** when the channel is configured as mapped -50…50 mV.
General information		
da 10000 a 10019	B	User code with ASCII codification. Acceptable values are in the set {32,…,126}.
10020	W	Current year
10021	W	Current month
10022	W	Current day
10023	W	Current hour
10024	W	Current minute
10025	W	Current second
10026	W	Measurement interval: 0=1s, 1=2s, 2=5s, 3=10s, 4=15s, 5=30s, 6=1min, 7=2min, 8=5min, 9=10min, 10=15min, 11=30min, 12=1h
10027	W	Logging interval: 0=1s, 1=2s, 2=5s, 3=10s, 4=15s, 5=30s, 6=1min, 7=2min, 8=5min, 9=10min, 10=15min, 11=30min, 12=1h
10036	W	Password to be supplied to enable configuration change commands. The reading provides the fixed value 32768.
da 10037 a 10046	B	Device group with ASCII codification. Acceptable values are in the set {32,…,126}.
10052	W	Setting of the quantities to be displayed in the automatic viewing cycle. Set the i-th bit (starting from LSB) to 1 if you wish to include the i-th quantity in the viewing cycle. *Example*: if in the model measuring and calculating: 1=Temp., 2=RH, 3=Td, 4=PVP, 5=Mix.Ratio, 6=AH, 7=Tw, the register is set to 0000 0000 0010 0010, only the relative humidity (RH) and the absolute humidity (AH) will be displayed alternatively.
10053	W	Adding of the Wi-Fi signal level in the automatic viewing cycle. Set LSB to 1 if you wish to include the Wi-Fi signal level in the viewing cycle.
da 20000 a 20011	B	User code with ASCII codification of measurement #1.
da 20012 a 20023	B	User code with ASCII codification of measurement #2.
da 20024 a 20035	B	User code with ASCII codification of measurement #3.
da 20036 a 20047	B	User code with ASCII codification of measurement #4.

Address	Type	Holding Register description
da 20048 a 20059	B	User code with ASCII codification of measurement #5.
da 20060 a 20071	B	User code with ASCII codification of measurement #6.
da 20072 a 20083	B	User code with ASCII codification of measurement #7.
da 20084 a 20095	B	User code with ASCII codification of measurement #8.
da 20096 a 20107	B	User code with ASCII codification of measurement #9.
da 20108 a 20119	B	User code with ASCII codification of measurement #10.
da 20120 a 20131	B	User code with ASCII codification of measurement #11.
da 20132 a 20143	B	User code with ASCII codification of measurement #12.

7 TECHNICAL CHARACTERISTICS

Measuring interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Logging interval	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Internal memory	Circular management or stop logging if memory is full. The number of storable samples depends on the number of quantities selected for logging (see the next table).
Interfaces	Wi-Fi (IEEE 802.11b/g/n) and ETHERNET (RJ45 connector)
Protocols	Proprietary, Modbus TCP/IP, SMTP, FTP, HTTP, NIST
Wi-Fi security standards	WEP64, WEP128, WPA, WPA2
Alarm	Acoustic by means of the internal buzzer, LED on the front panel, sending of e-mails.
Power supply	External 7…30 Vdc (no internal battery) PoE (Power over Ethernet) power supply via optional POE-SPLT12M8 splitter
Consumption	40 mA @ 24 V / 80 mA @ 12 V / Peak < 200 mA
Display	Optional custom or graphic LCD
LED indicators	Power supply, Network connection (LAN/WLAN) and Alarm
Operating conditions	-20…+70 °C (except HD50PM and HD501N4r1ZTV) -10…+60 °C (HD50PM) / -5…+50 °C (HD501N4r1ZTV) < 100%RH non-condensing
Housing	Material: Polycarbonate Dimensions: 130 x 90 x 40 mm (156 x 90 x 44 mm with flanges) Protection degree: IP 54 (with protective cap on RJ45 connector)
Weight	300 g approx.
Installation	Wall mount, indoor
Dimensions (mm)	

