



HD2013 TIPPING BUCKET RAIN GAUGE

HD2013-D DATALOGGER TO MEASURE RAINFALL

HD2013 BUCKET RAIN GAUGE

Introduction

The HD2013 is a reliable and sturdy bucket rain gauge, built entirely from corrosion resistant materials in order to guarantee its durability. So as to ensure accurate measurement even with low temperature climatic conditions or during and after precipitations of snow, a version with a heater which is automatically activated around +4°C has been developed so that snow deposits and ice formations are prevented.

The rain gauge is formed by a metal base on which a tipping bucket is set. The rain collector cone, fixed to the aluminium cylinder, channels the water inside the tipping bucket: once the predefined level is reached, the calibrated bucket rotates under the action of its own weight, discharging the water. During the rotation phase, the usually closed reed contact opens for a fraction of a second, sending an impulse to the counter.

The quantity of rainfall measured is based on the count of the number of times the bucket is emptied: the reed contacts, usually closed, open at the moment of the rotation between one bucket's section and the other. The number of impulses can be detected and recorded by a datalogger such as the HD2013-D DeltaOhm or by a pulse counter.

A removable filter for periodic cleaning and maintenance is inserted in the water collector cone so as to prevent leaves or other elements blocking the end of the hole.

For better water flow, the collector cone is treated with a teflon® paint.

The HD2013R, the version with a heater, operates using either 12Vdc or 24Vdc voltage and uses about 35W. Heating is activated around +4°C.

When submitting your order, upon request a bird dissuader, made of 8 3mm-diameter spikes, 60 mm in height, can be installed on the rain gauge.

Installation and maintenance

Upon request the rain gauge can be supplied ready calibrated at 0.1 - 0.2 or 0.5 mm of rain per commutation of the bucket: the calibration value is shown on the instrument's label.

The instrument must be installed in an open area, away from buildings, trees, etc..., ensuring the space over it is free from all objects which could obstruct rain measurements, and in an easily accessible position for the filter to be cleaned periodically.

Avoid installation in areas exposed to gusts of wind, turbulence (for example the

top of a hill) as these may distort the measurements.

The rain gauge can be installed on the ground or raised 500 mm above the ground. Other sizes above the ground are available on request.

Three adjustable support feet have been provided for ground installation so that the instrument can be levelled correctly, and the holes aligned so that it can be fixed to the floor.

For raised installations a collar has been provided which fastens around the base of the instrument on which the support staff must be inserted. The staff may end with either a flange so that it can be fixed to the floor, or a tip to be driven into the ground. The various fastening systems can be seen in fig. 2.

For the tipping device to function correctly and so for the measurement to be correct, it is important that the instrument is placed perfectly level. The base of the rain gauge is fitted with a bubble level.

For installation, unscrew the three screws at the sides of the cylinder that supports the water collector cone.

Note: a heating resistor is fitted around the cone vertex in the HD2013R version. To disconnect the power leads, the terminal block's protection cover must be removed and the connector plugged into the heater's leads coming from the cone needs disconnecting.

Electric connection

For the version without heater use a two-wired lead, for the version with heater use a four-wired lead. Slide the cable through the fairlead and fasten it with the cable-holder located near the entry hole at the base of the rain gauge.

The correct configuration of the connections is illustrated in figure 1. The rain gauge output, available on terminals 5 and 6, must be connected to the rain gauge datalogger HD2013-D input (please see the details in the instrument's description) or to a pulse counter or to a datalogger.

The heated version requires power for the resistors: the mode of connection depends on the level of power used (12Vdc or 24Vdc) and must be made in the manner reported in fig. 1.

The 24Vdc power must be connected between terminals 1 (+) and 4 (-), while for 12Vdc power use terminals 2 (+) and 4 (-) with a jumper between the terminals 1 and 3. If the connection are set correctly, a led placed near the terminals will be lit up.

Maintenance

Verify filter cleanliness periodically; check that there is no debris, leaves or anything else that might obstruct the passage of water.

Check that the tipping bucket contains no dirt, sand, ... deposits, or any other obstruction.

If necessary, the surface can be cleaned with mild non aggressive detergent.



Rain gauge installed on the ground.

Technical characteristics

	HD2013R	HD2013
Power	12Vdc or 24Vdc ±10% / 35W	---
Type of output contact	NC contact (opens during commutation)	
Resolution	0.1 - 0.2 or 0.5 mm/commutation (on request at the time of placing the order)	
Precision	± 2% between 20÷300 mm/h	
Operating temperature range	-20°C ... +60°C	+4°C ... +60°C
Heater intervention temperature	+4°C	---
Protection degree	IP67	
Collector area	400 cm ²	

HD2013-D RAIN GAUGE DATALOGGER

Introduction

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



Rain gauge with bird dissuader.

