OPERATING MANUAL

HD33[L]M-MB.4

4G data logger

EN

V1.0

senseca

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1 Introduction

The **HD33[L]M-MB.4** data logger allows several physical quantities to be monitored in a large variety of application fields.

To the "Master" RS485 Modbus-RTU input you can connect a network of sensors for measuring, for example, temperature, humidity, atmospheric pressure, solar radiation, wind speed and direction, etc.

As an alternative to the Modbus-RTU protocol, a proprietary protocol can be used to connect the HD2003 anemometer.

A voltage-free contact input allows connecting a rain gauge with contact output. The contact can be configured as normally closed or normally open. A measurement compensation curve as a function of the rainfall rate can be configured. The data logger calculates the rainfall rate in mm/h (by reporting the amount of rainfall in the last five minutes to an hourly value) and the amount of rainfall in the last day.

Thanks to 4G / 3G / GSM(2G) / GPRS transmission, the user will not have to remove the data logger from its position or reach the place where the data logger is installed to download the data measured with the PC: the instrument can send the data via **e-mail** or **FTP** and can upload the data on an **HTTP** server (**cloud**). The data logger can be controlled remotely either by sending commands via SMS or by establishing a direct TCP/IP connection via mobile network with a remote PC connected to the Internet.

For each detected quantity, the user can set two alarm thresholds (high threshold and low threshold), the alarm hysteresis and a delay in the generation of the alarm. The overrun of the thresholds can be indicated by an audible signal of the data logger through an internal buzzer or signaled by alarm e-mails or SMS messages.

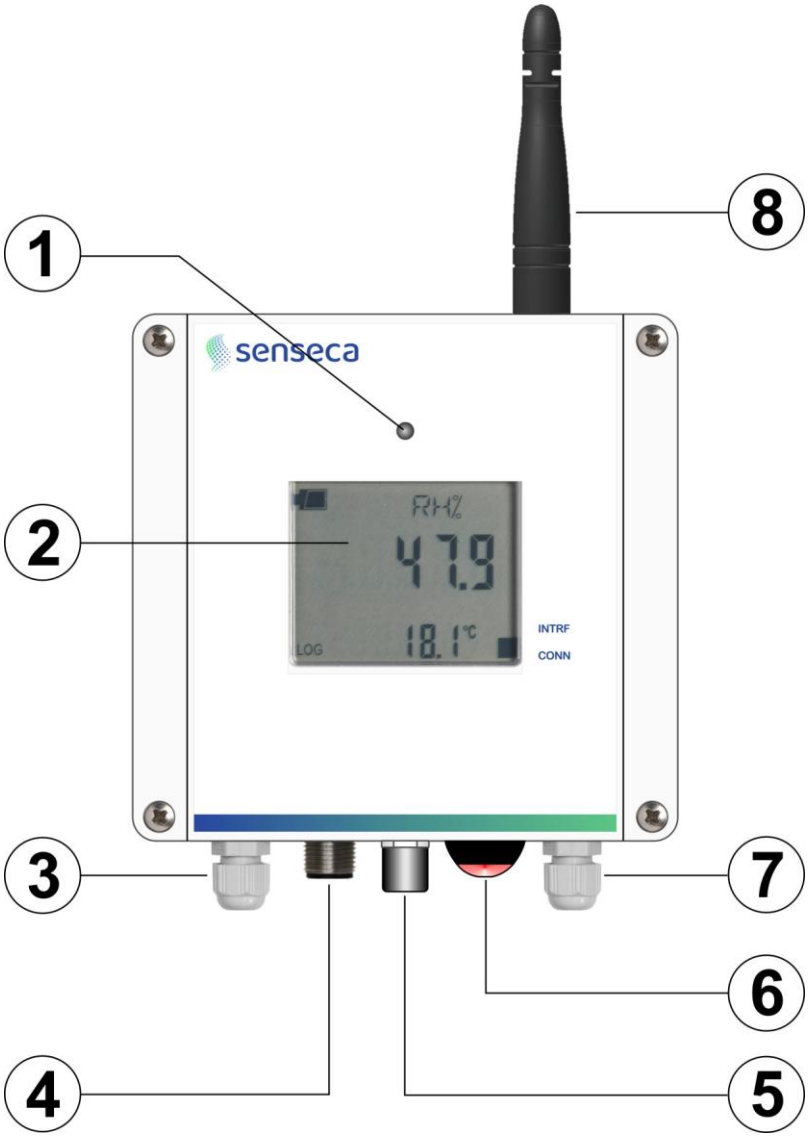
HD35AP-S PC software, downloadable from the website, allows configuration of data logger, displaying measurements in real time both in graphical and numerical format, data download. The data transferred to the PC are entered into a database.

