

**MORE THAN
METERING**

**ENERGY
CCM**



CCMW
Pt100

WiFi adapter with
digital outputs and
temperature input for
Principal CcM devices

USER MANUAL

CcM-W PT100

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

www.energyccm.com



INDEX	
1 Introduction	4
1.1 Contents of the box	4
1.2 Device documentation	4
1.3 About this manual	4
2 Technical specifications	5
2.1 Environmental conditions	5
3 Safety instructions	5
3.1 Symbols	5
3.2 Purpose	5
3.3 Transport damage check	6
3.4 Staff	6
3.5 Special hazards	6
3.6 Installation place	6
3.7 Alterations	6
3.8 Cleaning and maintenance	6
3.9 General hazards resulting from non-compliance with safety standards	7
3.10 General safety requirements	7
4 Device description	7
4.1 Identification	8
5 Installation	8
5.1 Step 1: Safety	9
5.2 Step 2: Connection to the principal CcM	9
5.3 Step 3: Connection of inputs/outputs	9
5.4 Step 4: Power supply and turning on	10
6 Configuration	11
6.1 Access Point Mode	11
6.1.1 Connection types	12
6.2 Client Mode	15
6.2.1 Settings	16
6.2.2 Data	17
6.2.3 Digital IO	18
6.2.4 Restore	19
6.3 Firmware update	20
7. Schedule	20
7.1 Instant Action	20
7.2 Agenda	21
8. EnergyCcM App	21
8.1 User Management	22
8.2 CcMs to be configured	23
8.3 CcMs already configured	24
9. Energy CcM Scada Web	26
Annex: Examples of Cloud, FTP and Gateway mode connections	27



1. INTRODUCTION

The CcM-W PT100 is one of the CcM WiFi devices in the CcM family range, which connects to principal devices such as CcM2, CcM3 and CcM4 to provide them with wireless connectivity, as well as offering a temperature input and digital isolated inputs and outputs. A PT100 probe shall be connected to the temperature input. Both isolated/potential-free inputs may be configured as pulse counters to measure gas or water counters. The isolated/potential-free outputs may be used to command a recloser to open/close a circuit breaker or up to two contactors to perform the same task.

The CcM product range devices offer multiple configuration options and allow users to configure the most convenient solution 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.

With the CcM WiFi extra devices, the user may easily access the data collected by the principal devices of the CcM product range using WiFi simply by directly connecting to the CcM device in question using plug & play, adapted to the physical shape of the principal devices and without need for external power supply except for the one provided by the hosting device.

Thanks to the wireless connection (WiFi) provided by the CcM-W module, it is possible to send requests to the devices using Modbus RTU over TCP commands (Gateway mode) or allow that the CcM device itself requests and sends the metering data to the default server (Energy CcM) as we will see further below (Cloud mode). There is a third option, through which the user defines the server to which the CcM-W module will send the data via FTP, in CSV format (FTP mode).

The only other way to establish a direct communication with the CcM product range devices without using the CcM-W adaptor would be via a cable connection RS-485 with any data collection

programme, which would send requests to the devices using the Modbus RTU protocol or via one of the free software tools such as the Energy CcM app, the CcManager programme or the Energy CcM web portal. For more information regarding these solutions, see the relevant manuals, available at www.energyccm.com.

1.1 CONTENTS OF THE BOX

Inside the box you should find:

- 1x CcM-W PT100
- 1 x extension cable
- Data sheet

1.2 DEVICE DOCUMENTATION

CcM-W PT100 documentation includes this manual and its data sheet. All documents can be downloaded from our web page 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 CcM-W PT100 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. Monsol Electronic reserves the right to modify the manual without previous notice.

2. TECHNICAL SPECIFICATIONS

Connectivity	802.11b/g/n
Maximum consumption	400 mW
Power supply	12 VDC
Dimensions	45 x 38 x 32 mm

2.1 ENVIRONMENTAL CONDITIONS

Operating temperature	-25...+50 °C
Protection degree	IP20
Relative humidity	0...95 % at 45 °C
Protection against over-current	Principal CcM device connected to external device (thermal-magnetic switches or residual-current circuit breakers)

3. SAFETY INSTRUCTIONS

Please read the below safety instructions and precautions before installation and use of the CcM-W PT100 device.

