GUIDE TO MONITORING OF AZZURRO ZCS SYSTEMS USING A DATALOGGER



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Pile Reg. IT12110P00002965 - Share Capital € 100,000.00 fully paid up
AR Company Reg. no. 03225010481 - REA AR no. 94189
ISO 9001 Certified Company - Certificate no. 9151 - CNS0 - IT-17778

Identification: MD-AL-GI-00
Rev. 1.0 of 30.03.21 - Application: GID

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1. Datalogger

1.1. Preliminary notes on how to configure the datalogger

The AzzurroZCS inverters can be monitored via a datalogger connected to a Wi-Fi network present at the place of installation or via an ethernet cable connected to a modem.
The inverters are connected in a daisy chain to the datalogger via a RS485 serial line.

- Datalogger up to 4 inverters (code ZSM-DATALOG-04): allows to monitor up to 4 inverters.
  It can be connected to the network via an Ethernet or Wi-Fi network.
- Datalogger up to 10 inverters (code ZSM-DATALOG-10): allows to monitor up to 10 inverters.
  It can be connected to the network via an Ethernet or Wi-Fi network.



Figure 1 – Diagram for connecting the ZSM-DATALOG-04 / ZSM-DATALOG-10 datalogger

- Datalogger up to 31 inverters (code ZSM-RMS001/M200): allows to monitor up to 31 inverters or a system with a maximum installed power of 200kW.
  It can be connected to the network via an Ethernet cable.

- Datalogger up to 31 inverters (code ZSM-RMS001/M1000): allows to monitor a maximum of 31 inverters or a system with a maximum installed power of 1000kW.
  It can be connected to the network via an Ethernet cable.

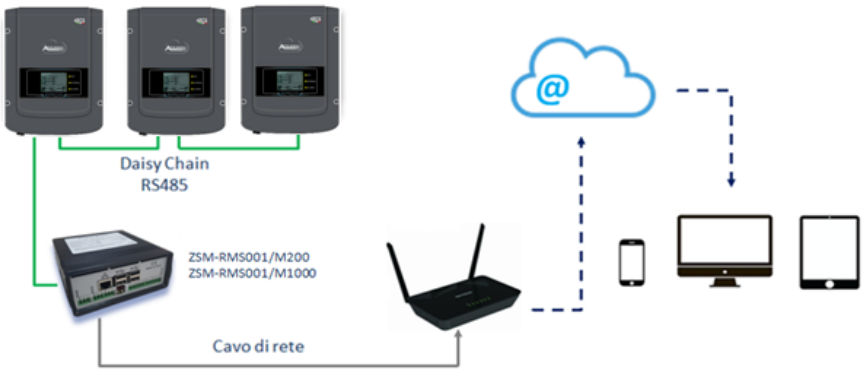


Figure 2 – Diagram showing the operation of the ZSM-RMS001/M200 / ZSM-RMS001/M1000 datalogger

All these devices carry out the same function, i.e. they transmit data from the inverters to a web server to allow remote monitoring of the system either through the "Azzurro Monitoring" app or through the "www.zcsazzurroportal.com" website.

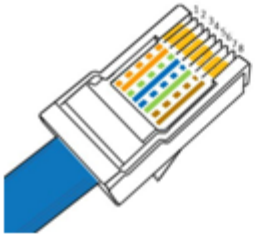
All the Azzurro ZCS inverters can be monitored using the datalogger; different models or families of inverters can also be monitored.

1.2. Electrical connections and configuration

All the Azzurro ZCS inverters have at least one RS485 connection point.
The connections can be made via the green terminal block or via the RJ45 plug inside the inverter.
Use positive and negative conductors. There is no need to use a conductor for the GND. This applies to both the terminal block and the plug.
The serial line can be created using a Cat. 5 or Cat. 6 network cable, or a classic RS485 2x0.5mm² cable.

1) In the case of three-phase inverters, a suitably crimped network cable with a RJ45 connector can also be used:

    a. Place the blue cable in position 4 of the RJ45 connector and the white-blue cable in position 5 of the RJ45 connector, as shown in the figure below.
    b. Insert the connector into the 485-OUT terminal.
    c. If there is more than one three-phase inverter, insert another connector in the 485-IN terminal to connect to the 485-OUT input of the next inverter.



RJ 45	Colore	Monofase	Trifase
4	Blu	TX +	485 A
5	Bianco-Blu	TX -	485 B

Figure 8 – Pin out for connecting the RJ45 connector

2) Daisy chain

    a. Insert the blue cable into input A1 and the white-blue cable into input B1.
    b. If there is more than one three-phase inverter, insert a blue cable into input A2 and a white-blue cable into input B2 and connect them to the respective A1 and B1 inputs of the next inverter.

Some inverters have both an RS485 terminal block and RJ45 plugs. This is shown in detail in the figure below.



Figure 5 – Tightening the network cable to the RS485 terminal block

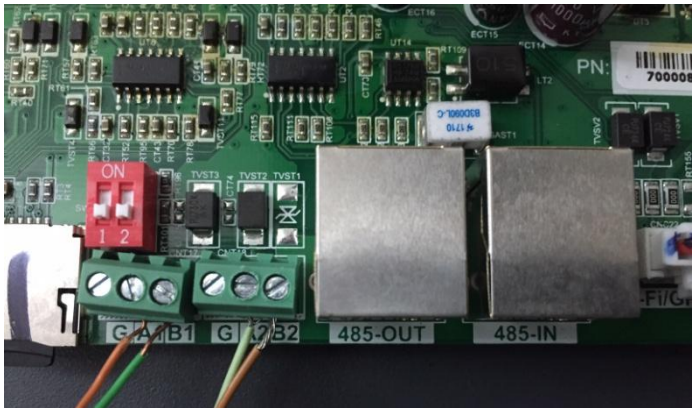


Figure 6 – Connecting the serial line via the RS485 terminal block and via the RJ45 plug

For the 3PH HYD5000-HYD20000-ZSS three-phase hybrid inverter, use only one positive and one negative of those shown in the figure below.

