

MORE THAN METERING

ENERGY CCM



- ✓ 1 Module
- ✓ DIN rail

CCMaster

The intelligent multi-device
hub designed to provide
**up to six possible
connectivity solutions**

USER MANUAL

CcMaster

*Take care of your planet
... take care of you*

www.energyccm.com

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1. INTRODUCTION

The CcMaster device is an intelligent concentrator of multiple devices, conceived to give up to six possible connectivity solutions: NBloT/2G, WiFi, Bluetooth, Ethernet, two RS-485 ports (one for native CcM devices and another for external devices) and one RS-232 port. In addition, the equipment also has two digital outputs, an output voltage adjustable from 0 to 10 V and data storage.

The CcM product range consists of a set of devices used for the monitoring of electrical parameters inside the electrical switchboard in single- and three-phase installations. It is best suitable for installation in thermal-magnetic switches or residual-current circuit breakers.

The CcMaster allows native reading of the CcM devices. It also has the DLMS and IEC protocols of the fiscal meters and other Modbus equipment such as photovoltaic inverters or network analyzers. In a comfortable and native way, it is possible to obtain information from the different devices and command them through any of its data inputs (RS-485/232/Ethernet/WiFi).

Because of all this, CcMaster becomes a unique communications solution for energy and self-consumption applications. Being faithful to Energy CcM's philosophy of quality, safety and minimization of the size of our products, being the most compact equipment in the market at this moment (one single DIN rail module).

Our principal CcM devices power the CcMaster through the 8-wire cable that is supplied, so that between them they form a perfect and compact "duo". One principal CcM device measures the electrical parameters and powers the CcMaster, which transmits the data from this and other connected devices, being a versatile, autonomous and compact solution.

As it can be combined and used with different devices within the product range, the CcM product family offers multiple configuration options and allows users to configure the most convenient solu-

tion for both, their domestic and industrial installations. Installations can be wireless, connected with a communication cable or mixed. The devices can be connected to each other and create communication buses, establishing configurable master-slave hierarchies.

1.1 CONTENTS OF THE BOX

Inside the box you should find:

- 1x CcMaster Lite/Lite Plus/Lite NBloT/PRO
- 1x CcM-Cable wire
- 1x antenna 2.4 GHz
- Green connectors for inputs/outputs
- Data sheet

1.2 DEVICE DOCUMENTATION

CcMaster documentation includes this manual and its technical sheet. All documents can be downloaded from our website www.energyccm.com.

1.3 ABOUT THIS MANUAL

The aim of this manual is to explain and describe as clearly as possible the correct use and features of the CcMaster device, within the CcM product family. For this purpose, it includes technical data as well as user instructions and specifications to provide information about its correct functioning.

This document is subject to regular updates. The contents of this manual might change partially or completely and it is the responsibility of the users to make sure that they are using the latest version of the user manual. Enerclis Innovatio reserves the right to modify the manual without previous notice.

2. TECHNICAL SPECIFICATIONS

Typical power supply	12 VDC
Maximum consumption	2 W
Processor	Cortex M0+ familia STM32
OS	FreeRTOS
Communications	Ethernet Base 10/100M
	NB IoT/2G (microSIM)
	WiFi 802.11 b/g/n
Buses	RS-485 Modbus native
	RS-485 Modbus ext
	RS-232
High-level protocol	MQTT
	FTP
Outputs	2 x isolated digital (230V@2A)
	1 x adjustable DC voltage (0-10V)
Enclosure material	PC/ABS flame retardant
Total dimensions	62 x 18 x 89 mm
Setup	DIN rail (EN 60715)

2.1 ENVIRONMENTAL CONDITIONS

Operating altitude	0...2000 m
Operating temperature	-20...+70 °C
Storage temperature	-30...+85 °C
Relative humidity	0...95 % a 45 °C

3. SAFETY INSTRUCTIONS

Please read and follow all the below safety instructions and precautions before installation and use of the CcMaster device.

3.1 SYMBOLS

The following symbols are used in this manual to highlight and emphasise important information. The general meanings of the different symbols used in the manual, and those present in the marking of the device, is as follows:



General caution



Electrical hazard



General information



Prohibited



Direct current



Reinforced insulation



CE marking

3.2 PURPOSE

This device is designed to concentrate data from multiple devices, to be powered externally and connected on a DIN rail of an electrical cabinet, in both industrial and domestic use.

The system devices should only be used for this purpose. Monsol Electronic is not liable for any damages caused by an inappropriate installation, use or maintenance of the system.

To ensure safe use, the system modules must only be used in compliance with the instructions in this manual. Legal and safety regulations must also be considered to ensure correct use.

3.3 TRANSPORT DAMAGE CHECK

Immediately after receiving the package, make sure that the packaging as well as the device have no signs of damage. At the same time, check that the order is complete, having in mind the contents of the box defined in section 1.1. If the packaging shows any sign of damage, impact or tear, damage of the system modules themselves should be suspected and they should not be installed. If this occurs, please contact Enerclíc Innovatio's customer service.

Telephone: +34 952 02 05 84

E-mail: info@energycm.com

Web: www.energycm.com

Address: Enerclíc Innovatio

Calle la Gitanilla, 17, Nave 1

29004 Málaga (Spain)

3.4 STAFF

This system should be installed, handled and replaced solely by qualified staff. The final user of this manual is staff who is capable of handling the devices.

Qualification of the staff mentioned herein must meet all the safety-related standards, regulations and legislation applicable to the installation and operation of this system in the country concerned.



The responsibility to select qualified staff always lies with the company that the staff works for. It is also the responsibility of the company to assess the ability of the worker to carry out any kind of work and ensure their safety. At the same time, staff must comply with workplace health and safety regulations. It is the responsibility of the company to provide their staff with the training necessary for handling electrical devices and to make sure that they familiarize themselves with the contents of this user manual.

3.5 SPECIAL HAZARDS

The devices are designed to form a part of an industrial or domestic electrical installation. Corresponding safety measures must be observed. Additional safety requirements should be specified by the company who has installed or configured the system.



High amount of current constantly circulates through the system and any physical contact could cause a serious injury. Please ensure that only qualified staff has access to the devices and make sure that the system is switched off or disconnected during handling.

3.6 INSTALLATION PLACE

The devices within the CcM family should be installed in watertight enclosures that comply with IP65 standards outdoors and IP55 standards indoors to be protected from corrosion and humidity.

3.7 ALTERATIONS



It is strictly prohibited to carry out any kind of alterations or modifications to the system.

3.8 CLEANING AND MAINTENANCE

Cleaning and maintenance works should only be carried out when the devices are disconnected from the grid. Before taking any action, make sure that the system has been correctly disconnected, generally deactivating the circuit breaker where the device that powers it is connected.



Do not try to repair the device on your own in case of any malfunction. If this occurs, contact Enerclíc Innovatio's customer service. The system does not require any special cleaning or maintenance, except for standard physical maintenance required by any current conducting electrical device connected with screws and terminals that need to be tightened.

3.9 GENERAL HAZARDS RESULTING FROM NON-COMPLIANCE WITH SAFETY STANDARDS

The technology employed in the manufacturing of the system modules ensures safe handling and operation. Nonetheless, the system might pose hazards if it is used by unqualified staff or handled in a way that is not specified in this user manual.

Any person in charge of the installation, putting into operation, maintenance or replacement of a CcM family device must first read and understand this user manual, especially the safety recommendations.

3.10 GENERAL SAFETY REQUIREMENTS



Operator

The person in charge of handling the electrical device is responsible for the safety of persons and property.



Disconnection

Before starting any work, disconnect the circuit breaker and check the absence of voltage in every cable that supplies voltage to the working site.



Prevention from inadvertent connection

Avoid re-connection of the system using signs, closing or blocking the working site. Accidental reconnection might cause serious injuries.



Verification of absence of voltage in the system

Determine conclusively, using a voltmeter, that there is no voltage in the system. Check all the terminals to make sure that there is no voltage in the system (every single phase).



Covering the adjacent components conducting voltage and restricting the access to electrical devices

Cover all the system components conducting voltage which could cause injuries while carrying out the works. Confirm that dangerous areas are clearly marked.

4. DEVICE DESCRIPTION

In Figure 1 the CcMaster is displayed.



Figure 1 Picture of the CcMaster device



Dynamic Assignment Mode

Off: read mode. Blink every second: dynamic assignment mode. Quick blinking: firmware update.

Internet and data server

Flashing every second indicates no connection, 1 flash every 3 seconds indicates that it has an internet connection and 2 flashes every 3 seconds that it has a connection to the data server.

GPRS modem

Off: modem disconnected. Flash every 2 seconds: searching for mobile network. Fixed: modem registered to network. Flashing when data traffic.