Internal memory capacity

Model	Number of samples (**)	Storable quantities (*)
HD50N/1TC	906,640	T
HD50N/2TC	Min=744,740, Max=906,640	T (2 channels)
HD50N/3TC	Min=615,220, Max=906,640	T (3 channels)
HD50NTV	906,640	T
HD501NTC	Min=388,560, Max=906,640	T, RH, T_D, T_W, AH, MR, PVP
HD5017PTC	Min=388,560, Max=906,640	T, RH, T_D, T_W, AH, MR, PVP
HD501NTV	Min=388,560, Max=906,640	T, RH, T_D, T_W, AH, MR, PVP
HD5014bNTV	Min=356,180, Max=906,640	T, RH, T_D, T_W, AH, MR, PVP, P_{ATM}
HD5014bNTC	Min=356,180, Max=906,640	T, RH, T_D, T_W, AH, MR, PVP, P_{ATM}
HD5014b7PTC	Min=356,180, Max=906,640	T, RH, T_D, T_W, AH, MR, PVP, P_{ATM}
HD501NB…TV	Min=356,180, Max=906,640	T, RH, T_D, T_W, AH, MR, PVP, CO_2
HD5014bNB…TV	Min=323,800, Max=906,640	T, RH, T_D, T_W, AH, MR, PVP, P_{ATM}, CO_2
HD501NI…TCV	Min=356,180, Max=906,640	T, RH, T_D, T_W, AH, MR, PVP, I
HD5014bNI…TCV	Min=323,800, Max=906,640	T, RH, T_D, T_W, AH, MR, PVP, P_{ATM}, I
HD501NB…I…TCV	Min=323,800, Max=906,640	T, RH, T_D, T_W, AH, MR, PVP, CO_2, I
HD5014bNB..I..TCV	Min=291,420, Max=906,640	T, RH, T_D, T_W, AH, MR, PVP, P_{ATM}, CO_2, I
HD501N4r1ZTV	Min=356,180, Max=906,640	T, RH, T_D, T_W, AH, MR, PVP, ΔP
HD50PM	Min=469,510, Max=906,640	PM1.0, PM2.5, PM4.0, PM10, TPS
HD50H	Min=615,220, Max=1,165,680	depends on the connected sensors

(*) **Quantities:**

T: temperature
RH: relative humidity
T_D: dew point
T_W: wet bulb temperature
CO_2: carbon dioxide
PM: particulate matter
TPS: typical particle size
AH: absolute humidity
MR: mixing ratio
PVP: partial vapour pressure
P_{ATM}: atmospheric pressure
ΔP: differential pressure
I: illuminance

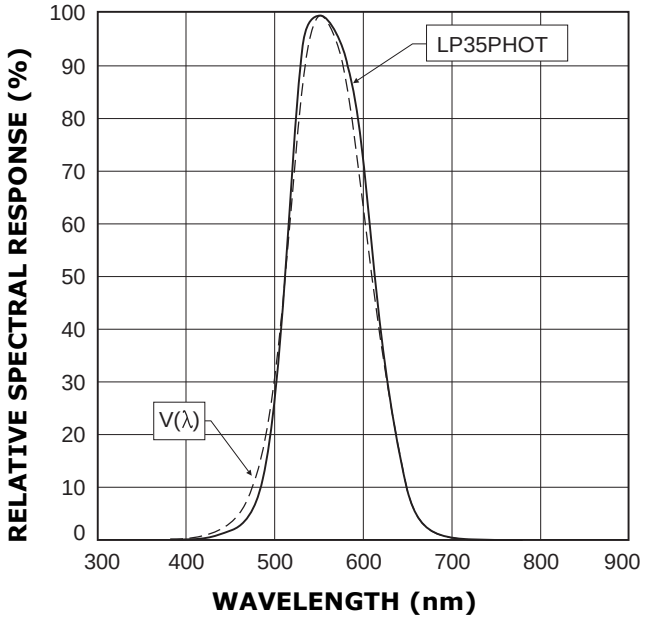
(**) The number of samples depends on the number of stored quantities. A sample consists of all the quantities measured and/or calculated enabled for storing.

