[GB] Introduction to the wireless data recording systems

A data recording system is a set of instruments which allows **measuring** and **storing** the values of certain physical quantities, such as temperature, humidity, pressure, solar radiation, etc.

A data recording system is generally made of:
- **Sensors**: they are placed at the measuring points and convert the values of the physical quantities into electrical analog or digital signals.
- **Acquisition system**: it reads and logs the electrical signals outgoing from the sensors. If the acquisition system is digital, the acquired values are kept in the system's internal memory until the memory is full.
- **PC**: the transfer of data from a digital acquisition system to a PC allows storing the measured values even after the internal memory of the acquisition system is full. The PC also allows processing and analyzing the acquired values.

Data recording system

Connecting the components of the system

The components of the recording system can be connected in two different ways:
- **Wired connection**
- **Wireless connection by radio frequency transmission**

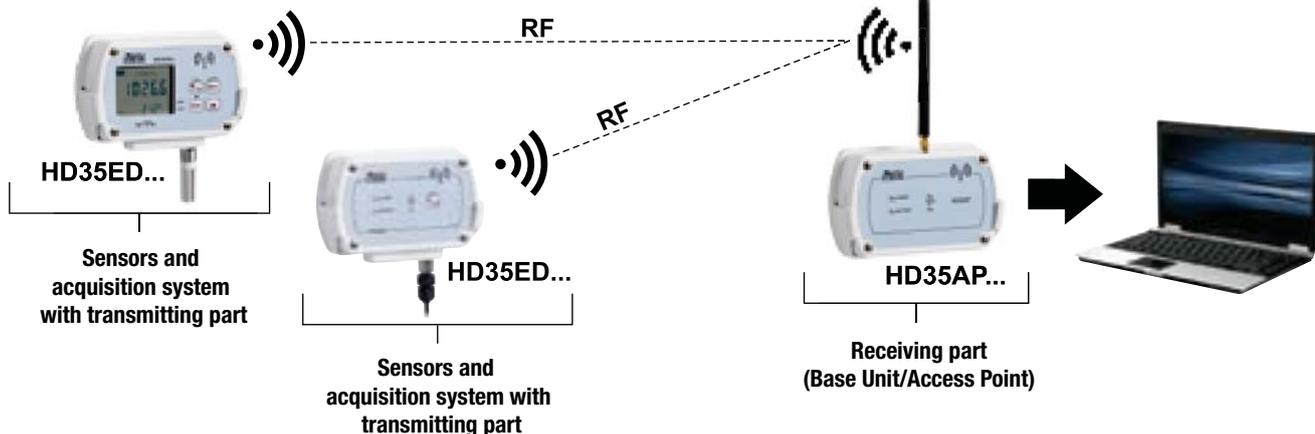The type of connection depends on various factors, such as:
• the distance among the various components of the system;
• ease of installation;
• cost of installation;
• possibility to easily modify the system;
• electromagnetic interferences in the environment of installation.

Advantages of the wireless connection

• **Quick and easy installation**: as it is not necessary the laying of cables and conduits, a wireless system is installed much more easily and quickly than a wired system, especially when the components are at a great distance from one another.

• **Reduction of installation costs**: the absence of cables allows a considerable saving in cost of material and labor.

• **Flexibility of the system**: the absence of fixed links between the various parts allows moving the system components at any time without problems.

• **Low maintenance**: the cables are subject to deterioration over time, the absence of cables reduces the maintenance costs of the system.

Contraindications of the wireless connection

The operation of a wireless system can be difficult in environments with excessive electromagnetic interferences (in which case a wired shielded connection may be preferable) or in areas particularly shielded that hinder the radio transmission between the parts of the system.

Radio frequency transmission in wireless systems

In the case of wireless connections, the acquisition system is made of a radiofrequency transmitting part and a radiofrequency receiving part:

- **Transmitting part**: positioned near the sensor, it transmits the measured values to the receiving part. The transmitter part is normally integrated in the measuring instrument to which the sensor is connected.

- **Receiving part**: positioned close to the PC, it receives the measured values and transmits them to the PC. The receiving part is usually indicated by the terms **Base Unit** or **Access Point**.
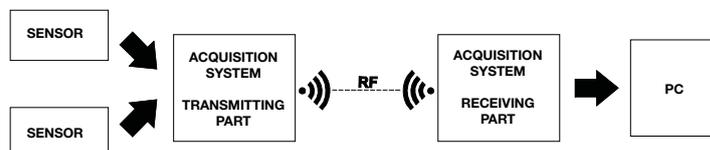
Wireless data recording system

The transmitter part of the acquisition system can be unique for all the sensors or can be made of multiple transmitters, each of which sends the measurements of some of the sensors. The receiving part of the system is the same for all sensors.