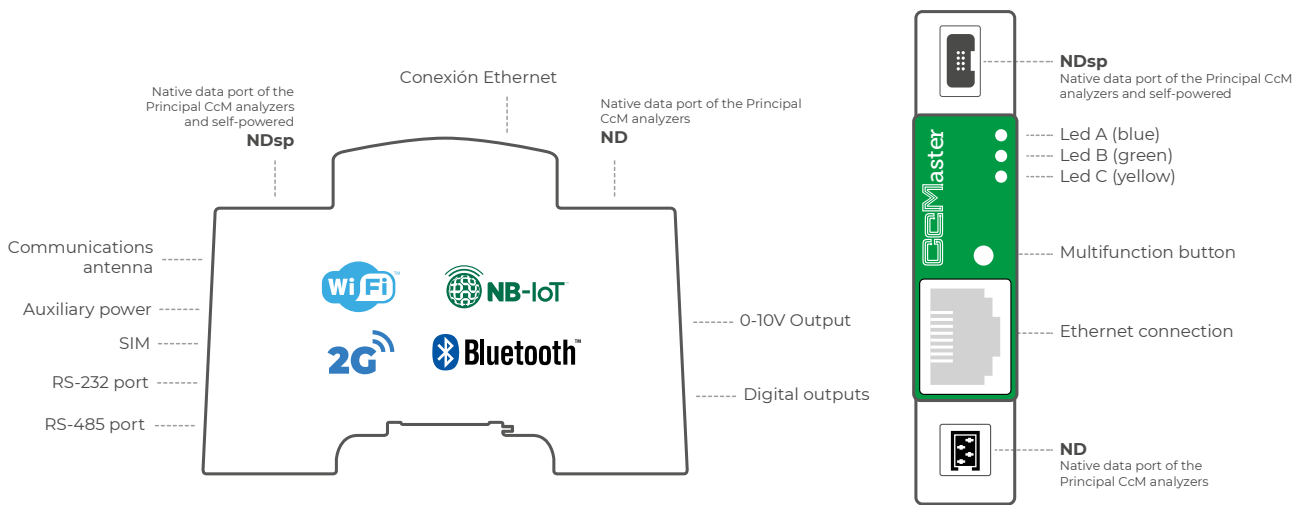


Figure 2 Graphic description of CcMaster

As depicted in Figure 2, the device counts with the following interfaces:

Front:

- **NDsp:** Native data input and power supply from the Principal CcM device. Native connection bus RS-485. It comprises of two power supply signals (VCC and GND) and the data signals (A+ and B-). The Principal CcM device will be connected to this bus and will be in charge of powering the CcMaster (in case an external power supply is not used).
- **ND:** Native data input from principal CcM devices (principal bus). Native connection bus RS-485 (without power supply). It comprises of two data signals (A+ and B-) required to communicate with the remaining devices of the bus. This bus will provide connection to other principal devices of this product range such as CcM4, CcM3 or CcM2.



Only principal CcM devices can be connected to this principal communication bus. If a secondary bus is connected, the equipment will be damaged because of a power supply voltage applied (see CcM principal device manuals for more information, available at www.energyccm.com).

• **LEDs:**

- **Blue:** In read mode, the LED is off; and in dynamic assignment mode, it flashes every second. When the CcMaster firmware is being updated, this LED flashes.
- **Green:** When the device is offline, this LED blinks every second; when it has an internet connection, one blink every 3 seconds; and when it is connected to the data server, two blinks every 3 seconds.
- **Yellow:** When the modem is offline, this LED is off; when it is searching for a mobile network, it blinks every two seconds; when the modem is registered to a network, the light is fixed; and when there is data traffic, it flashes (Lite NBloT and PRO models).

- **Multi-function button:** To synchronise the CcM devices connected to the port ND (section

6.1.2), and to reset the device to factory settings (pressing the button for 10 seconds or until the blue LED is switched off).

- **Ethernet connection (Lite Plus and PRO models).**

Right side:

- **External antenna:** For NBloT/2G or WiFi communications.
- **Auxiliary power:** To power the CcMaster using an external power supply, instead of using a Principal CcM.
- **MicroSIM card holder** (Lite NBloT and PRO models).
- **RS-232 port:** non-isolated port for electricity meters connection.
- **RS-485 port:** isolated RS-485 port for external equipment connection (photovoltaic inverters and other approved equipment).

Left izquierdo:

- **0-10V output:** one adjustable DC voltage output from 0 to 10V, for controlling external systems (PRO model).
- **Digital outputs:** two isolated/potential-free bistable relay outputs (230V@2A) for controlling external elements, such as reclosers or contactors (Lite Plus, Lite NBloT and PRO models).

4.1 IDENTIFICATION

In the enclosure of the equipment, the user will find an identification sticker with a QR code like the one shown in Figure 3, in which the serial number and MAC address of the device are coded. These serial number and MAC are unique and are also written next to the QR code.



Figura 3 Código QR identificativo

5. INSTALLATION



Due to electrical hazard when handling an electrical cabinet, it will be necessary to ensure that the installation zone meets the necessary safety conditions.

In order to install the CcMaster, follow these steps:

5.1 STEP 1: SAFETY



Make sure that the protection device is deactivated (thermal-magnetic switch or residual-current circuit breaker) by activation of the break switch marked in green in the following figures.

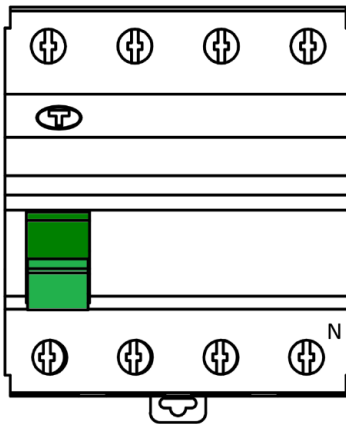


Figure 4 Residual-current circuit breaker

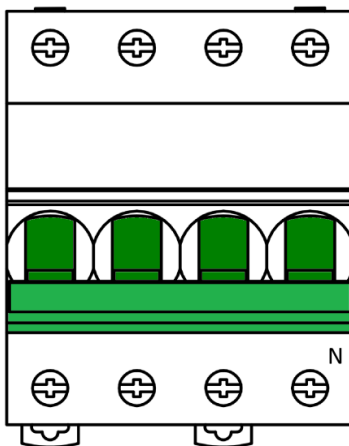


Figure 5 Thermal-magnetic switch

5.2 STEP 2: INSTALLATION OF THE PRINCIPAL CCM

The principal CcM device that shall power the CcMaster must then be installed. Otherwise, an appropriate external power supply shall be used.

For more information about the installation of the principal CcM, please refer to the manual of the device in question, available at www.energyccm.com.

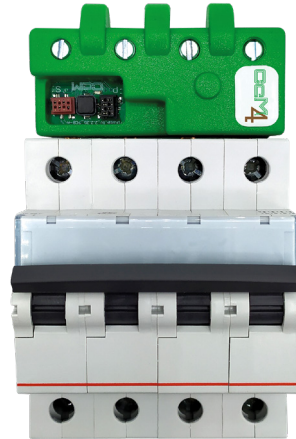


Figure 6 CcM4 instalado en magnetotermico



Figure 7 CcM2 instalado en magnetotermico

5.2.1 External power supply

It is possible to power the CcMaster with a standard external power supply, instead of using a principal CcM device. This power supply must be 12V@2A, and recommended to be DIN rail format for a more compact installation.

5.3 STEP 3: INSTALLATION OF THE CCMaster

Install the CcMaster on a DIN rail in the same electrical cabinet as the principal CcM device. This is a standard DIN-rail module, so just place it on the top of the rail and then hook the bottom of the rail in tightly until you hear a 'click'.

5.4 STEP 4: POWER THE CCMaster

Once the principal CcM device and the CcMaster have been installed, the user must use the 8-wire cable supplied with the CcMaster equipment to connect both devices. The two-connector adapter end must be connected to the principal CcM, and the black 8-pin connector end to the NDsp connector of the CcMaster, as shown in the examples in Figure 8 and Figure 9.

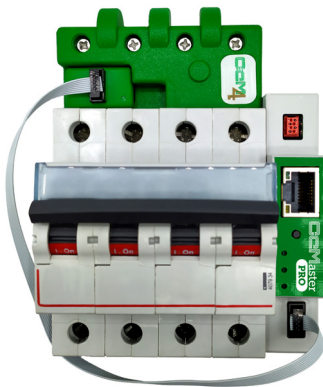


Figure 8 Connection example CcM4+CcMaster

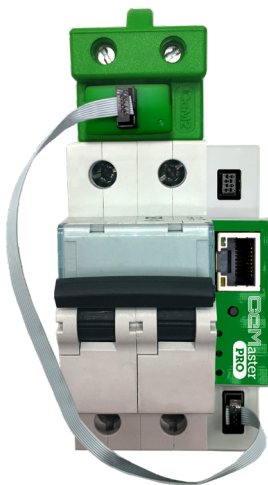


Figure 9 Connection example CcM2+CcMaster



The NDsp connector of the CcMaster has an unambiguous connection format for connecting the 8-wire cable.



Connect the 8-wire cable to the NDsP connector of the CcMaster to provide power to the CcMaster via the CcM principal device and allow the CcMaster to acquire data from the equipment.



The NDsp connector only allows the connection of a single principal CcM, being the device with the default Modbus address '1', and the one powering the CcMaster.



Note that it is possible to power the CcMaster using an external power supply (section 5.2.1).

Having configured the wiring necessary to power the CcMaster, the user may re-enable the differential/magnetic-thermal switch (section 5.1) to let the current pass through the principal CcM device and power the CcMaster.

