![Delta OHM logo]

HD 2013-D
DATALOGGER TO MEASURE RAINFALL

HD2013-D is a datalogger that has been specifically developed to capture and memorize weather and atmospheric precipitation trends. Together with the capacious memory, its long life Lithium battery guarantees remarkable recording capacity without it being necessary for the user to intervene. The large display not only provides the total and partial precipitations in real time, in both millimetres and inches, but also the environment temperature. It is supplied with **DeltaLog6** dedicated software, using which all the instrument's parameters can be set. It is connected to the PC **through an RS232C serial port** using the cable supplied. HD2013-D can be connected to the most popular types of rain gauges using NC or NO output contact.

For software installation and running, please refer to the documentation on the instrument's accompanying CD-ROM.

Important note: in order to make the instrument completely waterproof, buttons have not been used but reed relays were chosen instead. These can be operated with a magnet. The magnet is fixed to the end of a small aluminium handle, and this is connected to the case. After use the magnet, must be put away and stored in its housing.
On the instrument front there are two areas indicated in red corresponding to **"Clear/Up"** and **"Select/Set"**: the magnet should be placed on these areas to perform the instrument programming operations. Placing the magnet for some time on the red zone and then subsequently withdrawing it is the equivalent of activating a button. For the sake of simplicity, in the instrument description which follows, this operation will be called: **"activation of the Clear/Up button", "activation of the Select/Set button".**

Installation and connections
The HD2013-D case has an IP67 degree of protection. The two function keys that allow the instrument to be controlled are formed of reed contacts operated externally by using a magnet supplied with the instrument.
In the lower part of the case there are two connectors for the rain gauge (three-pole male connector in the centre of the case) and the PC's RS232C serial port (five-pole male connector on the right). At the bottom of the case there are two holes so that the instru-

ment can be fastened to a wall. As raised rain gauge it can be fasten to the support staff through the base HD2003.77.

Operation
The datalogger counts and memorizes the emptying of the rain gauge's small bucket through a magnet activating a reed relay on each emptying: each commutation corresponds to a quantity of rain equal to the rain gauge resolution. The following resolutions can be set using the DeltaLog6 software: from 0.050 to 1.599mm of rain. Furthermore, by using the software the type of reed contact closing can be selected. This depends on the type of rain gauge: it can either be normally closed (NC) or normally open (NO) In both cases an alarm display is set in case the small bucket, after its rotation, does not go back to the expected rest position according to the type of contact selected.
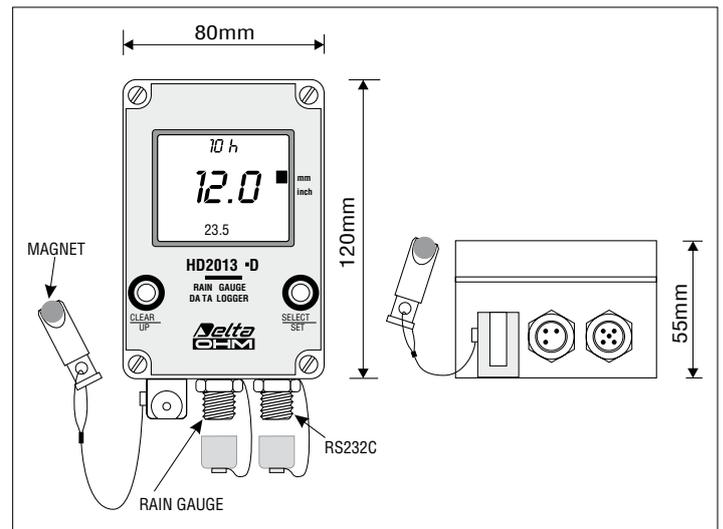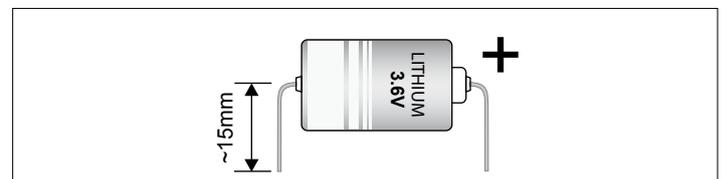The datalogger stores the ambient temperature at a fixed interval of 15'.

Fig. 4 General view and mechanical dimensions.