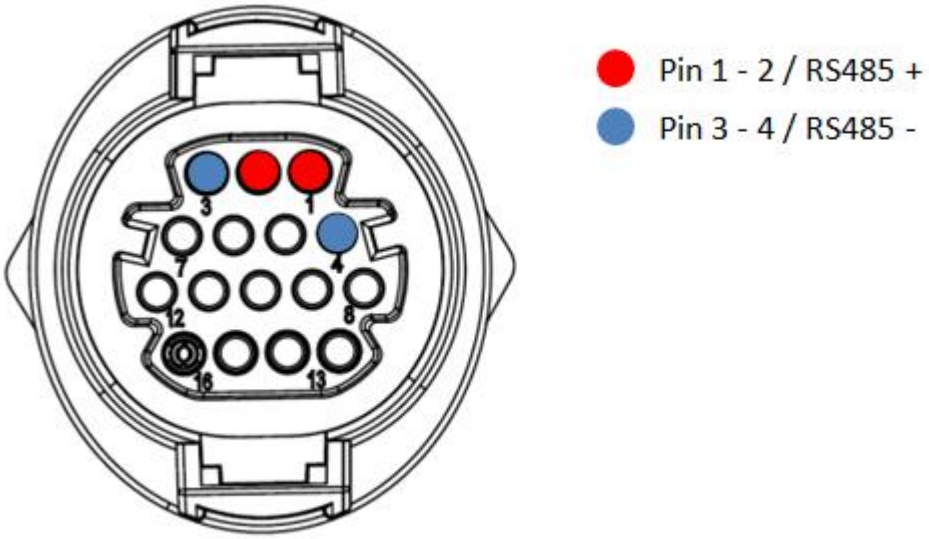


Figure 6 – Connecting the serial line via the communication connector for 3PH HYD5000-HYD20000-ZSS

c. Position the dip switches of the last inverter of the daisy chain as shown in the figure below for activating the 120 Ohm resistor and closing the communication chain. If there are no switches, physically connect a 120 Ohm resistor to terminate the bus.

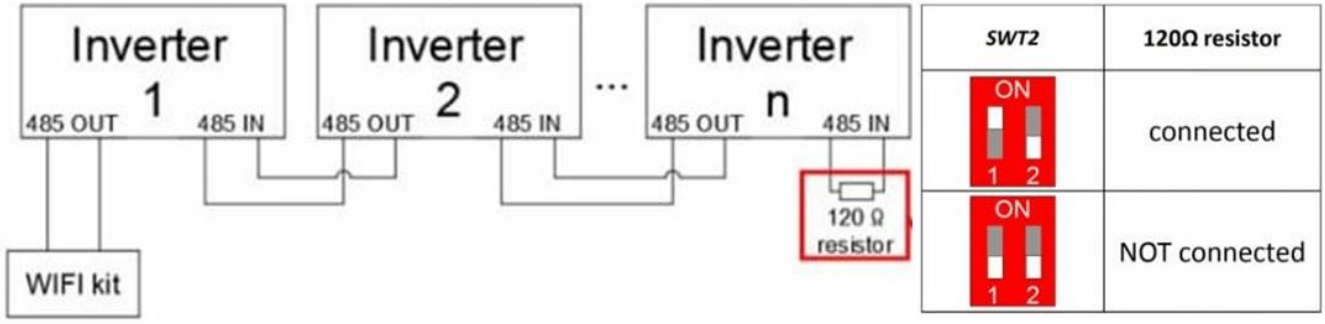


Figure 7 – Positioning of dip switches to connect the isolation resistor

3) Check that the RS485 icon is shown on the display of all the inverters. This indicates that the inverters are actually connected via the serial line. If this symbol does not appear, check that the connection is correct, as indicated in this guide.



Figure 10 – RS485 symbol on the display of the inverter

4) Set a sequential Modbus address on each inverter connected:

a. Enter the "Settings" menu.
b. Scroll to the submenu "Modbus Address."
c. Change the digits and set an increasing address on each inverter, starting from 01 (first inverter) to the last inverter connected. The Modbus address will be shown on the display of the inverter alongside the RS485 symbol. There should be no inverters with the same Modbus address.

1.3. ZSM-DATALOG-04 AND ZSM-DATALOG-10 DEVICES

The initial status of the LEDs on the datalogger will be:

- POWER steady on
- 485 steady on
- LINK off
- STATUS steady on

1.4. WI-FI CONFIGURATION

To configure the datalogger via Wi-Fi, please refer to the chapter on monitoring systems, as the configuration is similar to that of any type of Wi-Fi adapter.

1.5. Ethernet configuration

1) Insert the RJ45 connector of the Ethernet cable in the ETHERNET input of the datalogger.



Figure 25 – Ethernet cable connected to the datalogger

2) Connect the other end of the Ethernet cable to the ETH output (or equivalent) of the modem or a suitable data transmission device.
3) Activate the search for Wi-Fi networks on your phone or PC in order to display all the networks visible from your device.



Figure 26 - Wi-Fi network search on iOS smartphone (left) and Android (right)

Note: Disconnect from any Wi-Fi networks to which you are connected by removing automatic access.



Figure 27 - Disabling automatic reconnection to a network

4) Connect to a Wi-Fi network generated by the datalogger (i.e. AP_*******, where ******* indicates the serial number of the datalogger shown on the label of the device), which operates as an Access Point.

5) Note: To ensure that the datalogger is connected to the PC or smartphone during the configuration procedure, enable automatic reconnection of the AP_******* network.

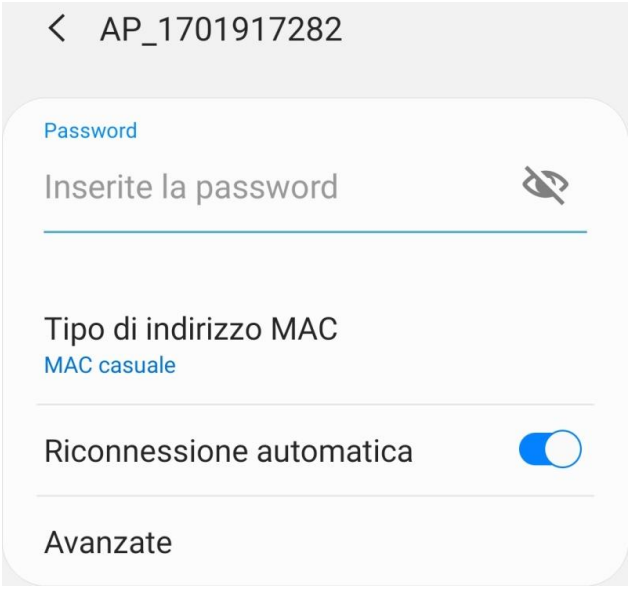


Figure 28 - Password entry prompt

Note: the Access Point is not able to provide internet access; confirm to maintain the Wi-Fi connection, even if internet is not available.



Figure 29 - Screen showing that the Internet cannot be accessed

6) Open a browser (Google Chrome, Safari, Firefox) and enter the IP address 10.10.100.254 in the address bar at the top of the screen.
In the box that appears, enter “admin” as both Username and Password.

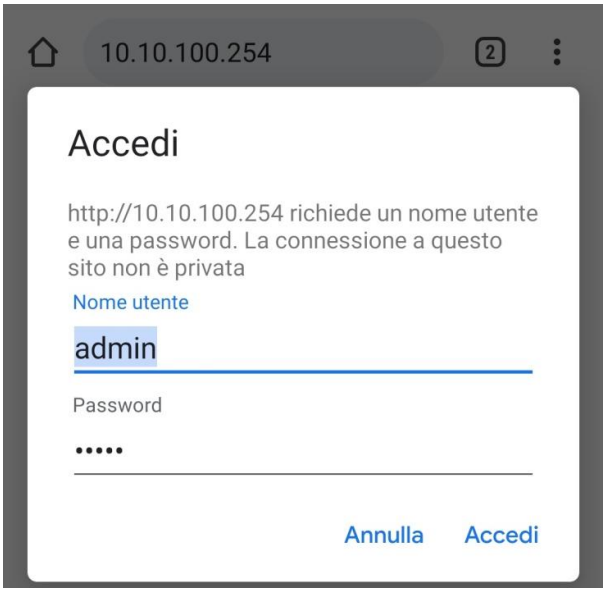


Figure 30 - Screen for logging into the web server to configure the datalogger

7) The status screen will open, showing the datalogger information such as serial number and firmware version.