5.5 STEP 5: COMMUNICATION WITH PRINCIPAL CcMs

The communication between the CcMaster device and other principal CcM devices (apart from the principal CcM that powers it) can be established in two ways: wireless or wired.



To connect Secondary CcM devices, these must be connected to any Principal CcM device hanging from the bus that ends in the ND connector (check CcM1-C and CcM3-C manuals, available at www.energycm.com).

5.5.1 WIRELESS

Using the CcM WiFi peripheral with the principal CcMs (CcM2, CcM3 or ccM4), or directly using the CcM2-W, that already has the WiFi module integrated. Check the installation manual and CcM WiFi configuration to learn more about this solution, available at www.energycm.com.



Up to 10 CcM principal devices can be connected through the WiFi interface.

5.5.2 WIRED

Connecting an RS-485 cable from the second native connector of the CcMaster (ND) to the principal bus (black) connector of the principal CcM. Check the installation manual and principal device configuration to learn more about this solution, available at www.energyccm.com.



Up to 32 CcM principal devices can be connected via cable.

In case you opt for a wired connection, you should connect the flat 4-wire cable with the pre-crimped connector, supplied with the principal CcM device, in the black female connector of the CcMaster (ND):

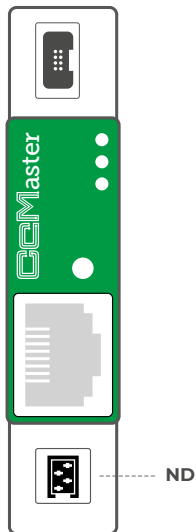


Figure 10 CcMaster ND connector

The other end of the cable shall be connected to the connector of the principal bus of the principal CcM (Figure 11), marked with a 'P' on the board.

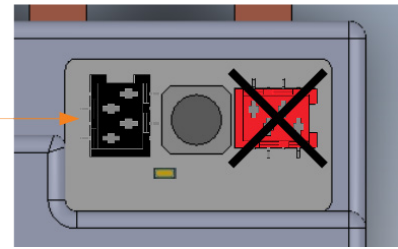


Figure 11 Detail of black connector of the principal bus
To do that, the user shall use the provided male connectors, in order to place a connector on the other end of the cable, as indicated in Figure 12.

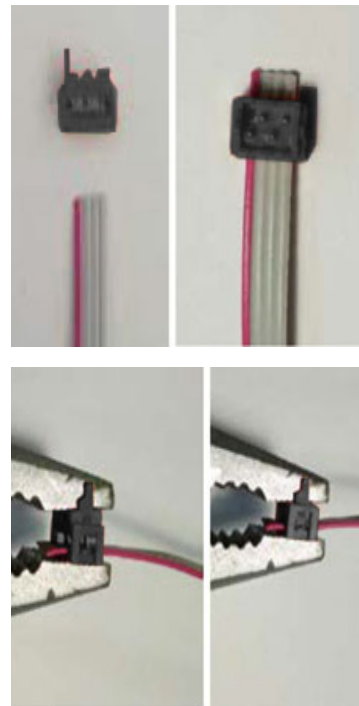


Figure 12 Crimp connector for RS-485 cable



Make sure that the polarisation slot of the connector is placed on the side of the red cable, which makes up one of the four wires of the flat cable.

You can regulate the distance between connectors and crimp them according to the distance that you consider most adequate for your installation and/or the existing distance between the devices connected to the same cable or bus.

The cable connectors have polarity (polarisation slot) placed in a way that they cannot be connected to the connector of the CcM device in the other way. For correct use, the polarisation slot of the connector must match the through-hole of the female connector installed at the secondary bus input of the CcM4 device.

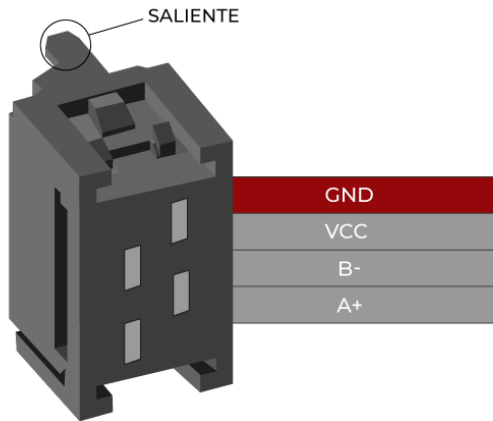


Figure 13 Connector RS-485

In the box of the secondary devices, there is a 4-wire flat cable with an already crimped red connector together with four red male connectors, which will be used to connect the secondary devices.



*With any modification that you make to the supplied flat cable (crimping of new connectors, cutting the cable to make it shorter, etc.), you need to make sure that **all the devices connected to the cable in question have no power supply** using the power cut in the thermal-magnetic switch or residual-current circuit breaker. Failure to meet this requirement could produce a short circuit between the signals that travel through the bus resulting in damage to the connected device.*

The internal communication between the principal CcM and a secondary CcM device (CcM1-C or CcM3-C) takes place via the secondary bus. In this bus the principal CcM will act as an information hub (master). For that purpose, an RS-485 cable should be installed similarly as described above, but this time it should be connected to the red female connector of the secondary bus (see Figure 14), marked with an 'S' on the board.

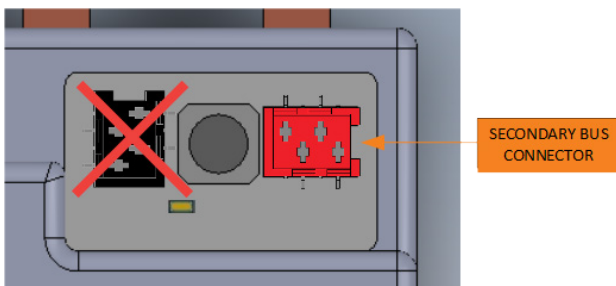


Figure 14 Detail of red connector of the secondary bus

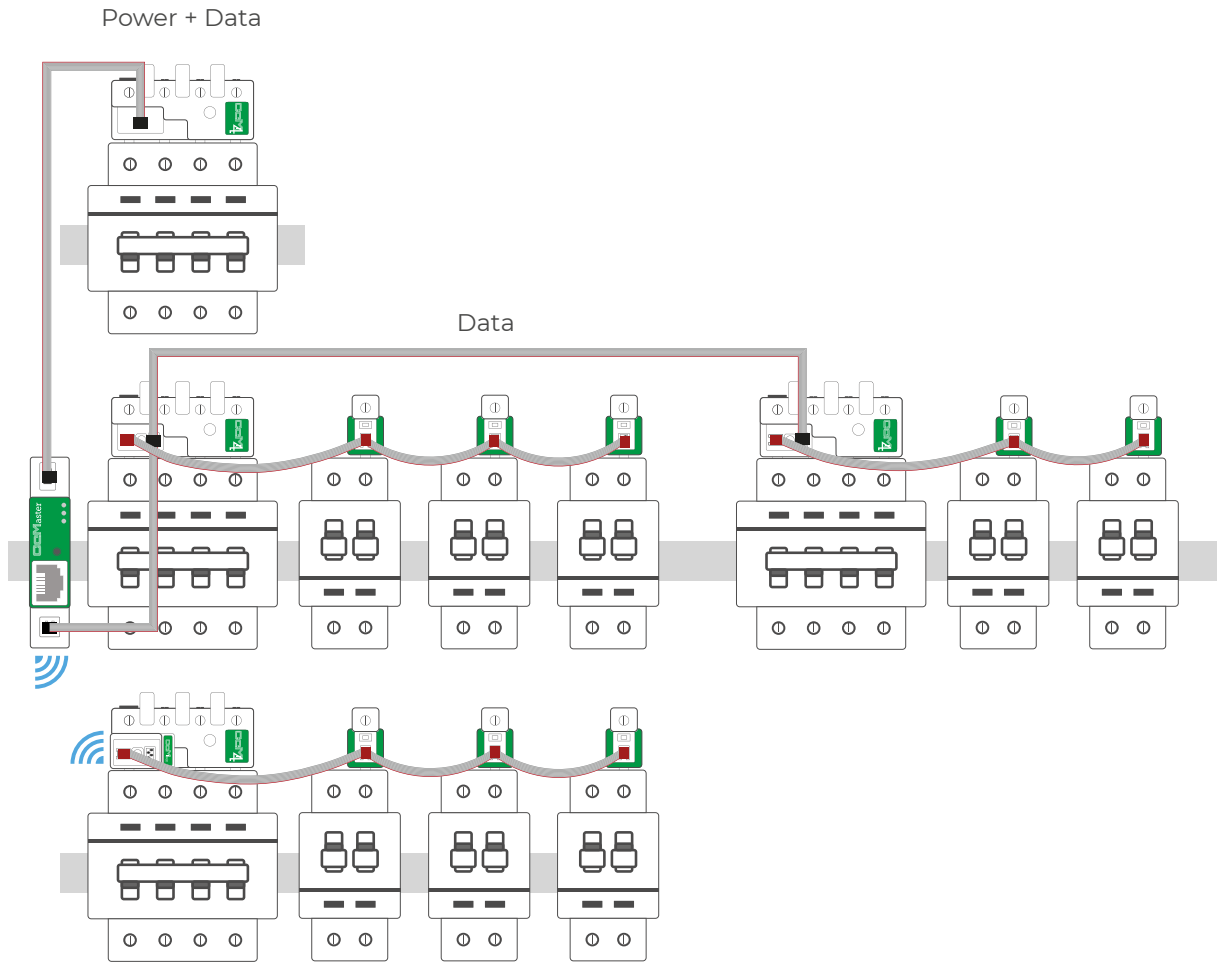


Figure 15 Installation example with principal and secondary buses, wireless and wired

5.6 STEP 6: COMMUNICATION WITH EXTERNAL DEVICES

The CcMaster is able to communicate not only with native CcM devices, but also with external devices that are authorized by Energy CcM. Click [here](#) to consult the list of authorised external devices.

