Регистраторы данных универсальные DELTA OHM HD2013-DB

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HD 2013-DB

HD2013-DB
RAIN GAUGE DATA LOGGER

HD2013-DB is a data logger that has been specifically developed to capture and store rainfall trends. It works with a long life lithium battery that provides, together with the large memory, remarkable recording capacity without user intervention. For user convenience, the supplied lithium battery, when exhausted, can be also replaced by three alkaline batteries (not supplied with instrument).
The backlit display shows in real time the rain quantity during various time intervals.
The instrument is perfectly waterproof thanks to the use of reed relays, instead of the common push-buttons. The reed relays are operated through a magnet, attached to the end of an aluminium handle tied to the case. When not in use, the magnet is placed back into its holder.
The software **HD32MTLogger** supplied with the instrument allows setting of the parameters of the instrument, the real time display of the values captured by the data logger, the download to a PC and the process of the stored data. The connection to the PC is made via the M12 8-pole RS232C serial connector placed at the bottom of the instrument.
HD2013-DB can be connected to the most popular types of rain gauges with normally closed (NC) or normally open (NO) output contact.
The display auto power-off feature allows to prolong the battery life. A front LED lets you check the operating status of the instrument when the display is off. The LED changes color when the rain gauge contact switches, thus allowing to verify that the rain gauge tipping bucket returns correctly in the stable position after emptying.

Technical characteristics

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 3 x 1,5 V alkaline batteries (not supplied with the instrument) can be used to replace the lithium battery when exhausted
Recorded event	NC or NO contact.
Resolution	Configurable from 0.050 to 1.599 mm/sample
Storage capacity	32.255 samples (equal to 6451 mm of rainfall with 0.2 mm/sample resolution) Non-volatile memory and cyclic memory management
PC interface	Isolated RS232C serial port – 115200 baud
Display	2-row backlit LCD
Indications on display	Rain quantity in mm from the counter reset Rain quantity in mm in the last hour and the last 4, 24, 48, 72 and 96 hours
LED indicator	Flashes red if the rain gauge contact is open Flashes green if the rain gauge contact is closed
Battery life	Approx. 5 years of continuous use with the supplied lithium battery and in typical operating mode, in which the backlit display is turned on occasionally (about 10 minutes per day) Approx. 18 months of continuous use with 3 alkaline batteries with 2200 mAh capacity
Operating temperature	-30 °C...+60 °C
Protection degree	IP 67, including connectors

Installation and connections

The housing of the data logger has IP 67 protection degree and can be wall mounted or, in the case of installations with the rain gauge off the ground, fixed to the rain gauge support by means of the HD2003.77/40 clamping. Diameter of the support: 40 mm.

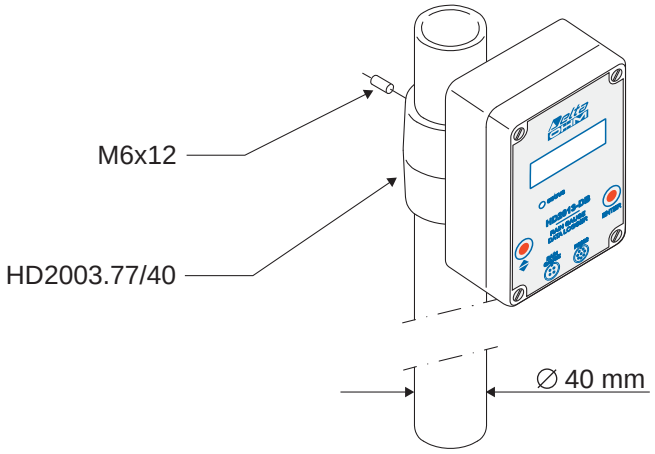
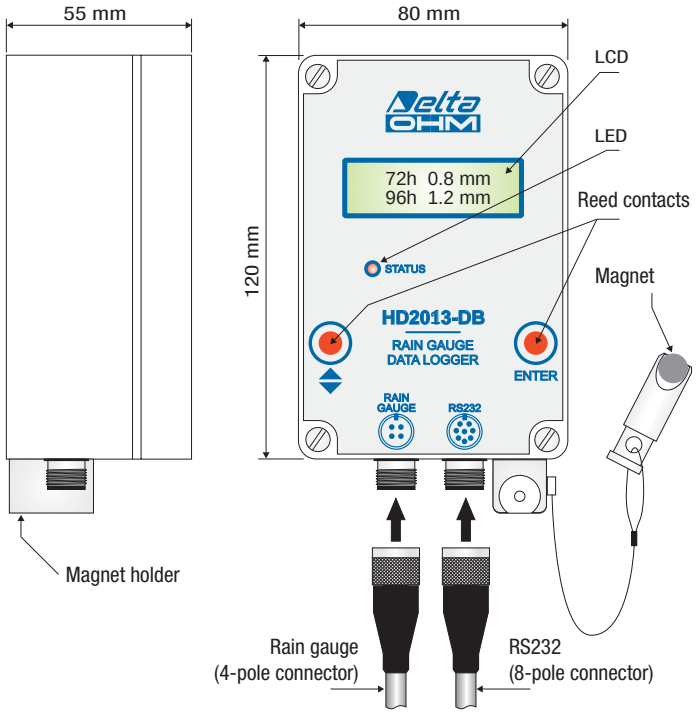


Fig.1: Installation with HD2003.77/40 clamping

HD2003.77/40 Clamping

Two connectors are placed at the bottom of the housing: one 4-pole M12 male connector for the connection to the rain gauge and one 8-pole M12 male connector for the connection to the PC. The arrangement of the two connectors is also clearly indicated on the front mask of the data logger.