Measurement characteristics (except HD50GH) - Instrument in line with the sensor

Temperature - NTC sensor HD50N/xTC, HD50[1][4b]NTC/TV, HD501NB[2]TV, HD501NI[2]TCV, HD501N4r1ZTV	
Sensor	NTC 10 kΩ @ 25 °C
Measuring range	-40…+105 °C
Resolution	0.1 °C
Accuracy	± 0.3 °C in the range 0…+70 °C / ± 0.4 °C outside
Stability	0.1 °C/year
Temperature - Pt100 sensor HD501[4b]7PTC	
Sensor	Pt100
Measuring range	-40…+150 °C
Resolution	0.1 °C
Accuracy	1/3 DIN
Stability	0.1 °C/year

Relative humidity	
Sensor	Capacitive
Measuring range	0…100 %RH
Resolution	0.1 %
Accuracy @ T=15…35 °C @ T=remaining range	± 1.8 %RH (0..85 %RH) / ± 2.5 %RH (85..100 %RH) ± (2 + 1.5% of the measure)%
Sensor operating temperature	-20…+80 °C (standard) -40…+150 °C (with HP3517**E**… probe)
Response time	T_{90} < 20 s (air speed = 2 m/s, without filter)
Stability	1%/year
Atmospheric pressure	
Sensor	Piezoresistive
Measuring range	300…1100 hPa
Resolution	0.1 hPa
Accuracy	± 0.5 hPa (700...1100 hPa) @ 20 °C ± 1 hPa (500…1100 hPa) / ± 1.5 hPa (300…500 hPa) @ T=(0…60 °C)
Stability	± 1 hPa/year
Differential pressure	
Sensor	Piezoresistive
Measuring range	± 125 Pa
Resolution	0.01 Pa
Accuracy	± 0.35% typ. of measuring span (2 x full scale)
Zero drift	Self-calibration
Temperature drift	±0.5% typ. of measuring span (2 x full scale)
Connection	Tube Ø 4 mm
Overpressure	24.9 kPa
Type of fluid	Air and neutral gases
Carbon dioxide (CO_2)	
Sensor	Non-Dispersive Infrared (NDIR)
Measuring range	**B**: 0…5,000 ppm **B2**: 0…10,000 ppm
Resolution	1 ppm
Accuracy	**B**: ± (50 ppm + 3% of the measure) @ 25 °C/1013 hPa **B2**: ± (100 ppm + 5% of the measure) @ 25 °C/1013 hPa
Operating conditions	-20…60 °C / 0…95%RH non-condensing 700…1100 hPa
Response time	T_{90} < 120 s (air speed = 2 m/s)
Stability	5% of the measure/5 years
Temperature drift	1 ppm/°C @ -20…45 °C

Illuminance	
Sensor	Photodiode
Measuring range	**I**: 0…20,000 lux **I2**: 0…200,000 lux
Resolution	**I**: 1 lux (0…2,000 lux), 10 lux (>2,000 lux) **I2**: 10 lux (0…20,000 lux), 100 lux (>20,000 lux)
Spectral range	In accordance with standard photopic curve V(λ)
α (temperature coefficient) $f_6(T)$	<0.05% K
Calibration uncertainty	<4%
f'_1 (accordance with photopic response V(λ))	<6%
f_2 (response as cosine law)	<3%
f_3 (linearity)	<1%
f_4 (instrument reading error)	<0.5%
f_5 (fatigue)	<0.5%
Class	B
One year drift	<1%
Operating temperature	0…50 °C
Reference standard	CIE n°69 – UNI 11142