Check that the fields relating to the Inverter Information are filled in with the information of all the inverters connected.

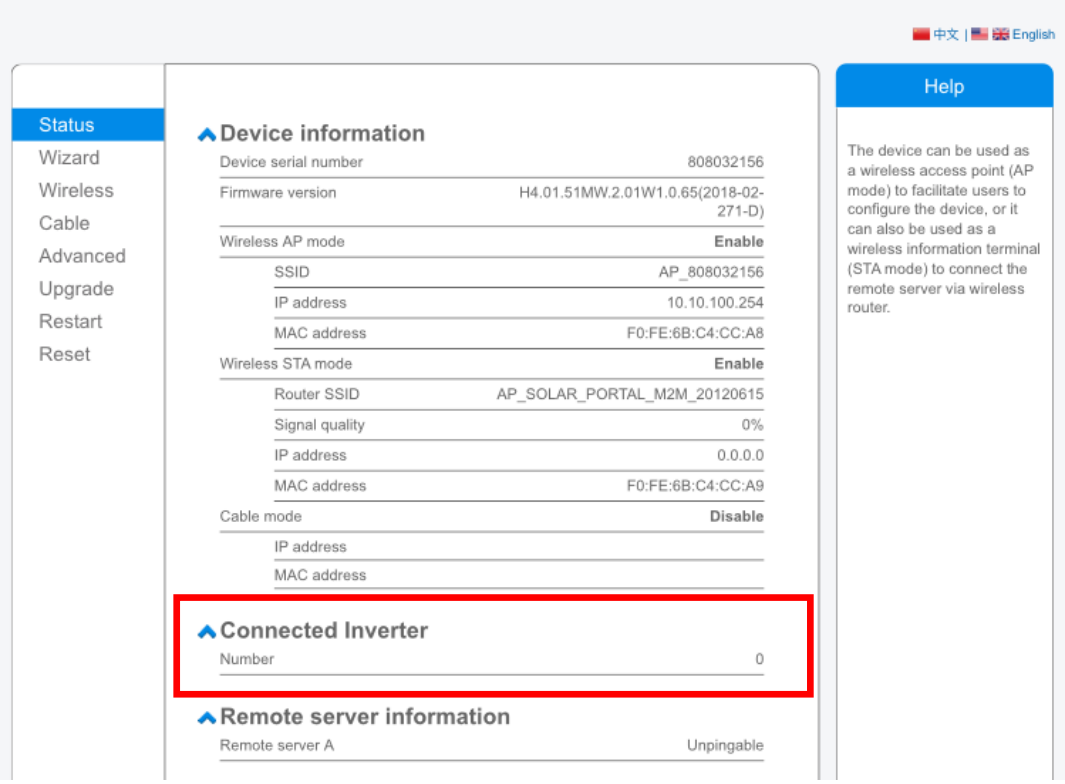


Figure 31 – Status Screen

8) Click on the Wizard setup button in the left-hand column.

9) Now click on the Start button to start the configuration wizard.

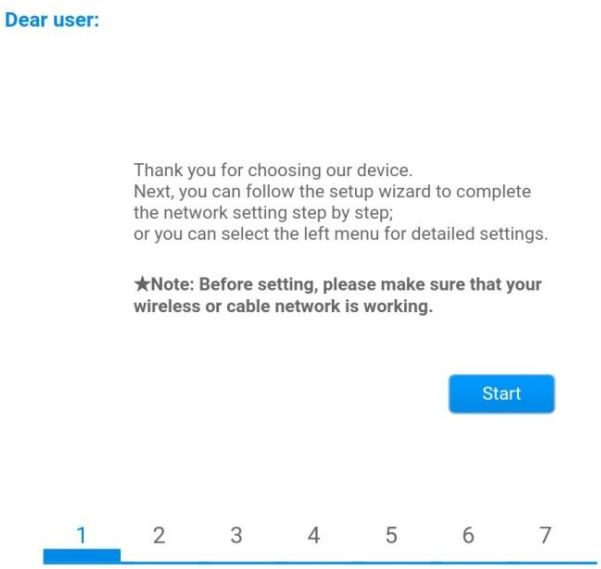


Figure 32 – Screen for starting (1) the Setup Wizard

10) Check the "Cable Connection" option and then click "Next."

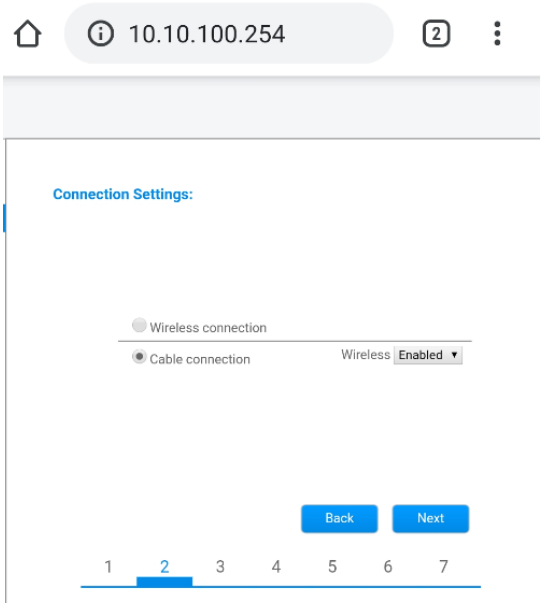


Figure 33

11) Make sure that the "Enable" option is selected to automatically obtain the IP address from your router, then click Next.

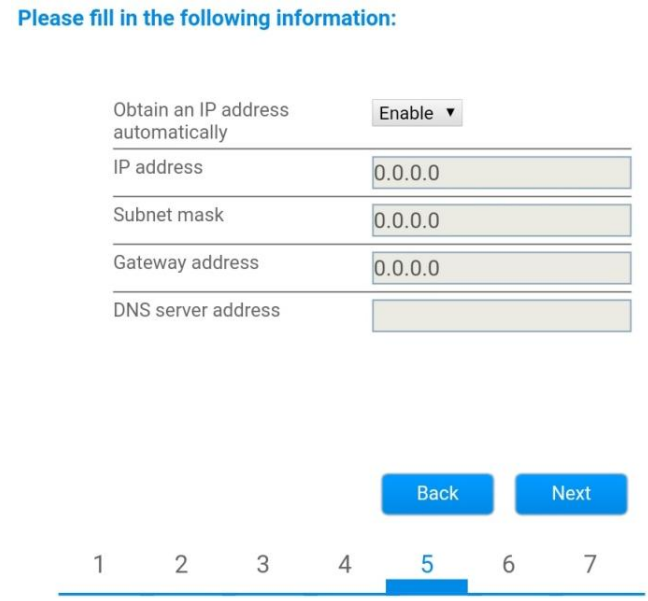


Figure 34 – Screen for automatically obtaining the IP address (5)

12) Click on Next without making any changes.