3.1 SYMBOLS

The following symbols are used in this manual to highlight and emphasise important information. Their general meaning is as follows:



General caution



Electrical hazard



Prohibited



General information

3.2 PURPOSE

This device is designed to provide WiFi connection to a principal CcM device (CcM2, CcM3 and CcM4), which will measure voltage, current, power, energy and harmonics distortion in single- or three-phase electrical installations connected directly to the load side of the thermal-magnetic switch or residual-current circuit breaker for use in both, industrial and domestic installations. In parallel, the CcM-W PT100 is able to measure temperature through a PT100 probe.

The CcM-W PT100 device 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 Monsol Electronic's customer service.

Telephone +34 952 02 05 84

E-mail: info@energycm.com

Web: www.energycm.com

Address: Monsol Electronic

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, preventing the current to go through them, generally deactivating the circuit breaker where the device is connected.



Do not try to repair the device on your own in case of any malfunction. If this occurs, contact Monsol Electronic'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 CcM-W PT100 is shown.



Figure 1 Picture of the CcM-W PT100 device

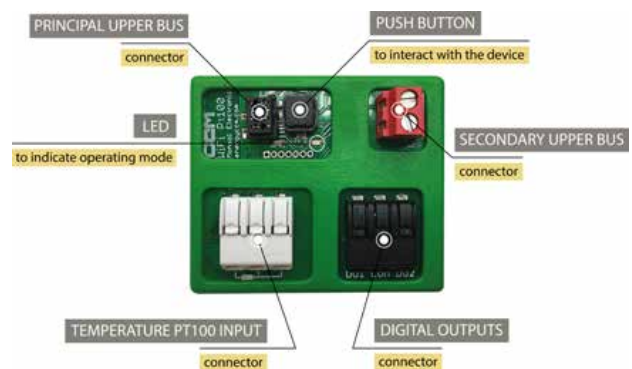


Figure 2 Graphic depiction of the top part of CcM-W PT100

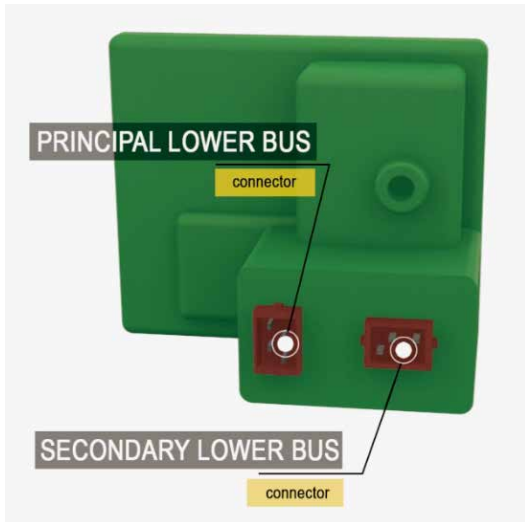


Figure 3 Graphic depiction of the bottom part of CcM-W PT100

As depicted in the previous figures, the device consists of:

- **LEDs:** These are two status LEDs to indicate the operating mode of the principal CcM device, which connects to the CcM-W PT100. Once the CcM-W PT100 is connected, the LED will flash once to indicate that it has turned on; once it becomes synchronized with the principal CcM, which hosts it, it will behave in the same way as the LED of the principal CcM.
- **PUSH BUTTON:** A push button to interact with the device. Performing a quick push, the CcM-W PT100 restarts its operation. Pushing and holding the button during more than 10 seconds, a factory reset is performed, removing the WiFi configuration.
- **PRINCIPAL LOWER BUS CONNECTOR:** Connector or connection interface with the principal CcM device.
- **SECONDARY LOWER BUS CONNECTOR:** Connector or connection interface with the principal CcM device.
- **PRINCIPAL UPPER BUS CONNECTOR (black):** Extension of the connector of the principal bus of the CcM (see manual of the CcM device in question available at www.energyccm.com). This connector will only be used if the device hosting the CcM-W PT100 has been connected to other CcM devices by cable connection using a principal bus RS-485.
- **SECONDARY UPPER BUS CONNECTOR (red):**

Extension of the connector of the secondary bus of the CcM (see manual of the CcM device in question available at www.energyccm.com). This connector will only be used to connect external Modbus devices capable of communicating with the principal CcM device.