Delta OHM wireless system

The basic Delta OHM HD35… series wireless system is made of:
- **One or more devices of the series HD35ED…**: the devices HD35ED... acquire the values measured by integrated or external sensors connected via cable. The data are both stored in the internal memory of the device and transmitted via radio to the receiving unit (base unit / Access Point). The devices HD35ED… work with a battery and do not require power connections.
- **Base Unit (Access Point) HD35AP…**: it receives the measured values from all devices HD35ED... and sends them to the PC. The base unit HD35AP… has an internal battery with limited autonomy, therefore it has to be powered externally by connecting it to a power supply (optional) or to the USB port of the PC.
- **HD35AP-S Software**: once installed in a PC, it allows downloading and viewing the data, entering the data into a database and configuring the system. The basic version of the software, which allows downloading the data in the local database of the PC where the software is installed and display them only from the same PC, is supplied free of charge with the base unit.

System configuration

The Delta OHM HD35… series wireless system can be fully configured through the basic software HD35AP-S. The RF communication between the devices HD35ED... and the base unit HD35AP... is bi-directional, that is to say that it allows the base unit HD35AP... to transmit to the devices HD35ED... all the changes in operating parameters generated by using the software HD35AP-S:

- The devices HD35ED… transmit the measured values to the base unit HD35AP…

- The base unit HD35AP… transmits the changes in the operating parameters to the devices HD35ED…

HD35ED...

Sensors and acquisition system with transmitting part

HD35ED...

Sensors and acquisition system with transmitting part

HD35AP...

Receiving part (Base Unit/Access Point)

Delta OHM wireless data recording system

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Choosing the base unit HD35AP…

The base unit HD35AP... is available in various versions. The choice of the base unit is independent of the type of measure to be accomplished, but it must be carried out according to how we want to connect the unit to a PC or PLC:

- **USB** connection, available in all the **HD35AP…** versions. The base unit should be installed near the PC and requires an external power by connection to a power supply (optional) or to the USB port of the PC.
- **RS485 with MODBUS-RTU protocol** connection, available in **HD35APS**. This version is particularly suitable for connection to a PLC via a multi-point RS485 network. It requires external power by connection to a power supply (optional).
- **ETHERNET** connection, available in **HD35APW**. This version is suitable if there is a wired local network. It is not necessary to install the unit near the PC, but it is sufficient to set it up near an access point in the local network. It requires external power by connection to a power supply (optional).
- **Wi-Fi** connection, available in **HD35APW**. This version is suitable if there is a wireless local network. It requires external power by connection to a power supply (optional).
- **GSM** connection, available in **HD35APG**. This version is designed to operate even in the absence of a connection to the PC, being able to transmit the data via e-mail or FTP via the GSM network. It is therefore suitable for monitoring data in unattended installations and mobile installations (for example, during freight). It requires an external power by connection to a power supply (optional).

Note: even if the unit **HD35APW** is connected to the local network, with the basic HD35AP-S software the data are available for download only in the local database of the PC where the software is installed and viewable only from the same PC. In order to download and display the data in remote databases, the advanced system features (**PLUS option**) should be purchased.

Choice of the HD35ED… devices

The devices HD35ED... that acquire measures are available in many versions which differ one to the other in the type of measures that can be realized. The choice must be therefore made according to the following criteria:

- the type of variables that are meant to be measured;
- the need to have sensors connected by cable to the instrument or sensors integrated in the instrument;
- the need of having or not the LCD display in the instrument to see the measures directly on the instrument display or configure the device via the front keypad;
- the fact that the measurement zone is in an indoor or outdoor environment (for example, for the detection of meteorological data in an external environment, it is convenient to choose a model in waterproof housing with screen protection from solar radiation).

How many HD35ED… devices can be used

In the data recording system, it is possible to use many HD35ED… devices simultaneously, all of them communicating with the same base unit HD35AP…

The number of devices to be used depends on:

- the number and type of quantities to be measured;
- the dislocation of the areas where the measures have to be carried out;

Examples:
- If it is requested to detect the temperature in two refrigerated cells placed side by side, it can be used a single device that can simultaneously measure two temperatures by using external probes (for example, HD35EDN/2TC).
- If it is requested to measure the temperature in two separate rooms or in two areas of a freight depot away a few dozen meters from each other, it is necessary to use two separate devices (for example, two HD35EDNTV with integrated sensor).