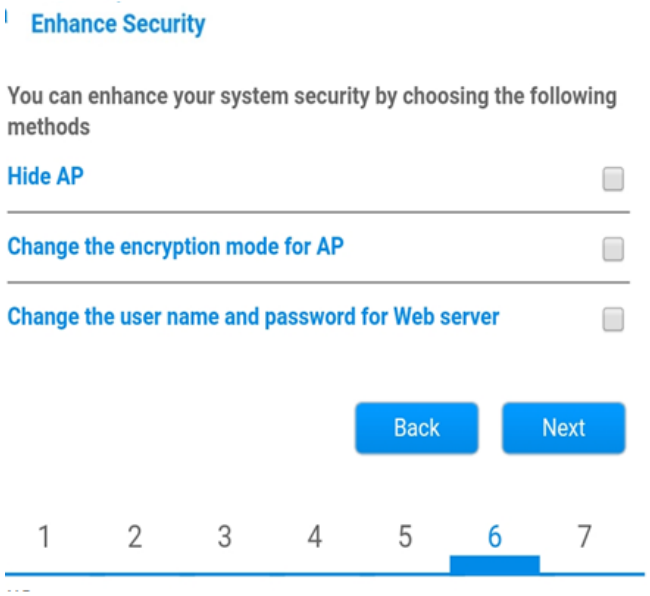


Figure 35 - Screen for setting the security options (6)

13) Complete the configuration procedure by clicking OK, as shown in the following screen.

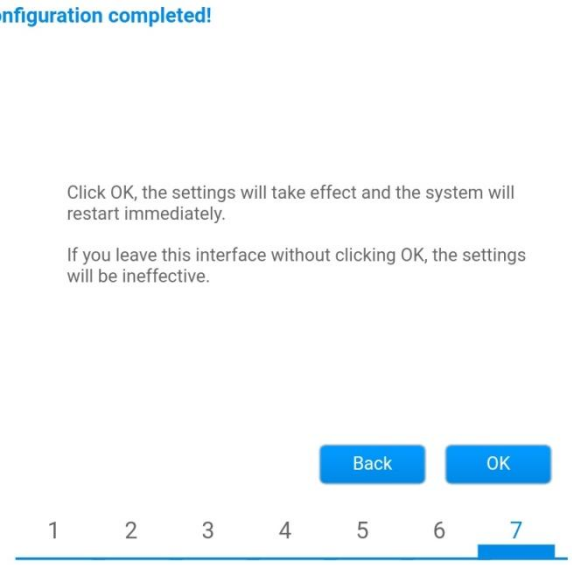


Figure 36 – Final configuration screen (7)

14)If the configuration procedure is successful, the following screen will appear.

If this screen does not appear, try refreshing the browser page.
The screen will prompt you to manually close the page; close the page from the background of your phone or from the close button on your PC.

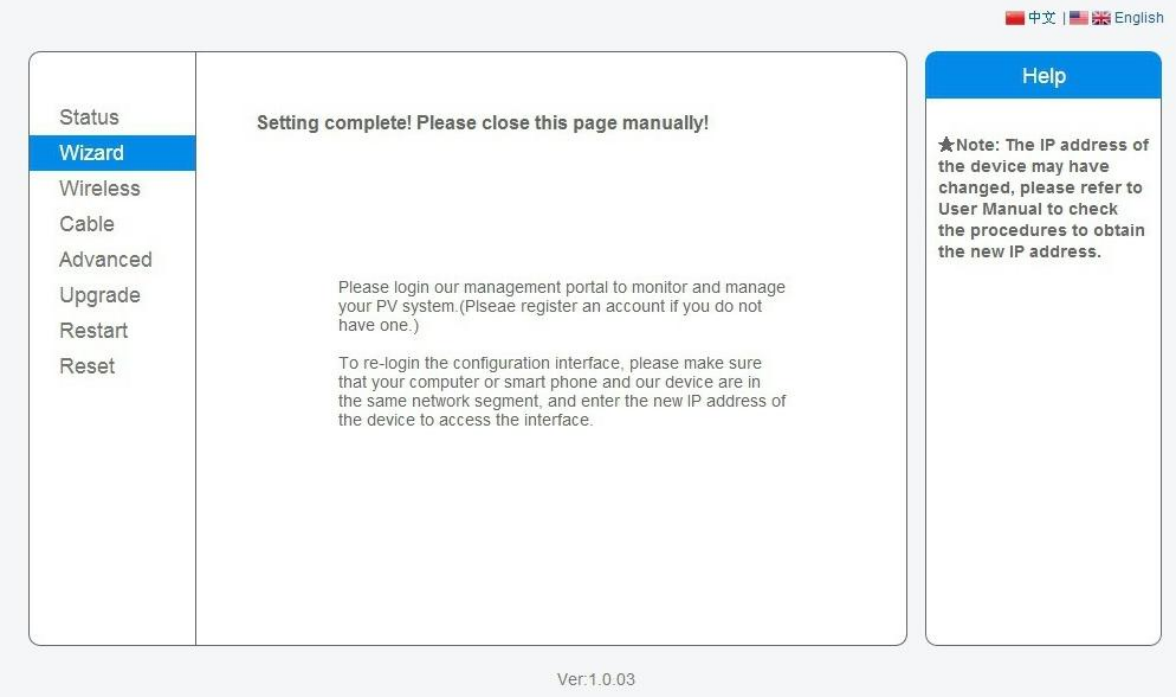


Figure 37 – Successful configuration screen

1.6. Checking that the datalogger has been configured correctly

Wait two minutes after completing the configuration of the device.
First of all, check that the LINK LED on the device is on and steady.



Figure 38 – LED indicating the correct configuration of the datalogger

Enter the IP address 10.10.100.254 again, and the login credentials ("admin" for both username and password). Once logged in, the Status screen will appear, where the following information can be checked:

- Check Wireless STA mode (if the datalogger has been configured via Wi-Fi)
  - Router SSID > Router name
  - Signal Quality > other than 0%
  - IP address > other than 0.0.0.0
- Check Cable mode (if the datalogger has been configured via Ethernet cable)
  - IP address > other than 0.0.0.0
- Check Remote server information
  - Remote server A > Pingable



Figure 39 – Main status screen and checking of correct configuration

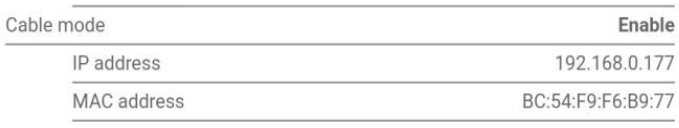


Figure 40 - main status screen and checking of correct configuration

If the Remote Server A item in the Status page is still “Unpingable”, the configuration was not successful, i.e. the incorrect router password was entered or the device was disconnected during connection.
It is necessary to reset the device:

- Select the Reset button in the left-hand column
- Press the OK button to confirm
- Close the web page and enter the Status page again. At this point, the configuration procedure can be repeated again.

