CRN TECNOPART, S.A.
Sant Roc 30
08340 VILASSAR DE MAR (Barcelona)
Tel 902 404 748 - 937 591 484   Fax 937 591 547
e-mail: crn@crntp.com http:// www.crntp.com

DO-040.74E

HD 2013   BUCKET RAIN GAUGE
HD 2013.2 RAIN DETECTOR

HD 2013 BUCKET RAIN GAUGE

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 bucked 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 3mmdiameter 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 fig2

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 coneneeds disconnecting.
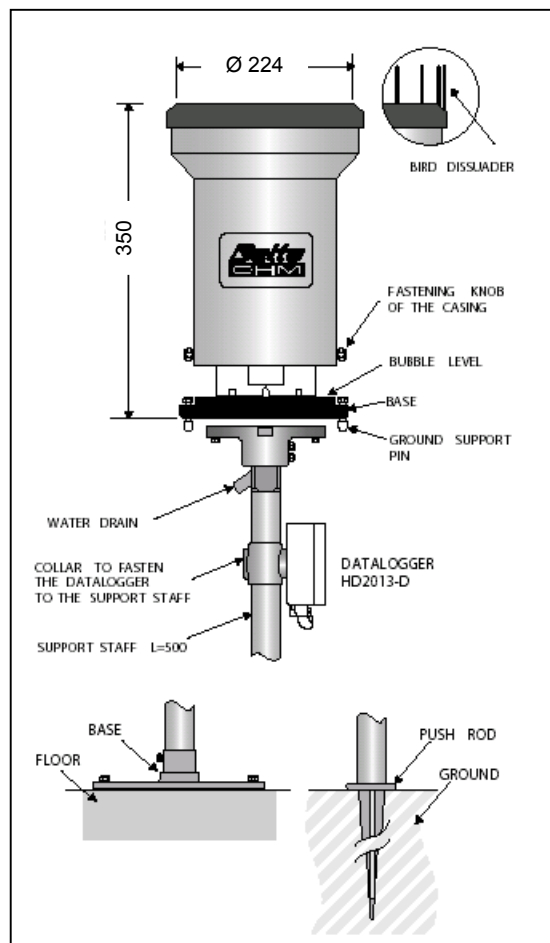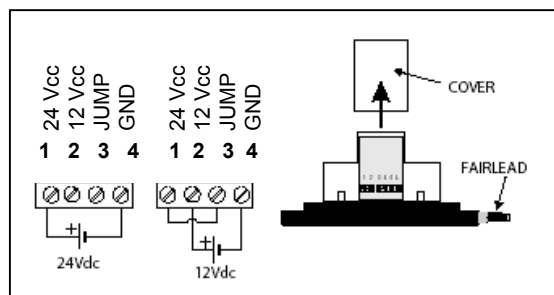

Fig. 1
Electricl connections

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

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.

TECHNICAL CHARACTERISTICS

	HD 2013R	HD 2013
Power	12 Vcc o 24 Vcc ±10%/ 35 W	--
Type of output contact	NC contact (opens during commutation)	
Resoluton	0.1 - 0.2 or 0.5 mm/commutation (on request at the time of placing the order)	
Accuracy	± 2% between 20÷300 mm/h	
Operating temperature	-025 ºC a 60 ºC	4 ºC a 60 ºC
Heater intervention temperature	4 ºC	--
Protection degree	IP67	
Collector area	400 cm^2	

HD 2013D   RAIN GAUGE DATALOGGER

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 (threepole 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 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'..

