Data logging Wireless

6-6-2013

HD 35AP…
HD 35RE
HD 35ED…

- Transportation of perishable and fragile goods (monitoring of shocks by measuring the acceleration)
- Air conditioning
- Clean rooms
- Laboratories
- Industrial processes

HD 35AP…, HD 35RE, HD 35ED…
WIRELESS DATA LOGGING SYSTEM

The Delta OHM wireless data logging system allows the monitoring of many physical quantities in various application fields. The data loggers are available for the monitoring of:

- Temperature
- Relative humidity
- Atmospheric pressure and differential pressure
- Illuminance (lux) and UV irradiance
- Carbon monoxide (CO)
- Carbon dioxide (CO_2)
- Acceleration

The models that measure relative humidity and temperature can also calculate derived humidity quantities. The calculated quantities depend on the model and can be: Dew Point, wet bulb temperature, absolute humidity, mixing ratio, partial vapour pressure.

Depending on the model, the external measuring probes are connected to the data logger via M12 connector or screw terminal header. Some of the models are equipped with built-in sensors.

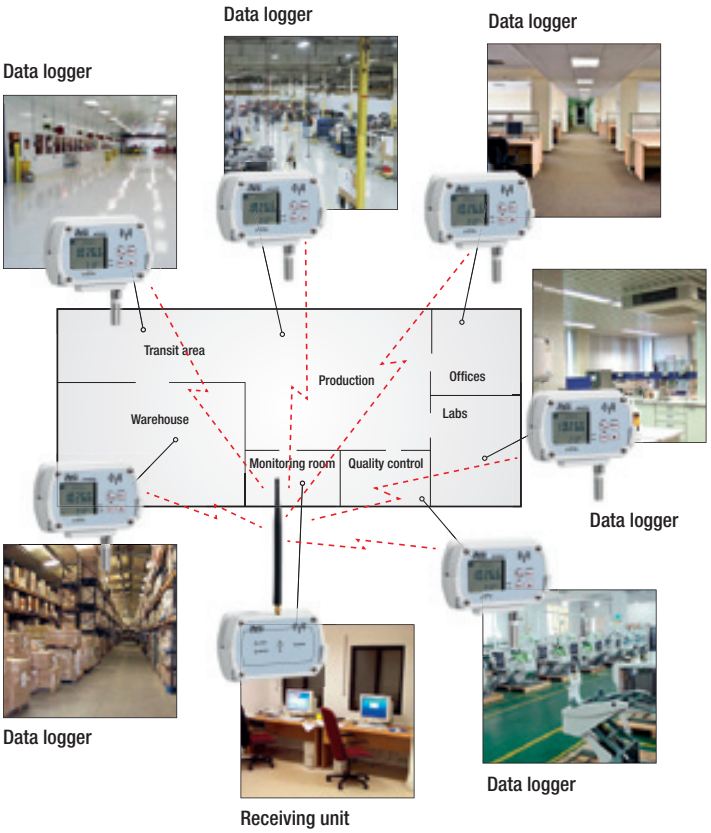
A version of data logger with terminal header inputs is available for the connection of:

- Transmitters with 4÷20 mA current output and 0÷1 V or 0÷50 mV voltage output
- Pt100 / Pt1000 and K, J, T, N, E type thermocouple temperature sensors
- Sensors with voltage free contact output (counting of switchings) or potentiometric output

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

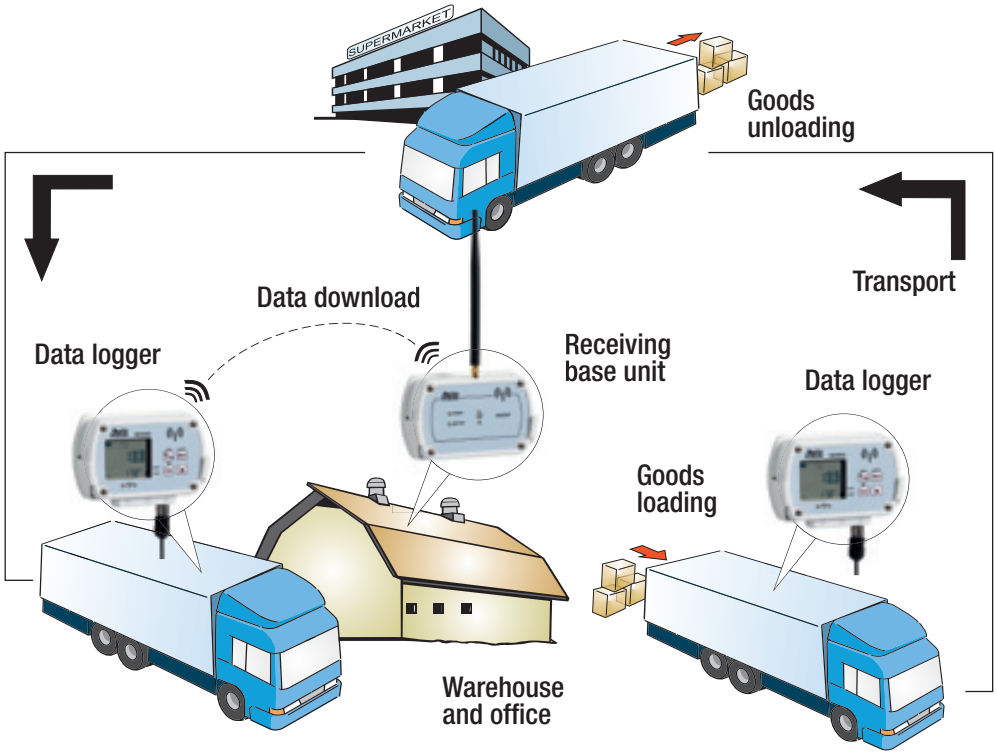
Typical application fields of the Delta OHM wireless data logging system are:

- Food services (refrigerated containers, cold storage, production and carriage of food)
- Health (storage of medicines, vaccines, blood, monitoring of incubators and operating rooms)
- Greenhouses and agriculture crops
- Environmental analyses (Air quality, meteorology and hydrology)
- Museums and document archives



Exemple of monitoring of an environment composed of several distinct areas

Monitoring of perishable (food, medicines, etc.) or fragile goods during transport



Components of the system

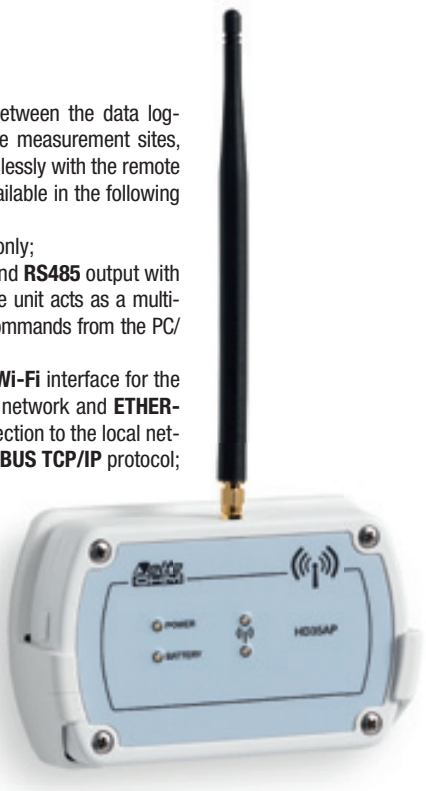
The system consists of the following components:
HD35AP…: Base unit.
HD35RE: Repeater.
HD35ED…: Series of data loggers.
HD35ED-ALM: Remote alarm module.

HD35AP…: Base unit.

The base unit is the interface between the data loggers of the system, placed in the measurement sites, and the PC. It communicates wirelessly with the remote data loggers. The base unit is available in the following versions:

- **HD35AP**: with the USB output only;
- **HD35APS**: with USB output and **RS485** output with **MODBUS-RTU** protocol (the base unit acts as a multiplexer to address the MODBUS commands from the PC/PLC to the devices in the network);
- **HD35APW**: with USB output, **Wi-Fi** interface for the connection to the wireless local network and **ETHERNET** interface for the cable connection to the local network; allows the use of the **MODBUS TCP/IP** protocol; Web server integrated;
- **HD35APG**: with USB output and integrated **GSM** module for sending alarm **SMS** to mobile phones and the recorded data via **e-mail** or to an **FTP** address. Allows the communication with the PC through the **GPRS TCP/IP** protocol.

When connected to the PC via the USB connection, the base unit is directly powered by the PC USB port. In the absence of the USB connection, the power is supplied by the internal rechargeable battery or by the external power adapter (**optional**).



HD35RE: Repeater.

The repeater is a device able to act as a bridge between the base unit HD35AP… and the remote data loggers HD35ED…. It allows the increasement of the communication distance among the data loggers and the base unit. It is possible to interpone other repeaters between a data logger and the base unit to further increase the communication distance.

HD35ED…: Series of data loggers.

The data loggers are the remote devices connected to the measuring probes. They are installed in the environments to be monitored and are powered by the internal battery (not rechargeable) that allows a long working life. The acquired measurements are stored in the internal memory and sent to the base unit automatically at regular intervals or upon user request. Versions with or without LCD are available. The versions with LCD allow to view the measurements also at the installation site and allow the data logger configuration through the front keyboard too.

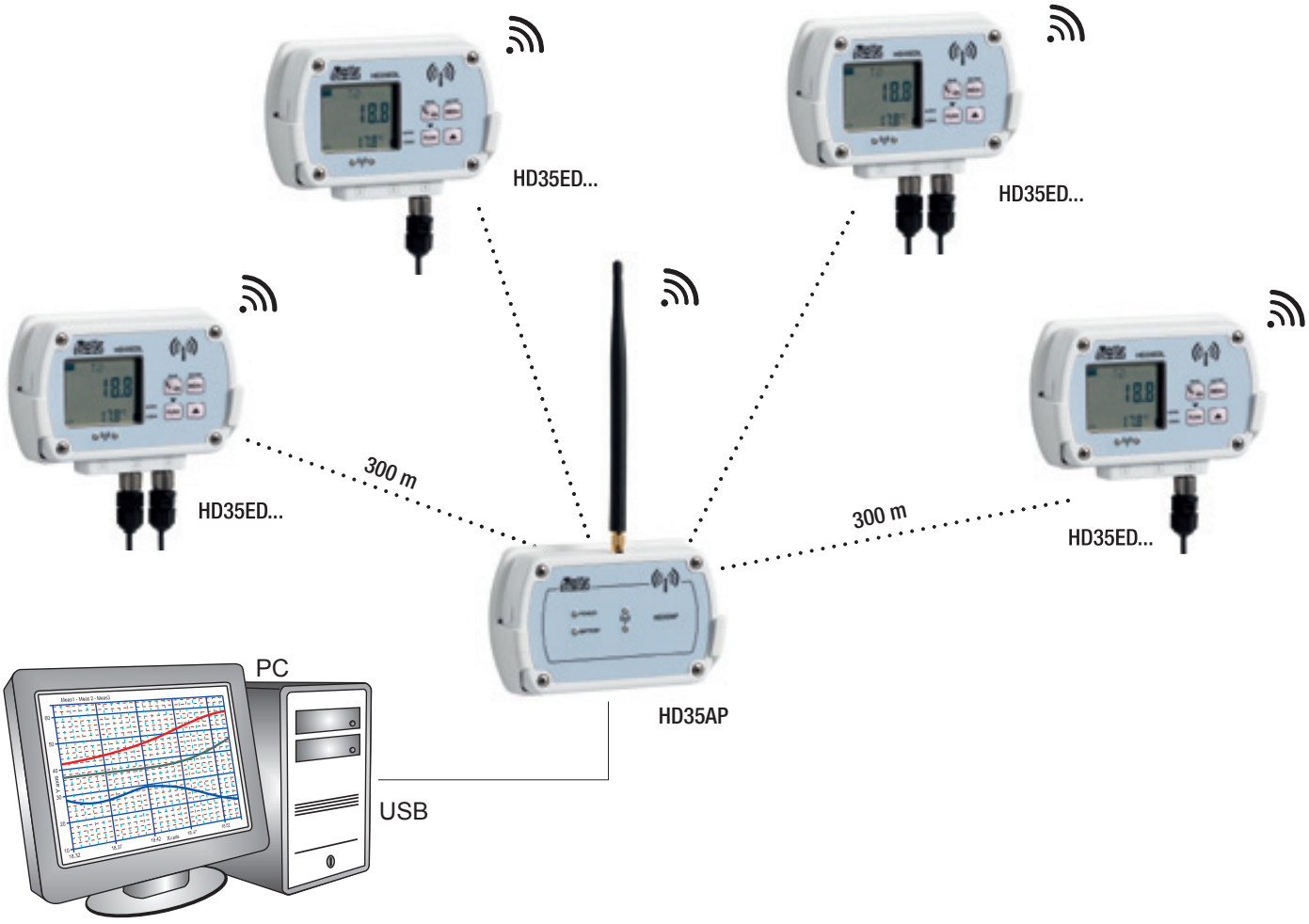
HD35ED-ALM: Remote alarm module.

With relay outputs, the module allows to activate signalling devices (sirens, blinking lights, etc.) or actuators.

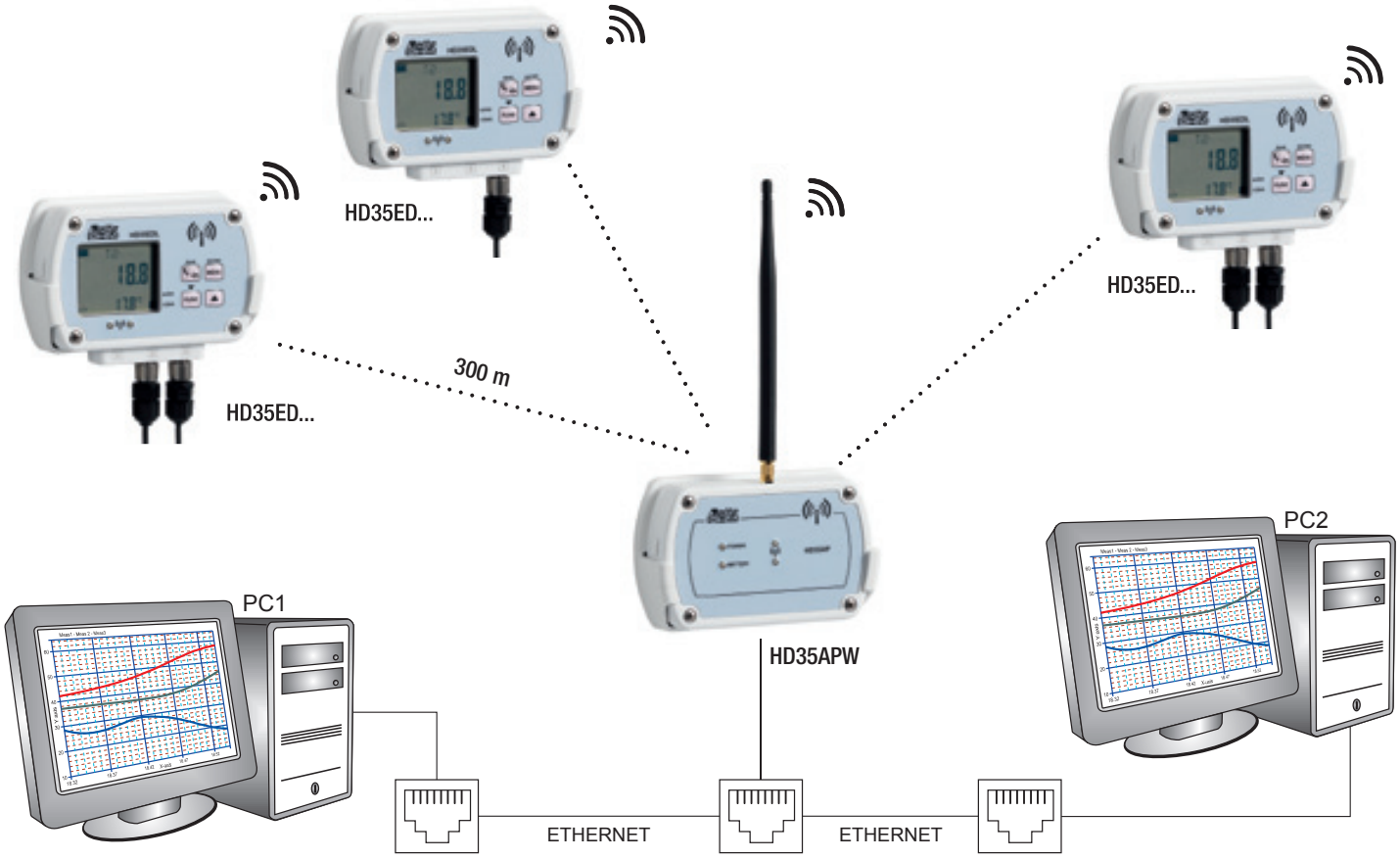
SYSTEM CONNECTION

Thanks to the wireless transmission, the installation of the system is extremely simple and quick. Furthermore, it is not necessary to remove the data logger from its place or to go to the installation site to download the measured data in the PC.