It is possible to easily add to the system or remove from the system one or more devices HD35ED… at any time.

How to increase wireless area coverage

In order to increase the distance between the HD35ED... devices and the HD35AP... base unit, install one or more RF signal repeaters **HD35RE…** between the devices and the base unit.

The repeaters are also useful to increase the distance in the **presence of obstacles**, for example when the HD35ED... devices and the base unit are installed in interior spaces separated by walls of reinforced concrete, or in **adverse weather conditions**, if the devices are installed in outdoor environments.

Which transmission frequency should be used

The transmission frequency of the wireless system must be one of those of free usage in the country where the system is installed. It is important to purchase the system with the correct frequency as **the transmission band cannot be changed by the end user**. Delta OHM offers the following alternatives:
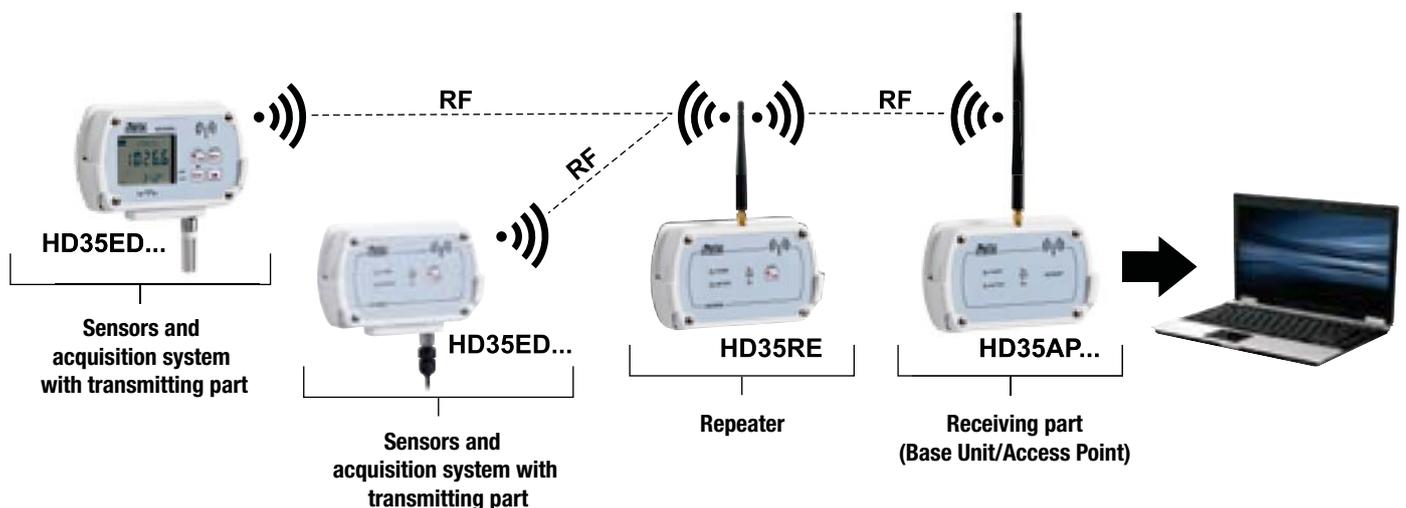
- **868 MHz** (in compliance with the European Standard EN 300 220)
- **902-928 MHz** (in compliance with FCC U.S. part 15 section 247 and Industry Canada RSS-210 standards)
- **915,9-929,7 MHz** (in compliance with Japanese standard ARIB STD-T108)

Immediate alarms

The Delta OHM HD35… series wireless system **immediately** signals the exceeding of the threshold values of the measures in the following ways:

- By an acoustic signal generated by the buzzer inside the devices.
- By highlighting the measures with errors on the PC monitor by means of the HD35AP-S software.
- By sending an SMS to the set phone numbers (only with the base unit HD35APG).
- By sending an alarm e-mail to the set addresses (only with the base units HD35APG and HD35APW).
- By activating additional signaling or actuators via the optional remote alarm module **HD35ED-ALM** with relay outputs.

The system allows setting two alarm thresholds for each measured variable (lower threshold and upper threshold). The alarm is signaled if the measured value falls below the lower threshold or rises above the upper threshold.

RF   **RF**   **RF**

HD35ED...

Sensors and acquisition system with transmitting part

HD35ED...

Sensors and acquisition system with transmitting part

HD35RE

Repeater

HD35AP...

Receiving part (Base Unit/Access Point)

Wireless data recording system with repeater