The data logger operates with 7…30 Vdc direct power supply voltage and can be powered by a solar panel through an appropriate **optional** power supply unit.

A switched power supply output allows powering the sensors only when measurements must be taken.

Optional custom LCD display.

2 Description



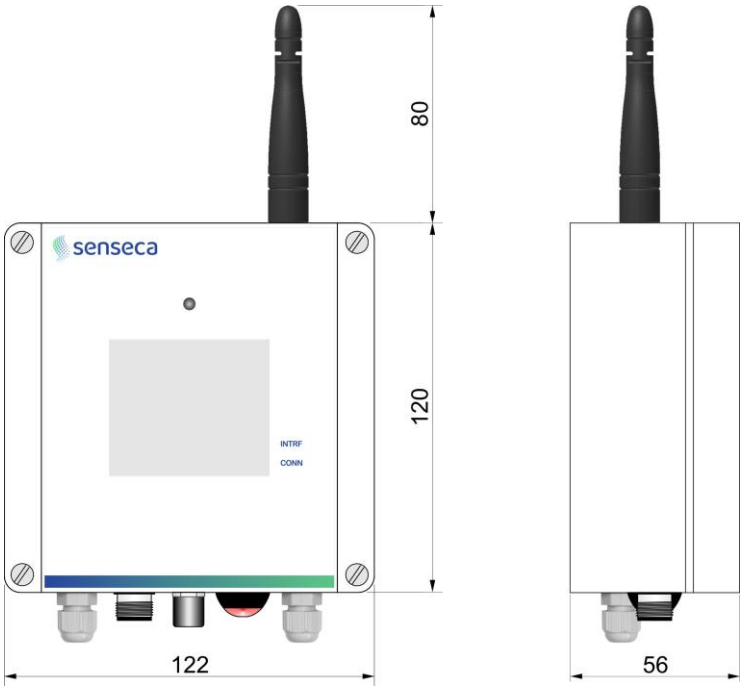
1. Bicolor LED: red blinking indicates that the instrument is powered, blinks green to signal mobile network activity
2. LCD (optional)
3. Cable gland for power supply
4. M12 connector for the connection of the rain gauge
5. USB port with mini-USB connector (with protective cap)
6. Push-button for manually scrolling the measurements on the display
   The cyclic automatic scrolling of the measurements can be set with the HD35AP-S software (see the software online help)
7. Cable gland for RS485 connection
8. Antenna

3 Technical specifications

Power supply	7…30 Vdc
Power consumption	< 3 mA during measurement (without cellular activity) < 2 A peak during cellular activity
Switched power supply output	Equal to the power supply voltage, active only when the external sensors have to be powered
Antenna	External
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. Number of samples: from 120,000 to 424,000 depending on the number of detected quantities.
Alarm	Acoustic with internal buzzer. Sending of alarm e-mail and SMS.
Display	Optional custom LCD
LED indicator	2-color LED: power on (blinks red), cellular activity (blinks green)
Connection to PC	USB port with mini-USB connector
External probes connection	RS485 Modbus-RTU input and input for rain gauge with contact output
Operating conditions	-40…+70 °C / 0…100 %RH for the version without LCD -20…+70 °C / 0…100 %RH for the version with LCD
Protection degree	IP 67 (with protective cap on USB connector)
Material	Polycarbonate (PC)
Weight	1 kg approx. (with optional shield)
Installation	Wall mount or fixing to a mast with optional support