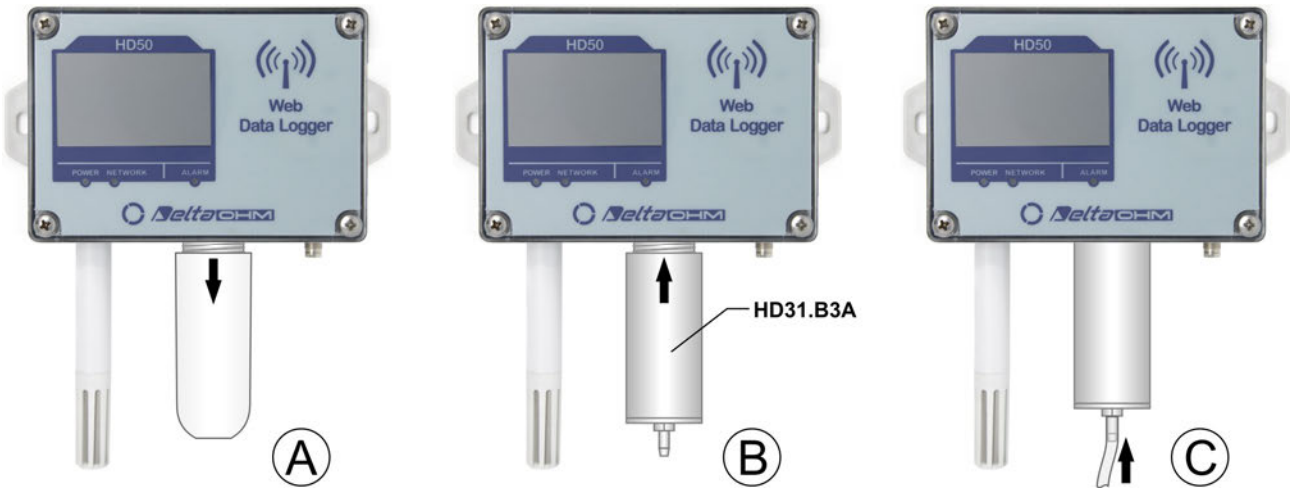
Particulate Matter (PM)	
Measuring principle	Laser scattering
Pollutants detected	PM1.0, PM2.5, PM4.0, PM10
Measuring range	0…1000 µg/m^3 (for each pollutant)
Particle size detection range	∅ 0.3…10 µm
Resolution	0.1 µg/m^3
Accuracy (@ 10…40 °C)	± 10 µg/m^3 (0…100 µg/m^3) ± 10% of the measure (100…1000 µg/m^3)
Warm up time	< 8 s
Sensor lifetime	> 8 years (24 h/day operation)

HD50GH measurement characteristics

Pt100 / Pt1000	
Measuring range	-200…+650 °C
Resolution	0.1 °C
Accuracy	± 0.1 °C (excluding probe error)
Sensor coefficient	α=0.00385 °C^{-1}
Connection	2, 3 or 4 wires
Thermocouple	
Thermocouple type	K, J, T, N, E. The inputs are not isolated, **use thermocouples with isolated hot junction**.
Measuring range	type K: -200…+1370 °C type J: -100…+750 °C type T: -200…+400 °C type N: -200…+1300 °C type E: -200…+750 °C
Resolution	0.1 °C
Accuracy (excluding probe error)	type K: ± 0.1 °C (< 600 °C) type J: ± 0.1 °C ± 0.2 °C (> 600 °C) type T: ± 0.1 °C type N: ± 0.1 °C (< 600 °C) type E: ± 0.1 °C (< 300 °C) ± 0.2 °C (> 600 °C) ± 0.2 °C (> 300 °C)
Input 0/4…20 mA	
Shunt resistance	Internal (50 Ω)
Resolution	16 bit
Accuracy	± 2 µA
Inputs -50…50 mV, 0…50 mV, 0…1 V and 0…10 V	
Input resistance	100 MΩ
Resolution	16 bit
Accuracy	± 0.01% f.s.
Potentiometric input	
Potentiometer	Typically 10 kΩ.
Resolution	16 bit
Accuracy	± 0.01% f.s.

8 ADAPTER FOR CO_2 CALIBRATION

To calibrate the CO_2 sensor with the aid of a cylinder, unscrew the probe filter, screw the **HD31.B3A** adapter and connect the cylinder; adjust the cylinder flow meter to get a constant flow between 0.3 and 0.5 l/min.



CO_2 calibration with a cylinder

The calibration is performed with the aid of the HD35AP-S software (follow the instructions of the software).

9 INSTRUMENT STORAGE

Conditions for storage of the instrument:

- Temperature: -20...+70 °C.
- Humidity: below 90 %RH no condensation.
- When storing, avoid places where:
    - humidity is high;
    - instrument is exposed to direct solar radiation;
    - instrument is exposed to high temperature source;
    - there are strong vibrations;
    - there is vapor, salt and/or corrosive gas.

10 SAFETY INSTRUCTIONS

General safety instructions

The instrument has been manufactured and tested in compliance with the safety standard EN61010-1:2010 "Safety requirements for electrical equipment for measurement, control and laboratory use" and left the factory in a safe and secure technical condition.

The proper operation and the operational safety of the instrument can be ensured only if all the regular security measures are observed as well as the specific measures described in this operating manual.

The proper operation and the operational safety of the instrument can be ensured only under the climatic conditions specified in this manual.