It will be possible to connect external devices through the following interfaces:

- **RS-485:** Using the external RS-485 port on the right side, and the green terminals supplied.
- **TCP/IP:** Via WiFi or Ethernet, by connecting a network cable to the RJ-45 connector on the front.

Once physically connected, the user must configure the CcMaster so that it can read the device (section 6.2.1.4.3).

6. OPERATION

6.1 OPERATING MODES

The device has two operating modes, which may be configured using the multi-function button:

6.1.1 Reading mode

It is the default mode. The CcMaster is reading the principal CcM that powers it and all those that may be connected to the rest of the communication ports.

6.1.2 Synchronisation mode

This mode is selected to link the CcMaster with other principal CcM devices via the ND bus. The dynamic assignment process is described in section 6.3.2.

6.2 CCMaster CONFIGURATION

The device has several operating modes and communication technologies, configurable through the embedded web portal (web server).

6.2.1 Web server

The CcMaster generates a WiFi access point to which the user can connect to access the web server. To do this, the user must use a PC with a WiFi connection in order to search for the available WiFi networks and locate the one generated by CcMaster. The network will have a name (SSID) with a format “MCCM_XX:XX” (where the characters XX:XX are the last four digits of the MAC address of the CcMaster device). The password to access this network is: 123456789, by default.



This internal WiFi network of the CcMaster has NO Internet connection, make sure you do not have any firewall or settings on your PC that prevent you from connecting to this type of WiFi network.

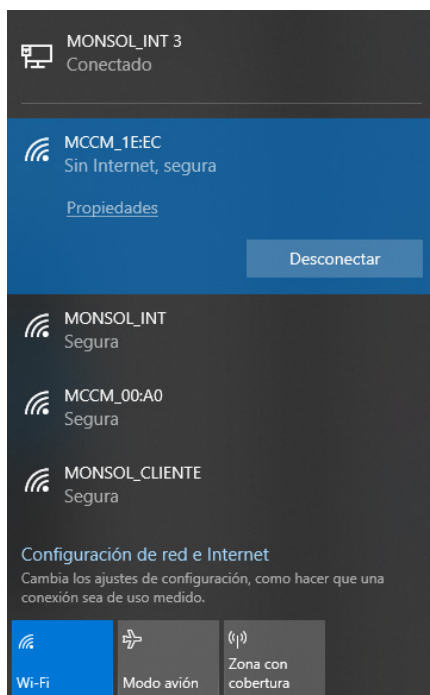


Figure 16 WiFi network created by the CcMaster device

Once connected to the WiFi network of the CcMaster, the user must open the web browser and write in the address bar: **http://192.168.4.1/**

The web server will load, which has a left side menu through which you can access the different configuration options. Each sub-menu will be described separately below.

6.2.1.1 Info

The “Info” submenu is displayed as the home screen. The essential information to identify the CcMaster is displayed in this screen (Figure 17):

- Serial number
- Model
- Firmware version
- Hardware version
- MAC address

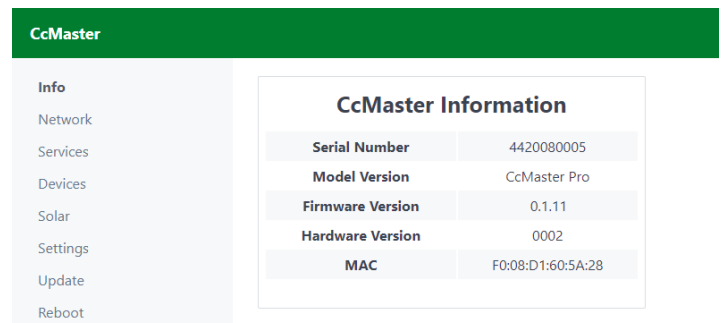


Figure 17 Web server – Info

In the “CcMaster Network” box a summary of the device connectivity information is depicted. It shows which communication interfaces and services are configured and connected.

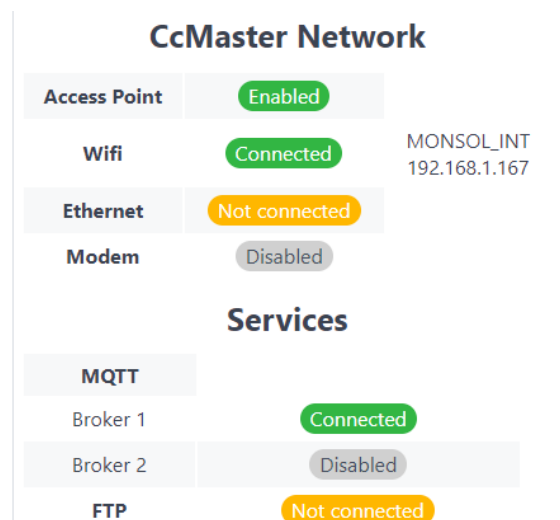


Figure 18 Web server – Info – CcMaster Network

6.2.1.2 Network

In the “Network” submenu it is possible to configure the type of network through which the data is going to be uploaded.

6.2.1.2.1 Access Point

In this section, the user is able to disable the WiFi Access Point, and to change its password, which by default is: 123456789.

If the Access Point is disabled, it can be re-enabled by a short press on the multi-function button on the front panel of the CcMaster. The device will restart and the user will be able to find the WiFi Access Point again among the available networks.



To specifically set that the CcMaster shall upload data using this interface, the “upload data” option must be enabled.

If “DHCP” is selected, please note that the WiFi router will assign an IP address to the CcMaster dynamically and automatically. To assign a fixed IP, the user must disable “DHCP” and fill in the “IP Address”, “Gateway” and “Netmask” fields.

Pressing the “Save” button will save the configuration.

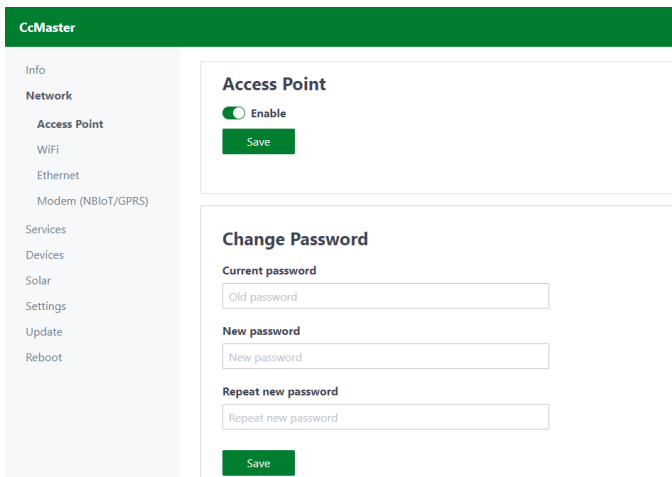


Figure 19 Web server – Network – Access Point



*Please note that by disabling the Access Point, the user will no longer be able to access the web server via WiFi and the IP **http://192.168.4.1/**.*

6.2.1.2.2 WiFi

Configuration of the WiFi interface to upload data, available on all CcMaster models.

By selecting the “enable” option the WiFi interface is activated and the user is able to enter the configuration parameters of the WiFi network to which the device shall be connected. Then enter the name of the WiFi network (SSID) and the password; be sure to keep the upper and lower case and any special characters.

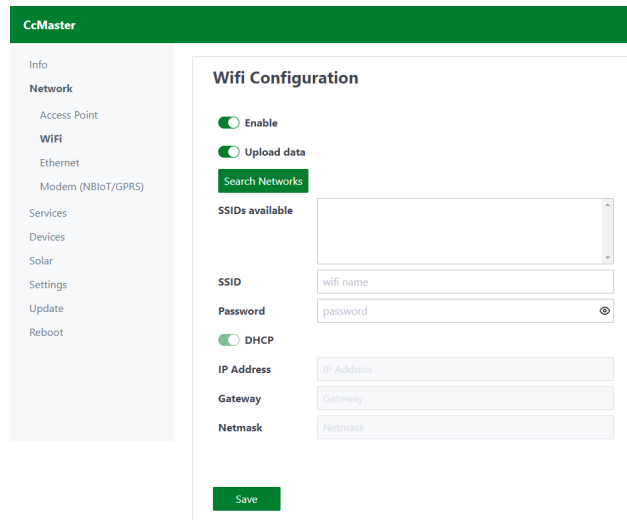


Figura 20 Web server – Network – WiFi

6.2.1.2.3 Ethernet

Configuration of the Ethernet interface to upload data, available on the CcMaster Lite Plus and PRO models.