- **PT100 CONNECTOR:** Connector for the temperature PT100 probe.
- **OUTPUT CONNECTORS:** Connectors for two digital outputs.

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 4, 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.



Figure 4 Identification QR code

5. INSTALLATION



Due to electrical hazard during installation, it will be necessary to ensure that the installation zone meets the necessary safety conditions.

In order to install CcM-W PT100, follow these steps:

5.1 STEP 1: SAFETY



Ensure that the principal CcM device is correctly installed and connected to a thermal-magnetic switch or residual-current circuit breaker and that its power supply has been disconnected so that there is no current flowing through the CcM device (see the corresponding manual of CcM4, CcM3 or CcM2)

5.2 STEP 2: CONNECTION TO THE PRINCIPAL CCM

Connect the CcM-W PT100 peripheral to its principal CcM and fit it in its upper part as depicted in Figure 5.

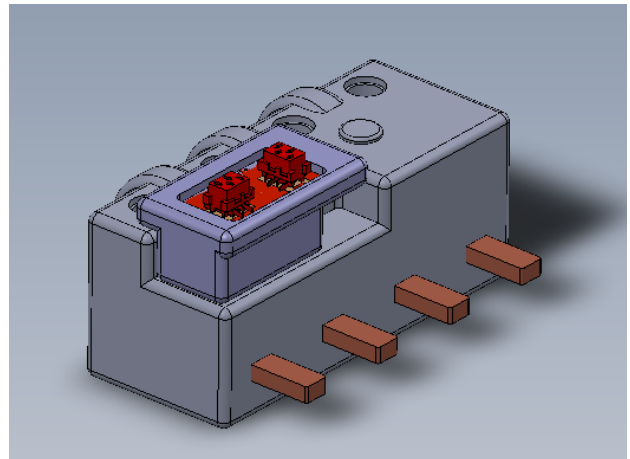
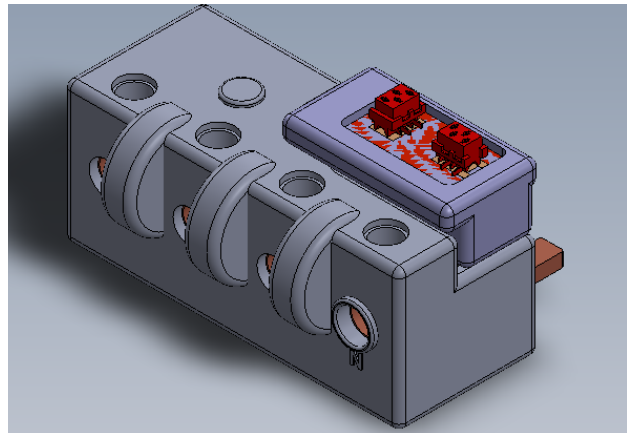
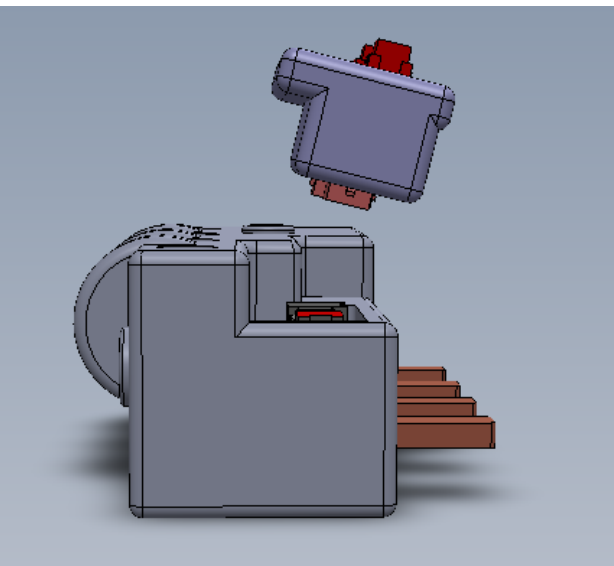
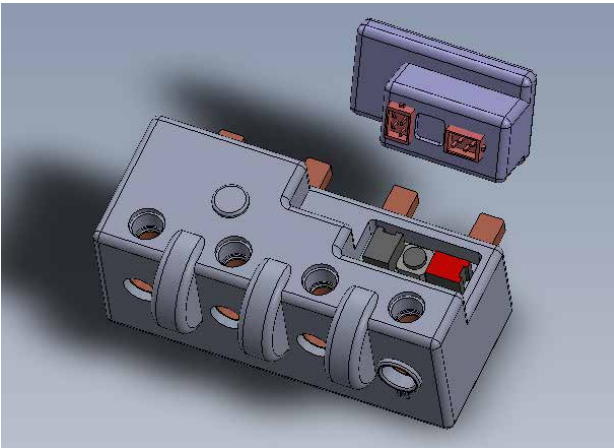