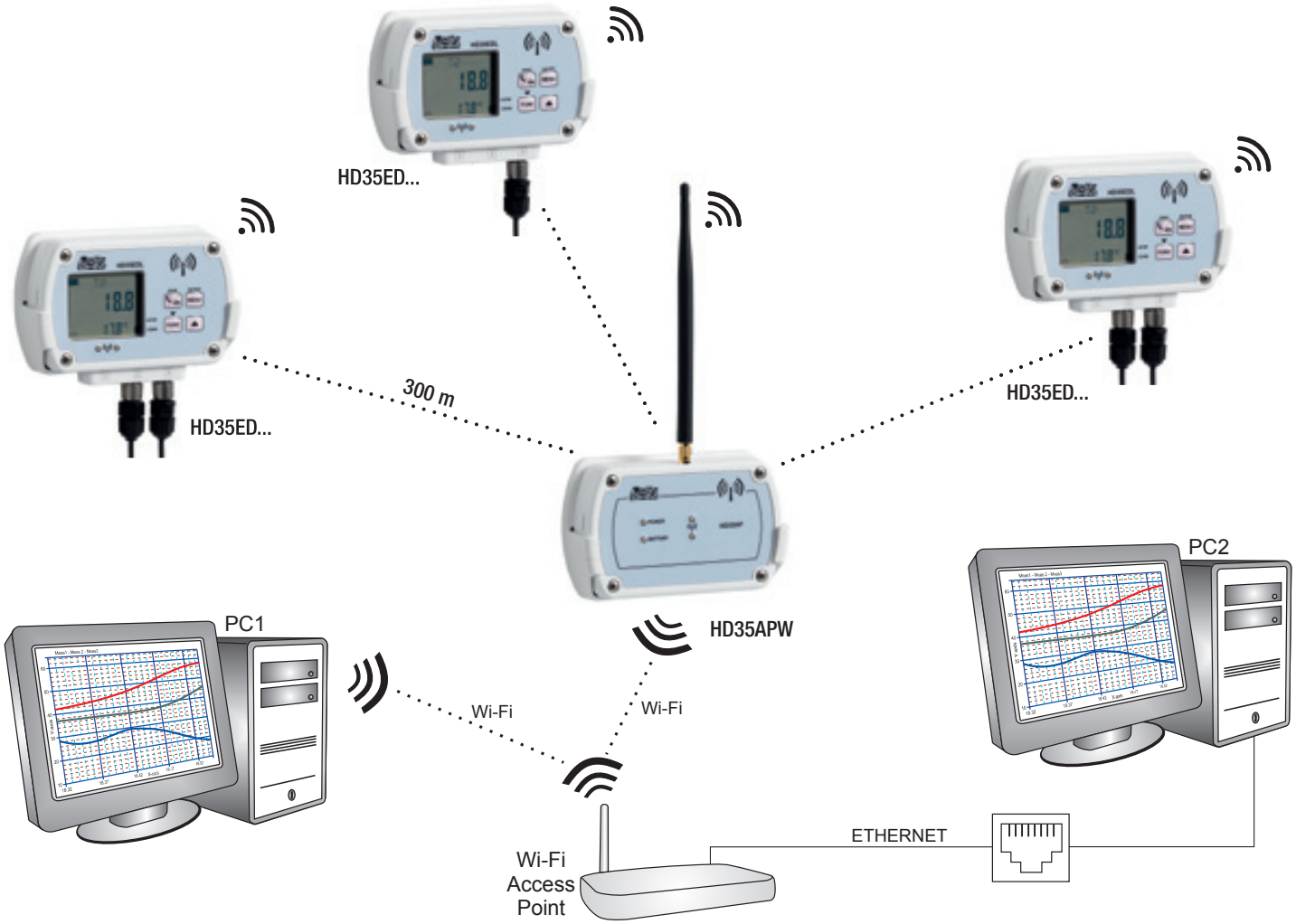
System with USB direct connection between PC and base unit



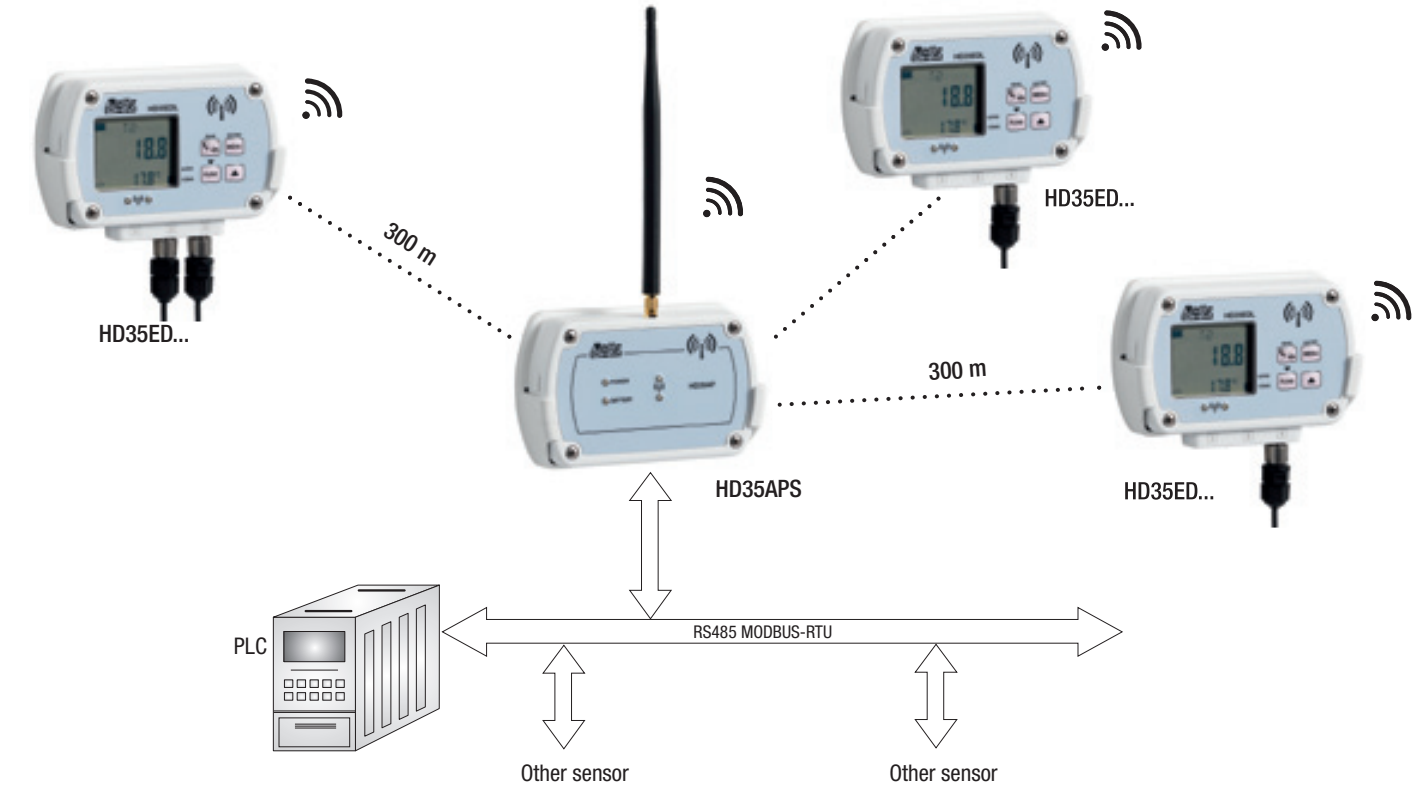
System with connection between PC and base unit via Ethernet local network



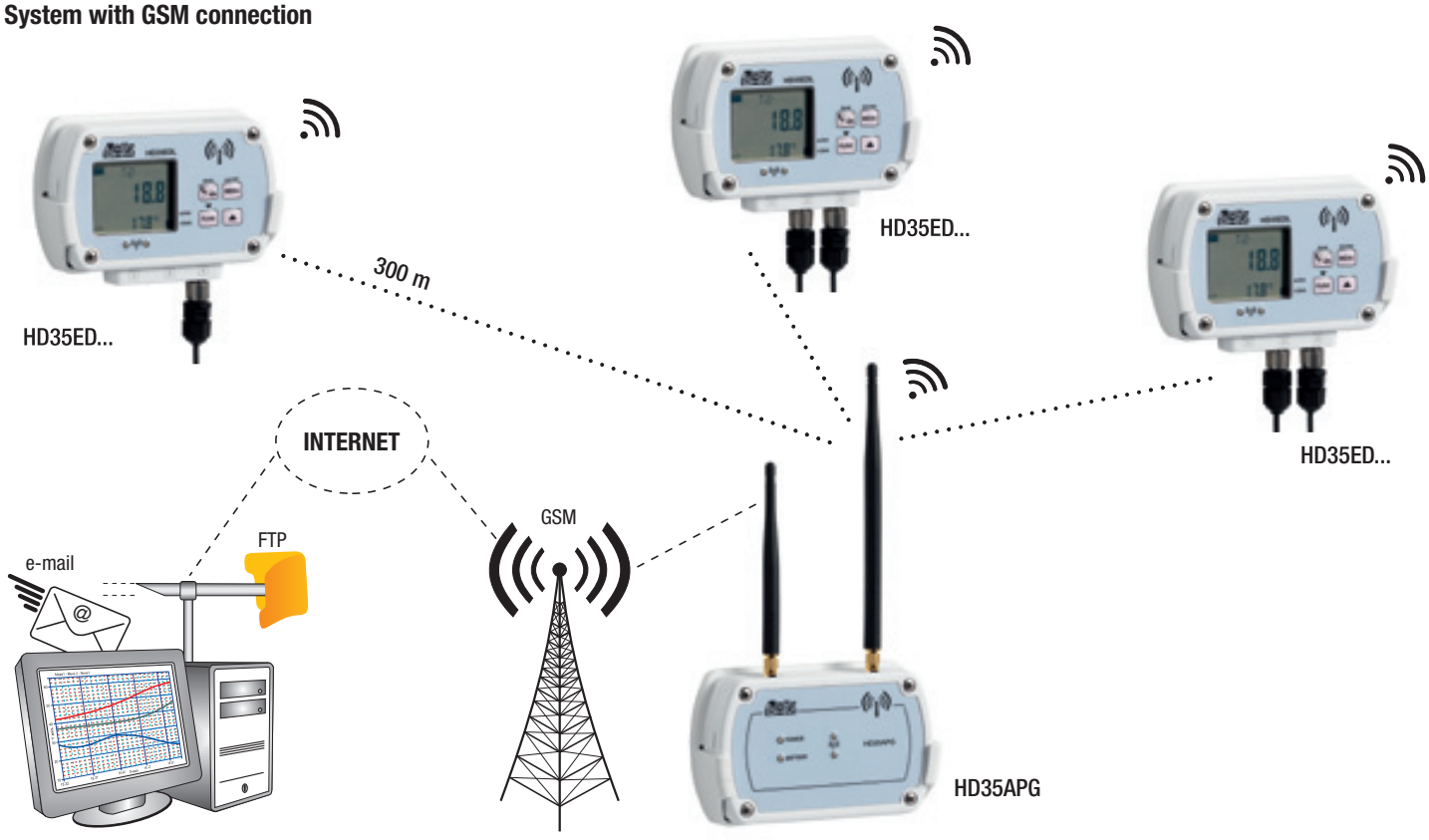
System with connection between PC and base unit via Wi-Fi local network



System with RS485 connection and MODBUS-RTU protocol



System with GSM connection



The connection also allows the monitoring of moving systems at a great distance, as for example in the case of the transport of perishable goods. Simply install the base unit in the moving system (for example inside a truck), in addition to the data loggers, to constantly keep under control the measured parameters from a fixed location. The communication through the **GPRS TCP/IP** protocol allows to interact with the base unit, in order to know and change the configuration of the system at any time.
All the models are available in three versions, depending on the transmitting frequency band:

- **868 MHz** (in compliance with the european normative EN 300 220),
- **902-928 MHz** (in compliance with U.S. FCC part 15 section 247 and I.C. RSS-210 regulations),
- **915.9-929.7 MHz** (in compliance with ARIB STD-T108 standard).
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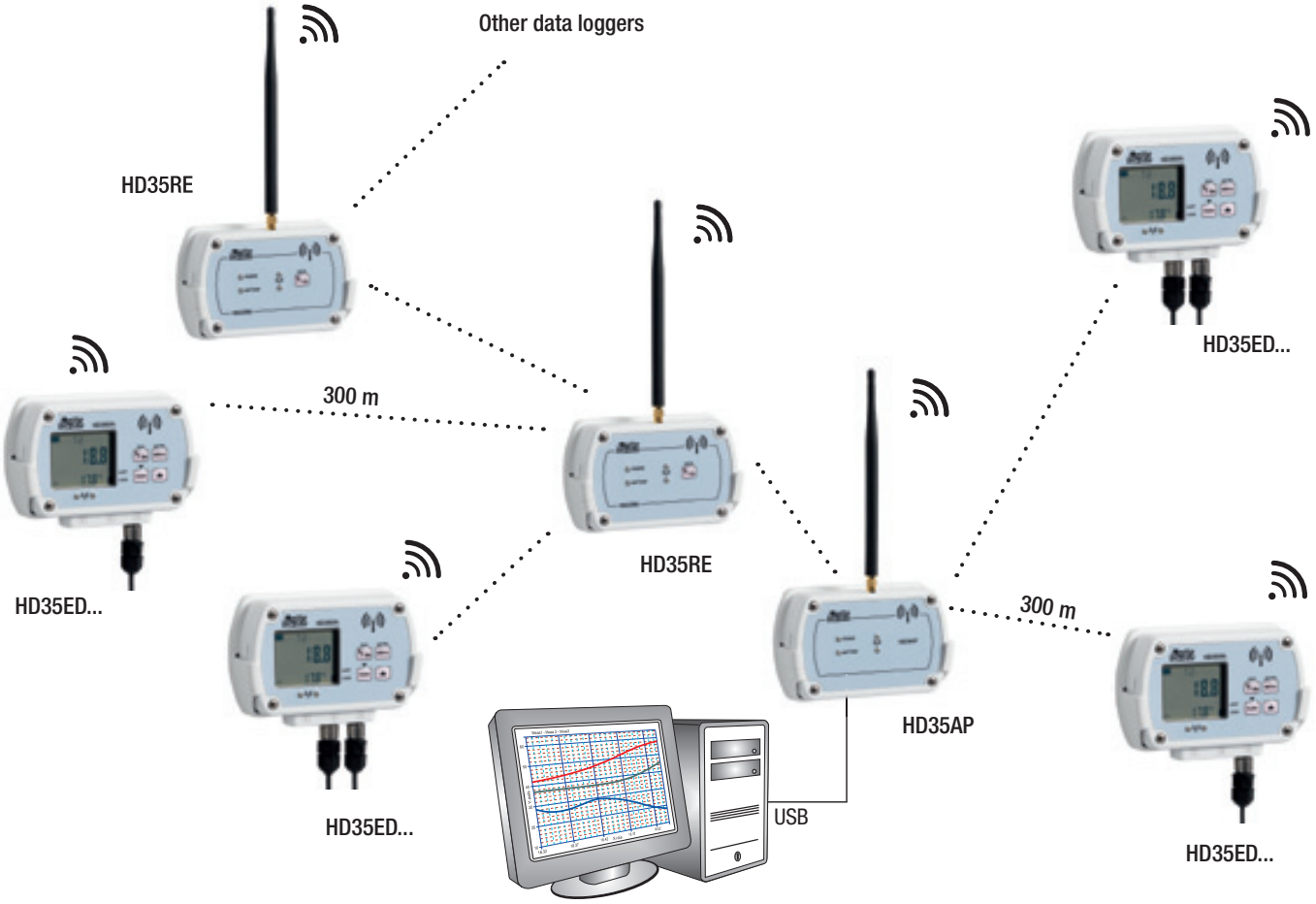
The wireless transmission of the Delta OHM system is extremely robust against radio frequency interference. The system is able to detect any RF interference in the transmission channel, and to transfer, upon request, the data communication in another channel of the same transmitting band. The correctness of the transmitted data is ensured by the **bidirectional** communication between the base unit and the remote data loggers.
The typical transmitting range between two devices communicating directly is **300 m** in open field. The range can be reduced if there are obstacles between the two devices. To increase the distance between the base unit and the data loggers, the **HD35RE** repeaters are used. More repeaters in cascade can be used ("multi-hop" network).