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'.

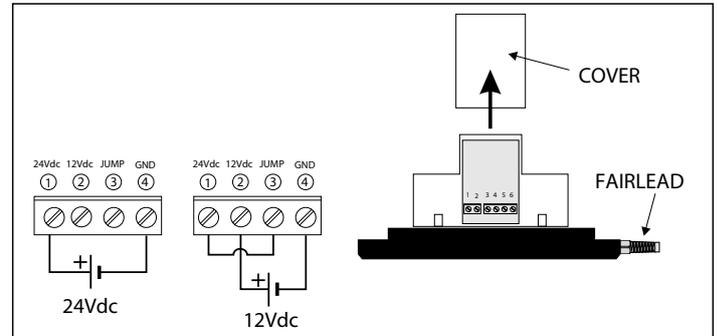


Fig. 1 Electric connection.

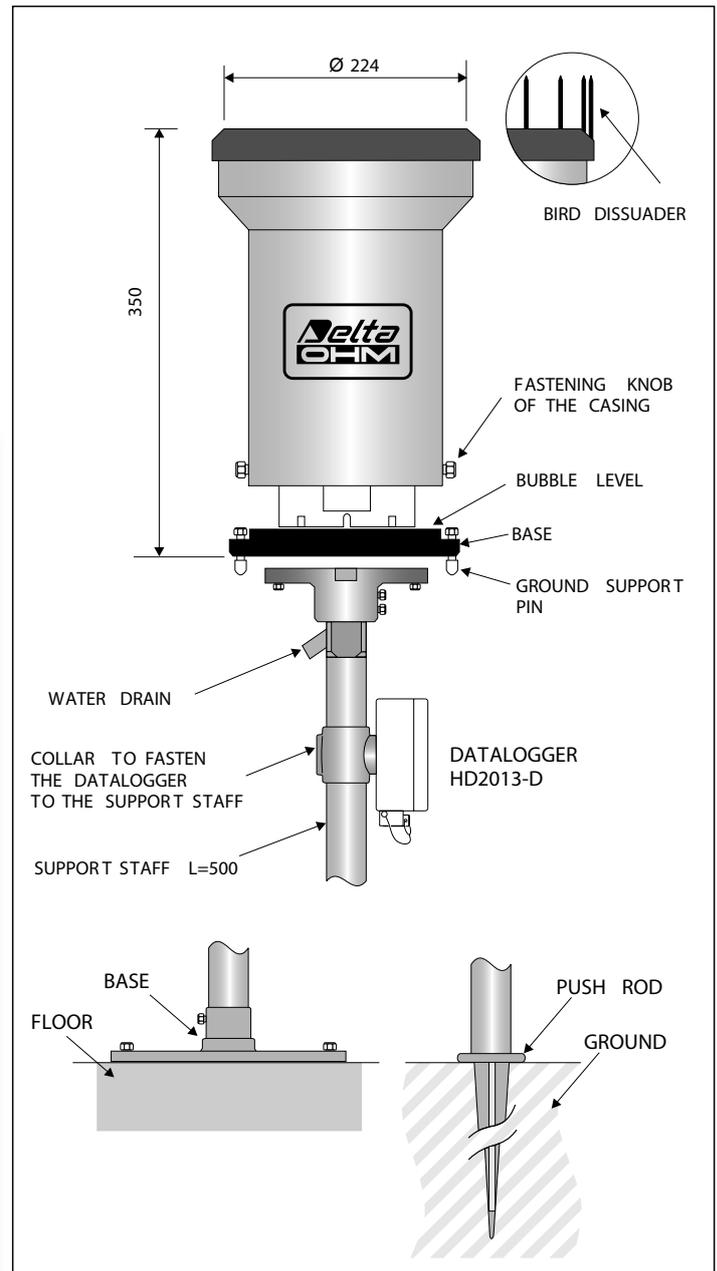


Fig. 2 Mechanical dimensions, and floor or ground fastening system.