Figure 5 CcM-W connected to CcM4



Make sure that the principal CcM device has the default Modbus address, '1', configured in the device. For more information about address assignment, refer to the specific manual of the related principal CcM device.

5.3 STEP 3: CONNECTION OF INPUTS/OUTPUTS

It is possible to connect a temperature PT100 probe (white connector) to the CcM-W PT100 and two digital isolated outputs (black connector).

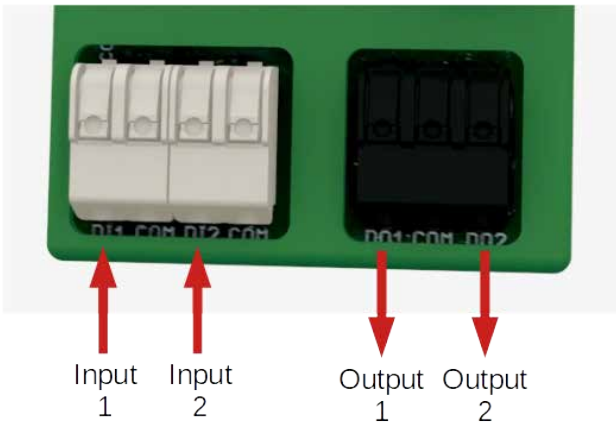


Figure 6 CcM-W PT100 inputs and outputs

- The PT100 temperature input measures the resistance variation of the PT100 probe with the temperature (RTD, Resistance Temperature Detector), and offers the measurement in °C. The user must take into account that the input is not isolated (Figure 7).
- The output counts with two isolated/potential-free signals to command a recloser or two contacts having the same common point (phase or neutral), as it can be seen in Figure 8

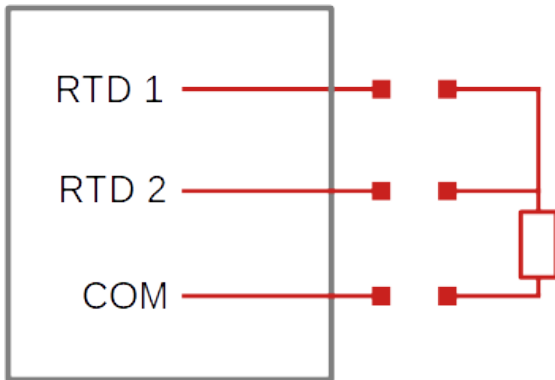


Figure 7 Pt100 input diagram

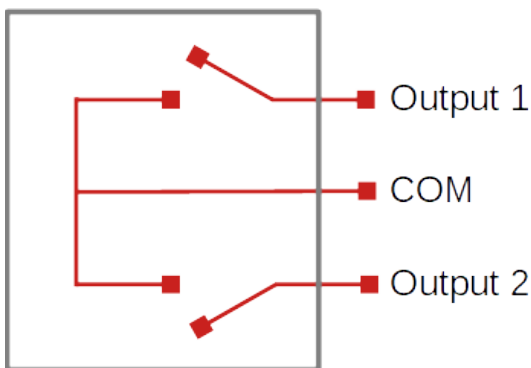


Figure 8 Isolated outputs diagram

5.4 STEP 4: POWER SUPPLY AND TURNING ON

Once it is connected to the hosting device (principal CcM) and the principal CcM is connected to the thermal-magnetic switch or residual-current circuit breaker, enable power supply of the principal CcM by activating the thermal-magnetic switch or residual-current circuit breaker. Then, the LED of the CcM-W PT100 will flash once to indicate that the device is powered and is on (Figure 9).