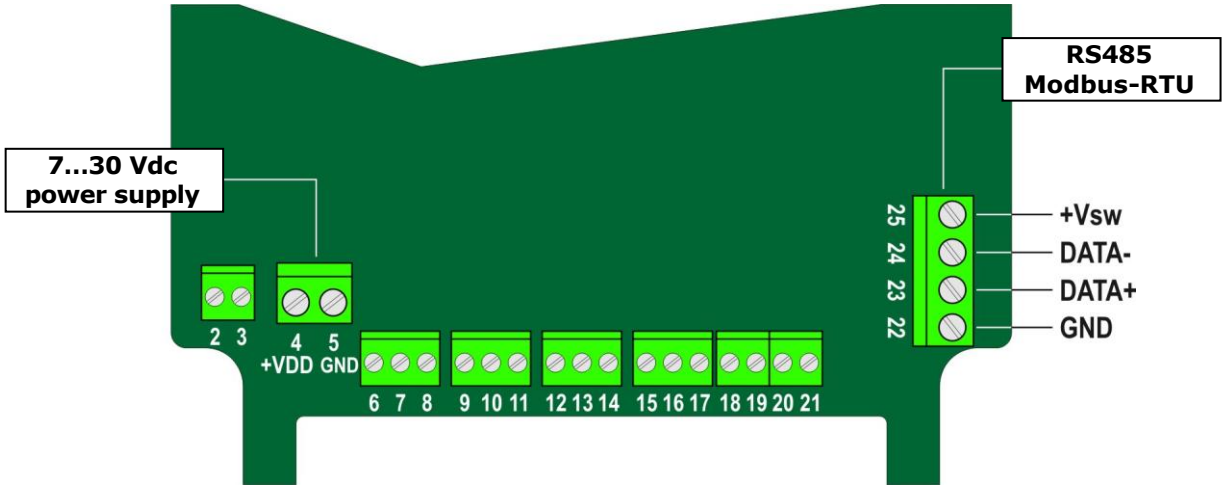
Note: the measurement specifications depend on the sensors connected.

Dimensions (mm)



4 Connections

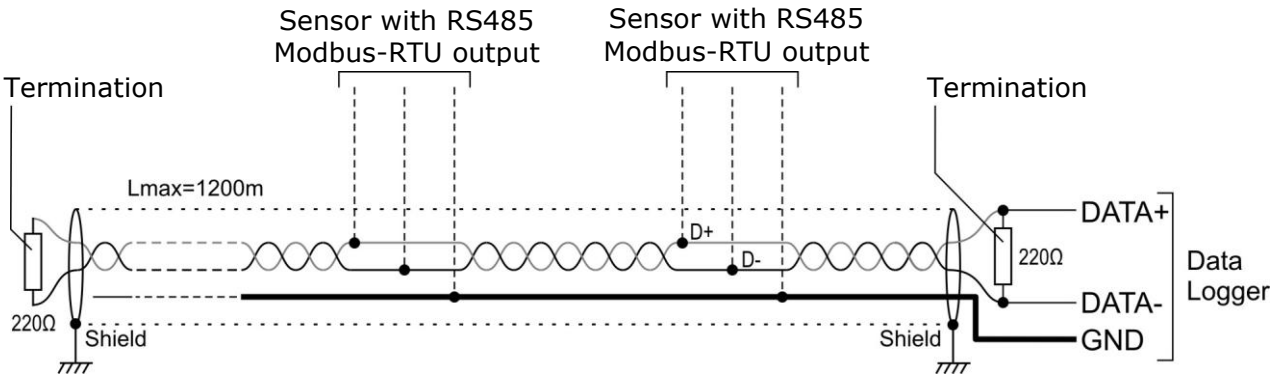
The power supply and the RS485 Modbus-RTU sensors network are connected to the internal terminal header via the cable glands at the bottom of the housing.