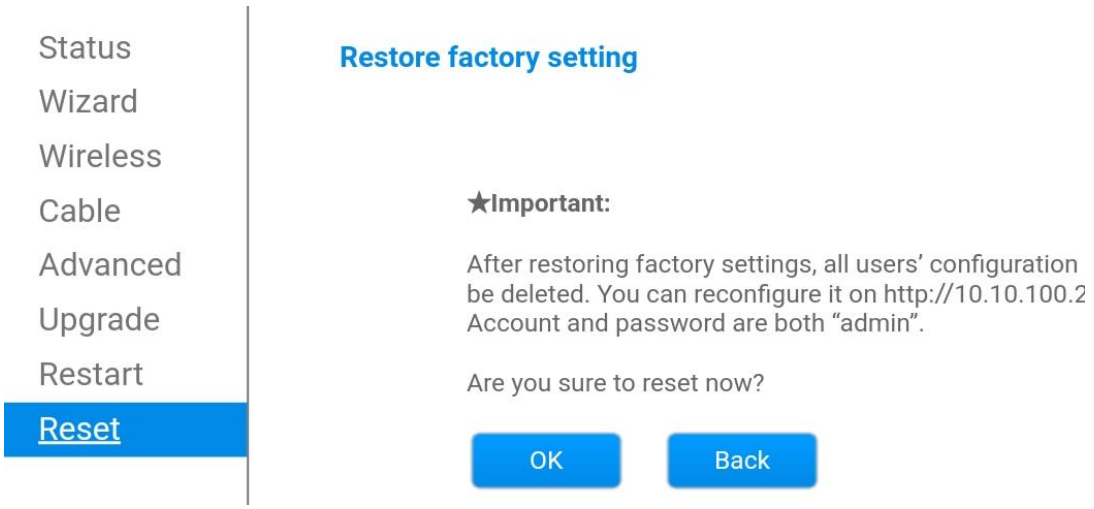


Figure 41 – Reset Screen

1.7. ZSM-RMS001/M200 and ZSM-RMS001/M1000 Devices

1.7.1. Mechanical description and Datalogger interface

Mechanical Dimensions: 127mm x 134 x 52 mm
Protection rating: IP20

The usable ports are indicated below.

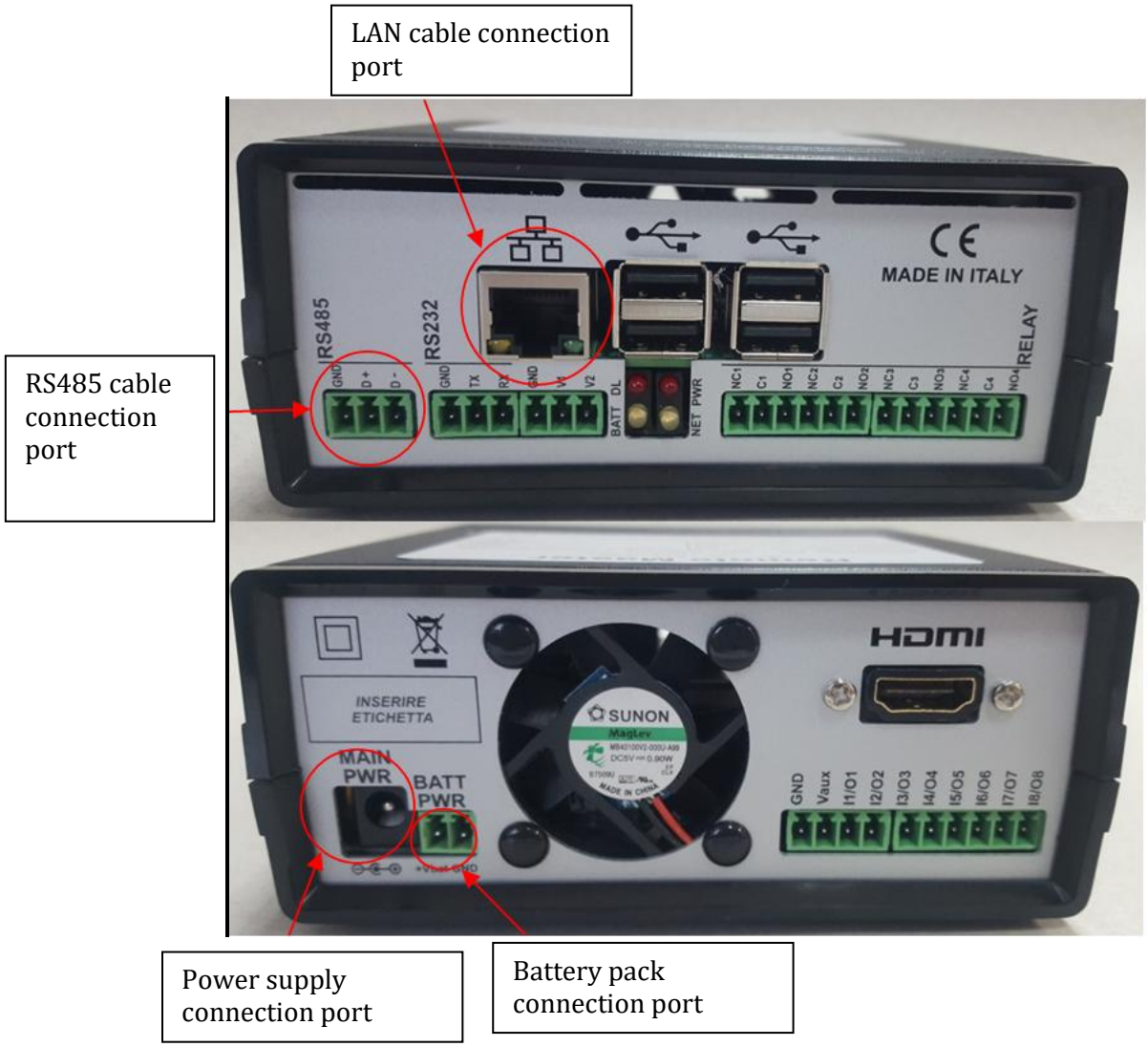


Figure 28: Datalogger rear panel

1.7.2.Connecting the Datalogger to the inverters

A serial communication via RS485 cable is provided for connecting to the inverters.
The GND cable does not need to be connected to the inverters. Follow the connections as shown in the table below.