The user must connect a network cable to the Ethernet input of the CcMaster (RJ-45 connector) and select the “enable” option to activate connectivity through the Ethernet port. In case the physical channel is not well established, the device automatically disables the Ethernet output to avoid excessive consumption.



To specifically set that the CcMaster shall upload data using this interface, the “upload data” option must be enabled.

If “DHCP” is selected, please note that the network will assign an IP address to the CcMaster dynamically and automatically. To assign a fixed IP, the user must disable “DHCP” and fill in the “IP Address”,

“Gateway” and “Netmask” fields.

Pressing the “Save” button will save the configuration.

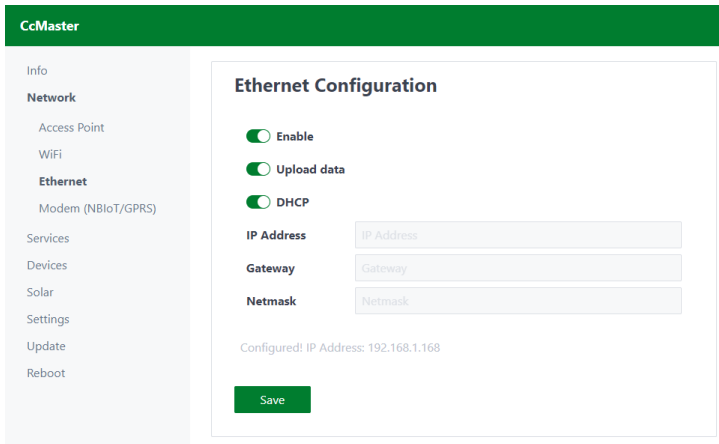


Figure 21 Web server – Ethernet



If the CcMaster is not going to use 2G/NB communications, it is recommended to disable the modem in order to avoid permanent retries to connect the device.

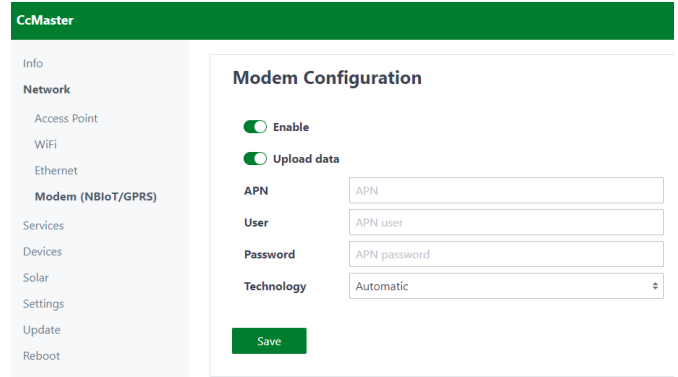


Figure 22 Web server – Network – Modem

6.2.1.2.4 Modem (NBloT/GPRS)

NBiot/CAT M1/2G modem configuration, available on CcMaster Lite NBloT and PRO models. This modem allows the equipment to be connected to the Internet through a mobile data network, by inserting a microSIM card supplied by the mobile operator and connecting the external antenna supplied with the equipment.



The SIM card PIN code must be disabled.

By selecting the “enable” option the interface is activated and the user is able to enter the modem configuration parameters, provided by the operator. These parameters are: APN (Access Point Network), user and password. The “Technology” options specifically defines the connection technology to be used by the CcMaster. The selected technology must be supported by the SIM contract, otherwise the CcMaster will not be able to establish connection.



To specifically set that the CcMaster shall upload data using this interface, the “upload data” option must be enabled.

Pressing the “Save” button will save the configuration.

6.2.1.3 Services

In the “Services” submenu it is possible to configure the type of service through which the data is going to be uploaded.

6.2.1.3.1 MQTT

MQTT service configuration. The user will be able to select to use the MQTT broker (1) by default, which reports data to the Energy CcM server; or to configure his own MQTT broker (2), which reports the data to an external server.

By selecting the “enable” option the user is able to edit the service parameters:

- **Host:** IP address or domain name where the MQTT server is hosted, and where the publications and subscriptions will be made (the host must start with “mqtt://” or “mqtts://”).
- **Port:** Port through which publications and subscriptions to the MQTT server will be performed.
- **Client ID:** Name of the client that makes the publication.
- **User:** User of the MQTT service to make the publications or subscriptions.
- **Password:** Password of the MQTT service to make the publications or subscriptions.
- **SSL/TLS Certificate Type:** If a MQTT server with

TLS security is to be configured, the type of certificate to be uploaded must be selected: “CA root certificate” or “Self-signed certificate”. If “Self-signed certificate” is selected, the certificate file must be uploaded at the bottom of the page.

- **Keepalive:** Time to keep the communication open between the user and the service. It should be higher or lower depending on the network quality.
- **Prefix SUB:** The folder where the messages are published (the folder name must start with “/”). Please note that the subscription and publication folders must be different (for example, by adding “/srv” at the end).
- **Prefix PUB:** The folder to which the CcMaster subscribes (the folder name must start with “/”). Please note that the subscription and publication folders must be different (for example, by adding “/dev” at the end).
- **QoS: Quality of Service level.** There are three options:

- 0: At most once (send and forget)
- 1: At least once
- 2: Exactly once

If QoS level 1 or 2 is requested, the protocol manages the retransmission of messages to ensure delivery. MQTT QoS 2 will increase latency because each message requires two complete handshake from sender to receiver and back.

Pressing the “Save” button will save the configuration.

Figure 23 Web server – Services – MQTT

The MQTT messages latency is configured to be 10 seconds by default, but it is configurable to 1 minute, 5 minutes, 15 minutes and 1 hour, through the box shown in Figure 24.

Figure 24 Web server – Services – MQTT latency

6.2.1.3.2 FTP

FTP service configuration. It is possible to send data to an external FTP server.

By selecting the “enable” option the user is able to edit the service parameters:

- **Server:** IP address or domain name where the FTP server is hosted.
- **Port:** Port of the FTP service.
- **Directory:** Folder in the FTP server where the files shall be saved.
- **User:** User of the FTP service.
- **Password:** FTP service password.

Pressing the “Save” button will save the configuration.



Once the FTP service has been configured, the user must set the historic latency and files sending frequency, in the “Settings → Historic” sub-menu (section 6.2.1.6.2).

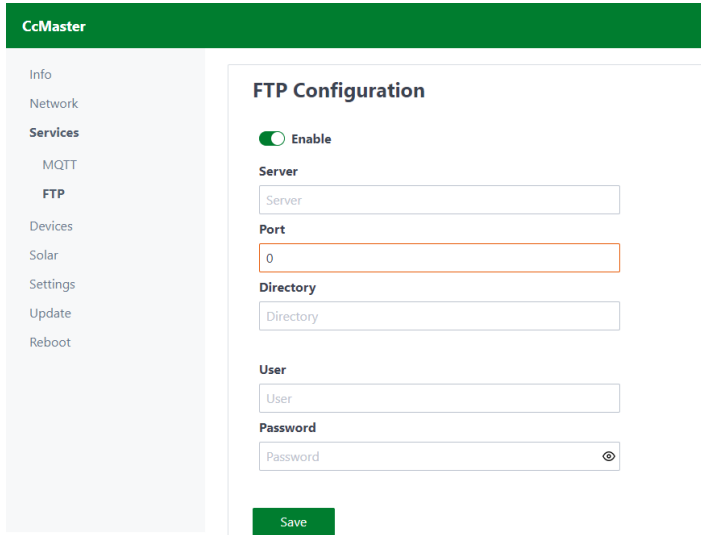


Figure 25 Web server – Services – FTP

6.2.1.4 Devices

In the “Devices” submenu it is possible to configure and display the devices being read by the CcMaster, whether they are native CcM devices or external devices.

6.2.1.4.1 View CcM

View of the CcM devices connected to the CcMaster, which are read by the CcMaster itself, bringing together all their data and sending them through the network (section 6.2.1.2) and service (section 6.2.1.3) previously configured.

In the case of Figure 26, the information related to the CcMaster and the CcM4 connected through the NDsp port is shown.