Figure 9 CcM-W PT100 connected to CcM4 and powered on

Automatically, the CcM-W PT100 will proceed to synchronize with the principal hosting CcM and will flash twice. Since this double flash, the LED of the CcM-W PT100 will start mirroring the one on the principal CcM device, which hosts it and supplies it with power.

At the end of this document, there is an annex with examples of the possible connections in **Cloud** and **Gateway** modes between principal CcM4 devices and secondary CcM1-C devices.

6. CONFIGURATION

The device has various operating modes, which may be configured using a web portal “embedded” in the CcM-W device.

Once the CcM-W device starts for the first time, it will act as an **Access Point** (section 6.1) for its configuration. Once it is configured and the local WiFi network (router) is selected in order to link it to data transfer to the cloud, the device will change to the **Client mode** (section 6.2). In the Client mode the data may be read and transferred to the EnergyCcM software tool (Cloud mode) or to a third-party server using connection to a fixed IP (Gateway mode) or via FTP (FTP mode).

6.1 ACCESS POINT MODE

This is the default operating mode, which is accessed when the device is turned on for the first time or after a reset.

Below, you will find a description of the process to configure the CcM-W using the web portal, which is embedded in the device. There are two options to access the configuration of the WiFi device.

First and the most user-friendly access is via an Android application (App) “Energy CcM” (see section 7 of this manual), which enables its configuration using any of the WiFi devices from the product range (CcM-W and CcM2-W). It also enables visualisation of data from these and the remaining devices using the EnergyCcM web portal (section 8) if required when the device has been set in Cloud mode.



In case you do not have an Android device with the application, the device may be configured using the web portal embedded in the device, which was mentioned earlier.

The CcM-W device will generate an open WiFi network called “CCM_XX:XX”, where “XX:XX” are the last 4 digits of the MAC address, which can be found on the product label or the series number, which appears on the sticker on the device. When the CcM-W has power supply and is turned on, it should search WiFi networks from any device with 802.11 connectivity and then it will be able to find the new network generated by CcM-W among available networks as shown in the example in Figure 10. The network in question is an open network without password.

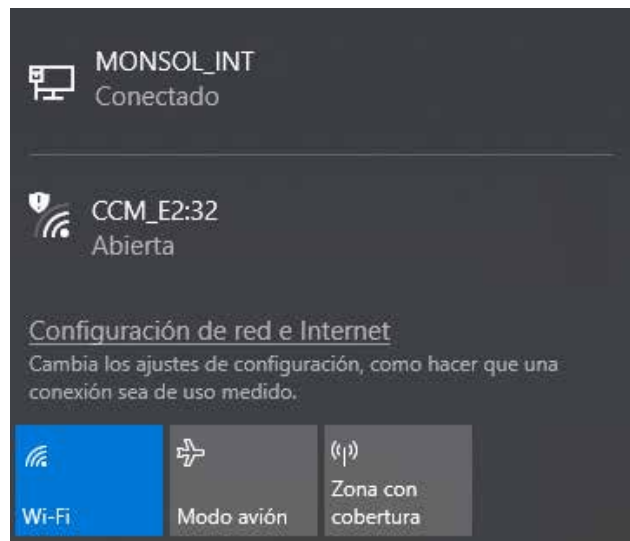


Figure 10 WiFi network created by the CcM-W device

In order to configure CcM-W and add credentials for the WiFi network with Internet access, which will be used to send the data, the device used to search the new WiFi networks (PC, PLC, tablet, smart phone, etc.) will connect to the network generated by the CcM-W device (“CCM_XX:XX”) and access the generated or embedded web of the CcM-W device. Once connected to the WiFi network of the CcM, you should open your web browser and write <http://192.168.4.1/> in the address bar.

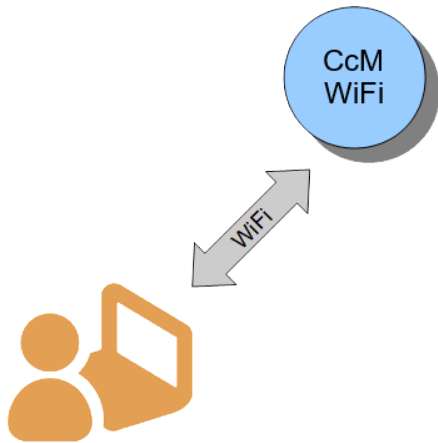


Figure 11 Connection to WiFi Access Point

Once you write the address (<http://192.168.4.1/>), you will get to the configuration page “CCM Config Web” (Figure 12) of the web embedded in the CcM device, through which the WiFi connection configuration may be completed.