Datalogger SIDE	BUS Signal	SENSOR SIDE (ZSM-IRR-TEMP-LM2)	Inverter SIDE
D+ terminal	+	RS485***+IB*** terminal	***+Tx*** terminal
D– terminal	-	RS485***-IA*** terminal	***-Tx*** terminal

Table 3: Connecting the Datalogger to the inverters

1.7.3.Internet connection via Ethernet cable

In order to display the data measured and processed by the Datalogger in the portal, it is necessary to connect to the internet via LAN cable and open the following router ports:

- VPN ports: 22 and 1194
- HTTP ports: 80
- DB ports: 3050
- FTP ports: 20 and 21

The local network of the device is configured for DHCP, and it is not necessary to activate any communication port on the router. If you want to set a fixed network address, this must be provided at the time of ordering together with the gateway address.

1.7.4.Connecting the power supply and battery pack to the Datalogger

Once the RS485 Half Duplex cable has been connected, power the Datalogger by connecting the power supply unit (supplied with the datalogger) to the MAIN PWR input (12V DC - 1A).
In order to prevent possible voltage drops and/or power failures, it is recommended to also connect the battery pack, which is supplied with the datalogger. The battery pack should be connected to the $+V_{bat}$ and GND inputs of the BATT PWR connector, positive and negative respectively (i.e. red to the $+V_{bat}$ input and black to the GND input).

The battery pack (ZSM-UPS-001) can be purchased separately.

1.7.5.Connecting the LM2-485 PRO cell irradiance and temperature sensor to the datalogger

For proper installation, make sure to connect the sensor signal cable and the power cable.



In particular, the sensor of the signal cables must be connected in a daisy chain configuration to the remaining devices on the RS485 bus, as shown in the table below.

Datalogger SIDE	BUS Signal	SENSOR SIDE (ZSM-IRR-TEMP-LM2)	Inverter SIDE
D+ terminal	+	RS485***+IB*** terminal	***+Tx*** terminal
D– terminal	-	RS485***-IA*** terminal	***-Tx*** terminal

To supply power to the sensor, the datalogger can be directly connected to the mains power, as shown in the table below, or connected to an external +12Vdc power supply.

Datalogger SIDE	SENSOR SIDE
V1 terminal (12Vdc output voltage)	**RED +12V** Terminal
GND terminal (GND/RTN)	**BLACK 0V** Terminal
V2 terminal (12Vdc driveable voltage)	

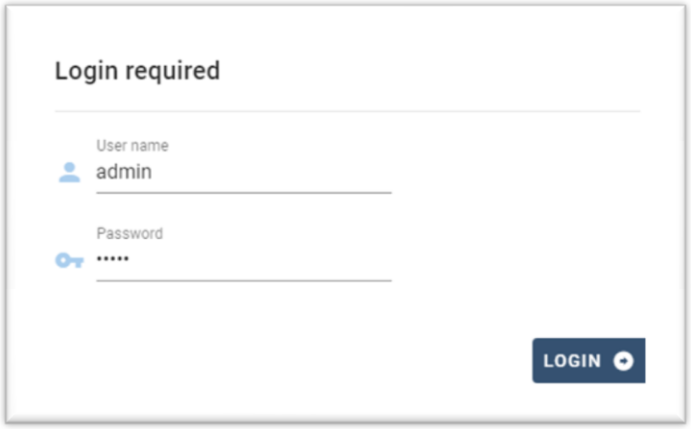
Table 4: Electrical connection of the sensor to the datalogger (power supply)

A stable communication in terms of signal and power supply, up to 200m, is guaranteed by using the RS485 cable, type Te.Co. 15166 (2x2x0,22+1x0,22)st/pu.

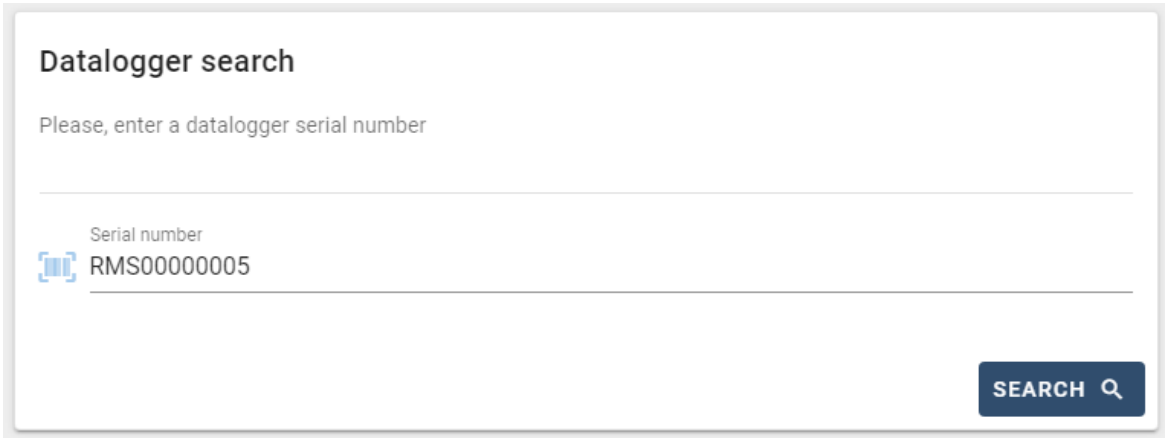
For longer distances, a connection to the signal side of the datalogger is recommended, and a connection to the +12V power supply via an external power supply unit.

1.8. Configuring the Datalogger

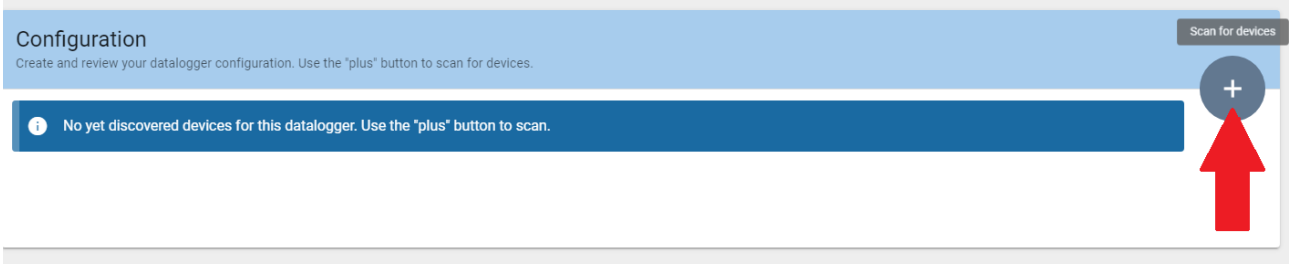
Connect to the website dlconfig.it and login by entering the temporary credentials: Username = admin and Password = admin.