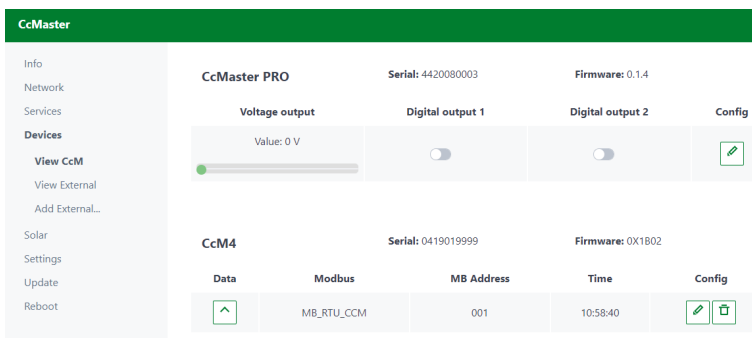


Figure 26 Web server – Devices – View CcM

At a glance, the following information regarding the CcMaster is shown:

- Model
- Serial number
- Firmware version
- Status and activation of the voltage output (PRO), and digital outputs (Lite Plus, Lite NBIoT and PRO)
- Outputs configuration via the “Config” button

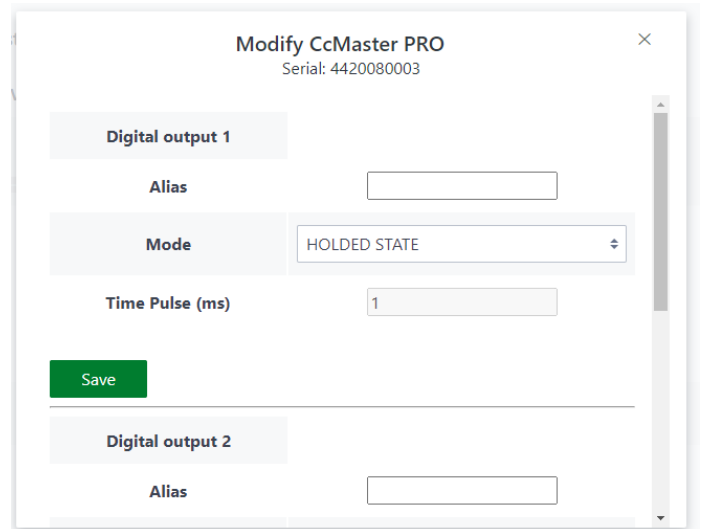


Figure 27 Web server – Devices – View CcM – CcMaster config

In the same way, the following information of the connected devices is shown, in this case a CcM4:

- Serial number
- Firmware version
- Modbus protocol
- Modbus ID
- Timestamp of the last data received
- Device configuration: alias and belonging to a self-consumption plant

By pressing the “Data” button, the user can view all the electrical parameters of the device (Figure 28).

Variable	Value
date	11:57:15 2020-08-25
i1 (Arms)	0.02
v1 (Vrms)	224.92
i2 (Vrms)	0.02
v2 (Vrms)	225.79
i3 (Arms)	0
v3 (Vrms)	225.16
pf1 (PF)	0.61

Figure 28 Web server – Devices – View CcM – CcM4 (NDsp)



Principal CcM devices have the Modbus ID '1' by default. Therefore, the Principal CcM device connected to the NDsp port and feeding the CcMaster equipment keeps the ID '1', and the address of the rest of the CcM devices connected to the ND port must be changed, since both ports share the same bus and are internally connected.

6.2.1.4.2 View External

View of the external devices connected to the CcMaster, whose data are read and sent together with the data of the native CcM devices.

In the case of Figure 29, the information related to a GoodWe residential inverter is shown.

CcMaster					
Inverter					
		Serial: INV 000002			
Data	Modbus	MB Address	Time	Config	
^	MB_RTU_EXT	100	01:00:00	[Edit] [Delete]	

Figure 29 Web server – Devices – View External

The following information regarding external devices is displayed:

- Internal serial number
- Modbus protocol
- Modbus ID
- IP address (in the case of Modbus TCP)

- Timestamp of the last data received
- Device configuration: alias and belonging to a self-consumption plant

6.2.1.4.3 Add External

Insertion of authorized external devices. This menu is used to add the devices that will appear in the “View External” tab (section 6.2.1.4.2).

- Port: Port to which the external device is connected (RS-485 or TCP/IP).
- Type: Device type (solar inverter, network analyzer...).
- Brand: Device brand.
- Class: Device class.
- Series: Device series.
- Model: Device model.
- Modbus ID: Device ID Modbus address.
- Alias: Name assigned to identify the device.

Pressing the “Save” button will add the device.

CcMaster

- Info
- Network
- Services
- Devices**
- View CcM
- View External
- Add External...
- Solar
- Settings
- Update
- Reboot

Add external authorized device

CommunicationPort

Type

Brand

Class

Serie

Model

ID Modbus

Alias

Figure 30 Web server – Devices – Add External

6.2.1.5 Solar

In the “Solar” submenu it is possible to define a self-consumption photovoltaic plant and display the energy calculation, taking into account the energy generated and consumed.

6.2.1.5.1 Add Plant

Creation of a self-consumption photovoltaic plant. A list of all devices added to the CcMaster, both external and native, is displayed. The user must select the devices with which the value of energy produced (Photovoltaic Production) and energy consumed (Grid consumption) will be obtained.

Pressing the “Save” button will save the plant.

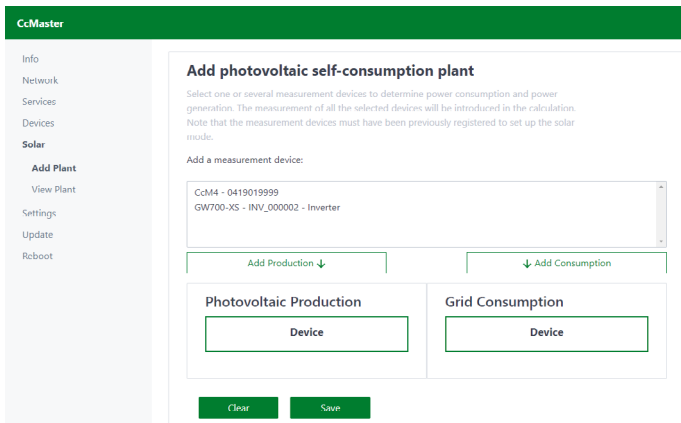


Figura 31 Web server – Solar – Add Plant

6.2.1.5.2 View Plant

View of the photovoltaic plants created in section 6.2.1.5.1. A plant shall be selected among all those defined, and the calculation of the instantaneous power balance is shown. In the case of Figure 32, a CcM4 is providing the consumption data and a GoodWe inverter is providing the production data, and it is showing a total instantaneous consumption of 392W.

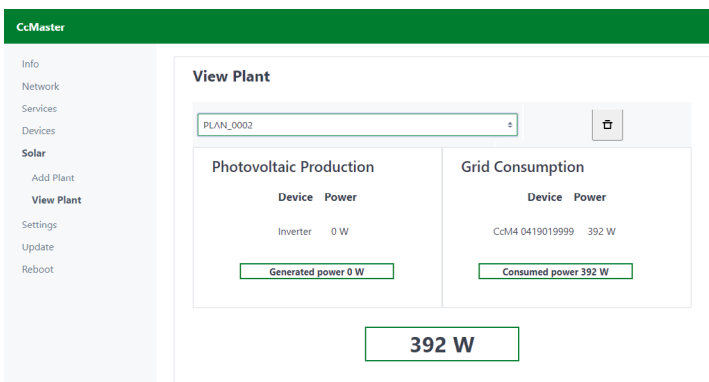


Figure 32 Web server – Solar – View Plant

6.2.1.6 Settings

In the “Settings” submenu it is possible to configure an access password for the web server, to change

the time zone of the device, and to configure the storage of historical data.

6.2.1.6.1 Security

Configuration of a user and password to access the web server. This feature introduces an extra level of security to prevent the configuration of the device from being modified by an unwanted user. The option “enable” must be activated to configure user and password, stating the previous password. By default, the credentials saved in the device are the following:

- User: admin
- Password: admin

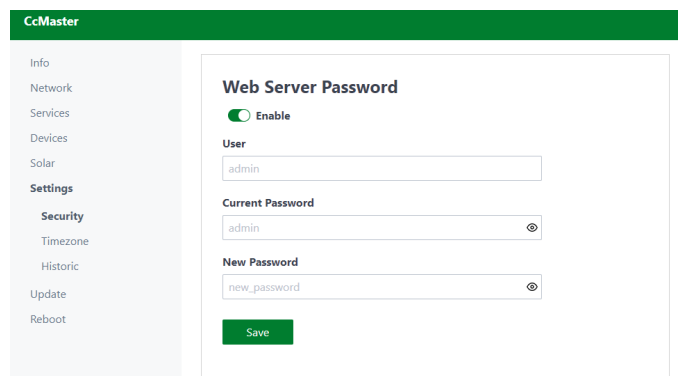


Figure 33 Web server – Settings – Security

6.2.1.6.2 Timezone

Configuration of time zone of the CcMaster.

Pressing the “Save” button will save the settings.

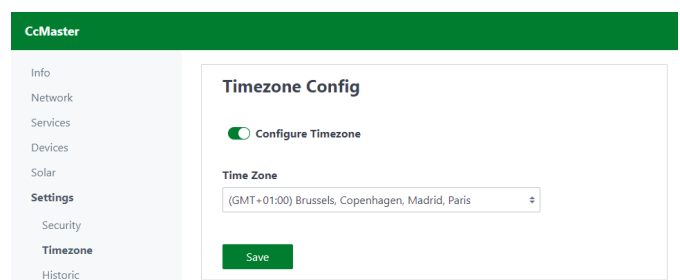


Figure 34 Web server – Settings – Timezone

6.2.1.6.3 Historic

Configuration of historical data storage. By selecting the “enable” option the user is able to enter the configuration parameters:

- Latency: Data saving time interval.
- Format: Fomat of the FTP file (CSV or JSON).

In the case of configuration of the FTP service (section 6.2.1.3.2), the user must enable “FTP sending” and configure the parameters:

- Sending latency: Time interval for sending the FTP file.
- Select time: Time at which the FTP file will be sent.

Pressing the “Save” button will save the settings.