+Vsw is the switched power supply output that allows powering the sensors only when the measurements must be detected. The power output, when enabled, has the same value as the power input.

RS485 connection:

The sensors are connected in sequence by means of a shielded cable with twisted-pair wires for signals and a third wire for the ground.

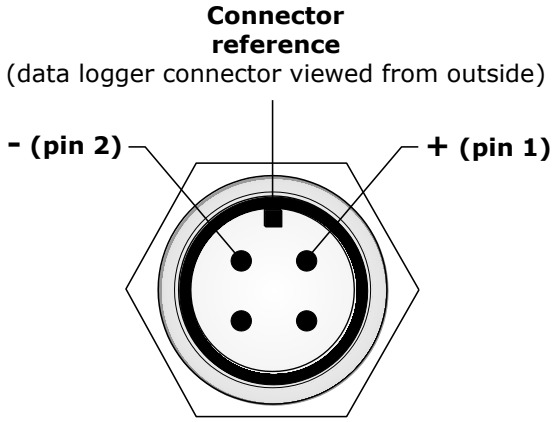


Line terminations must be placed at the ends of the network. The cable shield must be connected to both ends of the line.

The cable maximum length depends on the transmission speed and on the cable characteristics. Typically, the maximum length is 1200 m. The data line must be kept separated from any power lines to avoid interferences to the transmitted signal.

Each sensor in the RS485 network is uniquely identified by an address between 1 and 247. **There must not be more sensor with the same address on the network**.

Ran gauge connection:



USB connection:

The data logger can be connected to a PC through the mini-USB connector located at the bottom of the housing. Remove the connector protective cap and connect the **CP23** cable. The connection doesn't require the installation of drivers.

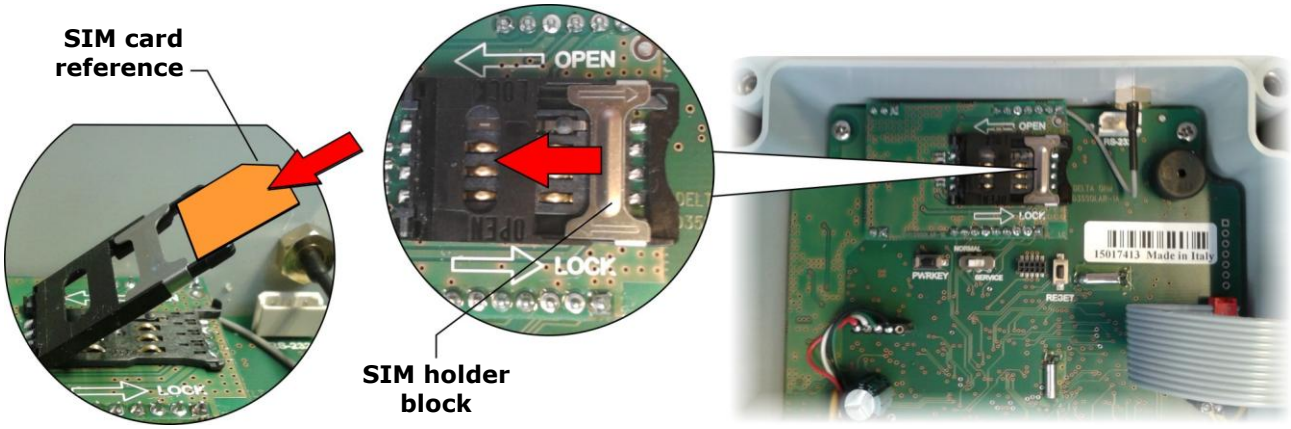
The data logger must be powered separately, it is not powered by the PC USB port.

When the data logger is not connected to the PC, replace the mini-USB connector protective cap to ensure the watertight integrity of the instrument.