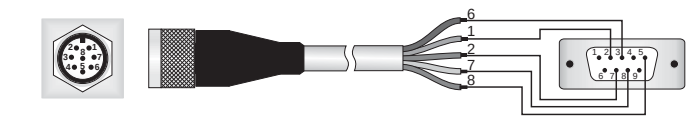
4-pole M12 male connector of the datalogger (visible side)

Cable CP2013-DB

Fig. 2: Description and connections

Connector	Function	Color
1	Rain gauge contact	Brown
2	Rain gauge contact	White
3	Not connected	Blue
4	Not connected	Black

Fig. 3: Connection of the CP2013-DB cable to the rain gauge



M12 8-pole male connector of the data logger (visible side)

DP9 female connector of the cable (soldering side)

M12 connector	Function (PC side)	DB9 connector
1	Rx	2
2	RTS	7
6	Tx	3
7	CTS	8
8	GND	5

Fig. 4: RS232 Serial connection

Over-voltage protection: the data loggers supplied with the mast clamping already mounted on the back of the housing are provided with internal over-voltage protection devices, connected to the clamping. For the correct operation of the protection devices, the mast on which the clamping is fixed, must be connected to ground.

Keyboard

The two function keys that allow to control the instrument are formed by two reed contacts, operable from outside by means of a magnet supplied with the instrument.

Two red areas are indicated on the front of the instrument, corresponding to the word "ENTER" and to the symbols ▲ and ▼: on these areas will be placed the magnet to operate the instrument. Keeping the magnet on the red area for a few instants and then moving it away is equivalent to press a button. For simplicity, in the description of the instrument that follows, this operation will be called: "**press the ENTER button**", "**press the ▲/▼ button**".

After use, the magnet with its support should be placed back into its holder.

Operation

The data logger counts and stores the number of emptying of the rain gauge tipping bucket. Each emptying of the bucket corresponds to a quantity of rain equal to the resolution of the rain gauge. The resolution can be set from 0.050 to 1.599 mm of rain by using the HD32MTLogger software. The rain gauge contact can be both NC and NO type (it is not necessary to set the contact type, the data logger automatically works with both types of contact).

Status indicator: the LED indicator of the data logger indicates the status of the contact of the rain gauge. The LED blinks red if the contact is open, and green if the contact is closed. **Therefore, the LED color allows to highlight the emptying of the bucket and check that the bucket returns in the stable position after emptying**.

Display: the display is backlit; to minimize the battery consumption, the display is switched off if no operation is peformed on the data logger for 2 minutes. However, the data logger is still working even when the display is off, and its activity is signaled by the flashing status indicator LED. In order to turn the display on, press any of the two buttons. When the display is on, the following screens are displayed sequentially:

- quantity of rain in mm in the last hour and the last 4 hours;
- quantity of rain in mm in the last 24 and 48 hours;
- quantity of rain in mm in the last 72 and 96 hours;
- quantity of rain in mm from the last counter reset (partial rainfall); if the correction table is enabled, both the uncompensated and the compensated values are displayed (Note 1);
- date/time and battery voltage;
- user code and serial number of the data logger.

Note 1: if the rain gauge connected to the data logger has a measurement correction table as a function of the rainfall rate, the partial rainfall compensated

View of the magnet

values can also be displayed by storing the correction in the data logger. By default, the correction is disabled. The correction can be enabled by using the HD32MTLogger software. The correction is not applied to the values of quantity of rain in 1h, 4h, 24h, 48h, 72h and 96h.
The values of the quantity of the rain are shown on the display with 0.1 mm resolution. The internal resolution of the data logger is 0.001 mm and the thousandth values are visible by downloading the data to the PC with the HD32MTLogger software.
The data logger indicates "over-range" if the rain quantity in 1h, 4h, 24h, 48h, 72h, 96h exceeds 1000 mm.
The counter of partial rainfall is limited only by the memory capacity (32.255 samples). The memory is managed cyclically: the new sample overwrite the oldest.

Reset of the partial rainfall counter: the reset of the partial rainfall value can be performed by using the HD32MTLogger software or directly by using the data logger keyboard according to the following procedure:
1. turn the display on, if turned off, by pressing any of the two buttons on the data logger;
2. wait until the display shows the message "Use magnet to enter MENU";
3. press the ▲/▼ button by using the magnet; "RESET INCR. COUNT" indication appears;
4. select "YES" by pressing ENTER button; the data logger automatically exits MENU.