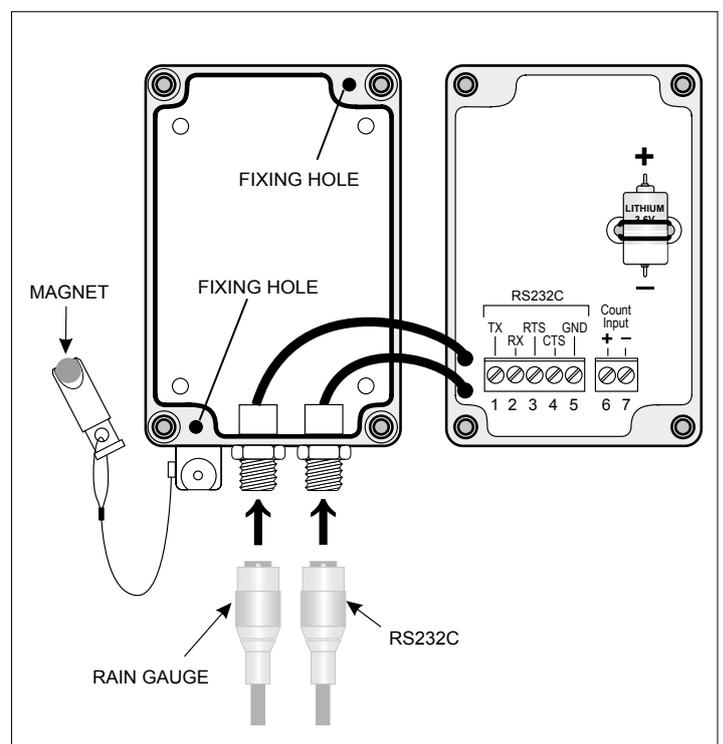**Fig. 5** 3.6V Lithium battery

Fig. 6 Inside the instrument

Keyboard description

In normal operating conditions the HD2013-D display shows the hour and minutes on the top line, the precipitation quantity since last reset (partial precipitations), and the temperature detected by the sensor located inside the case.
By operating directly on the instrument buttons it is possible to:
- Display the total precipitation quantity since the last reset or since the last battery change
- Modify date and time
- Reset the partial rain quantity.

The functions performed by the two buttons are described:

Clear/UP BUTTON

The menu can be accessed by starting from the normal functioning mode and activating the button for **more than 3 seconds:** the words "ZERO CNT OR MENU" are then displayed.
At this point further action on the same button resets the partial counter (CLEAR function): the display returns to normal functioning mode displaying the complete day, month, year date and the partial count at zero once.
Should you be inside the parameters modification menu, the same button increases the current value.

Select/SET BUTTON

Select the menu parameter to be modified: the top line on the display shows the selected parameter while the middle line shows the current value. The parameter displayed can be increased by using the CLEAR/UP button; the new setting can be confirmed by using the SELECT/SET button.

On entering the menu (the words "ZERO CNT OR MENU" appear on the display), pressing the SELECT/SET button causes a circular routine to present the following parameters in this same order:
YEAR: modification of the year
MON: modification of the month
DAY: modification of the day
HOUR: modification of the hour
MIN: modification of the minutes
SEC: modification of the seconds
TOT: displays the total quantity of precipitation

On further activating the SELECT/SET button the normal functioning mode returns.

When one of the items is displayed by pressing the CLEAR/UP button its value can be increased.
To confirm the new setting press the SELECT/SET button.
The detailed description of the steps necessary for the modification of the minutes are outlined as an example below.
To enter the menu from the normal measurement condition press the CLEAR/UP button for three seconds. When the display shows "ZERO CNT OR MENU", press the SELECT/SET button five times until the current minutes are displayed (**YEAR >> MON >> DAY >> HOUR >> MIN**). Using the CLEAR/UP button means the displayed minutes can be increased up to the new value. This can be confirmed using the SELECT/SET button.

Device for data logger setting

Battery replacement

HD2013-D is powered by a 3.6V type ½AA Lithium battery with axial rheophores. The battery's charge status is constantly monitored and shown on the HD2013 display. When the symbol begins to blink it means the charge level is no longer sufficient to power the instrument and the battery needs replacing.
Proceed as follows:
1. Download the data and disconnect the instrument from the PC;
2. Unscrew the four screws on the front cover;
3. Release the battery from the ring fastening it to the printed circuit and take it out of its housing;
4. Cut the rheophores of the new battery to a length of about 15 mm.
5. Put the new battery in **making sure the polarity is correct as outlined in fig. 5**
6. Fasten it with the elastic ring and close the cover with the screws.

Connection to the PC

HD2013-D can be connected to a PC with a Windows operating system via serial cable or by using a cable connected directly to the instrument's internal terminal block (RS232); the temperature and rain data contained in the datalogger memory can be discharged by using the **DeltaLog6 software** and the data can be displayed in graphic or tabular form.

The connector located at the base of the instrument is used with the supplied serial cable.
The internal terminal block can only be used if a longer serial cable is ordered. Note that in this case the cable length cannot exceed 15 metres. The connection is outlined in the following table:

HD2013-D terminal block	Sub D 9-pole female serial connector
1 - TX	3
2 - TX	2
3 - RTS	7
4 - CTS	8
5 - GND	5

Technical characteristics

Power	Replaceable 3.6V type ½AA Lithium battery
Type of event recorded	NC or NO contact that the program is able to select. Ambient temperature at a fixed interval of 15'. An alarm is generated (it can be disabled) if the contact remains in an unstable condition for more than 3 seconds.
Resolution	From 0.050 to 1.599mm/sample
Storage capacity	93000 samples (equal to 18600mm of rain with a resolution of 0.2mm/sample) 2 years of temperature with a fixed interval of 15'
PC interface	Insulated RS232C serial port – 9600 baud
Display indications	Partial rain in millimetres or inches Total rain in millimetres or inches Environment temperature °C/°F
Operating temperature range	-20°C ... +60°C
Protection degree	IP67
Software supplied	DeltaLog6

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HD2013-D: Rain gauge datalogger with LCD display; reads and records up to 93000 impulses, given each time the bucket is emtied. Visualizes and up-dates the internal temperature every minute and saves it every 15 minutes. Insulated RS232C serial output, DeltaLog6 software supplied. 3.6V Lithium battery power. IP67 protection degree
CP2013.2P: One meter 3-pole cable to connect the rain gauge to the HD2013-D fixed to the support staff.
CP2013/RS232: 5-pole cable / RS232C to download data from datalogger to PC.
HD2013.77/40: Flange to fasten the datalogger to the support staff.

Environmental Analysis