5 SIM card

To use mobile network functionalities, a **SIM** card enabled for data transmission must be inserted into the data logger. The card should be requested to a carrier that has adequate network coverage in the place where the data logger will be installed. To insert the card, proceed as follows:

1. Disconnect the power supply.
2. Unscrew the 4 front screws on the housing and remove the cover.
3. Push the metal block of the SIM tray in the direction of the arrow OPEN, and rotate the tray upward.
4. Insert the SIM card into its tray so that the SIM card contacts face down and correspond to the contacts on the electronic board. The SIM has to be inserted between the metal block and the plastic part.



5. Put the SIM tray back in place and push the metal block in the direction of the arrow LOCK.
6. Close again the housing by fixing the 4 front screws.

Through the HD35AP-S software, set the necessary information for mobile network operation: SIM PIN, name of the APN access point, e-mail account and addresses, FTP address, telephone numbers, data transmission mode, etc. (see section *GSM/3G/4G settings* of the software online help).

Note: the NORMAL/SERVICE switch located under the SIM card must be in NORMAL position. The SERVICE position and the PWRKEY button are used to update the mobile communication module firmware.

The connection symbol (CONN) on the display is ON when the instrument is connected to the mobile network (the symbol blinks while connecting).

Among the information that you can scroll on display with the button in the lower part of the data logger, there is also the strength RSSI (Received Signal Strength Indication) in dBm of the mobile network signal received.

6 HD35AP-S software

The HD35AP-S software, downloadable from the website, allows:

- Configuring the data logger: measurements to be displayed, alarm thresholds and hysteresis, logging and transmitting intervals, date and time, etc. (see sections *Data loggers configuration*, *Alarms configuration*, *GSM/3G/4G settings* and *Clock setting* of the software online help).
- Transferring stored data to PC (see sections *Data download* and *Data download from FTP* of the software online help).
- Displaying measurements in real time, also in graphic format (see section *Monitor* of the software online help).
- Managing the graphical representation, printing and export of acquired data (see section *Displaying data in the database* of the software online help).

For the connection of the data logger to the HD35AP-S software, see section *Connection* of the software online help.

7 SMS commands

SMS messages containing commands can be sent by a mobile phone to the data logger. The SMS must be sent to the number of the SIM card inserted into the data logger. The following table lists the available commands:

Command	Description
RESET	Reset of the device
EMAIL-ON	Activates periodic download of measurement data via e-mail
EMAIL-OFF	Deactivates periodic download of measurement data via e-mail
EMAIL-PERIOD= *period index*	Set the transmission interval via e-mail, where *period index*: 0⇒15 min, 1⇒30 min, 2⇒1 hour, 3⇒2 hours, 4⇒4 hours, 5⇒8 hours, 6⇒12 hours, 7⇒24 hours, 8⇒2 days, 9⇒4 days, 10⇒1 week
EMAIL-FORMAT= *format index*	Set the format of the data sent via e-mail, where *format index*: 1⇒log (format for database), 2⇒csv (format for Excel®), 3⇒log+csv
EMAIL-DL-START	Activates immediate data download by e-mail starting from the last measurement transmitted
EMAIL-DL-FROM=*YYYY/MM/DD HH:MM:SS*	Downloads data by e-mail starting from the specified date, where YYYY: year, MM: month, DD: day, HH: hour, MM: minutes, SS: seconds
EMAIL-DL-INTERVAL=*YYYY/MM/DD HH:MM:SS - YYYY/MM/DD HH:MM:SS*	Downloads by e-mail all data between the specified dates, where YYYY: year, MM: month, DD: day, HH: hour, MM: minutes, SS: seconds
EMAIL-ALARM-REPORT	Transmits by e-mail a report containing the measurements that can generate alarms
EMAIL-REPORT	Transmits by e-mail a report containing the current measurements
EMAIL-HELP	Transmits an e-mail containing a list of all SMS commands
FTP-ON	Activates the periodic download of measurement data via FTP
FTP-OFF	Deactivates the periodic download of measurement data via FTP
FTP-PERIOD= *period index*	Set the transmission interval via FTP, where *period index*: 0⇒15 min, 1⇒30 min, 2⇒1 hour, 3⇒2 hours, 4⇒4 hours, 5⇒8 hours, 6⇒12 hours, 7⇒24 hours, 8⇒2 days, 9⇒4 days, 10⇒1 week
FTP-FORMAT= *format index*	Set the format of the data sent via FTP, where *format index*: 1⇒log (format for database), 2⇒csv (format for Excel®), 3⇒log+csv
FTP-DL-START	Activates immediate data download by FTP starting from the last measurement transmitted
FTP-DL-FROM=*YYYY/MM/DD HH:MM:SS*	Downloads data via FTP starting from the specified date, where YYYY: year, MM: month, DD: day, HH: hour, MM: minutes, SS: seconds
FTP-DL-INTERVAL=*YYYY/MM/DD HH:MM:SS - YYYY/MM/DD HH:MM:SS*	Downloads by FTP all data between the specified dates, where YYYY: year, MM: month, DD: day, HH: hour, MM: minutes, SS: seconds
FTP-ALARM-REPORT	Transmits by FTP a report containing the measurements that can generate alarms
FTP-REPORT	Transmits by FTP a report containing the current measurements
FTP-HELP	Transmits by FTP a file containing a list of all SMS commands
SMS-ALARM-ON	Activates transmission of alarm SMS for overrun of measurement thresholds (if the device is selected for sending alarm SMS)
SMS-ALARM-OFF	Deactivates the transmission of alarm SMS for the overrun of the measurement thresholds for the selected devices
EMAIL-ALARM-ON	Activates the transmission of e-mail measurements alarms (if the device is selected for sending alarm e-mail)

Command	Description
EMAIL-ALARM-OFF	Deactivates the transmission of e-mail alarms for measurement alarms
SMS-ALARM-REPORT	Indicates whether the measurements are in alarm. Only the selected measurements are taken into consideration for SMS alarms
SMS-DEVICE-ALARM-REPORT	Transmits via SMS a report of the measurements selected for SMS alarms
SMS-DEVICE-REPORT	Transmits via SMS a report of the measurements of the device
SMS-HELP	Transmits an SMS containing the list of all SMS commands
TCP-SERVER-ON	Activates a TCP connection with AP acting as a TCP server
TCP-SERVER-OFF	Deactivates the TCP connection with the device acting as a TCP server
TCP-CLIENT-ON	Activates a TCP connection with the device acting as a TCP client
TCP-CLIENT-OFF	Deactivate the TCP connection with the device acting as a TCP client
TCP-SERVER-ADDRESS="*server address***"**	Specifies the server address for TCP connection when the device acts as TCP client. The server-address string can be a domain or a IP address
TCP-SERVER-PORT=*port number*	Specifies the number of the TCP port used by the remote server to accept connections with the device when the device acts as TCP client
TCP-LISTEN-PORT=*port number*	Specifies the number of the TCP listening port used by the device when the device acts as TCP server
HTTP-ON	Activates the periodic upload of measurement data on HTTP server
HTTP-OFF	Deactivates the periodic upload of measurement data on HTTP server
HTTP-PERIOD= *period index*	Set the transmission interval via HTTP, where *period index*: -1⇒Real time, 0⇒15 min, 1⇒30 min, 2⇒1 hour, 3⇒2 hours, 4⇒4 hours, 5⇒8 hours, 6⇒12 hours, 7⇒24 hours, 8⇒2 days, 9⇒4 days, 10⇒1 week
HTTP-DL-START	Activates immediate data upload on the HTTP server starting from the last measurement transmitted
HTTP-DL-FROM=*YYYY/MM/DD HH:MM:SS*	Uploads data on the HTTP server starting from the specified date, where YYYY: year, MM: month, DD: day, HH: hour, MM: minutes, SS: seconds
HTTP-DL-INTERVAL=*YYYY/MM/DD HH:MM:SS - YYYY/MM/DD HH:MM:SS*	Uploads on the HTTP server all data between the specified dates, where YYYY: year, MM: month, DD: day, HH: hour, MM: minutes, SS: seconds
ADD-PHONE="*phone number***"**	Adds a phone number to the list of numbers considered for SMS alarms
CANC-PHONE	Delete my phone number and don't consider it any more for SMS alarms. The primary phone number cannot be deleted
ERASE-PHONE=*phone number index*	Deletes the phone number with specified index. This command is accepted only by the primary phone number
MEASURE-INTERVAL=*interval index*	Set the measuring interval, where *interval index*: 0⇒1 s, 1⇒2 s, 2⇒5 s, 3⇒10 s, 4⇒15 s, 5⇒30 s, 6⇒1 min, 7⇒2 min, 8⇒5 min, 9⇒10 min, 10⇒15 min, 11⇒30 min, 12⇒1 hour
LOG-INTERVAL= *interval index*	Set the logging interval, where *interval index*: 0⇒1 s, 1⇒2 s, 2⇒5 s, 3⇒10 s, 4⇒15 s, 5⇒30 s, 6⇒1 min, 7⇒2 min, 8⇒5 min, 9⇒10 min, 10⇒15 min, 11⇒30 min, 12⇒1 hour