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

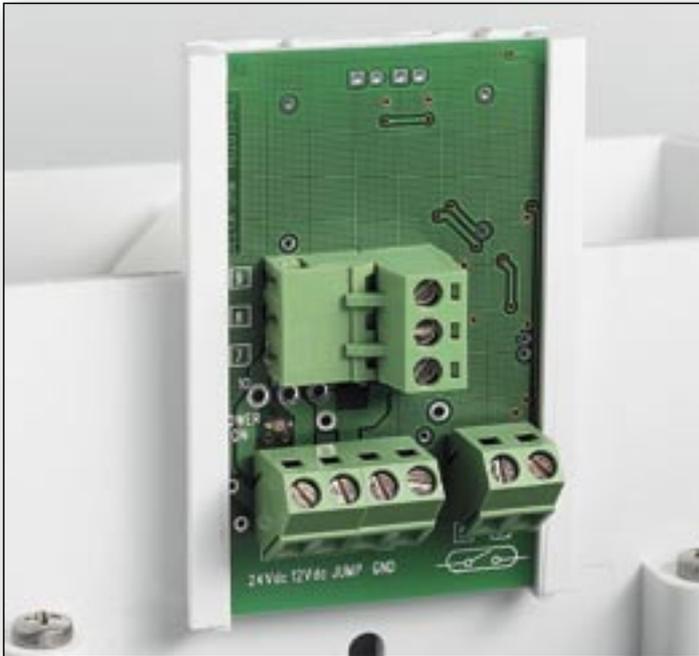
The menu can be accessed by starting from the normal functioning mode and activating the button for **more than 3 seconds**: the words "ZERO CNT OR MENU" are then displayed.

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.



View of tipping bucket



Electrical connection



Bubble level

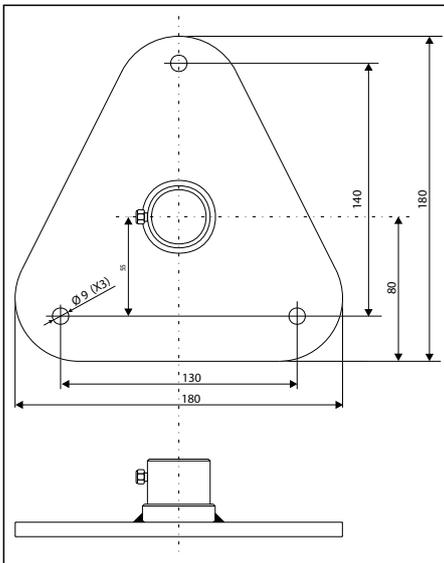


Fig. 3 Base for ground fastening HD2013.78



Support plate for rain gauge raised from ground



Tip for ground for rain gauge raised from ground

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.

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; the 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

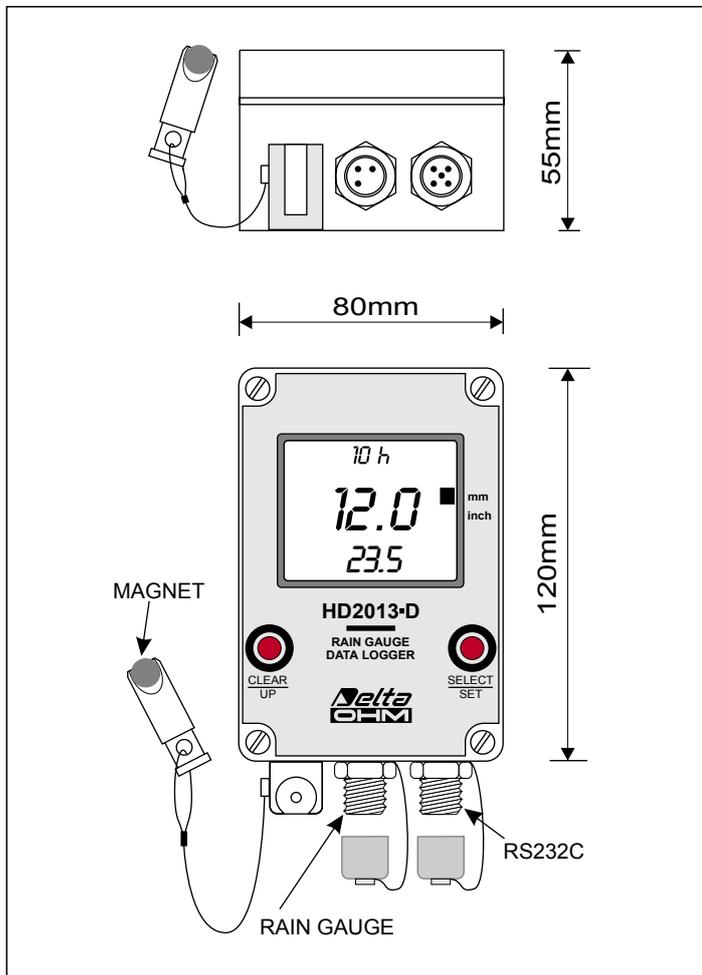


Fig. 4 General view and mechanical dimensions.