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.
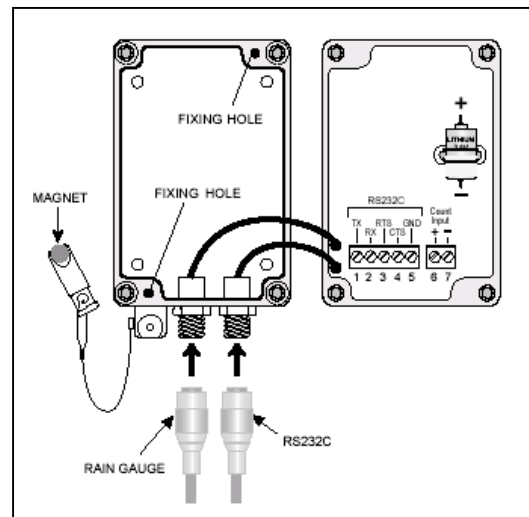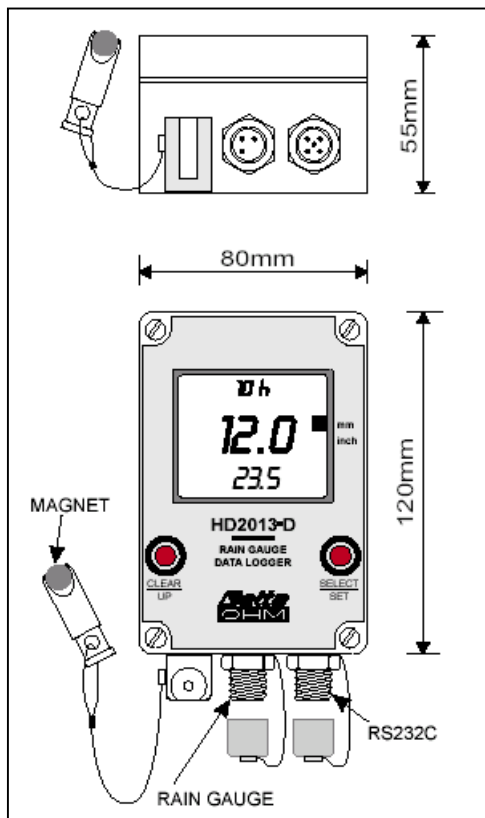

Fig. 3 Electrical connection

Fig. 4   HD 2013D

Fig. 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 fi xed 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	0,1 - 0,2 - 0,5 mm/sample
Storage capacity	93000 samples (equal to 18600mm of rain with a resolutionof 0.2mm/sample) 2 years of temperature with a fi xed interval of 15
Interface PC	Insulated RS232C serial port – 9600 baud
Display indications	Partial rain in millimetres or inches Total rain in millimetres or inches Environment temperature °C/°F
Working temperature	-20 to 60 ºC
Protection	IP67
Software	DeltaLog6 (supplied)

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 modifi cation menu, the same button increases the current value.

SELECT/SET BUTTON

Select the menu parameter to be modifi ed: 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 confi rmed 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: modifi cation of the year
MON: modifi cation of the month
DAY: modifi cation of the day
HOUR: modifi cation of the hour
MIN: modifi cation of the minutes
SEC: modifi cation 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 confi rm the new setting press the SELECT/SET button.
The detailed description of the steps necessary for the modifi cation 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 fi ve 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 confi rmed 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 suffi cient 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)
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 - RX	2
3 - RTS	7
4 - CTS	8
5 - GND	5

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.

HD 2013.2 RAIN DETECTOR

The HD2013.2 is a rain detector based on the capacity principle. The capacity value of the sensitive element, on an alumina rest, changes according to the surface dampened by raindrops. An integrated heater keeps it dry, evaporates water and prevents false signals caused by fog or dew. The heater also activates at low temperatures, melting the snow and allowing to detect snow precipitations. The instrument external circular dome acts as a windshield for the sensor, preventing false indications.

The instrument is equipped with three different outputs: a "Rain ON/OFF" output, which detects whether it is raining/snowing (ON) or not (OFF), also used to control a relay coil or similar devices; a 0…1V voltage analogue output (calibrated) and a 1,5…6KHz frequency output (not calibrated), which provide an accurate indication of current precipitation intensity. The ON/OFF output comes with a delay circuit that indicates the "rain over" condition with a 2 minute delay, so that the "rain over" condition is distinguished from the "light rain" one. The heater can be disabled when power consumption is critical. To do it, set the Heater OFF input on 0V.

If requested when ordering, a bird spike, consisting of a 6-spike ring (spike height: 60mm, diameter: 3 mm), can be mounted.

TYPICAL APPLICATIONS

The rain detector can be used either as a separate device, or connected to a data logger system (for example: in a weather station). In fi gure 1, the HD2013.2 ON/OFF output is connected to a relay coil that powers an engine: should it rain, the ON/OFF output will energize the relay coil, which will close the normally open contact (in this case the rain detector is employed as part of a control system, such as, for example, for closing windows).