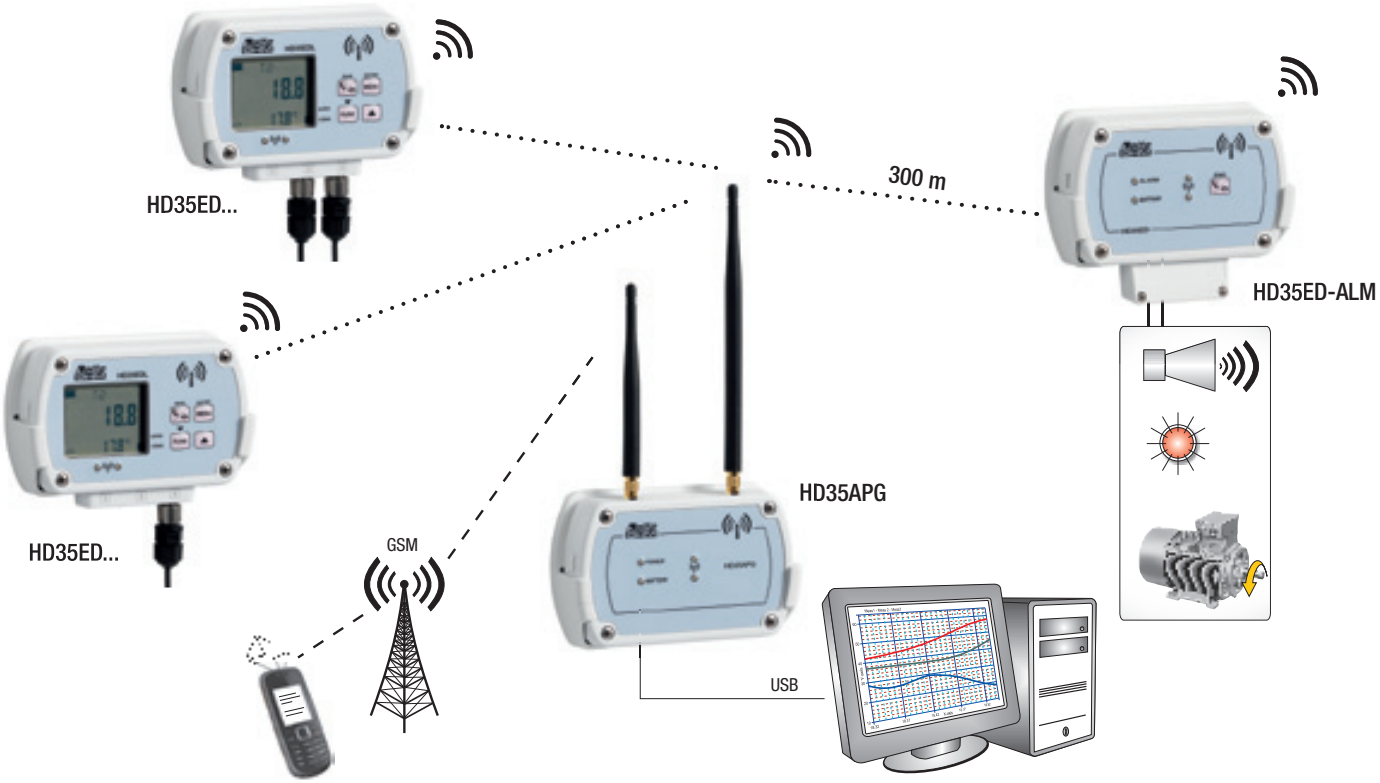
System with RF signal repeaters

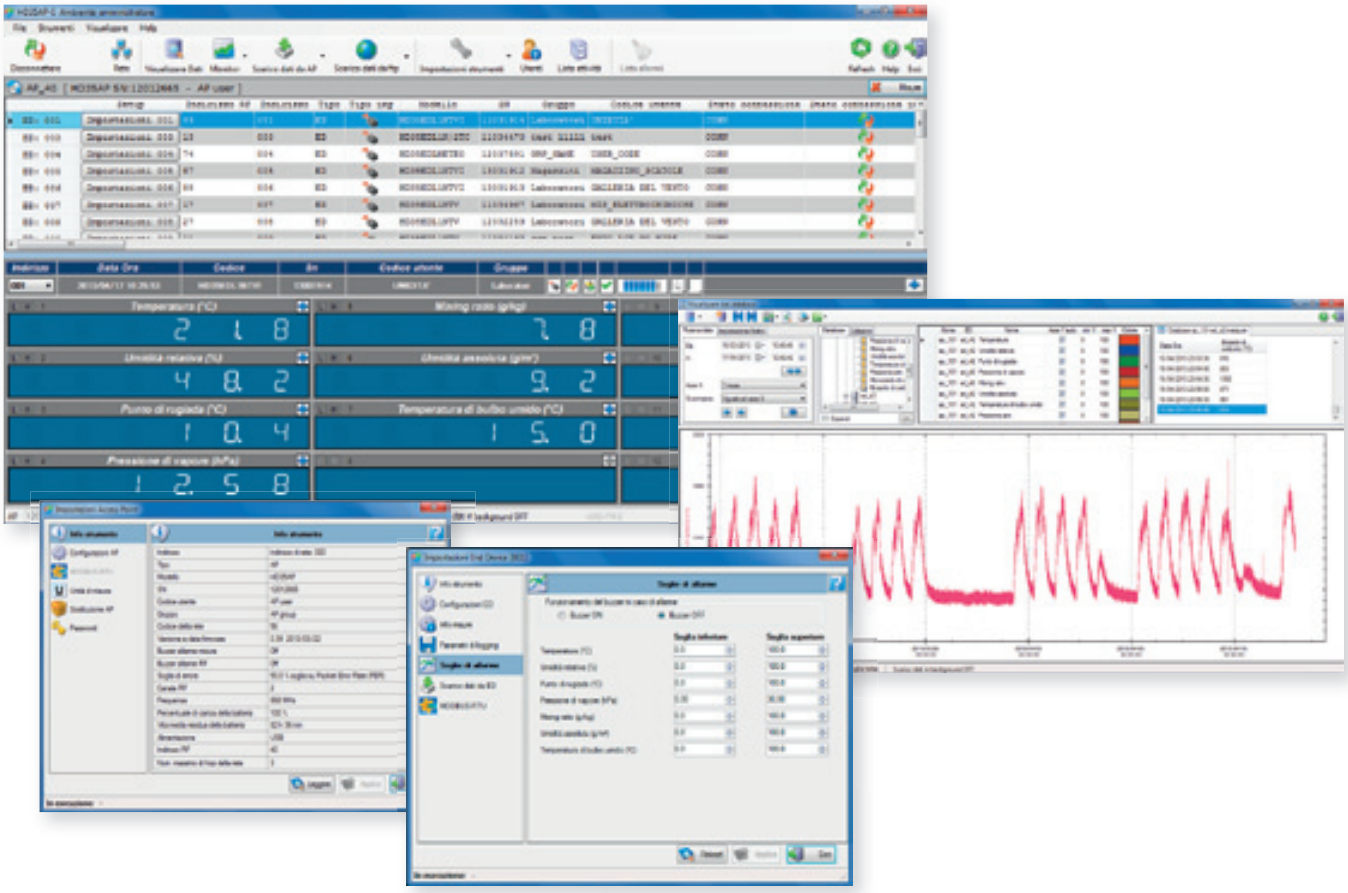


The system can consist of up to **255** devices (including the base unit and any repeaters). Each device is uniquely identified by its own address.

Alarms
For each measured quantity, two alarm thresholds can be set by the user (higher and lower threshold). When a threshold is exceeded, the internal buzzer of the data logger emits an acoustic signal and the alarm signal is immediately sent to the base unit and displayed on the PC. If the base unit is equipped with the GSM module (**HD35APG**), the alarm is signalled also by sending an SMS and an e-mail. A wireless remote alarm module with relay output is available (**HD35ED-ALM**), so to allow to activate more signalling devices (sirens, blinking lights, etc.) or actuators. The alarm module HD35ED-ALM works with all the versions of base unit.

Signalling the alarm





Logging

Each data logger of the system can be configured with a different measuring and logging interval. The stored value is the average of the measures acquired in the logging interval. The transmitted data are also stored in the internal memory of the data logger; when the data logger memory is full, it can be chosen to stop the logging or to continue overwriting the older data (cyclic logging). In addition to the individual loggers, after the transmission the data are also stored in the internal memory of the base unit; in this way the system is extremely safe against any data loss and it is not necessary to keep the PC always connected to the base unit. The memory of the base unit is managed cyclically.

Software

The supplied PC basic software **HD35AP-S** allows to configure all the devices of the system, to view the connection status, the RF signal level and the battery charge level of each device, to view the real time measurements both graphically and numerically, to download data automatically at regular intervals or manually upon user request.
The data downloaded in the PC are also entered in a database. If the PC is connected to a local network, by installing the advanced version of the software (**HD35AP-PLUS**), the data stored in the database are also accessible from other PCs connected to the same local network.

Web server
By means of the web server application included in the CD-ROM of the software **HD35AP-PLUS,** the database is accessible by using a web browser.
In the systems using base units equipped with ETHERNET and Wi-Fi (**HD35APW**) connection, thanks to the web server integrated in the base unit it is possible to view in real time the measurements and configure the system from any PC connected to the network by simply using a web browser (Internet Explorer®, Firefox®,…), without installing specific softwares in the PC.
The access of the user to the data logging system via web browser is protected by authentication codes.

Configuration
The data logger equipped with LCD and keyboard can be also configured via the front keyboard. The access to the configuration parameters of the data logger via keyboard is password protected. There are two different passwords, one for the use of the data logger as operator (access to some settings only) and one for the use as administrator (access to all the configuration parameters). The changes done to a data logger configuration via keyboard are automatically transmitted to the base unit and also reported in the PC software, allowing an always updated viewing of the system from the PC connected to the base unit. The base unit keeps also track of the system parameters of each data logger (for example of the alarm thresholds, etc.); it is therefore not necessary to request the parameters to the various data loggers to know the system configuration, just connecting the PC to the base unit and immediately get all the information needed.

Internal clock
The internal clock of each data logger is continuously **synchronized** with the clock of the base unit, thereby eliminating any problems due to the drift of the data logger clock. This ensures that the data loggers of the system have all the same time, feature particularly useful if you want to compare the measures acquired by various data loggers at the same time.

Indicators
The devices of the system are equipped with front LED indicating the communication status: any transmission difficulties due, for example, to the excessive distance among the devices or to the presence of obstacles are immediately highlighted.
The devices also report the charge status of the internal battery and the status of the alarm. The indication is on the display for the models provided with LCD and through LED indicators for the models without LCD.

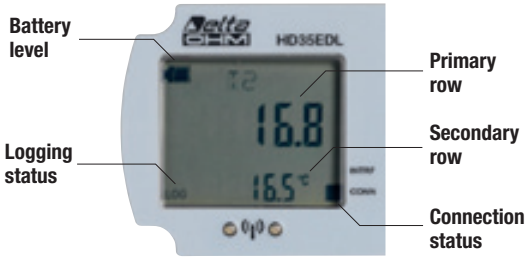
Installation
The practical wall mount plastic support allows to quickly remove and replace the devices of the system for service operations, for example to change the battery or to periodically check the calibration at a laboratory. Alternatively, a fixed installation can be realized, by using the appropriate anodized aluminium alloy flanges to be fixed on the back of the instrument case. The use of the flanges make it possible to prevent the removal of the instrument thanks to the possibility of applying a security padlock, inserted in a pin to be fixed to the wall.

Plastic support

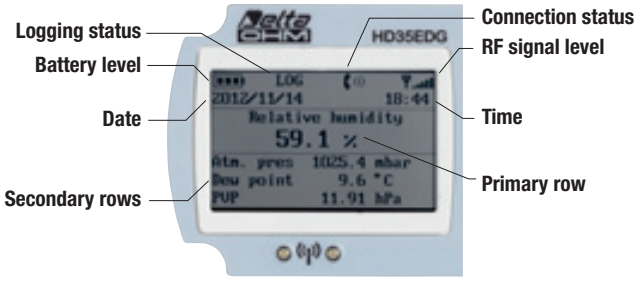
Flanges and security padlock

Conformities
The data loggers are in compliance with the standard **EN 12830**. The PC application software **HD35AP-S** is designed in accordance with the **FDA 21 CFR part 11** recommendations: the operations are protected by passwords and it is kept track of all the operations performed.

The display in the data loggers with optional LCD
Depending on the data logger model, the LCD is custom or graphic type. The models with custom LCD are identified by the **L** letter in the code. The models with graphic LCD are identified by the **G** letter in the code.
All the various quantities measured and calculated by the data logger can be viewed on the LCD. In the models with custom LCD that measure various quantities, the temperature is displayed in the secondary row.
Indications on the status of connection, logging (running/disabled) and battery charge level are provided.



Custom LCD
The models with graphic LCD allow to view 3 measures at the same time in the secondary rows. The graphic display also shows the level of the RF signal, date and time.



Graphic LCD
The data loggers with LCD can display the measured values in different units of measure. For example, in the models measuring temperature the user can set °C or °F, or, in the models measuring atmospheric pressure, the unit of measure can be set by the user in: hPa (= mbar), mmHg, inchHg, mmH_2O, $inchH_2O$, atm.

Available data loggers

The following tables list the **HD35ED**… data logger models available. Other models, in addition to those listed, can be supplied upon request for quantities.

To highlight the physical quantities measured by the data loggers, the ordering codes include some characters that identify the various quantities, according to the following convention:

1 = Humidity

4b = Atmospheric pressure (barometer)

4 = Differential pressure (**4r1** = range 1, **4r2** = range 2, etc.)

N = Temperature with NTC10K sensor (**N/2** = two channels, **N/3** = three channels)

7P = Temperature with Pt100/Pt1000 sensor (**7P/3** = three channels)

A = Carbon monoxide (CO)

B = Carbon dioxide (CO_2)

I = Illuminance (lux)

U = UVA irradiance

V = Acceleration

To indicate the fixed probe or the probe with cable, the following indications are used:

TC = Probe with cable

TV = Temperature and/or R.H. fixed vertical probe without cable, with high accuracy R.H. sensor

TVI= Temperature and R.H. fixed vertical probe without cable

TCV =Illuminance/irradiance probe with cable and temperature and R.H. fixed vertical probe without cable, with high accuracy R.H. sensor

The models that measure temperature and humidity with combined probe with cable (models **…TC**) use the probes of the series **HP3517…** with **high accuracy relative humidity sensor** and, depending on the model, NTC 10KΩ @ 25 °C or Pt100 temperature sensor. **The replacement of the probe HP3517… requires the recalibration of the instrument in line with the new probe**.

The models with M12 connectors equipped with inputs for measuring only the temperature use the temperature probes of the series **TP35…** with NTC 10KΩ @ 25 °C or Pt100/Pt1000 sensor.