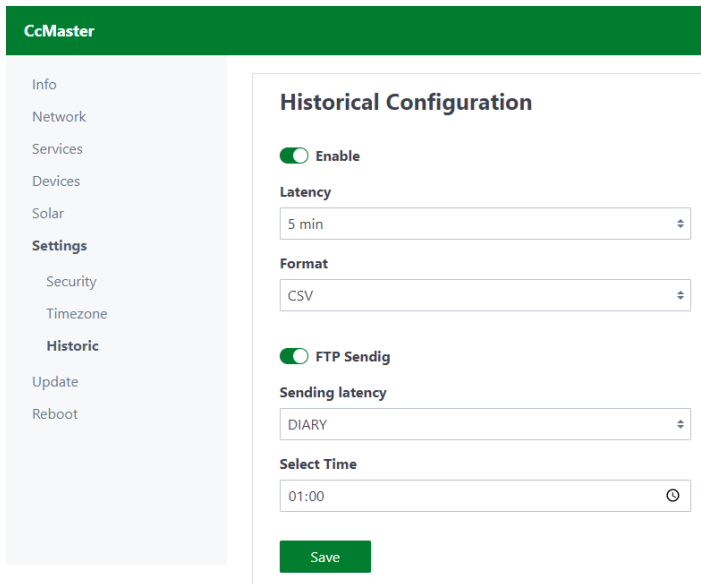


Figura 35 Web server – Settings – Historic

6.2.1.7 Update

It is possible to update the firmware of the CcMaster locally through the “Update” submenu. A screen like the one below shall appear:

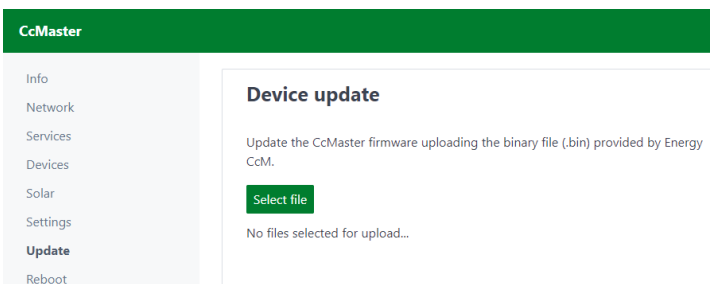


Figure 36 Web server – Update

The user must select the firmware upgrade file using the “Select file” button and upload it by pressing the “upload” button. The process may take several minutes, please wait until the message “Update firmware upload” appears.

Once finished, the CcMaster will reboot and the

user should reload the web server page and check in the “Info” submenu that the “Firmware version” field has been updated.



Always check that you are still connected to the WiFi Access Point of the CcMaster.

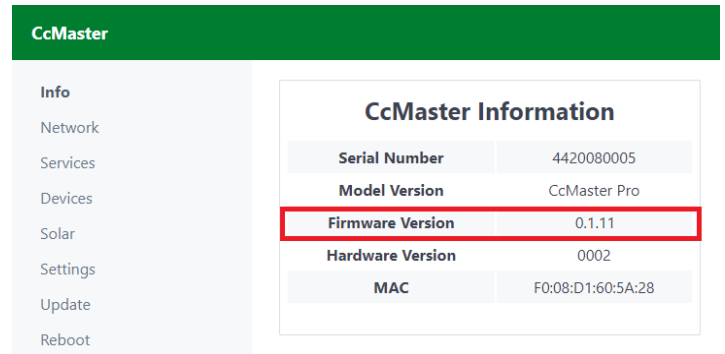


Figura 37 Web server – Info – Firmware actualizado

6.2.1.8 Reboot

Through this submenu it is possible to restart the CcMaster. This operation may be required to apply certain changes to the device configuration. To do this, the “Restart” button must be pressed.

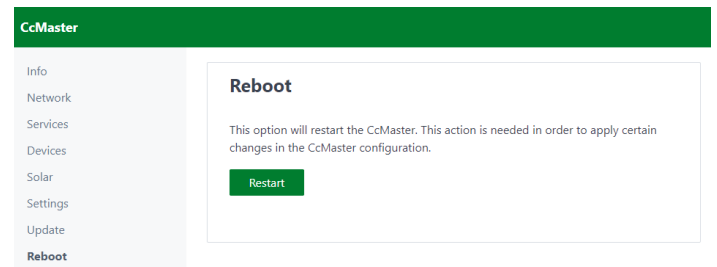


Figure 38 Web server – Reboot



Please note that if the device is restarted, the WiFi access point will disappear for a few seconds, so the PC will be disconnected from the network and may not reconnect automatically, even if the access point is available again. In this case, the user will have to reconnect manually.

6.3 COMMUNICATION WITH OTHER DEVICES

By default, the communication with other principal CcM devices is performed via the communication RS-485 native ports described above (NDsp and

ND). It will also be possible to implement a wireless communication via the CcM WiFi module (for more information review the CcM WiFi manual available at www.energyccm.com). Check section 5.5 to physically connect the devices.

6.3.1 Parameters of the RS-485 communication interface

The CcMaster device supports the Modbus RTU protocol with the following parameters:

Baudrate	9600 bps
Format	8N1
Mode	Asynchronous
Range of addresses	1...247

Table 2 Parameters of the RS-485 interface

6.3.2 Address setting

All the principal CcM devices are assigned by the default the Modbus ID '1'. There fore, the principal CcM device connected to the NDsp port and powering the CcMaster keeps the ID '1', and it is necessary to change the address of the rest of the CcM devices connected to the ND port, since both ports share the same bus and are internally connected.

Address assignment process:

1. The multi-function button on the CcMaster must be pressed for 2 to 5 seconds, until the blue LED starts to flash. When the button is released, the LED must continue to flash.
2. The black button on the principal CcM to be linked to the CcMaster must be pressed until the blue LED on the principal CcM device starts to flash. When the button is released, the LED on the principal CcM must flash rapidly, indicating that the CcMaster has assigned a correct Modbus ID. The CcMaster will assign the ID '2' and so on.
3. Step 2 must be repeated as many times as principal CcM devices are to be connected to the CcMaster.
4. When all desired principal CcMs have been linked, the multi-function button on the CcMaster must be pressed for a few seconds

until the blue LED stops flashing. The device will return to read mode, leaving the synchronisation mode.

5. By reloading the “Devices” page in the left side menu of the web server, the user may check that all principal CcM devices linked to the CcMaster are displayed, with their respective assigned Modbus IDs (Figure 40).

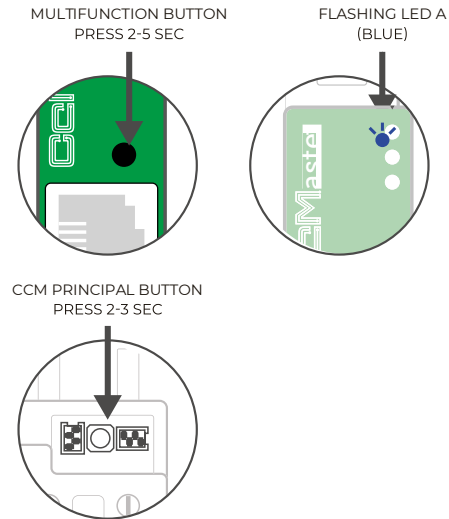


Figure 39 Modbus ID assignment process

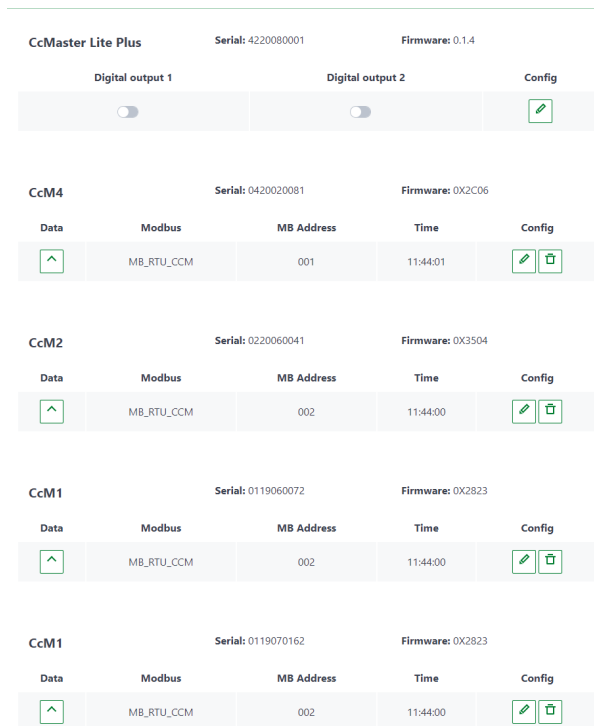


Figure 40 Web server – Devices – Principal CcMs (ND)

For more information regarding the operating modes of the secondary CcM device and its configuration, review the installation and configuration manual available at www.energyccm.com.

7. SOLAR SELF-CONSUMPTION

One of the main applications of the CcMaster is oriented to the photovoltaic self-consumption sector. Through the self-consumption universal solution, the user will be able to monitor all their photovoltaic plants under a single platform with maximum accuracy, regardless of the brand or model of the inverter(s) installed.