Figure 12 Configuration page CcM Config Web

Once the network is selected from the list, its name will appear in the “SSID” field. If you are certain that you know the name of the network, you can write it directly in the “SSID” field (not recommended).

Once you have finished, write the password of the selected WiFi network in the password field. The CcM-W device will be linked to the WiFi network and use it to send the data to the Energy CcM server, or it can be connected wirelessly to obtain the data depending on the type of communication that the user requires (see section 6.1.1).

The following field that appears is “Device Hostname” where you can assign a name to the CcM-W device for later identification in your WiFi network, for example “engine_room”. By default, the field is set as “ChangeName”.



If you have several CcM-W devices connected to the same network, make sure to assign different “hostnames” to each one of them. Keep in mind that the assigned names shouldn’t contain spaces (“ ”) or exceed 20 characters in length.

Next, in the “Set meter current flow mode” section, the user shall configure the device according to the direction of the current: unidirectional or bidirectional mode (see the manual of the principal CcM device in question available at www.energyccm.com).

Finally, in the “**Set communication mode selection**” part you should select one of the two types of connection, in which the device will operate once it is connected to the WiFi network in client mode, described in the following section.

6.1.1 Connection types

6.1.1.1 Cloud Mode

The Cloud mode is the recommended type of connection.

In this configuration, once the CcM-W connects to its WiFi network, it will automatically send requests to the CcM device, which will host it, and it will start

to send data every minute to the Energy CcM server using its local network. This data can be visualised on a computer, tablet or smartphone using the web platform EnergyCcM (www.energyccm.com). See section 8 EnergyCcM at the end of this manual. The user shall select the time zone in which the CcM device is installed, in order to obtain the timestamp of each data.

Figure 13 Detail of Cloud mode selection

OPTIONAL: When you click on the “Advanced Settings” box on Figure 13, you will see fields enabling configuration of a static IP address (“New IP”), gateway portal (“New GW”) and network mask (“New NetMask”) for your network (Figure 14). It is also possible to create a password to lock the configuration of the CcM (“Access password”), so that it cannot be modified by anyone without the user permission.

Figure 14 Detail of “Advanced settings” in Cloud mode selection

If you do not click on the “Advanced Settings” box and therefore do not fill in the fields, the router will automatically assign a random IP address each time the CcM-W device connects.



It is recommended to assign a static IP address to be able to access the embedded web of the CcM-W device in the Client mode (section 6.2) and to change its configuration. It is also possible to change the device configuration using the Android application Energy CcM (section 7). In case you assign a dynamic IP, which is unknown to the user (automatically assigned by the router), and you do not have the Energy CcM app, the user will not be able to return to or to access the embedded web. To change it, you will need to reset the CcM-W and restart the configuration.

RESET: To reset the configuration of CcM-W, you should keep the button pressed for over 10 seconds. Once you have done this, the device will return to the Access Point mode and it should restart the configuration (section 6.1).

Once you finalize the “Connection Type” configuration, you should press the “Send” button to validate the device configuration.

In case the device does not obtain a valid IP address, either because the selected IP is not valid with a static IP assigned, or because the routing device is unable to provide an IP when a dynamic IP is assigned, the CcM-W device will remain in the Point of Access mode. Conversely, if the configuration is successful, the CcM-W will change to Client mode (described in section 6.2).



In order to have a successful communication between the principal CcM and the CcM-W connected to it, the principal CcM must have assigned to it the default Modbus address, i.e. “1”.

6.1.1.2 GATEWAY MODE

It is a transparent communication mode where the CcM-W device does not request or send data and only acts as an information gateway for an external device outside the CcM family to request and acquire the data from the device, which hosts the CcM-W. In case that the device has slaves connected to a secondary bus, these data will also be sent via gateway.

In case the principal CcM device hosting the CcM-W is connected to a principal bus, the external device may request and receive data from all the CcM devices connected to that bus using a WiFi interface generated by the CcM-W and using the Modbus RTU over TCP protocol.