Do not use the instrument in places where there are:

- Rapid ambient temperature variations that may cause condensation.
- Corrosive or flammable gases.
- Direct vibrations, shocks to the instrument.
- High-intensity electromagnetic fields, static electricity.

If the instrument is moved from a cold environment to a hot one or vice versa, the formation of condensation might cause problems to its operation. In this case you need to wait for the instrument temperature to reach ambient temperature before operation.

User obligations

The user of the instrument must make sure that the following regulations and directives related to the handling of hazardous materials are fulfilled:

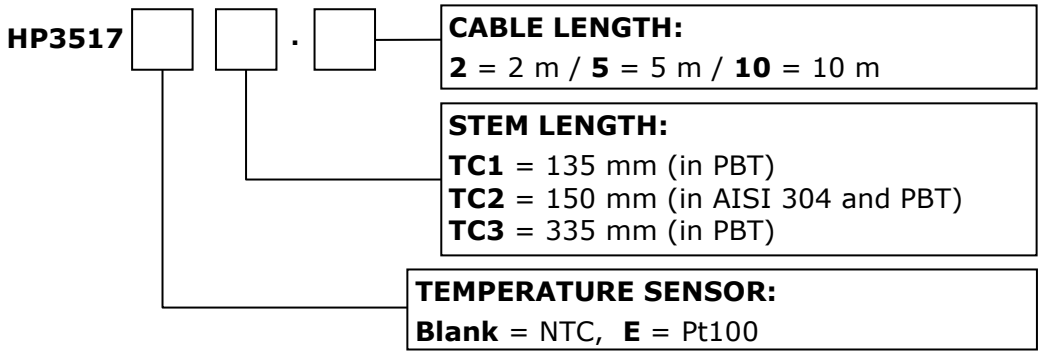
- European directives on safety and health at work.
- National regulations on safety and health at work.
- Accident prevention regulations.

11 PROBES AND ACCESSORIES ORDERING CODES

The devices are supplied with pair of flanges for wall mounting, adapter from M8 connector to screw terminals (for connecting the power supply) and HD35AP-S / HDServer1 software (downloadable from Delta OHM website).
External probes, SWD10M8 power supply or POE-SPLT12M8 PoE splitter or CPM8… power supply cable and HD35AP-CFR21 advanced software (for the management of the system in accordance with the FDA 21 CFR part 11 recommendations) have to be ordered separately. The Ethernet cable is not included.

TEMPERATURE AND RELATIVE HUMIDITY COMBINED PROBES

HP3517… Temperature and relative humidity combined probe. R.H. sensor measuring range: 0…100%.
Temperature measuring range: -40…+105 °C (HP3517TC…), -40…+150 °C (HP3517ETC…).
R.H. sensor operating temperature: -20…+80 °C (HP3517TC…), -40…+150 °C (HP3517ETC…).
Diameter 14 mm. Cable length 2, 5 or 10 m standard. 4-pole (HP3517TC…) or 8-pole (HP3517ETC…) M12 connector.



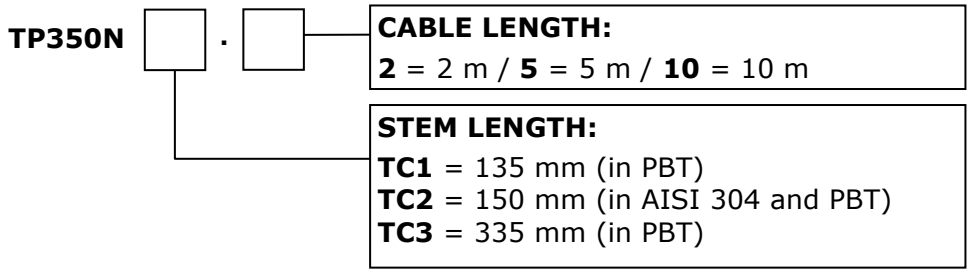
The outdoor installation of the HP3517… probe requires HD9007A-1 or HD9007A-2 protection against solar radiations. The replacement of the HP3517… probe requires recalibration of the instrument in line with the new probe.

HD9007A-1 12-ring protection against solar radiations. Includes support bracket.

HD9007A-2 16-ring protection against solar radiations. Includes support bracket.