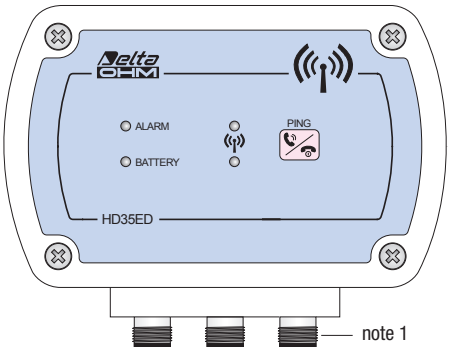
(*) Differential pressure ranges available

Model	Measuring range
HD35ED 1N4r1 TV	-2.5…+2.5 hPa (mbar)
HD35ED 1N4r2 TV	-10…+10 hPa (mbar)
HD35ED 1N4r3 TV	-100…+100 hPa (mbar)
HD35ED 1N4r4 TV	-2000…+2000 hPa (= 2 bar)

TAB. 1A: Data loggers in housing for indoor use

Model	MEASURES									OPTIONAL LCD		INPUTS		Fig.
	NTC 10K	Pt100 Pt1000	RH	Patm	ΔP	Lux	UVA	CO	CO_2	L Custom	G Graphic	Number of M12 connectors	Built-in sensors	
HD35ED 7P/3 TC		•									•	3		**A**, **B**
HD35ED N/3 TC	•									•		3		**A**, **B**
HD35ED N TV	•									•			•	**E**, **F**
HD35ED 1 TV			•							•			•	**E**, **F**
HD35ED 1 TVI			•							•			•	**E**, **F**
HD35ED 1N TC	•		•							•		1		**A**, **B**
HD35ED 1N/2 TC	•		•							•		2		**A**, **B**
HD35ED 17P TC		•	•							•		1		**A**, **B**
HD35ED 1N TV	•		•							•			•	**E**, **F**
HD35ED 1N TVI	Sensor integrated in RH module		•							•			•	**E**, **F**
HD35ED 14bN TC	•		•	•						•		1	Patm	**A**, **B**
HD35ED 14bN TV	•		•	•						•			•	**E**, **F**
HD35ED 14bN TVI	Sensor integrated in RH module		•	•							•		•	**E**, **G**
HD35ED 4r…TV (*)					•					•			•	**H**, **I**
HD35ED 1N4r…TV (*)	•		•		•					•			•	**H**, **I**
HD35ED 1NI TCV	•		•			•				•		1	T / RH	**E**, **F**
HD35ED 1NI TV	•		•			•				•			•	**E**, **F**
HD35ED 1NIU TCV	•		•			•	•			•		1	T / RH	**E**, **F**
HD35ED 1NIU TV	•		•			•	•			•			•	**E**, **F**
HD35ED 14bNI TCV	•		•	•		•				•		1	T / RH Patm	**E**, **F**
HD35ED 14bNI TV	•		•	•		•				•			•	**E**, **F**
HD35ED 14bNIU TCV	•		•	•		•	•			•		1	T / RH Patm	**E**, **F**
HD35ED 14bNIU TV	•		•	•		•	•			•			•	**E**, **F**
HD35ED 1NAB	Sensor integrated in RH module		•					•	•		•		•	**J**, **K**
HD35ED 14bNAB			•	•				•	•		•		•	**J**, **K**
HD35ED H	Transmitters with 4÷20 mA, 0÷1 V or 0÷50 mV output Pt100 / Pt1000 sensors, thermocouples K, J, T, N, E Sensors with voltage-free contact or potentiometric output										•	3 terminal header inputs		**C**, **D**

TAB. 1B: Data loggers in housing for indoor use - Images



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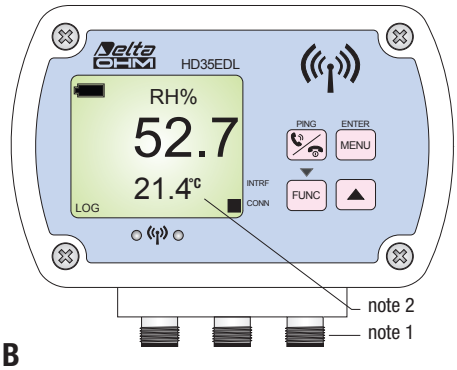

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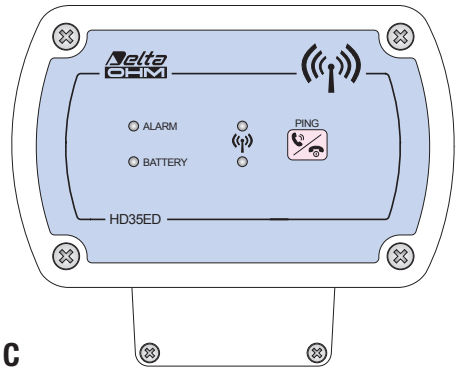

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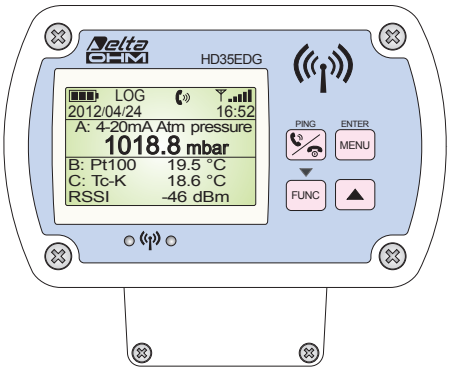

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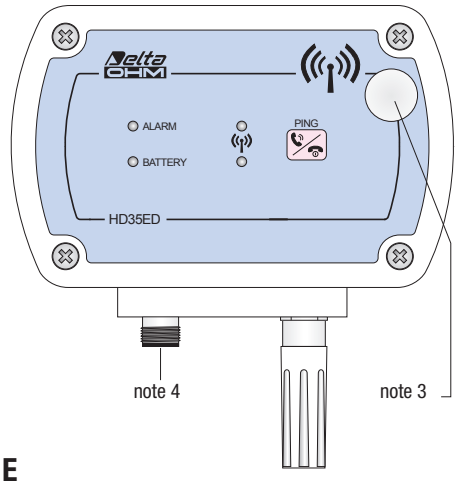

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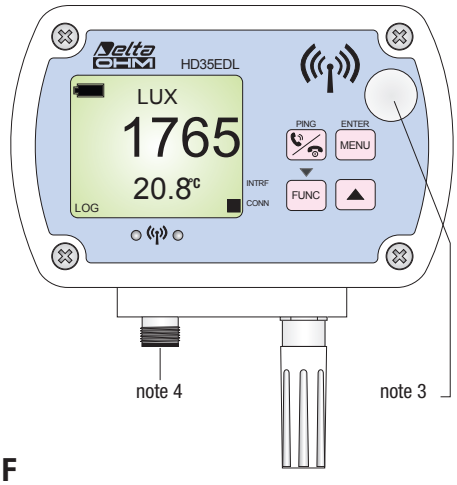

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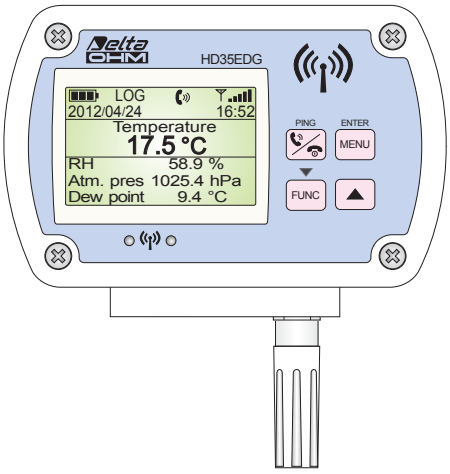

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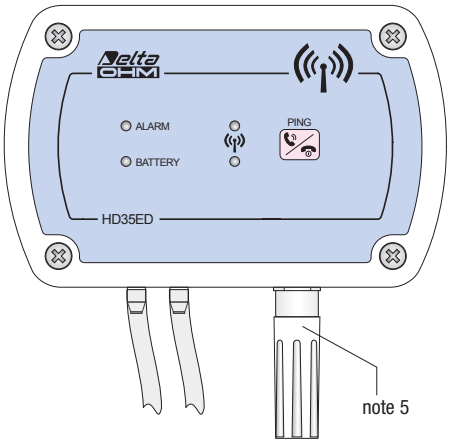

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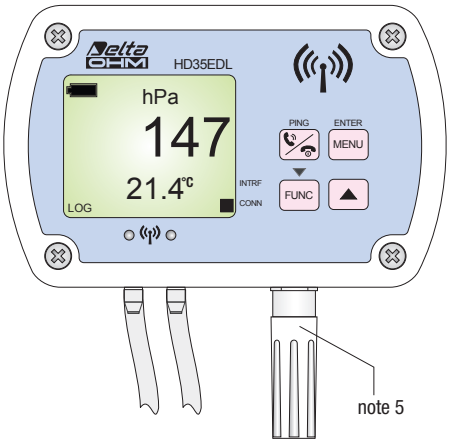

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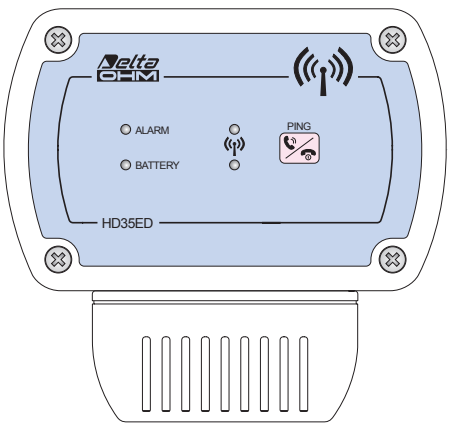

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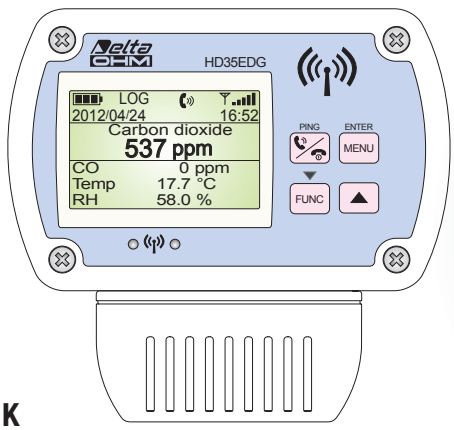
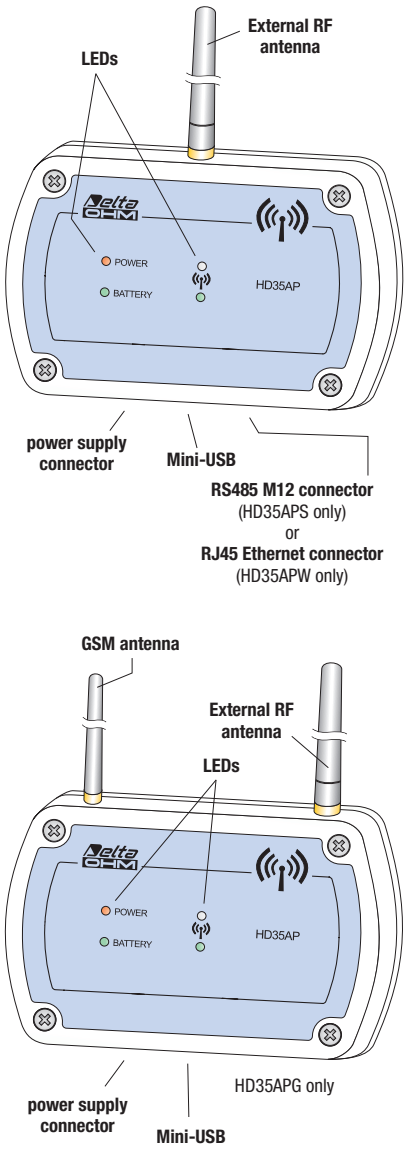


K

Note 1: the number of M12 connectors depends on the model and is indicated in table 1A.
Note 2: the type of LCD depends on the model and is indicated in table 1A.
Note 3: available only in the models that measure illuminance or UVA irradiance with built-in sensor.
Note 4: available only in the models that measure illuminance or UVA irradiance with external probe.
Note 5: available only in the models that measure temperature and humidity.

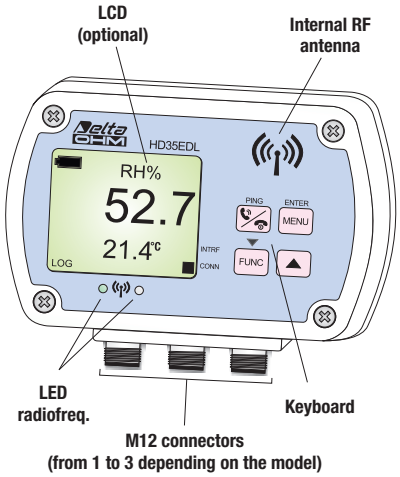
TECHNICAL SPECIFICATIONS

HD35AP… base unit	
	
Versions	**HD35AP**: USB output only **HD35APS**: USB and RS485 MODBUS-RTU outputs **HD35APW**: USB output, Wi-Fi and ETHERNET interface **HD35APG**: USB output and GSM module
Power supply	Internal 3.7 V lithium-ion **rechargeable** battery, capacity 2250 mA/h, JST 3-pole connector **Optional** 6 Vdc external power adapter (**SWD06**) Directly from the PC USB port
Power consumption	30 mA
Transmitting frequency	868 MHz, 902-928 MHz or 915.9-929.7 MHz depending on the model
Antenna	Whip external
Transmitting range	300 m in open field **The range can be reduced if obstacles or adverse weather conditions are present**
Serial outputs	USB with Mini-USB type connector (cable **CP23**) RS485 with **MODBUS-RTU** protocol (HD35APS only)
Ethernet connection	Only in HD35APW model. Allows the **MODBUS TCP/IP** protocol. Integrated Web server included.
Wi-Fi connection	Only in HD35APW model. Allows the **MODBUS TCP/IP** protocol. Integrated Web server included.
GSM connection	Only in HD35APG model. For sending alarm **SMS** and data via **e-mail** or **FTP**. Allows the **GPRS TCP/IP** protocol.
Internal memory	The number of samples that can be stored depends on the type of data loggers connected. The capacity is 226.700 samples if all the data loggers record 7 quantities.
LED indicators	Presence of external power supply, battery charge level, RF communication status.
Battery autonomy	**3 days typical**
Working temperature and humidity range	-10…+60 °C / 0…85 %RH not condensing
Dimensions	See dimensional drawings
Weight	200 g approx. (including battery)
Housing	ABS
Protection degree	IP 64
Installation	Wall mount support (**supplied**) for removable installation or flanges (**optional**) for fixed installation

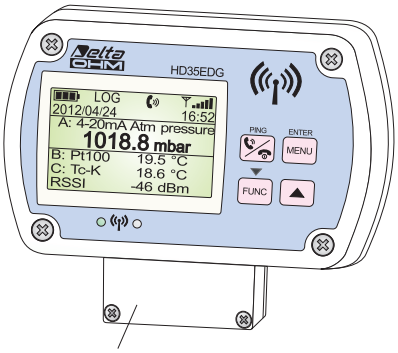
HD35ED… data loggers in housing for indoor use	
Transmitting frequency	868 MHz, 902-928 MHz or 915.9-929.7 MHz depending on the model
Antenna	Internal
Transmitting range	300 m in open field (**the range can be reduced if obstacles or adverse weather conditions are present**)
Measuring interval(*)	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Logging and transmitting interval(*)	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Internal memory	Circular management or stop logging if full. The number of samples that can be stored depends on the number of acquired quantities (see table 2).
Alarm	Acoustic by means of the internal buzzer

(*) Some models measuring several quantities may have a minimum interval greater than 1 second.