In this type of connection, the device will be accessible as a bus using the TCP/IP server in port 502 following the Modbus RTU protocol. You will be able to access it using any Modbus RTU control tool such as CcManager (for more information, see the CcManager manual available at www.energyccm.com).

In order to configure this connection type, you should select the "Gateway" option, which will show fields enabling configuration of a static IP, gateway portal ("New GW") and network mask ("New Net-Mask") for your network (Figure 15), in the same way as in the previous section. It is also possible to create a password to lock the configuration of the CcM ("Access password"), so that it cannot be modified by anyone without the user permission.

Figure 15 Detail of Gateway mode selection

In the Gateway mode, the CcM-W device will communicate using the Modbus RTU on TCP/IP connection ("IP:Port"). This will require establishment of a connection to the IP, which was configured in the 502 port.

Once you finalize the "Connection Type" configuration, you should press the "Send" button to validate the device configuration.

In case the device does not obtain a valid IP address, either because the selected IP is not valid with a static IP assigned or because the routing device is unable to provide an IP with a dynamic IP assigned, the CcM-W device will remain in the Point of Access mode. Conversely, if the configuration is successful, the CcM-W will change to Client mode (described in section 6.2).

6.1.1.3 FTP Mode

In this configuration, the CcM-W, once linked to the user's local WiFi network, will automatically interrogate the CcM device that hosts it and send the data in CSV format to the server designated by the user.

Figure 16 Detail of FTP mode selection

Selecting the FTP option (Figure 16) will display the external server configuration boxes:

- "Server/port": Server URL and access port.
- "FTP folder": Name of the folder where the CSV files with the collected data will be saved. This folder must be created previously by the user.
- "User/pass": FTP username and password.
- Time zone: Drop-down list to select the time

zone in which the device is located.

OPTIONAL: When you click on the “Advanced Settings” (Figure 16) checkbox, you will see fields enabling configuration of a static IP address (“New IP”), gateway (“New GW”) and network mask (“New NetMask”) for your network (Figure 17). It is also possible to create a password to lock the configuration of the CcM (“Access password”), so that it cannot be modified by anyone without the user permission.

Figure 17 Detail of “Advanced settings” in FTP mode selection

If you do not click on the “Advanced Settings” box and therefore do not fill in the fields, the router will automatically assign a random IP address each time the CcM-W device connects.



It is recommended to assign a static IP address to be able to access the embedded web of the CcM-W device in the Client mode (section 6.2) and to change its configuration. It is also possible to change the device configuration using the Android application Energy CcM (section 7). In case you assign a dynamic IP, which is unknown to the user (automatically assigned by the router),

and you do not have the Energy CcM app, the user will not be able to return to or to access the embedded web. To change it, you will need to reset the CcM-W and restart the configuration.

RESET: To reset the configuration of CcM-W, you should keep the button pressed for over 10 seconds. Once you have done this, the device will return to the Access Point mode and it should restart the configuration (section 6.1).

Once you finalize the “Connection Type” configuration, you should press the “Send” button to validate the device configuration.

In case the device does not obtain a valid IP address, either because the selected IP is not valid with a static IP assigned, or because the routing device is unable to provide an IP when a dynamic IP is assigned, the CcM-W device will remain in the Point of Access mode. Conversely, if the configuration is successful, the CcM-W will change to Client mode (described in section 6.2).



In order to have a successful communication between the principal CcM and the CcM-W connected to it, the principal CcM must have assigned to it the default Modbus address, i.e. “1”.

6.2 CLIENT MODE

Once the CcM-W device is configured, it will be connected to the local WiFi network selected during the “Access Point” configuration (section 6.1) and it will have an internet connection. The “embedded” web of CcM-W may be accessed from any device with 802.11 connectivity using the assigned IP in the address bar of your browser (for example <http://192.168.1.220/>).