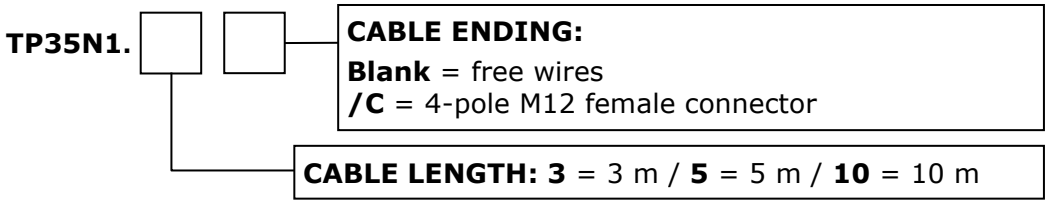
HD9007T26.2 Adapter for Ø 14 mm probes for protections against solar radiations HD9007A-1 and HD9007A-2.

TP350N... **NTC** 10KΩ environmental temperature probe. Operating temperature: -40…+105 °C. 14 mm diameter. Cable length 2, 5 or 10 m standard. 4-pole M12 connector.

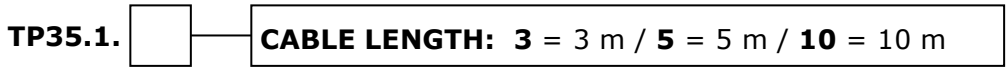


The outdoor installation of the TP350N… probe requires HD9007A-1 or HD9007A-2 protection against solar radiations.

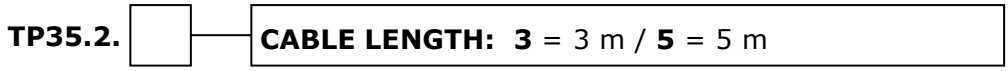
TP35N1... **NTC** 10KΩ temperature probe. Operating temperature: -40…+105 °C. Ø5 x 40 mm AISI 316 stainless steel tube. Cable length 3, 5 or 10 m standard. Cable ending with free wires or 4-pole M12 connector.



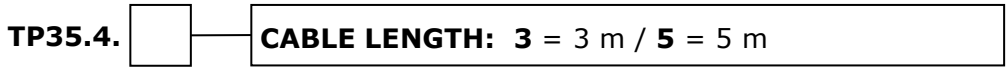
TP35.1... 4-wire 1/3 DIN **Pt1000** temperature probe. Operating temperature: -50…+105 °C. Ø5 x 40 mm AISI 316 stainless steel tube. Cable length 3, 5 or 10 m standard. Cable ending with free wires.



TP35.2... 4-wire 1/3 DIN **Pt1000** temperature probe. Operating temperature: -40…+105 °C. Ø5 x 20 mm thermoplastic rubber tube. Cable length 3 or 5 m standard. Cable ending with free wires. Suitable for use with chemically aggressive solutions as well.



TP35.4... 4-wire 1/3 DIN **Pt100** temperature probe. Operating temperature: -50…+105 °C. Ø6 x 50 mm AISI 316 stainless steel tube. Cable length 3 or 5 m standard. Cable ending with free wires.



TP35K6.5 **K-thermocouple** temperature probe. Isolated junction. Class 1 according to IEC 60584-1. Operating temperature: -50…+750 °C. Ø3 x 150 mm AISI 316 stainless steel tube. Cable length 5 m. Cable ending with free wires.

PHOTOMETRIC PROBE

LP 35 PHOT	Photometric probe for measuring illuminance, CIE photopic filter, spectral response according to the standard photopic curve, diffuser for cosine correction. Measuring range: 0.1…200,000 lux. Cable length 5 m.
LPBL	Base with levelling device for the photometric probe.
LPBL3	Adjustable wall support for the photometric probe.

ACCESSORIES

CPM8.2	Power supply cable. M8 connector on one side, free wires on the other. Length 2 m (CPM8.2), 5 m (CPM8.5) or 10 m (CPM8.10).
CONM8H	Adapter from M8 connector to screw terminals. **Spare part**.
SWD10M8	Stabilized mains power supply 100-240 Vac / 12 Vdc-1A. M8 connector.
POE-SPLT12M8	PoE splitter, 12 V output, M8 connector.
HD75	Saturated solution to check Relative Humidity probes at 75 % RH, includes ring adapter for Ø14 mm probes, thread M12×1.
HD33	Saturated solution to check Relative Humidity probes at 33 % RH, includes ring adapter for Ø14 mm probes, thread M12×1.
HD11	Saturated solution to check Relative Humidity probes at 11 % RH, includes ring adapter for Ø14 mm probes, thread M12×1.
HD31.B3A	Adapter for the calibration of the CO_2 sensor with a cylinder. Supplied with connection tube.