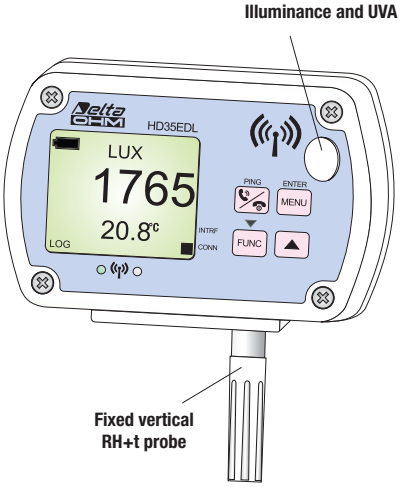
HD35ED… data loggers in housing for indoor use

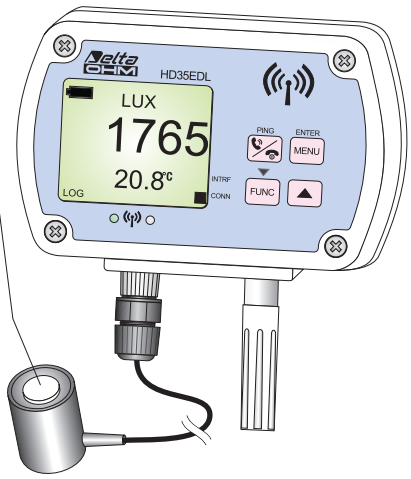


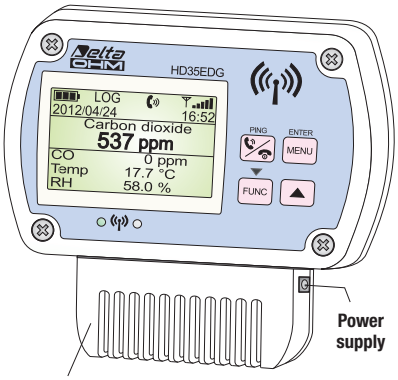
Power supply	Internal 3.6 V lithium-thionyl chloride (Li-$SOCl_2$) **not rechargeable** battery, size AA, Molex 5264 2-pole connector. In the models in housing with grid, a connector for external power supply (**SWD 06**) is available.
Display	Optional. Custom or graphic LCD depending on the model (see table 1).
Keyboard	Push-buttons for connection. The models with LCD are provided with buttons for configuration and scrolling of the measured values.
LED indicators	RF communication status. The models without LCD are provided with alarm LED and battery level LED.
Battery autonomy	2 years typ. (without repeaters and 30 s logging interval)
Working temperature and humidity range	-20…+70 °C (-10…+70 °C for the models with grid) 0…85 %RH not condensing
Dimensions	See dimensional drawings
Connectors for external probes with cable	Depending on the model, M12 connectors or terminal header inputs 3.5 mm pitch.
Weight	200 g approx. (version with LCD, including battery)
Housing	ABS
Protection degree	IP 64 (versions with M12 connectors)
Installation	Wall mount support (**supplied**) for removable installation or flanges (**optional**) for fixed installation.



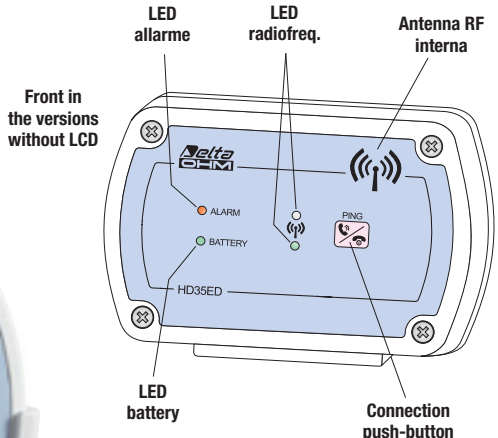
Terminal header inputs
protected by cover

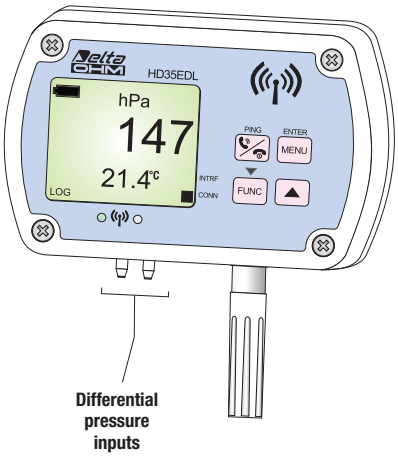




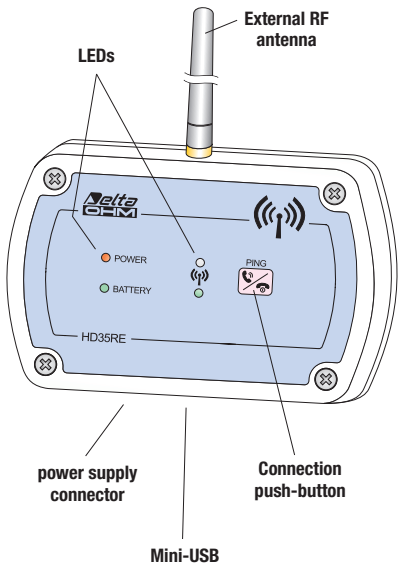


LP BL3
jointed support



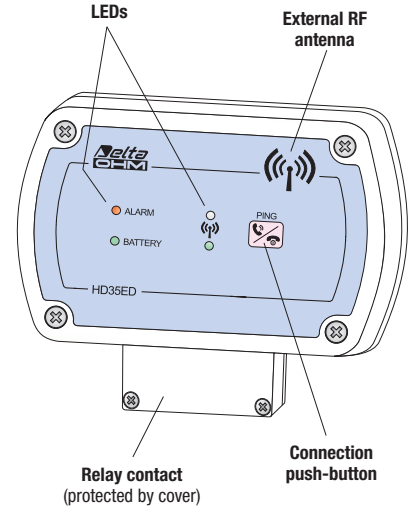


HD35RE repeater



Power supply	Internal 3.7 V lithium-ion **rechargeable** battery, capacity 2250 mA/h, JST 3-pole connector **Optional** 6 Vdc external power adapter (**SWD06**) Powered directly from the PC USB port
Power consumption	30 mA
Transmitting frequency	868 MHz, 902-928 MHz or 915.9-929.7 MHz depending on the model
Antenna	Whip external
Transmitting range	300 m in open field **The range can be reduced if obstacles or adverse weather conditions are present**
Serial outputs	USB with Mini-USB type connector (cable **CP23**) **Only for configuration, not for data download**
LED indicators	Presence of external power supply, battery charge level, RF communication status.
Keyboard	Push-button for connection
Battery autonomy	3 days typical
Working temperature and humidity range	-10…+60 °C / 0…85 %RH not condensing
Dimensions	See dimensional drawing
Weight	200 g approx. (including battery)
Housing	ABS
Protection degree	IP 64
Installation	Wall mount support (**supplied**) for removable installation or flanges (**optional**) for fixed installation

HD35ED-ALM alarm module



Power supply	Internal 3.6 V lithium-thionyl chloride (Li-$SOCl_2$) **not rechargeable** battery, size AA, Molex 5264 2-pole connector
Transmitting frequency	868 MHz, 902-928 MHz or 915.9-929.7 MHz depending on the model
Antenna	Internal
Transmitting range	300 m in open field **The range can be reduced if obstacles or adverse weather conditions are present**
Keyboard	Push-button for connection
LED indicators	Presence of alarm, battery charge level, RF communication status.
Relay	2 bistable relays with voltage-free contact Contact: max 1A @ 30Vdc resistive load
Battery autonomy	1 year in typical operating conditions (**the actual autonomy depends on how often the alarm condition is generated**)
Working temperature and humidity range	-10…+60 °C / 0…85 %RH not condensing
Dimensions	See dimensional drawing
Weight	200 g approx. (including battery)
Housing	ABS
Installation	Wall mount support (**supplied**) for removable installation or flanges (**optional**) for fixed installation

TAB. 2: Capacity of the internal memory of the data logger in housing for indoor use

Models	Number of samples that can be stored	Notes
HD35EDNTV, HD35ED1TV, HD35ED1TVI, HD35ED4r…TV, HD35EDH with only one input used (not as counter)	74,000	
HD35EDH with only one input used as counter	56,000	
HD35EDH with two inputs used (not as counter)	56,000	
HD35EDH with two inputs used, one of which as counter	44,000	
HD35EDH with three inputs used (not as counter)	44,000	
HD35EDH with three inputs used, one of which as counter	36,000	
HD35EDN/3TC, HD35ED7P/3TC	44,000	
HD35ED1NAB, HD35ED14bNITV, HD35ED14bNITCV	36,000	(1)
HD35ED14bNAB, HD35ED1NIUTV, HD35ED1NIUTCV	32,000	(1),(2)
HD35ED14bNIUTV, HD35ED14bNIUTCV	28,000	(1),(2)
HD35ED1NTC, HD35ED17PTC, HD35ED1NTV, HD35ED1NTVI	22,000	(1)
HD35ED1N/2TC, HD35ED1NITV, HD35ED1NITCV, HD35ED14bNTC, HD35ED14bNTVI, HD35ED14bNTV, HD35ED1N4r…TV	20,000	(1)

Note 1: The models also store 5 calculated humidity quantities: Dew Point, wet bulb temperature, absolute humidity, mixing ratio, partial vapour pressure.

Note 2: The models that measure illuminance and UVA irradiance also store the **proportion of UV present (µW/lumen)**.

One sample consists of all the quantities measured and calculated by the data logger at the same instant of acquisition. For example, the model HD35ED1NAB measures four quantities and calculates five quantities (the derived humidity quantities) and one sample includes one temperature measure, one CO measure, one CO_2 measure and six humidity measurements (the relative humidity measure plus the five derived quantities).

TAB. 3: Number of data loggers in the system as a function of the data transmission interval

Data transmission interval	Number of data loggers manageable by the base unit	Data transmission interval	Number of data loggers manageable by the base unit
1 s	12	**10 s**	120
2 s	24	**15 s**	180
5 s	60	**> 30 s**	254

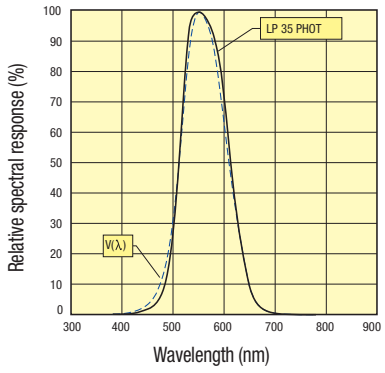
Table 3 refers to the case of direct connection among the base unit and the data loggers (1 "Hop"). If repeaters are present, the transmission of the data requires more time and the number of data loggers manageable by the base unit could be lower than that reported in table 3.

The number of devices in the system (base unit + repeaters + data loggers) should not exceed 255.

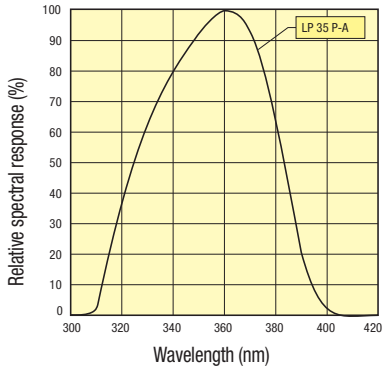
TAB. 4: Measurement characteristics (instrument in line with the sensor)
For all the data loggers except the versions with terminal header inputs

Temperature – NTC10K sensor For …N…TC and …TV versions				
Sensor	NTC 10 kΩ @ 25 °C			
Measuring range	-40…+105 °C			
Resolution (of the instrument)	0.1 °C			
Accuracy	± 0.3 °C in the range 0…+70 °C / ± 0.4 °C outside			
Stability	0.1 °C/year			
Temperature – Sensor integrated in the RH module For …TVI versions and the models HD35ED1NAB, HD35EDG1NAB, HD35ED14bNAB, HD35EDG-14bNAB				
Sensor	Sensor integrated in the humidity module			
Measuring range	-40…+105 °C			
Resolution (of the instrument)	0.1 °C			
Accuracy	± 0.2 °C in the range 0…+60 °C ± (0.2 – 0.05 * T) °C in the range T=-40…0 °C ± [0.2 + 0.032 * (T-60)] °C in the range T=+60…+105 °C			
Stability	0.05 °C/year			
Temperature - Pt100/Pt1000 sensor For …7P…TC versions				
Sensor	Pt100 / Pt1000 1/3 DIN thin film			
Measuring range	-100…+350 °C max. for probes measuring only temperature (the measuring range can be limited by the operating temperature of the probe used) -40…+150 °C for T/RH combined probes HD3517ETC…			
Resolution (of the instrument)	0.1 °C			
Accuracy	1/3 DIN			
Stability	0.1 °C/year			
Relative humidity – High accuracy sensor For …TC and …TV versions				
Sensor	Capacitive			
Measuring range	0…100 %RH			
Resolution (of the instrument)	0.1 %			
Accuracy	± 1.5 %RH (0..90 %RH) / ± 2 %RH (remaining range)			
Sensor working temperature	-20…+80 °C standard -40…+150 °C with probe HP3517**E**…			
Response time	T_{90} < 20 s (air speed = 2 m/s, without filter)			
Temperature drift	±2% in all the working temperature range			
Stability	1%/year			
Calculated quantities	Depending on the model: Dew Point, wet bulb temperatue, absolute humidity, mixing ratio, partial vapour pressure			
Relative humidity For …TVI versions and the models HD35ED1NAB, HD35EDG1NAB, HD35ED14bNAB, HD35EDG-14bNAB				
Sensor	Capacitive			
Measuring range	0…100 %RH			
Resolution (of the instrument)	0.1 %			
Accuracy	± 1.8 %RH (0..80 %RH) ± [1.8 + 0,11 * (UR-80)] %RH (remaining range)			
Sensor working temperature	-40…+105 °C (R.H.max=[100-2*(T-80)] @ T=80…105 °C)			
Response time	T_{63} < 4 s (air speed = 2 m/s, without filter)			
Temperature drift	±2% in all the working temperature range			
Stability	< 0.5%/year			
Calculated quantities	Depending on the model: Dew Point, wet bulb temperatue, absolute humidity, mixing ratio, partial vapour pressure			
Atmospheric pressure				
Sensor	Piezoresistive			
Measuring range	600…1100 hPa			
Resolution (of the instrument)	0.1 hPa			
Accuracy	± 0.5 hPa @ 20°C			
Stability	2 hPa/year			
Temperature drift	±3 hPa between -20…+60 °C			
Differential pressure				
Sensor	Piezoresistive			
Measuring range	Depending on the model:			
	range 1	**range 2**	**range 3**	**range 4**
	±2.5 hPa	±10 hPa	±100 hPa	±2000 hPa
Resolution (of the instrument)	0,001 hPa	0,005 hPa	0,05 hPa	1 hPa
Accuracy	± 1% f.s. over the entire compensated temperature range (0…50 °C)			
Connection	Tube Ø 5 mm			
Carbon monoxide (CO)				
Sensor	Electrochemical cell			
Measuring range	0 … 500 ppm			
Resolution (of the instrument)	1 ppm			
Accuracy	±3 ppm+3% of the measure			
Working temperature	-5…50 °C			
Response time	T_{90} < 50 s			
Stability	5% of the measure/year			
Sensor life	> 5 years under normal environmental conditions			
Carbon dioxide (CO_2)				
Sensor	Non-Dispersive Infrared (NDIR)			
Measuring range	0…5000 ppm			
Resolution (of the instrument)	1 ppm			
Accuracy	±(50 ppm+3% of the measure) @ 20 °C and 1013 hPa			
Working temperature	-5…50 °C			
Response time	T_{90} < 120 s (air speed = 2 m/s)			
Stability	5% of the measure/5 years			
Temperature drift	0.1% f.s. / °C			

Illuminace	
Sensor	Photodiode
Measuring range	0…10,000 lux
Resolution (of the instrument)	1 lux (0…2000 lux), 5 lux (2000…10,000 lux)
Spectral range	According to photopic curve V(λ)
Spectral response	See graph 1
α (temperature coefficient) $f_6(T)$	<0.05% K
Calibration uncertainty	<4%
f'1 (according to photopic curve V(λ))	<6%
f_2 (response according to the cosine law)	<3%
f_3 (linearity)	<1%
f_4 (instrument reading error)	<0.5%
f_5 (fatigue)	<0.5%
Class	B
Drift after 1 year	<1%
Operating temperature	0…50 °C
Reference Standard	CIE n°69 – UNI 11142
UVA irradiance	
Sensor	Photodiode
Measuring range	0…2000 mW/m²
Resolution (of the instrument)	1 mW/m²
Spectral range	UVA, peak ≅ 360 nm
Spectral response	See graph 2
Calibration uncertainty	<5%
f_2 (response according to the cosine law)	<6%
f_3 (linearity)	<1%
f_4 (instrument reading error)	±1 digit
f_5 (fatigue)	<0.5%
Drift after 1 year	<2%
Operating temperature	0…50 °C



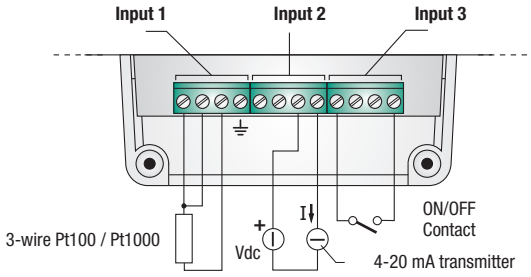
Graph 1 - Relative spectral response of the illuminance sensor



Graph 2 - Relative spectral response of the UVA irradiance sensor

Terminal header in the model HD35EDH

The model HD35EDH is equipped with three terminal header inputs. Each input can be configured as input for: Pt100/Pt1000, thermocouple, 4…20 mA (the shunt resistance is internal), 0…1 V, 0…50 mV or potentiometer. Only input 3 can also be configured as pulse counter (counting of switchings of a voltage-free contact).