Up to 16 commands can be written in the same text message, separated by spaces or commas.

For safety, commands are executed only if they are coming from the cell numbers set in the HD35AP-S software and if the SMS text starts with a user-defined key word. The key word is set through the HD35AP-S software, going to the menu *GSM options*

at the item *SMS recipients* and setting the field *SMS keyword* (see section *GSM/3G/4G settings* of the software online help).

Example: supposing you entered the string "**>>>**" in the *SMS keyword* field and you wish to activate periodic download via e-mail of the measured data with an interval of 1 hour, you will have to send the following text message:

>>> EMAIL-ON EMAIL-PERIOD=2

With the commands EMAIL-HELP, FTP-HELP and SMS-HELP you can ask the base unit to send respectively by e-mail, to an FTP address and through SMS the complete list of the available SMS commands.

8 4G/3G/GPRS TCP/IP Connection

Through 4G/3G/GPRS TCP/IP protocol, it is possible to interact with the data logger from a remote PC with an Internet connection.

The connection can be of two types:

1) **Data Logger = Client** , **PC = Server**

   The data logger acts as TCP client and requests the connection to the PC, the PC acts as TCP server and waits for the connection request. The server IP address (PC or Router) must be public and can be either static or dynamic; if the IP address is dynamic, it is convenient to register the server to a DDNS (Dynamic Domain Name System) service.

2) **Data Logger = Server** , **PC = Client**

   The PC acts as TCP client and requests the connection to the data logger, the data logger acts as TCP server and waits for the connection request. The server IP address (data logger) must be public and static.

Connection Data Logger = Client , PC = Server

1. Open a port (port forwarding) in the Modem/Router through which your PC connects to Internet (follow the instructions of your Modem/Router).
2. Connect the data logger to a PC USB port and perform the connection procedure with the HD35AP-S software.
3. In the HD35AP-S software select *Instruments setup >> GSM options >> GPRS TCP/IP client settings* and set the server IP address or domain name and port number (number of the port opened in the Modem/Router).
4. Disconnect the data logger from the USB port.
5. In the HD35AP-S software select *Tools >> Type of connection*, select the *TCP server* option and set the number of the port opened in the Modem/Router.
6. In the HD35AP-S software, select the *Connect* icon.
7. Send to the data logger the SMS command **TCP-CLIENT-ON**.

If the connection is not established within 30 minutes after sending the SMS command TCP-CLIENT-ON, the command must be sent again.