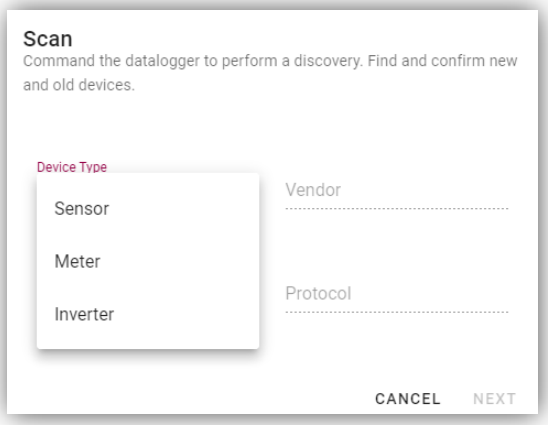
In the screen that opens, enter the serial number(S/N) of the datalogger to be configured and click “SEARCH”.



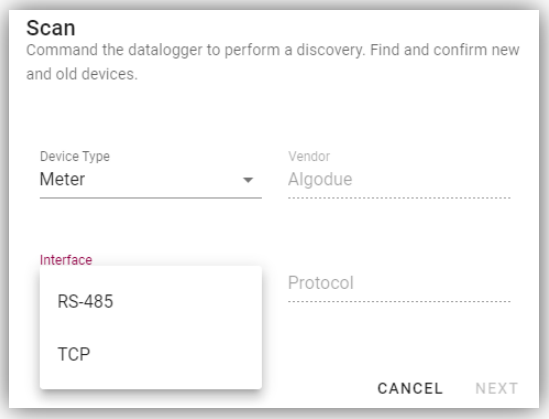
In the configuration page, you can search for any devices connected to the datalogger (inverter, meter or sensors) by clicking the + button, as shown in the figure.

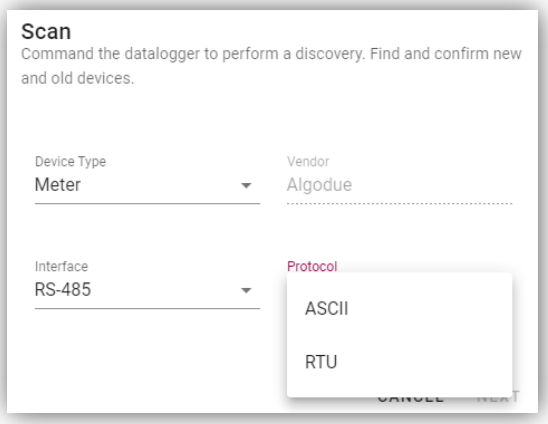


A window will open where you can search for each type of device connected to the Datalogger, after indicating the range of addresses associated with the relative devices.

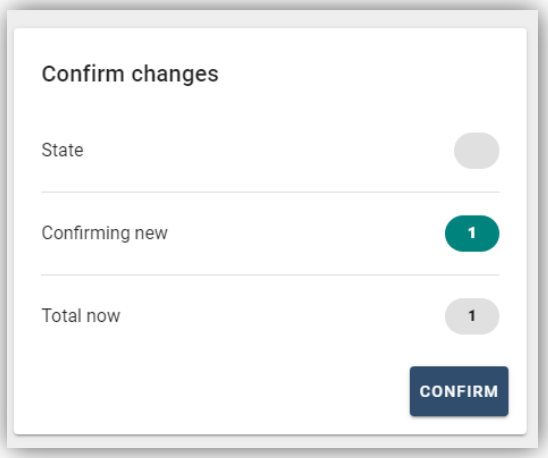


If a meter is one of the devices connected to the Datalogger, select the type of Meter/Datalogger communication interface and the relative communication protocol.

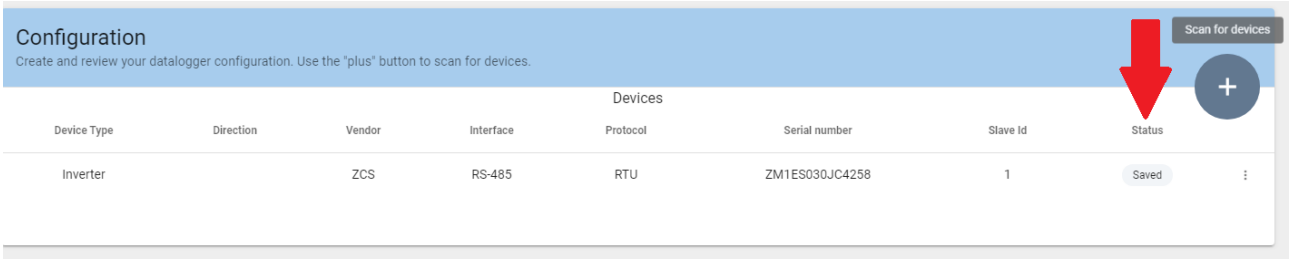




Once this operation has been completed, update the new configuration by clicking “Confirm,” which will allow you to register the devices associated with the datalogger.

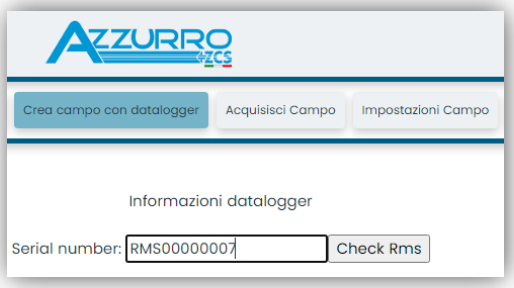


From this moment, the datalogger is correctly configured (all devices must be in the “saved” status) and therefore a new installation can be created on the ZCS Azzurro portal for associating the datalogger and the devices connected to it.

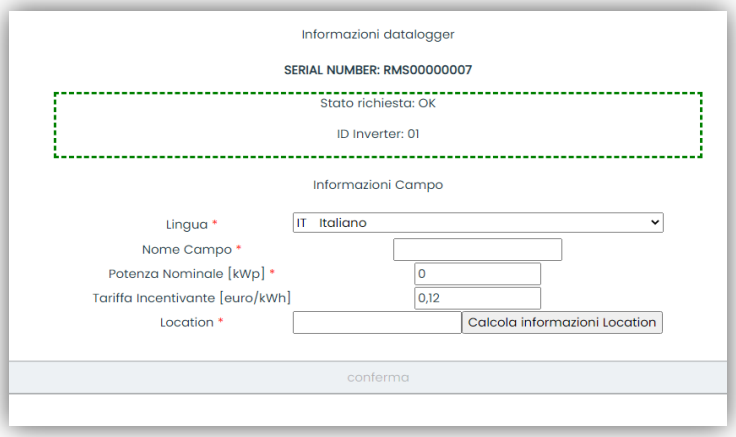


1.8.1. Configuring the Datalogger on the ZCS Azzurro portal

Access the ZCS Azzurro portal (https://www.zcsazzurroportal.com). For new users, click “Sign up now” to register on the portal by entering your email, username and password. After logging into the portal, click “Configuration Panel”, and then select the option “Create field with Datalogger.” The “Create New Field” operation will be possible only if the user’s privileges allow acquiring new fields (at the time of registration the limit will be equal to 1, an upgrade is required to increase the limit).