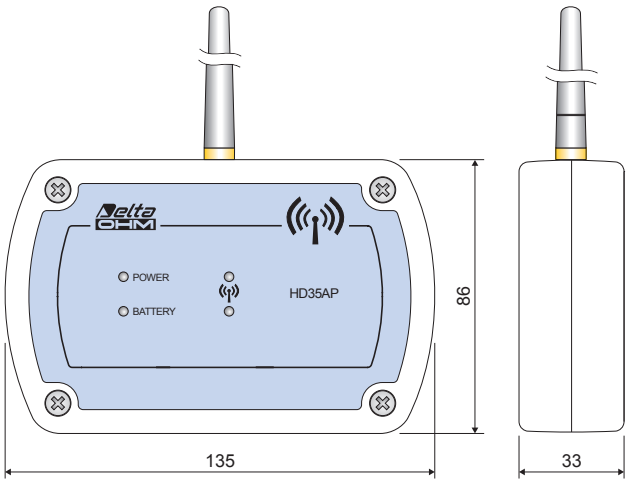


Example of connection of HD35EDH model inputs

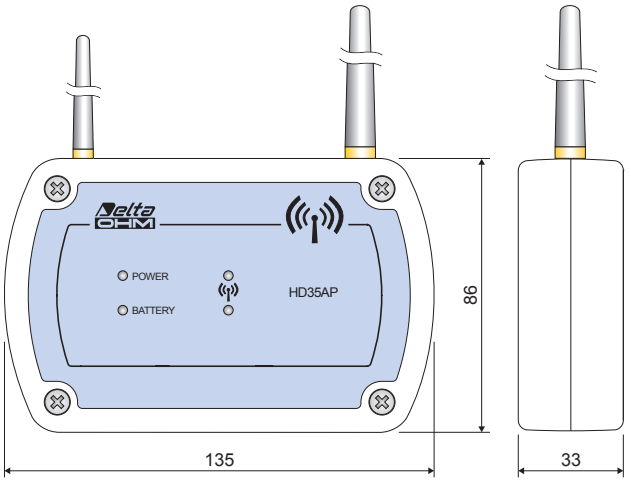
TAB. 5: Characteristics of the terminal header inputs of the instrument HD35EDH:

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 **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) ± 0.2 °C (> 600 °C) type E: ± 0.1 °C (< 300 °C) ± 0.2 °C (> 300 °C)
4…20 mA input	
Shunt resistance	Internal (50 Ω)
Resolution	16 bits
Accuracy	± 2 µA
0…1 V and 0…50 mV inputs	
Input resistance	100 MΩ
Resolution	16 bits
Accuracy	± 0.01% f.s.
Input for counting the switchings of a voltage-free contact	
Switching frequency	50 Hz max.
Hold Time	10 ms min.
Potentiometric input	
Potentiometer	Tipically 10 kΩ.
Resolution	16 bit
Accuracy	± 0,01% f.s.

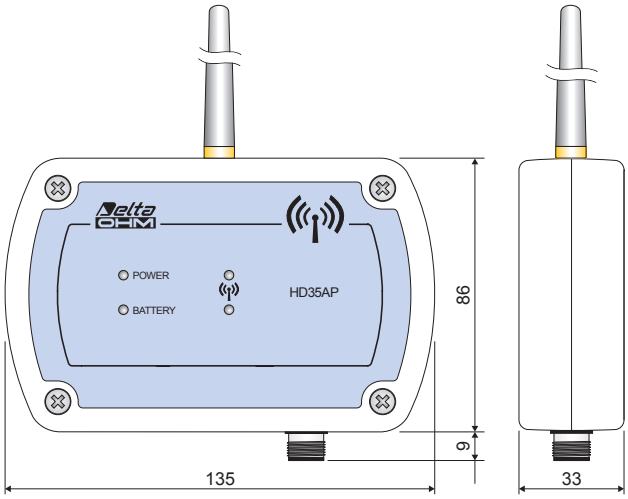
DIMENSIONS (mm)



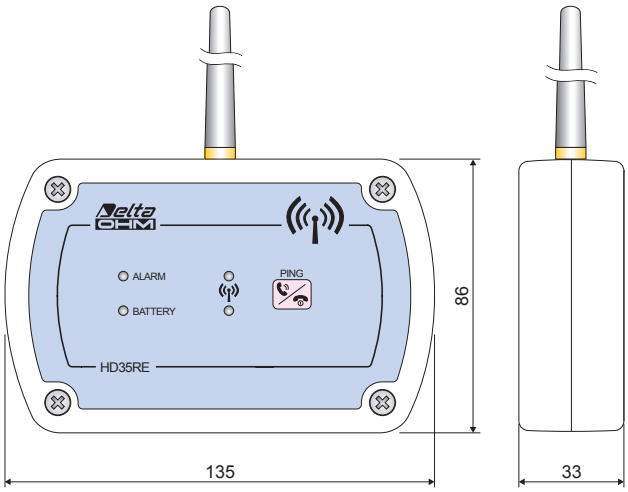
HD35AP...



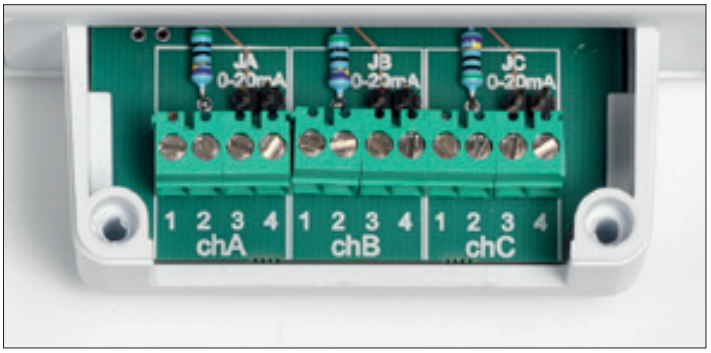
HD35APG

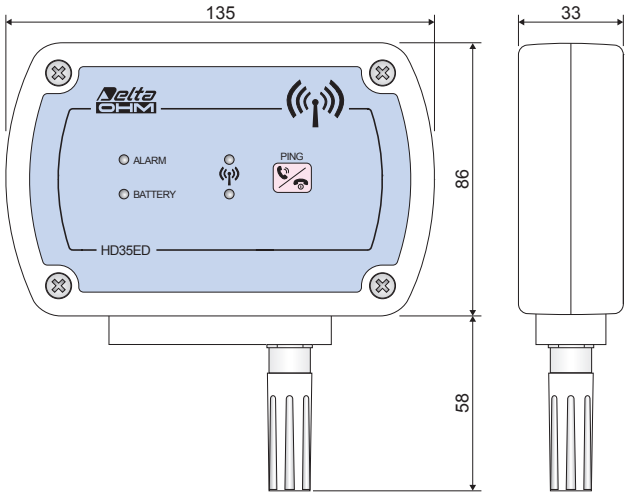


HD35APS

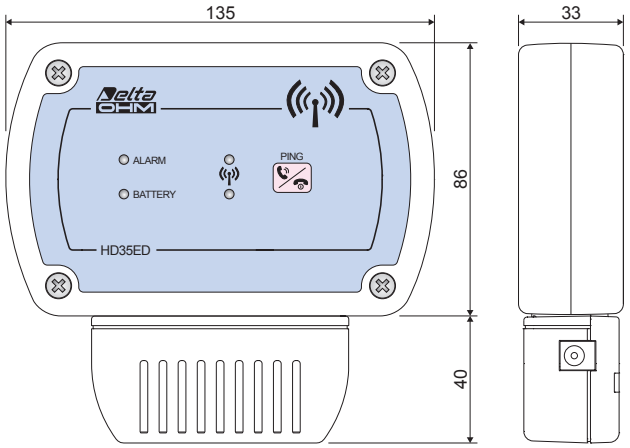


HD35RE

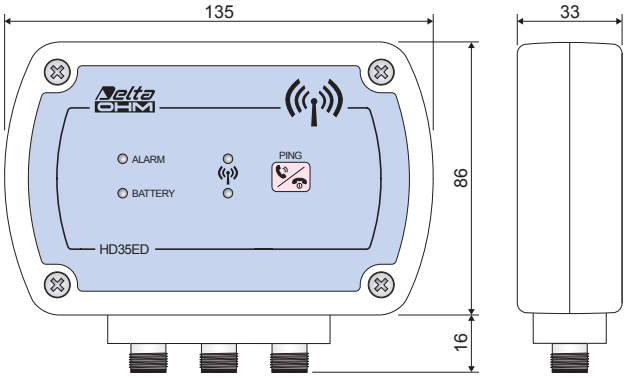




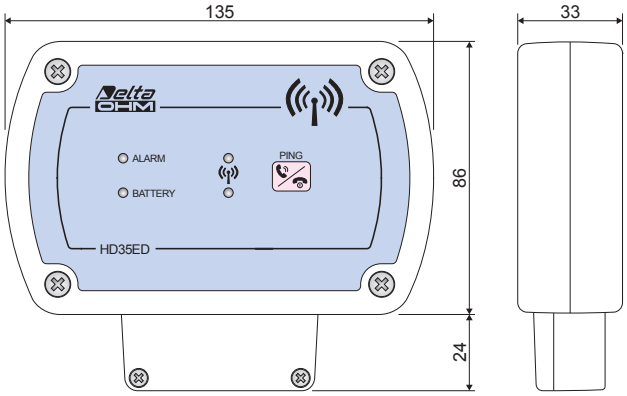
HD35ED… versions with fixed RH+T probe



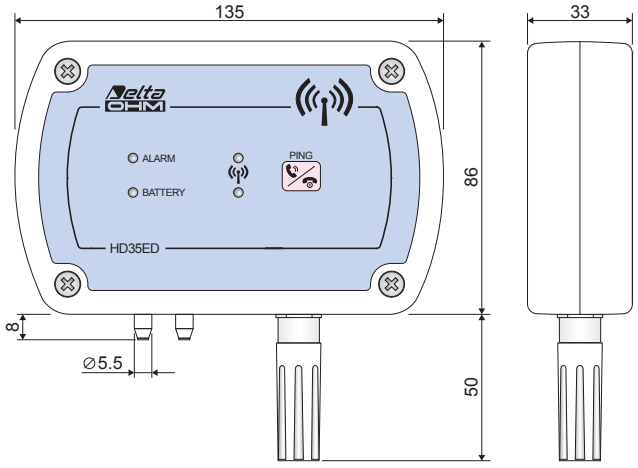
HD35ED… versions with grid



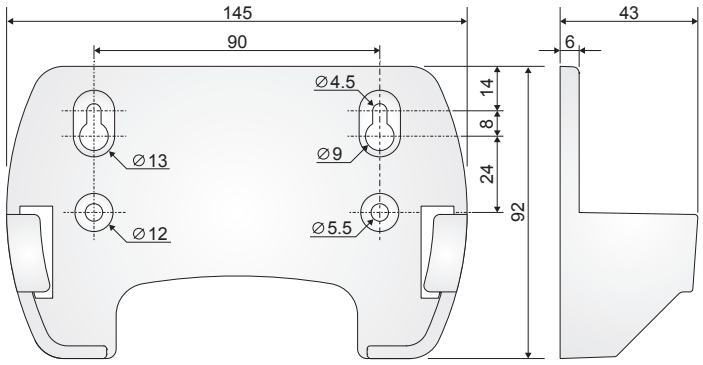
from 1 to 3 connectors depending on the model
HD35ED… versions with M12 connectors



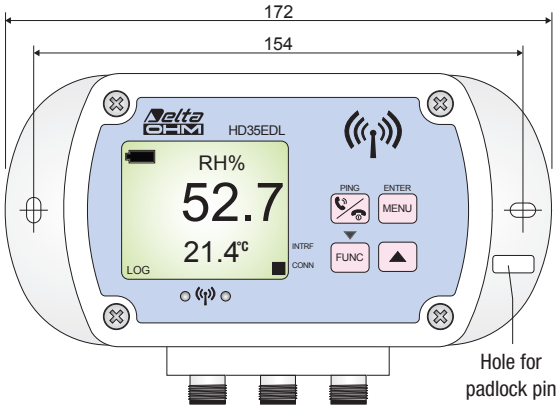
HD35ED… versions with terminal header

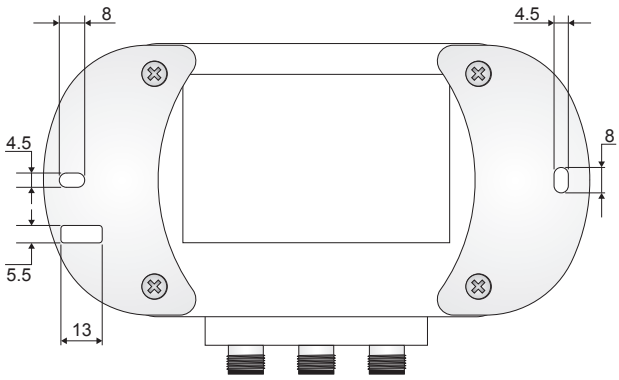


HD35ED… versions with differential pressure inputs (with and without fixed RH+T probe)

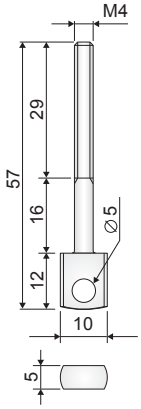


Support for removable installation





Flanges for fixed installation



Pin for padlock

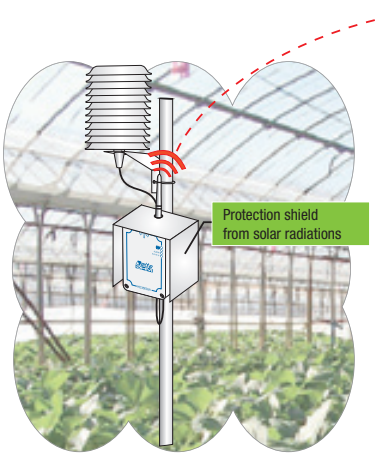
Waterproof versions for outdoor use

Waterproof versions for outdoor use and industrial applications (HD35EDW… series)
For outdoor use or in severe environmental conditions (e.g. in the case of industrial applications), data loggers in housing with front dimensions 120 x 80 mm and IP 67 protection degree are available.
To ensure IP 67 seal, the data loggers have no front keys and use M12 connectors for the connection of the external probes.

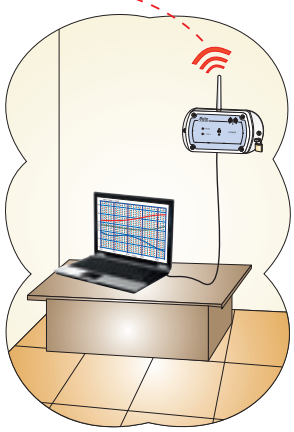
The housing of the waterproof versions can be wall mounted or, in the case of outdoor installations, fixed on a 40 mm diameter mast by means of the HD2003.77/40 clamping. For outdoor installations, the data logger can be supplied with the **protection shield from solar radiations (HD9217TF1)**.
For outdoor installation on a mast, the data logger can be supplied with the mast clamping already mounted on the back of the housing and provided with internal over-voltage protection devices, connected to the clamping. For the correct operation of the protection devices, the yellow/green cable with faston connector fixed to the clamping must be connected to ground.
The outdoor installation of the combined temperature and relative humidity probe requires the protection from solar radiations HD9007A-1 or HD9007A-2.

Available data loggers

The following tables list the **HD35EDW**… data logger models available in waterproof housing. Other models, in addition to those listed, can be supplied upon request for quantities.