Warning: when the HD2013.2 is connected to a relay coil, use always a protection diode,as shown in fi gure 1.

Fig.1
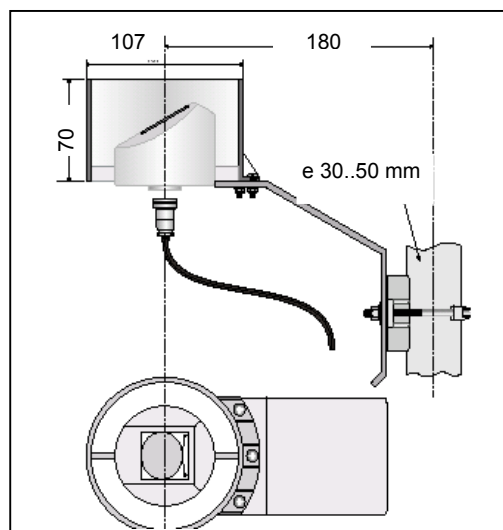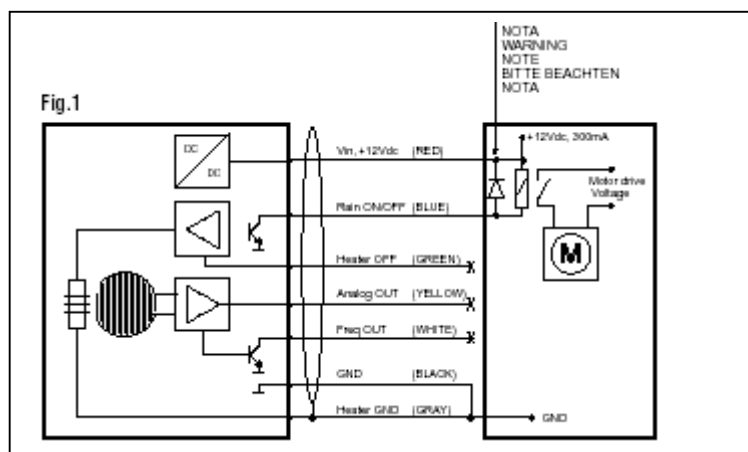
TECHNICAL DATA
Sensor
    Capacitive, with integrated heater
    ArEa sensor: 6,6 cm^2
    Angle: 30º
Sensitivity
    Min. sensitive area: 0,05 cm^2
    ON delay/Trip delay (OFF>>ON) <0,1ms
    OFF delay/Shut-off delay (ON>>OFF) <5 min
Dimensions
    Diam. x height ø107 x 70 mm
    Weight 450g
    Cable length 5m (other lengths available on request)
Electrical Features
Power Supply
    Supply Voltage 12Vdc ± 10%
    Current Consumption 130mA (typical)
                    230mA (max)
                    10mA (with heater disabled)
Sensor Power Consumption   0.5 … 2.3W
Outputs
    Rain ON/OFF Open collector, closed in case of rain.
    Max. Voltage 15V
    Max. Current 50mA
    Analogue Output 0…1V (0V = rain, 1V = dry sensor)
    Frequency Output 1500 … 6000Hz (rain … dry sensor) Not calibrated
Imputs
    Heater OFF OFF = connected to GND
    Closing Contact Capacity 15Vdc, 2mA
Ambient Conditions
    Operating Temperature -15 … +55°C
    Storage Temperature -40 … +65°C
Electrical Connection – Colour Codes
    Power supply (+)   Red
    Rain ON/OFF   Blue
    Heater OFF   Green
    Analogue Output   Yellow
    Frequency Output   White
    Electronics Earth   Black
    Heater Earth   Grey

CE CONFORMITY

Security	EN61000-4-2, EN61010-1 nivel 3
ESD	EN61000-4-2 nivel 3
Fast electrical transients	EN61000-4-4 nivel 3
Voltage variations	EN61000-4-11
Susceptibility to electromagnetic interference	IEC 1000-4-3
Emisión to electromagnetic interference	EN55020 clase B