To exit MENU without resetting the counter, when "RESET INCR. COUNT" indication appears select "NO" by pressing the ▲/▼ button, then select ENTER button to exit.
Date/time, user code, resolution, correction table and language of the data logger can be set by using the HD32MTLogger software (see the instructions of the software).

Connection to PC
The data logger is provided with an RS232 serial port with 8-pole M12 connector located at the bottom of the instrument. For the connection to the PC use:
- the **HD2110RS** cable for the connection to a RS232 port of the PC;
- the **CP25** cable for the connection to a USB port of the PC; to use the **CP25** cable, the related USB drivers must be installed in the PC.

With the **HD32MTLogger software**, for Windows® operating systems, it is possible to set the parameters and the language of the instrument, view in real time the values captured by the data logger, download to the PC and process the stored data.
When the data logger is connected with the HD32MTLogger software, the backlit display is always on. To prolong the battery life, it is recommended to maintain the connection only for the time necessary.

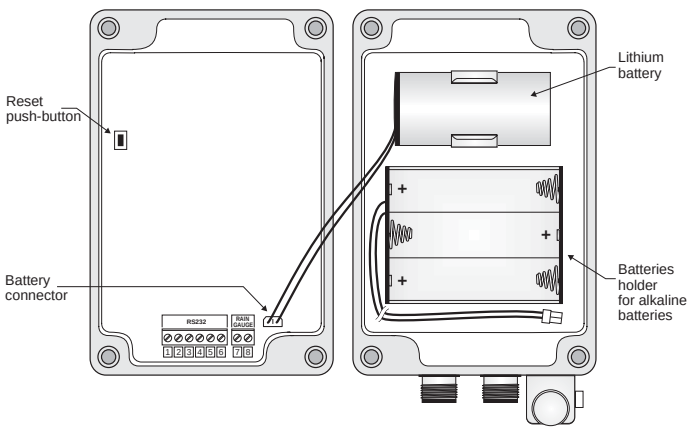


Fig. 5: Inside view of the data logger

Battery replacement
HD2013-DB uses an internal 3.6 V lithium-thionyl chloride (Li-$SOCl_2$) **not rechargeable** battery, size C, with Molex 5264 2-pole connector. The charge status of the battery is constantly monitored and displayed.
When the battery voltage drops below a certain value, the instrument automatically turns off the backlit of the display, so as to minimize the battery consumption and allow the instrument to continue to perform the measurement functions. When the backlit is turned off, it is recommended to replace the battery soon.
If the battery voltage drops further to a level that does not allow the correct operation of the instrument, the message "CHANGE BATTERY NOW!" is displayed; in such a case, the battery replacement is necessary.
The instrument is equipped with non-volatile memory: the data remain stored even if the battery is discharged and disconnected.

1. To replace the battery, proceed as follows:
2. disconnect the instrument from the PC, if connected;
3. unscrew the four screws fixing the front cover;
4. remove the battery connector and take the battery out of its holder;
5. insert the new battery paying attention to the correct polarity (the connector is provided with a protection device that prevents the reversal of polarity);
6. as an alternative to the lithium battery, if not available, three 1.5 V alkaline batteries can be used, to be inserted in the batteries holder shown in figure 5. In such a case, connect the batteries holder connector to the battery connector on the board of the instrument;
7. close the cover with the fixing screws; when closing, verify that the sealing gasket is properly positioned; the screws must be securely fastened.

Ordering codes
HD2013-DB: Rain gauge data logger. With backlit LCD. Detects and stores up to 32.255 pulses caused by the bucket emptying. Resolution configurable from 0.050 to 1.599 mm/pulse. Isolated RS232 serial output. IP 67 protection degree. Powered by a 3.6 V lithium battery. Supplied with: internal not rechargeable lithium-thionyl chloride (Li-$SOCl_2$) battery (**BAT-2013DB**), **HD32MTLogger** software, 4-pole female connector (**FCM12.4**). The **HD2003.77/40** clamping for the fixing the data logger to the Ø 40 mm support mast of the rain gauge, the **CP2013-DB** cable for the connection to the rain gauge and the **HD2110RS** (RS232) or **CP25** (USB) cable for the connection to the PC have to be ordered separately.
CP2013-DB: 4-pole cable. Length 1 m. 4-pole M12 connector on one side, open wires on the other side.
HD2110RS: Serial connection cable with M12 connector on the instrument side and 9-pole SubD female connector for RS232C on the PC side.
CP25: Serial connection cable with USB connector on the PC side and 8-pole M12 female connector on the instrument side. The cable has a built-in USB/RS232 converter and connects the instrument directly to the PC USB port.
HD2003.77/40: Clamping for fixing the data logger to the Ø 40 mm support mast of the rain gauge.
BAT-2013DB: 3.6 V lithium-thionyl chloride (Li-$SOCl_2$) **not rechargeable** battery, capacity 8400 mAh, size C, Molex 5264 2-pole connector.
FCM12.4: 4-pole M12 female spare connector, for connecting the data logger at distances greater than 1 m from the rain gauge.
FCM12.8: 8-pole M12 female spare connector, for connecting the data logger to the PC.

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