Outdoor transmitting station with data logger of the series HD35EDW…

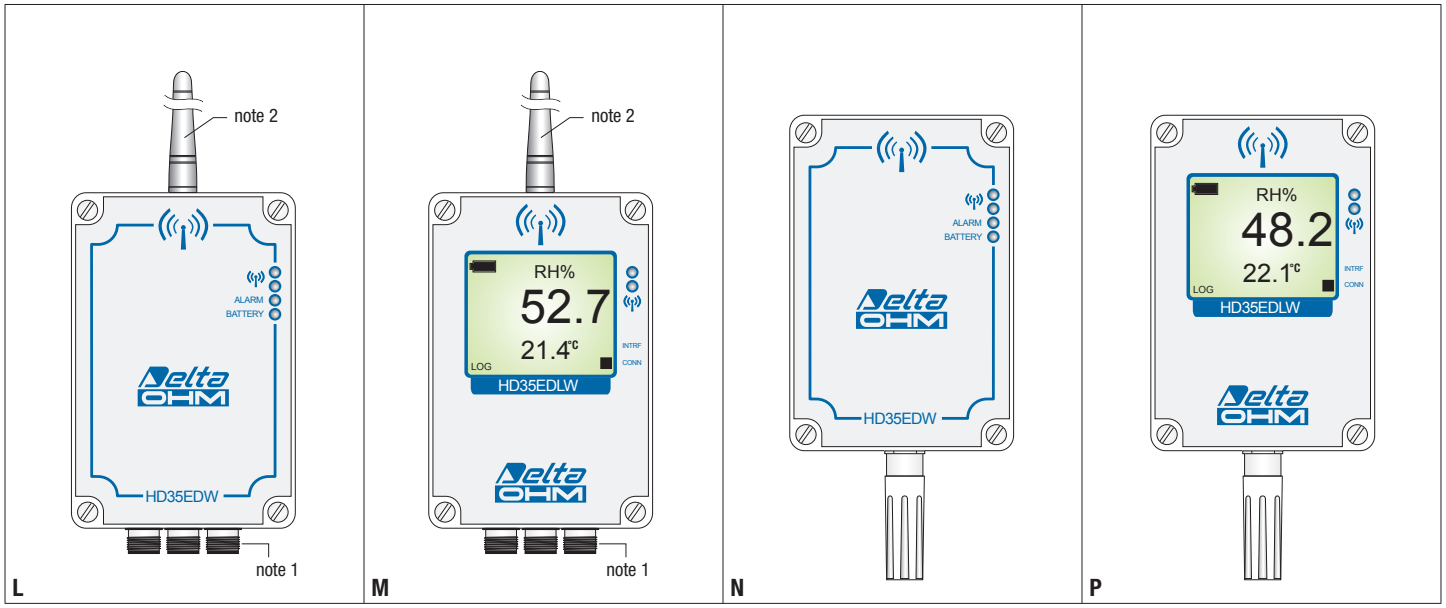


Receiving station with base unit HD35AP

TAB. 6A: Data loggers in waterproof housing for outdoor use

Modello	MEASURES					OPTIONAL LCD		INPUTS		Fig.
	NTC 10K	Pt100 Pt1000	RH	Patm	*a*	L Custom	G Graphic	Number of M12 connectors	Built-in sensors	
For industrial and environmental applications										
HD35EDW 7P/3 TC		•				•		3		**L, M**
HD35EDW N/3 TC	•					•		3		**L, M**
HD35EDW N TV	•					•			•	**N, P**
HD35EDW 1 TV			•			•			•	**N, P**
HD35EDW 1 TVI			•			•			•	**N, P**
HD35EDW 1N TC	•		•			•		1		**L, M**
HD35EDW 1N/2 TC	•		•			•		2		**L, M**
HD35EDW 17P TC		•	•			•		1		**L, M**
HD35EDW 1N TV	•		•			•			•	**N, P**
HD35EDW 1N TVI	Sensor integrated in RH module		•			•			•	**N, P**
HD35EDW 14bN TC	•		•	•		•		1	Patm	**L, M**
HD35EDW 14b7P TC		•	•	•		•		1	Patm	**L, M**
HD35EDW 1NV	Sensor integrated in RH module		•		•	•			•	**L, M**

TAB. 6B: Data loggers in waterproof housing for outdoor use - Images

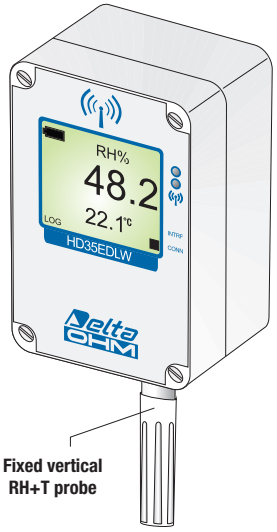


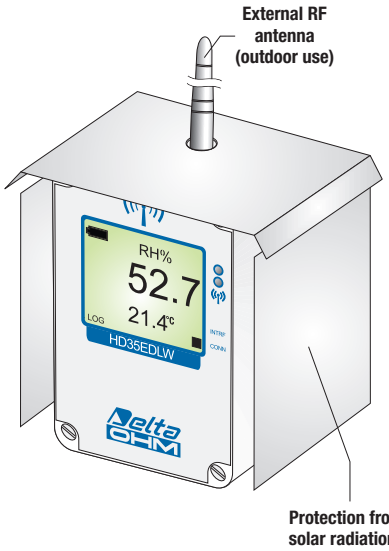
Note 1: the number of M12 connectors depends on the model and is indicated in table 6A.
Note 2: the antenna is external for outdoor installation with protection shield from solar radiations; the antenna is internal for indoor installation.

TECHNICAL SPECIFICATIONS

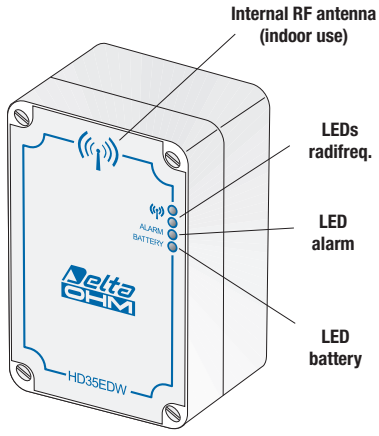
HD35EDW… data loggers in waterproof housing for outdoor use

Transmitting frequency	868 MHz, 902-928 MHz or 915.9-929.7 MHz depending on the model
Antenna	External for outdoor installation with protection shield from solar radiations. Internal for indoor installation.
Transmitting range	300 m in open field (**the range can be reduced if obstacles or adverse weather conditions are present**)
Measuring interval (*)	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Logging and transmitting interval (*)	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Internal memory	Circular management or stop logging when full. The number of samples that can be stored depends on the number of acquired quantities (see table 7).
Alarm	Acoustic by means of the internal buzzer
Power supply	Internal 3.6 V lithium-thionyl chloride (Li-$SOCl_2$) **not rechargeable** battery, size C, capacity 8400 mAh, Molex 5264 2-pole connector. Optional 24 Vac/dc power supply.
Display	Optional custom LCD
Push-buttons	Push-button for connection inside the instrument
LED indicators	RF communication status (2-color LED)
Battery autonomy	4 years typ. (without repeaters and 30 s logging interval)
Working temperature and humidity range	-20…+70 °C / 0…100 %RH
Dimensions	See dimensional drawings
Connectors for external probes	M12 connectors
Weight	250 g approx. (including battery)
Housing	ABS
Protection degree	IP 67
Installation	Wall mounted or fixed to the 40 mm diameter mast by means of the HD2003.77/40 clamping (**optional**). Protection shield from solar radiations HD9217TF1 (**optional**) for outdoor installation.
(*) Some models measuring several quantities may have a minimum interval greater than 1 s.	





Front in the versions without LCD



TAB. 7: Capacity of the internal memory of the data logger in housing for outdoor use

Models	Number of samples that can be stored	Notes
HD35EDWNTV, HD35EDW1TV, HD35EDW1TVI	74,000	
HD35EDWN/3TC, HD35EDW7P/3TC	44,000	
HD35EDW1NTC, HD35EDW17PTC, HD35EDW1NTV, HD35EDW1NTVI	22,000	(1)
HD35EDW1N/2TC, HD35EDW14bNTC, HD35EDW14b7PTC	20,000	(1)

Note 1: The models also store 5 calculated humidity quantities: Dew Point, wet bulb temperature, absolute humidity, mixing ratio, partial vapour pressure.

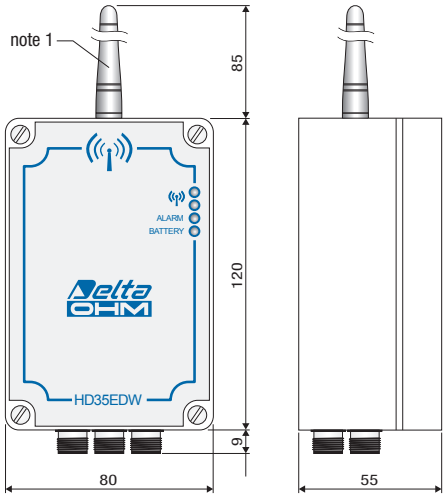
One sample consists of all the quantities measured and calculated by the data logger at the same instant of acquisition. For example, the model HD35EDW1NTC measures two quantities and calculates five quantities (the derived humidity quantities) and one sample includes one temperature measure and six humidity measurements (the relative humidity measure plus the five derived quantities).

TAB. 8: HD35EDW… measurement characteristics

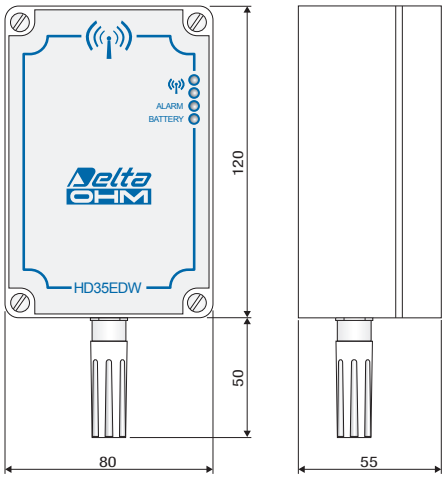
Temperature – NTC10K sensor For …N…TC and …TV versions	
Sensor	NTC 10 kΩ @ 25 °C
Measuring range	-40…+105 °C
Resolution (of the instrument)	0.1 °C
Accuracy	± 0.3 °C in the range 0…+70 °C / ± 0.4 °C outside
Stability	0.1 °C/year
Temperature – Sensor integrated in the RH module For …TVI versions and the model HD35EDW1NV	
Sensor	Sensor integrated in the humidity module
Measuring range	-40…+105 °C
Resolution (of the instrument)	0.1 °C
Accuracy	± 0.2 °C in the range 0…+60 °C ± (0.2 – 0.05 * T) °C in the range T=-40…0 °C ± [0.2 + 0.032 * (T-60)] °C in the range T=+60…+105 °C
Stability	0.05 °C/year
Temperature - Pt100/Pt1000 sensor For …7P…TC versions	
Sensor	Pt100 / Pt1000 1/3 DIN thin film
Measuring range	-100…+350 °C max. for probes measuring only temperature (the measuring range can be limited by the operating temperature of the probe used) -40…+150 °C for T/RH combined probes HD3517ETC…
Resolution (of the instrument)	0.1 °C
Accuracy	1/3 DIN
Stability	0.1 °C/year
Relative humidity – High accuracy sensor For …TC and …TV versions	
Sensor	Capacitive
Measuring range	0…100 %RH
Resolution (of the instrument)	0.1 %
Accuracy	± 1.5 %RH (0..90 %RH) / ± 2 %RH (remaining range)
Sensor working temperature	-20…+80 °C standard -40…+150 °C with probe HP3517**E**…
Response time	T_{90} < 20 s (air speed = 2 m/s, without filter)
Temperature drift	±2% in all the working temperature range
Stability	1%/year
Calculated quantities	Depending on the model: Dew Point, wet bulb temperatue, absolute humidity, mixing ratio, partial vapour pressure
Relative humidity For …TVI versions and the model HD35EDW1NV	
Sensor	Capacitive
Measuring range	0…100 %RH
Resolution (of the instrument)	0.1 %
Accuracy	± 1.8 %RH (0..80 %RH) ± [1.8 + 0,11 * (UR-80)] %RH (remaining range)
Sensor working temperature	-40…+105 °C (R.H.max=[100-2*(T-80)] @ T=80…105 °C)
Response time	T_{63} < 4 s (air speed = 2 m/s, without filter)
Temperature drift	±2% in all the working temperature range
Stability	< 0.5%/year
Calculated quantities	Depending on the model: Dew Point, wet bulb temperatue, absolute humidity, mixing ratio, partial vapour pressure
Atmospheric pressure	
Sensor	Piezoresistive
Measuring range	600…1100 hPa
Resolution (of the instrument)	0.1 hPa
Accuracy	± 0.5 hPa @ 20°C
Stability	2 hPa/year
Temperature drift	±3 hPa between -20…+60 °C

Acceleration	
Sensor	Tri-axial accelerometer
Measuring range	0…16 g
Resolution (of the instrument)	< 0,05 g (function of measured value)
Accuracy	< 0,1 g (function of measured value)

DIMENSIONS (mm)



HD35EDW… versions with M12 connectors



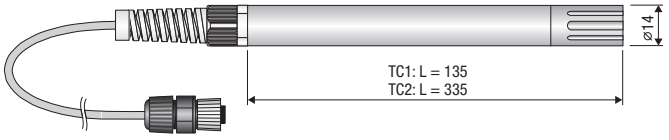
HD35EDW… versions with fixed RH+T probe

Note 1: the antenna is external for outdoor installation with protection shield from solar radiations; the antenna is internal for indoor installation.

RELATIVE HUMIDITY AND TEMPERATURE PROBES

Combined temperature and relative humidity probes

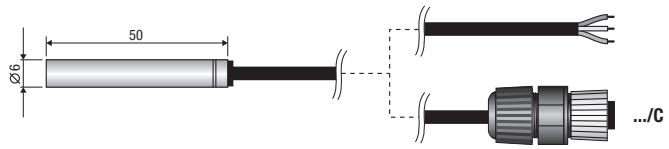
HP3517…



R.H. sensor	Capacitive
Temperature sensor	NTC 10 kΩ @ 25 °C (HP3517TC…) Pt100 1/3 DIN (HP3517**E**TC…)
R.H. sensor measuring range	0…100 %RH
Temperature sensor measuring range	-40…+105 °C (HP3517TC… with NTC 10 kΩ sensor) -40…+150 °C (HP3517ETC… with Pt100 sensor)
R.H. sensor operating range	-20…+80 °C standard -40…+150 °C with option **E**
Accuracy	± 1.5 %RH (0..90 %RH) / ± 2 %RH (remaining range)
Cable length	2, 5 or 10 m standard
Connection	4-pole M12 female connector

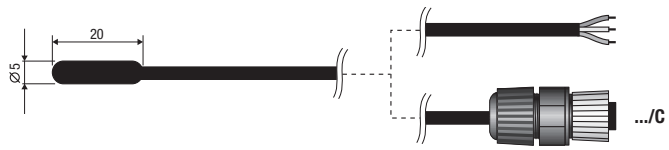
Thin film 1/3 DIN Pt1000 sensor temperature probes:

TP35.1…



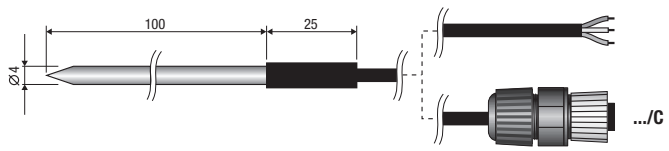
Sensor	3-wire Pt1000
Temperature range	-50…+105 °C
Accuracy	1/3 DIN
Application	Immersion
Cable length	3, 5 or 10 m standard, other lengths on request
Connection	Open wires or 4-pole M12 female connector (option **/C**)
Material	AISI 316 stainless steel tube

TP35.2…



Sensor	3-wire Pt1000
Temperature range	0…+70 °C
Accuracy	1/3 DIN
Application	Immersion
Cable length	3 or 5 m standard, other lengths on request
Connection	Open wires or 4-pole M12 female connector (option **/C**)
Material	Thermoplastic rubber

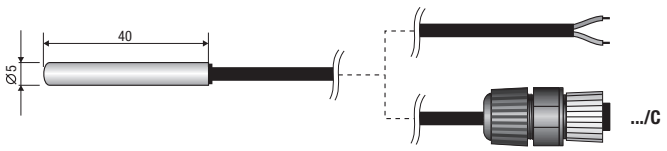
TP35.5…



Sensor	3-wire Pt1000
Temperature range	-40…+300 °C
Accuracy	1/3 DIN
Application	Penetration
Cable length	3 or 5 m standard, other lengths on request
Connection	Open wires or 4-pole M12 female connector (option **/C**)
Material	AISI 316 stainless steel tube

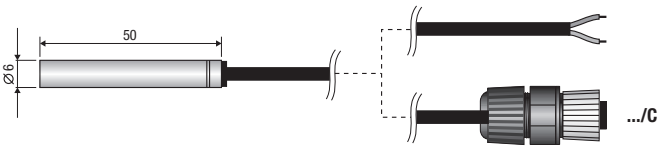
NTC 10KΩ @ 25 °C sensor temperature probes:

TP35N1...