Rain gauge

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

Order codes

HD2013: Rain gauge with tipping bucket, area 400 cm², for temperatures from +4°C to +60°C; resolution 0.1 - 0.2 or 0.5 mm. Output contact normally closed.

HD2013R: Rain gauge with tipping bucket, area 400 cm², for temperatures from -25 to +60°C; resolution 0.1 - 0.2 or 0.5 mm. Output contact normally closed. Power voltage 12Vdc or 24Vdc ±10% / absorption 35W.

HD2013.18: Bird dissuader.

HD2013.5K: Accessory kit for installation of the 500 mm raised from ground rain gauge, formed by a support plate for the staff, support staff L=500 mm, fastening screws.

HD2013.75: Base with tip for the ground to support the raised from ground rain gauge (to add to the Accessory kit HD2013.5K).

HD2013.78: Level base for fastening the raised from ground rain gauge (to add to the Accessory kit HD2013.5K).

HD2013.77/40: Flange to fasten the datalogger to the support staff.

HD2013-D: Rain gauge datalogger with LCD display; reads and records up to 128000 samples. 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.

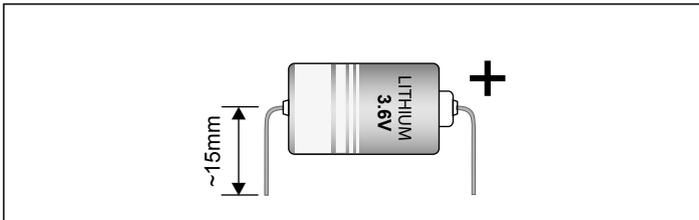


Fig. 5 3.6V Lithium battery

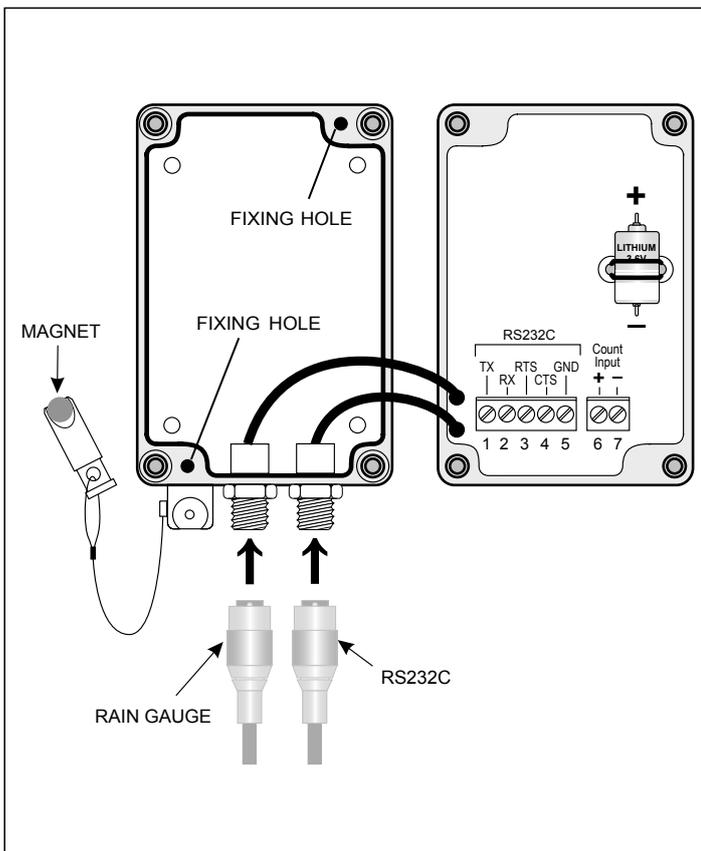


Fig. 6 Inside the instrument



Device for data logger setting



CE CONFORMITY	
Safety	EN61000-4-2, EN61010-1 Level 3
Electrostatic discharge	EN61000-4-2 Level 3
Electric fast transients	EN61000-4-4 livello 3, EN61000-4-5 Level 3
Voltage variations	EN61000-4-11
Electromagnetic interference susceptibility	IEC1000-4-3
Electromagnetic interference emission	EN55020 class B