7.1 Installation.

When adding external devices (section 6.2.1.4.3) for a self-consumption plant in the CcMaster (section 6.2.1.5), the user must take into account the direction of the current measured by each device, so that the self-consumption balance is correctly calculated.

There must be one or more devices in generation and one or more devices in consumption, and all must be consistent with the following current diagrams.

7.1.1 With CcM native devices.

The current direction in the production line will always be the same, and in the grid line the current can flow in both directions, depending on whether the installation is importing or exporting energy from the grid.

In order to properly perform the housing consumption calculation, the production active power must be positive. On the other side, the grid active power must be positive when importing energy, and negative when exporting energy.

In the case of using CcM meters in both lines, this configuration is achieved by setting the production CcM in unidirectional mode (by default), and the grid CcM in bidirectional mode. Depending on the possibilities of the installation's electrical panel, the CcM may be installed upstream or downstream of the mains circuit breaker, so the installer must configure the device in bidirectional mode or in bidirectional reverse mode, following the diagrams in Figure 41 and Figure 42, respectively. More information is available in the manual of the principal CcM device in question, available at www.energyccm.com.

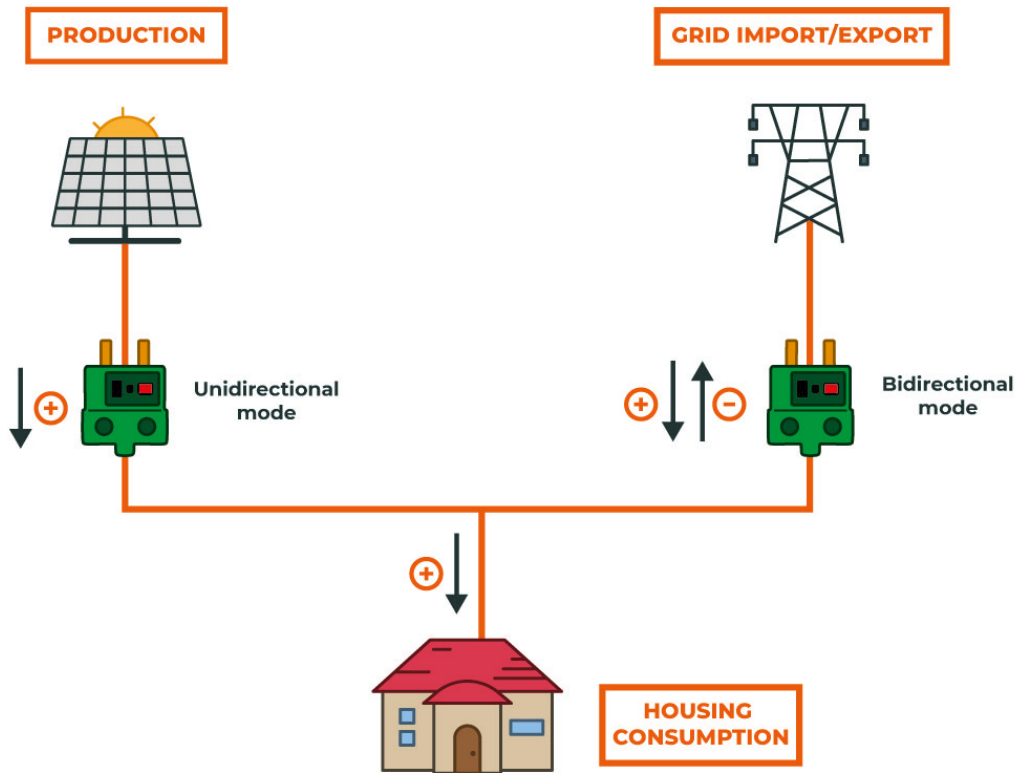


Figure 41 Currents diagram of a self-consumption plant with native CcM devices (bidirectional mode)

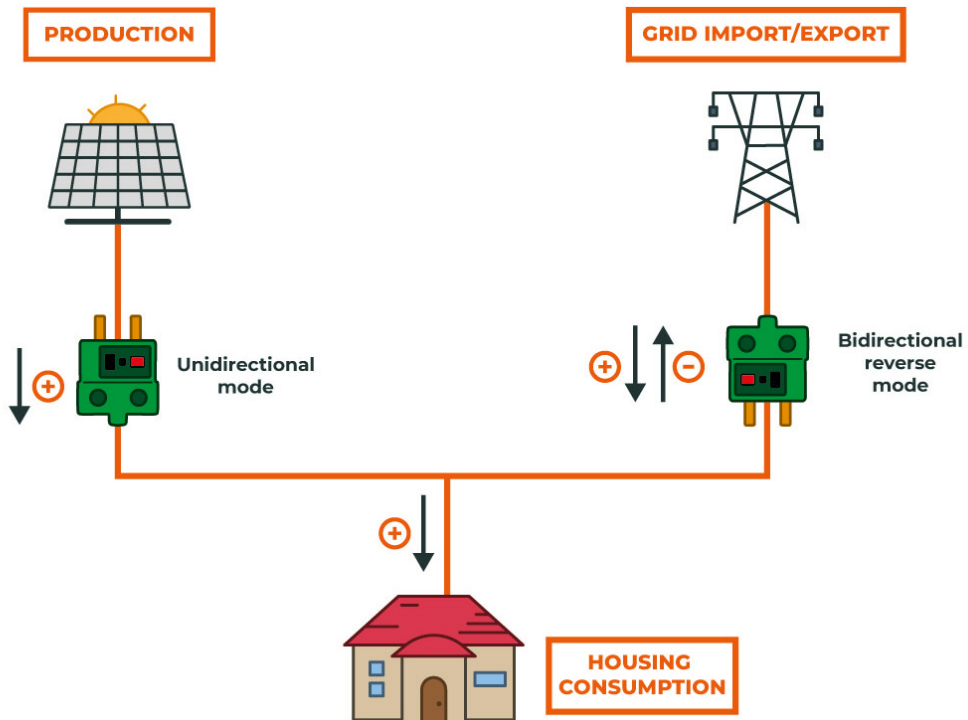


Figure 42 Currents diagram of a self-consumption plant with native CcM devices (bidirectional reverse mode)

7.1.1 With external devices.

The current direction in the production line will always be the same, and in the grid line the current can flow in both directions, depending on whether the installation is importing or exporting energy from the grid.

In order to properly perform the housing consumption calculation, the production active power must be positive. On the other side, the grid active power must be positive when importing energy, and negative when exporting energy.

In the case of using external devices (inverters or grid analysers), the installer shall configure the devices according to the diagram in Figure 43.

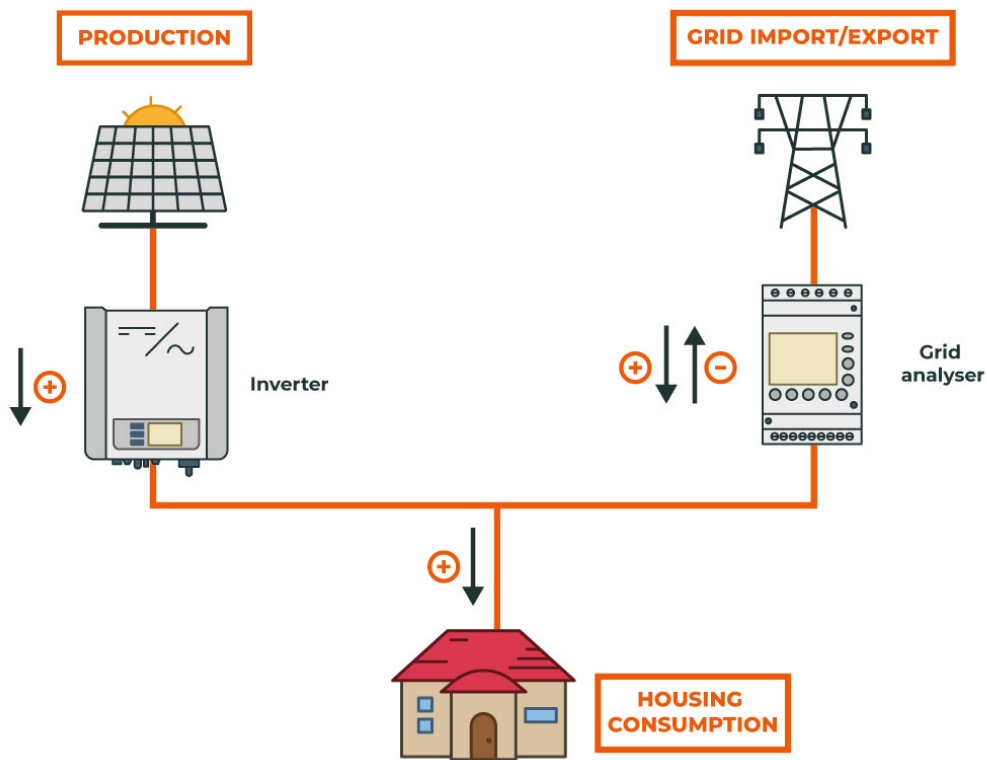


Figure 43 Currents diagram of a self-consumption plant with external devices



Calle La Gitanilla 17, Nave 1
CP: 29004 - Málaga, Spain
Tel.: (+34) 952 02 05 84
info@energyccm.com | www.energyccm.com