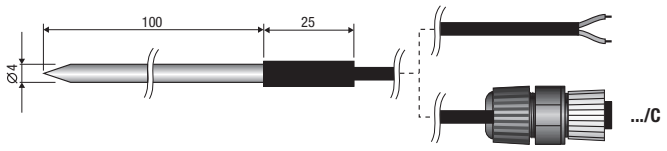
Sensor	NTC 10 kΩ @ 25 °C
Temperature range	-20…+85 °C
Accuracy	± 0.3 °C in the range 0…+70 °C / ± 0.4 °C outside
Application	Immersion
Cable length	3, 5 or 10 m standard, other lengths on request
Connection	Open wires or 4-pole M12 female connector (option **/C**)
Material	AISI 316 stainless steel tube

TP35N2...



Sensor	NTC 10 kΩ @ 25 °C
Temperature range	0…+70 °C
Accuracy	± 0.3 °C
Application	Immersion
Cable length	3, 5 or 10 m standard, other lengths on request
Connection	Open wires or 4-pole M12 female connector (option **/C**)
Material	AISI 316 stainless steel tube

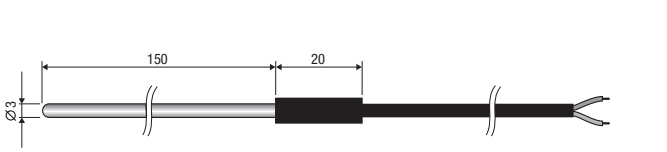
TP35N5...



Sensor	NTC 10 kΩ @ 25 °C
Temperature range	-20…+105 °C
Accuracy	± 0.3 °C in the range 0…+70 °C / ± 0.4 °C outside
Application	Penetration
Cable length	3 or 5 m standard, other lengths on request
Connection	Open wires or 4-pole M12 female connector (option **/C**)
Material	AISI 316 stainless steel tube

K thermocouple temperature probes:

TP35K6.5



Sensor	K thermocouple with isolated junction
Max. temperature	-50…+750 °C
Accuracy	Class 1 according to IEC 60584-2
Application	Immersion
Cable length	5 m, standard, other lengths on request
Connection	Open wires
Material	AISI 316 stainless steel tube

ORDERING CODES

Base unit

HD35AP… Base unit for the interfacing between the PC and the data loggers of the system. USB connection. In addition to the USB output, one of the following options is available: RS485 output with MODBUS-RTU protocol (option **S**), Wi-Fi interface and ETHERNET connection with integrated Web server (option **W**), GSM module (option **G**). Powered by the PC USB port or external power adapter **SWD06** (**optional**). The unit is supplied with: internal lithium-ion rechargeable battery **HD35-BAT1**, software **HD35RAP-S basic**, wall mount support **HD35.03**, operating manual.
The radio frequency (868, 902-928 or 915.9-929.7 MHz) has to be specified when ordering.
The serial cable **CP23** and the kit **HD35.11K** (pair of flanges, pin for padlock and padlock) for fixed installation **have to be ordered separately.**

HD35AP ☐ . ☐

RADIO FREQUENCY:
J = 915.9-929.7 MHz radio frequency (Japan)
E = 868 MHz radio frequency (Europe)
U = 902-928 MHz radio frequency (U.S.A. and Canada)

TYPE OF CONNECTION:
Blank = USB output only
S = USB output and RS485 output with MODBUS-RTU protocol
W = USB output, Wi-Fi interface and ETHERNET connection with Web server integrated
G = USB output and GSM module

Repeater

HD35RE RF signal repeater. Powered by the PC USB port or external power adapter **SWD06** (**optional**). Supplied with: internal lithium-ion rechargeable battery **HD35-BAT1**, wall mount support **HD35.03**, operating manual.
The radio frequency (868, 902-928 or 915.9-929.7 MHz) has to be specified when ordering.
The serial cable **CP23** and the kit **HD35.11K** (pair of flanges, pin for padlock and padlock) for fixed installation **have to be ordered separately**.

HD35RE. ☐

RADIO FREQUENCY:
J = 915.9-929.7 MHz radio frequency (Japan)
E = 868 MHz radio frequency (Europe)
U = 902-928 MHz radio frequency (U.S.A. and Canada)

Alarm module

HD35ED-ALM Module with two relay outputs for signalling alarm events. Powered by the internal 3.6V not rechargeable lithium-thionyl chloride (Li-$SOCl_2$) battery. Supplied with: internal 3.6V not rechargeable lithium-thionyl chloride (Li-$SOCl_2$) battery **HD35-BAT2**, wall mount support **HD35.03**, operating manual.
The radio frequency (868, 902-928 or 915.9-929.7 MHz) has to be specified when ordering.
The kit **HD35.11K** (pair of flanges, pin for padlock and padlock) for fixed installation **has to be ordered separately**.

HD35ED-ALM. ☐

RADIO FREQUENCY:
J = 915.9-929.7 MHz radio frequency (Japan)
E = 868 MHz radio frequency (Europe)
U = 902-928 MHz radio frequency (U.S.A. and Canada)

Data loggers

HD35ED… Wireless data logger that stores the measures in the internal memory and transmits the acquired data to the base unit automatically at regular intervals or upon request. **Optional LCD**. Acoustic alarm with internal buzzer. Powered by the internal not rechargeable battery. Supplied with: internal 3.6V not rechargeable lithium-thionyl chloride (Li-$SOCl_2$) battery, wall mount support **HD35.03** (models for indoor only), operating manual.
The radio frequency (868, 902-928 or 915.9-929.7 MHz) has to be specified when ordering.
The kit **HD35.11K** (pair of flanges, pin for padlock and padlock) for the fixed installation of the housing for indoor use **has to be ordered separately**.
For the versions in waterproof housing, **please specify at the time of order whether the installation will be outdoor with protection shield from solar radiations and if the housing has to be supplied with the mast clamping HD2003.77/40 already installed**.
The external probes have to be ordered separately.

Housing for indoor use

HD35ED ☐☐☐ . ☐

RADIO FREQUENCY:
J = 915.9-929.7 MHz radio frequency (Japan)
E = 868 MHz radio frequency (Europe)
U = 902-928 MHz radio frequency (U.S.A. and Canada)

PROBE TYPE:
Blank = internal sensors protected by grid
H = terminal header inputs
TC = probe with cable
TV = combined T/R.H. fixed vertical probe without cable, with high accuracy R.H. sensor
TVI = combined T/R.H. fixed vertical probe without cable

MEASURED QUANTITIES :
See table 1 for the combinations of quantities measured by the available data loggers. **Other models can be supplied upon request.**
1 = humidity
4b = atmospheric pressure (Barometer)
4 = differential pressure: **4r1**=range 1, **4r2**=range 2, ... **(**)**
N = temperature NTC10K sensor: **N/2**=2 channels, **N/3**=3 channels
7P = temperature Pt100/Pt1000 sensor: 7P/3=3 channels
A = carbon monoxide (CO)
B = carbon dioxide (CO_2)
I = illuminance (lux)
U = UVA irradiance
(**) For the differential pressure ranges available see table 1A.

TYPE OF LCD:
Blank = without LCD
L = with custom LCD
G = with graphic LCD
The type of LCD (custom or graphic) **is not a choice**, but enforced by the data logger model (see table 1).

Waterproof housing for outdoor use

HD35ED ☐**W**☐☐ . ☐

RADIO FREQUENCY:
J = 915.9-929.7 MHz radio frequency (Japan)
E = 868 MHz radio frequency (Europe)
U = 902-928 MHz radio frequency (U.S.A. and Canada)

PROBE TYPE:
TC = probe with cable
TV = combined T/R.H. fixed vertical probe without cable, with high accuracy R.H. sensor
TVI = combined T/R.H. fixed vertical probe without cable

MEASURED QUANTITIES :
See table 6 for the combinations of quantities measured by the available data loggers. **Other models can be supplied on request.**
1 = humidity
4b = atmospheric pressure (Barometer)
N = temperature NTC10K sensor: **N/2**=2 channels, **N/3**=3 channels
7P = temperature Pt100/Pt1000 sensor: **7P/3**=3 channels
V = acceleration

LCD:
Blank = without LCD
L = with custom LC

Probes

Temperature and relative humidity combined probes

HP3517… Temperature and relative humidity combined probe with high accuracy R.H. sensor. R.H. sensor measuring range: 0…100%. Temperature sensor: NTC 10KΩ for HP3517TC…, Pt100 for HP3517ETC.... NTC10KΩ sensor measuring range: -40…+105 °C. Pt100 sensor measuring range: -40…+150 °C. R.H. sensor operating temperature: -20…+80 °C standard, -40…+150 °C with **option E**. Diameter 14 mm. Cable length 2, 5, or 10 m standard. Female 4-pole M12 connector.

HP3517 □□.□

CABLE LENGTH:
2 = 2 m
5 = 5 m
10 = 10 m

STEM LENGTH:
TC1 = 135 mm
TC2 = 335 mm

R.H. SENSOR OPERATING TEMPERATURE:
Blank = -20…+80 °C
E = -40…+150 °C

HD9007A-1: 12-ring protection from solar radiations. Supplied with mounting bracket.

HD9007A-2: 16-ring protection from solar radiations. Supplied with mounting bracket.

HD9007T26.2: Fitting for Ø 14 mm probes for the protections from solar radiations HD9007A-1 and HD9007A-2.

Pt1000 temperature probes

TP35.1…: Stainless steel immersion temperature probe. 3-wire Pt1000 1/3 DIN temperature sensor. Dimensions: Ø 6 x 50 mm. Cable length 3, 5 or 10 m standard. Cable terminated with open wires or female 4-pole M12 connector. Operating temperature: -50…+105 °C.

TP35.2…: Thermoplastic rubber immersion temperature probe. 3-wire Pt1000 1/3 DIN temperature sensor. Dimensions: Ø 5 x 20 mm. Cable length 3 or 5 m standard. Cable terminated with open wires or female 4-pole M12 connector. Operating temperature: 0…+70 °C.

TP35.5…: Stainless steel penetration temperature probe. 3-wire Pt1000 1/3 DIN temperature sensor. Dimensions: Ø 4 x 100 mm. Cable length 3 or 5 m standard. Cable terminated with open wires or female 4-pole M12 connector. Operating temperature: -40…+300 °C.

TP35 □.□□

Blank = cable terminated with open wires
/C = cable terminated with female 4pole M12 connector

3 = cable length 3 m **Other lengths upon request**
5 = cable length 5 m
10 = cable length 10 m (only TP35.1…)

1 = stainless steel immersion temperature probe
2 = thermoplastic rubber immersion temperature probe
5 = stainless steel penetration temperature probe

NTC 10KΩ @ 25 °C temperature probes

TP35N1…: Stainless steel immersion temperature probe. NTC 10KΩ @ 25 °C temperature sensor. Dimensions: Ø 5 x 40 mm. Cable length 3, 5 or 10 m standard. Cable terminated with open wires or female 4-pole M12 connector. Operating temperature: -20…+85 °C.

TP35N2…: Stainless steel immersion temperature probe. NTC 10KΩ @ 25 °C temperature sensor. Dimensions: Ø 6 x 50 mm. Cable length 3, 5 or 10 m standard. Cable terminated with open wires or female 4-pole M12 connector. Operating temperature: 0…+70 °C.

TP35N5…: Stainless steel penetration temperature probe. NTC 10KΩ @ 25 °C temperature sensor. Dimensions: Ø 4 x 100 mm. Cable length 3 or 5 m standard. Cable terminated with open wires or female 4-pole M12 connector. Operating temperature: -20…+105 °C.

TP35 □.□□

Blank = cable terminated with open wires
/C = cable terminated with female 4pole M12 connector

3 = cable length 3 m **Other lengths upon request**
5 = cable length 5 m
10 = cable length 10 m (only TP35N1… and TP35N2…)

N1 = stainless steel immersion temperature probe, Ø 5 mm
N2 = stainless steel immersion temperature probe, Ø 6 mm
N5 = stainless steel penetration temperature probe

Thermocouple temperature probes

TP35K6.5: Immersion temperature probe. Stainless steel tube. K-type thermocouple sensor with isolated junction. Cable length 5 m. Cable terminated with open wires.

Photometric - radiometric probes

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…10.000 lux. Cable length 2m.

LP 35 P-A: Combined probe with two sensors for measuring illuminance, with standard photopic spectral response and irradiance in the **UVA** spectral range 315 nm…400 nm, diffuser for cosine correction. Measuring range: 0…2000 mW/m^2. Cable length 2m.

LP BL: Base with levelling device. Upon request for assembly with the probe when placing the order. For photometric and radiometric probes.

LP BL3: Adjustable wall support for Ø 30 mm photometric and radiometric probes.

Accessories

HD35AP-S: Further copy of the CD-ROM with HD35AP-S basic software for the system configuration, the real time viewing of the measures and the data download. The access to the data is allowed only from the PC where the Data Base is installed. For Windows® operating systems.

HD35AP-PLUS: Advanced version of the HD35AP-S software that provides access to the Data Base from all the PCs connected in the network to the server where the Data Base is installed. It works with digital key. For Windows® operating systems.

CP23: Direct USB connection cable with male mini-USB connector on the side of the instrument and male A type USB connector on the side of the PC.

SWD06: Mains power adapter 100-240 Vac / 6 Vdc - 1 A.

HD35.03: Plastic support for the removable installation of base unit, repeaters and data loggers in housing for indoor use.

HD35.11K: Pair of flanges made of anodized aluminium alloy for the fixed installation of base unit, repeaters and data loggers in housing for indoor use. Pin for padlock and padlock included.

HD35-ANT: Spare external RF antenna for the base units HD35AP… and the repeater HD35RE.

HD35-BAT1: 3.7 V lithium-ion **rechargeable** battery, capacity 2250 mA/h, 3-pole JST connector. For the base units HD35AP… and the repeater HD35RE.

HD35-BAT2: 3.6 V lithium-thionyl chloride (Li-$SOCl_2$) **not rechargeable** battery, size AA, 2-pole Molex 5264 connector. For the alarm module HD35ED-ALM and the data loggers HD35ED… in housing for indoor use.

BAT-2013DB: 3.6 V lithium-thionyl chloride (Li-$SOCl_2$) **not rechargeable** battery, capacity 8400 mAh, size C, Molex 5264 2-pole connector. For the data loggers HD35EDW… in waterproof housing for outdoor use.

HD2003.77/40: Clamp to fix the waterproof housing to the 40 mm diameter mast.

HD2003.71K: 40 mm diameter mast kit, height 2 m, in two pieces.

HD2003.75: Pointed grounding rod for 40 mm diameter mast.

HD2003.78: Flange for 40 mm diameter mast, to be fastened on the floor.

HD2004.20: 40 mm diameter tripod kit. Height 3 m. It can be fixed on a flat base with screws or to the ground with pegs.

HD9217TF1: Protection shield from solar radiations for outdoor installation. For the HD35EDW… waterproof data loggers.

Accessories for humidity probes

HD75: 75% RH saturated solution for checking the relative humidity sensors, supplied with threaded ring for 14 mm diameter probes M12×1 thread.

HD33: 33% RH saturated solution for checking the relative humidity sensors, supplied with threaded ring for 14 mm diameter probes M12×1 thread.

Accessories for CO sensor

MINICAN.12A: Nitrogen can for CO calibration at 0 ppm. Volume 20 litres. **With regulating valve**.

MINICAN.12A1: Nitrogen can for CO calibration at 0 ppm. Volume 20 litres. **Without regulating valve**.

ECO-SURE-2E CO: CO spare sensor.

HD37.36 Connection tube kit between instrument and nitrogen can for CO calibration.