Enter the serial number (S/N) of the datalogger and click “Check RMS”. If the datalogger has been configured correctly, a screen will open where you can enter the required information relating to the field to be installed.

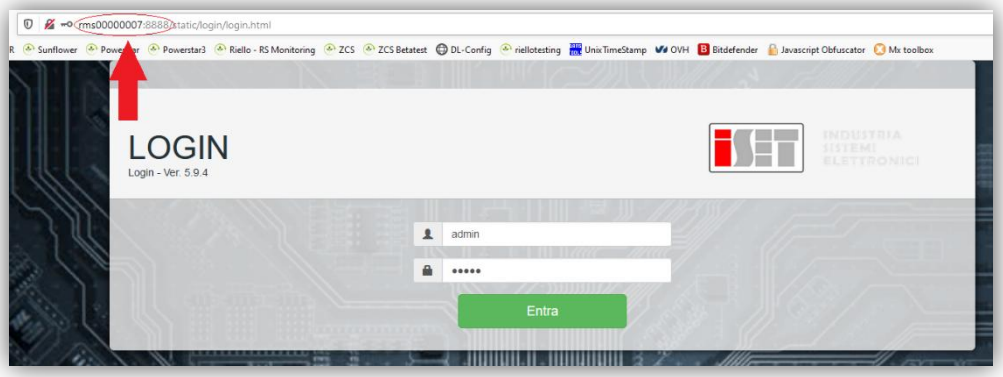


Once the “location” of the field has been entered, click “Calculate Location Information” to allow the system to obtain the latitude, longitude and time zone of the installation. Click “Confirm” to complete the configuration of the field. You only need to wait a few minutes to view the data flow on the ZCS Azzurro portal.

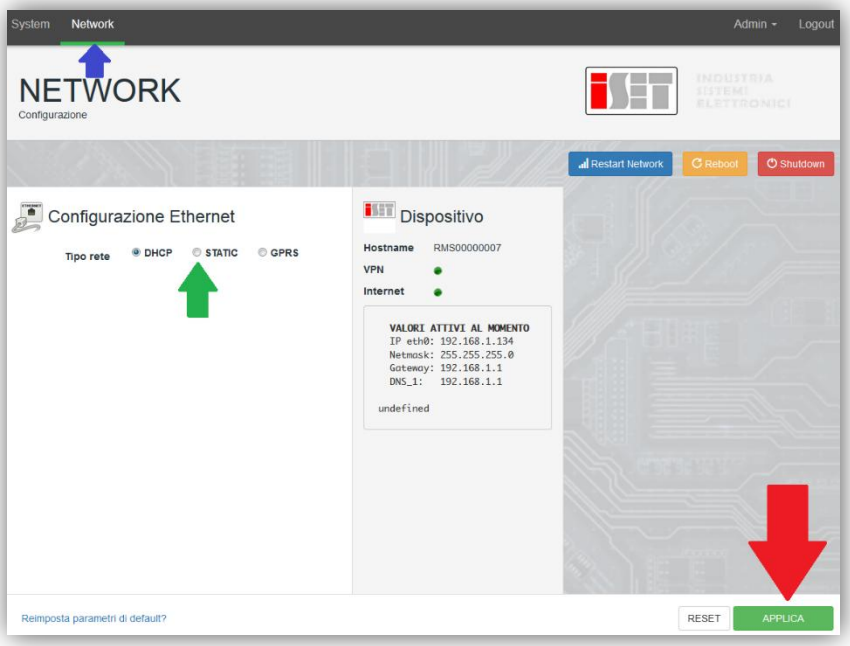
ATTENTION: The location data is essential for the correct operation of the datalogger in the ZCS system. It is important to define it very carefully.

1.8.2. Network configuration

At the time of purchase, the Datalogger is configured in DHCP, i.e. dynamic configuration.
However, if you want to set up a static configuration for your Datalogger, you can access the internet page via the link RMSxxxxxxxx: 8888, as shown in the figure (e.g. RMS00000007).



By entering the credentials: username = admin and password = admin, you can change the configuration from dynamic to static by selecting the network window (see blue arrow) and then the “STATIC” option (see green arrow).



To complete the operation, click “Apply” (see red arrow).

1.9. Local monitoring

The datalogger makes it possible to obtain an additional monitoring system (***local monitoring***), which can be used locally on a web page (therefore, also without an internet connection) and accessed from any device present in the same local network as the datalogger.

1.9.1. Requirements for installation of local monitoring

In order to install the local monitoring system on the datalogger, the customer must ensure that:

- The datalogger is connected to the local network and to the internet (the internet connection is only required during installation and configuration of the local monitoring system).
- A static address (to be provided by the customer) with gateway and subnet mask is available for viewing the page locally.

1.9.2. Features of local monitoring

After installation and configuration, local monitoring makes it possible to monitor the fundamental parameters of the photovoltaic system, even without an internet connection, from any device connected to the same local network.
In particular, it is possible to monitor the power and energy of the inverters and the storage systems over the last 7 days. It is also possible to view alarms, and other information such as temperature, peak daily power, CO_2 gains and savings.
Below is an example of a local monitoring page.

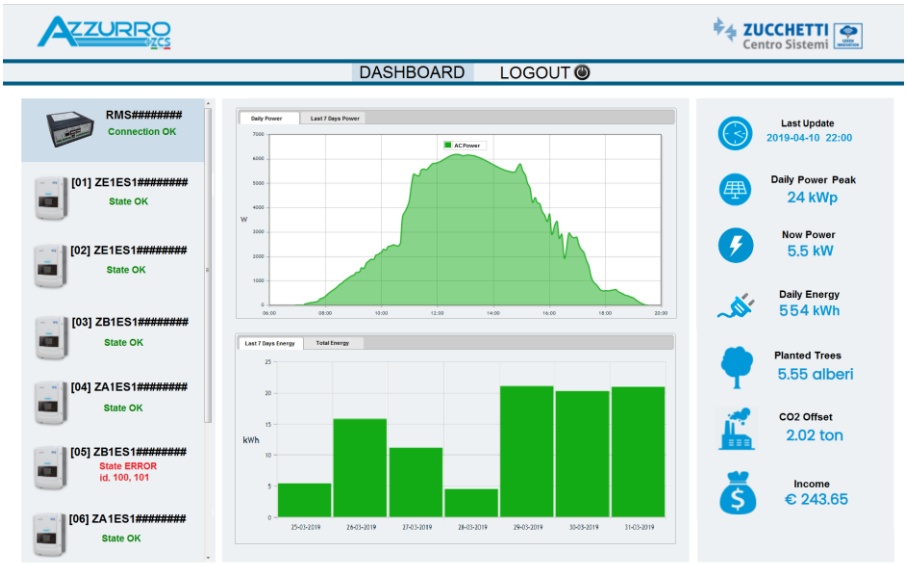


Figure 36: Example of local monitoring page