Alternatively, the server IP address or domain name and port number can be set in the data logger without connecting the data logger to the PC and without the HD35AP-S software by using the SMS commands **TCP-SERVER-ADDRESS** and **TCP-SERVER-PORT**.

Connection Data Logger = Server , PC = Client

1. Open a listening port in the data logger by using the SMS command **TCP-LISTEN-PORT** (for example, TCP-LISTEN-PORT=2020).
2. Send to the data logger the SMS command **TCP-SERVER-ON**.
3. The data logger replies with a first SMS to confirm that the command has been accepted. Wait for a second SMS with the confirmation that the *TCP server* functionality has been activated and with the IP address (and port number) assigned to the data logger.

4. In the HD35AP-S software select *Tools >> Type of connection*, select the *TCP client* option and set the IP address and port number of the datalogger.
5. In the HD35AP-S software, select the *Connect* icon.

If the connection is not established within 1 hour after sending the SMS command TCP-SERVER-ON, the command must be sent again.

9 Maintenance

Do not use aggressive cleaning agents or incompatible with the materials indicated in the technical specifications. For cleaning the instrument, use a soft dry cloth or slightly dampened with clean water.

10 Safety instructions

The instrument proper operation and operating safety can be ensured only in the climatic conditions specified in this manual and if all standard safety measures as well as the specific measures described in this manual are followed.

Do not use the instruments in places where there are:

- Corrosive or flammable gases.
- Direct vibrations or shocks to the instrument.
- High-intensity electromagnetic fields, static electricity.

User obligations

The instrument operator shall follow the directives and regulations below that refer to the treatment of dangerous materials:

- EU directives on workplace safety.
- National law regulations on workplace safety.
- Accident prevention regulations.

11 Accessories ordering codes

The data logger is supplied with HD35AP-S software, downloadable from the website.

Probes and CP23 USB cable must be ordered separately. SIM card not included.

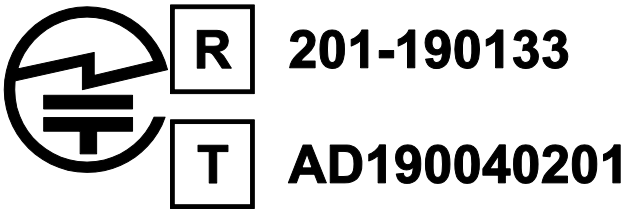
See website for available sensors.

Accessories

HD35AP-CFR21	Advanced version of the HD35AP-S software for the management of the data logging system in accordance with the **FDA 21 CFR part 11 recommendations**.
CP23	Direct USB connection cable with mini-USB male connector on the instrument side and A-type USB male connector on the PC side.
HD32MT.SWD	100…240 Vac / 24 Vdc power supply unit with switch. IP 65 housing. Suitable for fastening to a Ø 60 mm max. mast. Includes fastening accessories.
HD32WSF.S12	Solar panel power supply unit with SDI-12 interface for reading the power supply voltage. Includes a 12 Vdc / 7.2 Ah battery and a charge regulator. The power supply output is the unregulated voltage of the internal battery. IP 65 housing. Suitable for fastening to a Ø 60 mm max. mast. Includes fastening accessories.
OPZ30W	30 W solar panel with support for mast and 2 m connecting cable.
FIX33M001	Protection shield from solar radiation suitable for fastening to a Ø35…44 mm mast.
HD2005.20...	Tripod with adjustable legs for installing environmental sensors. Material: anodized aluminum. Max. height 225 cm (HD2005.20) or 335 cm (HD2005.20.1). It can be fixed on a flat base with screws or to the ground with pegs.

12 Approvals

HD33[L]M-MB**.4** contains LTE module FCC ID: XMR201903EG25G
IC ID: 10224A-201903EG25G
ANATEL: 02828-19-07968
TELEC certified RF module: [R] 201-190133



Notes

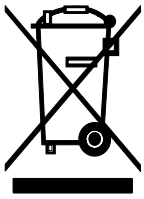
WARRANTY

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 reserve 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

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