DELTA OHM metrology laboratories LAT N° 124 are ISO/IEC 17025 accredited by ACCREDIA for Temperature, Humidity, Pressure, Photometry / Radiometry, Acoustics and Air Velocity. They can supply calibration certificates for the accredited quantities.

Approvals

IEEE 802.11 (Wi-Fi) certifications:

HD50… data loggers contain IEEE 802.11b/g/n certified RF module:

S/N < 23003660: FCC ID: XM5-SMG2N2
IC ID: 8516A-SMG2N2
TELEC: [R] 204-520077

S/N ≥ 23003660: FCC ID: QOQWGM160P
IC ID: 5123A-WGM160P
KC: R-C-BGT-WGM160P
TELEC: [R] 005-102265

FCC and IC notices

Notice: This device complies with Part 15 -15.247(a2) and 15.247(b) and 15.249 of the FCC Rules and with Industry Canada (IC) licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Avis: *Cet appareil est conforme avec Part 15 -15.247(a2) et 15.247(b) et 15.249 des règlements FCC et Industrie Canada (IC) RSS standard exempts de licence(s). Son fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne peut pas provoquer d'interférence et (2) cet appareil doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement du dispositif.*

Notice: This equipment has been tested and found to comply with the limits for Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and radiates radio frequency energy, and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by tirning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measure:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Notice: To satisfy FCC/IC RF exposure requirements for mobile and base station transmission devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Avis: *Pour répondre aux exigences d'exposition RF FCC/IC pour les dispositifs de transmission mobiles et les stations de base, une distance de séparation de 20 cm ou plus doit être maintenue entre l'antenne de l'appareil et des personnes en cours de fonctionnement. Pour assurer la conformité, l'exploitation de plus près à cette distance n'est pas recommandée. L'antenne(s) utilisé pout cet émetteur ne dois pas être co-localisés ou fonctionner conjointement avec une autre antenne ou transmetteur.*

Notice: Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Avis: *Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.*

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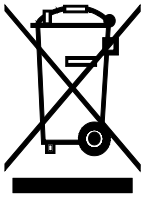
WARRANTY

The manufacturer is required to respond to the "factory warranty" only in those cases provided by Legislative Decree 6 September 2005 - n. 206. Each instrument is sold after rigorous inspections; if any manufacturing defect is found, it is necessary to contact the distributor where the instrument was purchased from. During the warranty period (24 months from the date of invoice) any manufacturing defects found will be repaired free of charge. Misuse, wear, neglect, lack or inefficient maintenance as well as theft and damage during transport are excluded. Warranty does not apply if changes, tampering or unauthorized repairs are made on the product. Solutions, probes, electrodes and microphones are not guaranteed as the improper use, even for a few minutes, may cause irreparable damages.
The manufacturer repairs the products that show defects of construction in accordance with the terms and conditions of warranty included in the manual of the product. For any dispute, the competent court is the Court of Padua. The Italian law and the "Convention on Contracts for the International Sales of Goods" apply.

TECHNICAL INFORMATION

The quality level of our instruments is the result of the continuous product development. This may lead to differences between the information reported in the manual and the instrument you have purchased.
We reserves the right to change technical specifications and dimensions to fit the product requirements without prior notice.

DISPOSAL INFORMATION



Electrical and electronic equipment marked with specific symbol in compliance with 2012/19/EU Directive must be disposed of separately from household waste. European users can hand them over to the dealer or to the manufacturer when purchasing a new electrical and electronic equipment, or to a WEEE collection point designated by local authorities. Illegal disposal is punished by law.

Disposing of electrical and electronic equipment separately from normal waste helps to preserve natural resources and allows materials to be recycled in an environmentally friendly way without risks to human health.

CE RoHS

senseca

Please note our new name:
Senseca Italy Srl
Via Marconi 5, 35030 Padua, Italy
Documents are in the process of being changed.