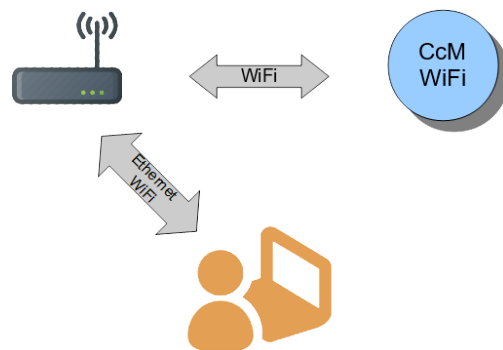


Figure 18 Client mode connection

If you do not know the IP because it is assigned as dynamic, you should follow these steps depending on the operating system (Windows, Linux, iOS or Android) of the device from which you would like to access the embedded web of the CcM-W device:

- **Device with Microsoft operating system (Windows 7, 8, 10):**
 - You should install the “Bonjour” tool available on the Apple website: https://support.apple.com/downloads/bonjour_for_windows.
 - Once this is done, open the web browser and enter the device name (“device hostname” in Figure 12) followed by “.local”. By default: <http://ChangeName.local/>
- **Device with Linux based operating system (for example Ubuntu):**
 - Open a web browser and enter the device name. By default: <http://ChangeName.local/>
- **Device with iOS operating system:**
 - Open a web browser and enter the device name. By default: <http://ChangeName.local/>
- **Device with Android operating system (RECOMMENDED OPTION):**
 - Install the Energy CcM application (section 7).

When you finalize the access to the device, the embedded web page “CcM Web Server” will appear in your browser (Figure 19).

At this stage, depending on the connection set in the previous section 6.1.1, you will have several tabs available in the upper menu:

- **Settings:** Configuration page of the device network parameters (“CCM Config Web”) described in section 6.1.
- **Data:** This tab will only be available in the “Cloud” connection type (section 6.1.1.1). On this page you may view a summary of the most relevant data obtained from the principal CcM and from up to 4 secondary CcM devices connected to the secondary bus of the principal device, as well as the temperature measurement extracted from the PT100 probe.

- **DigitalIO:** Page to configure and activate the digital outputs.
- **Restore:** The page to restore the default values of the CcM-W device, and thus, to return to the Access Point mode (section 6.1).

6.2.1 Settings

By selecting “Settings” in the upper menu, the screen will appear as per Figure 19.

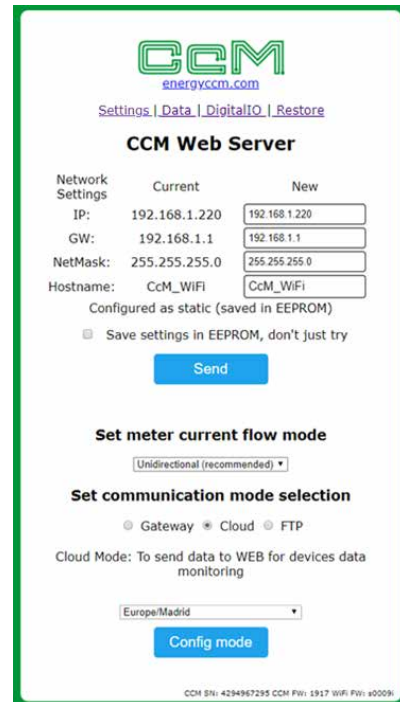


Figure 19. CcM Web Server – Settings

On this page you can change (if required) the network configuration of CcM-W, in the same way as described in section 6.1.1.

On this screen there is an option “Save settings in EEPROM, don’t just try” available, which enables that the new configuration remains permanently recorded in the device. Thus, if the power supply of CcM-W is disconnected, the configuration values will stay. If you just want to make sure that the configured values are valid, do not select this option. In this way, if you disconnect power supply of CcM-W, it will return to the same network configuration as prior to pressing “Send” (Figure 19).

Furthermore, in section “Set communication mode selection” the connection type of the CcM-W device may be changed between the ones mentioned in section 6.1.1: Cloud, Gateway or FTP. By pressing the

“Config mode” button, the selection made in the “CcM Web Server” fields will become implemented.



If the user has assigned a password to lock the configuration (see section 6.1.1), it will be necessary to enter it in order to change the settings in “Network Setting” (Figure 20). Once logged in, the session may be closed on the “Restore” page (Figure 24).



Figure 20 CcM Web Server – Login

6.2.2 Data

This screen primarily serves for basic data visualisation.



This page only appears available in Cloud mode (section 6.1.1.1) and FTP mode (6.1.1.3), because in Gateway mode (section 6.1.1.2) the device only acts as a gateway.

By selecting “Data” in the upper menu, the screen will appear as per Figure 21.

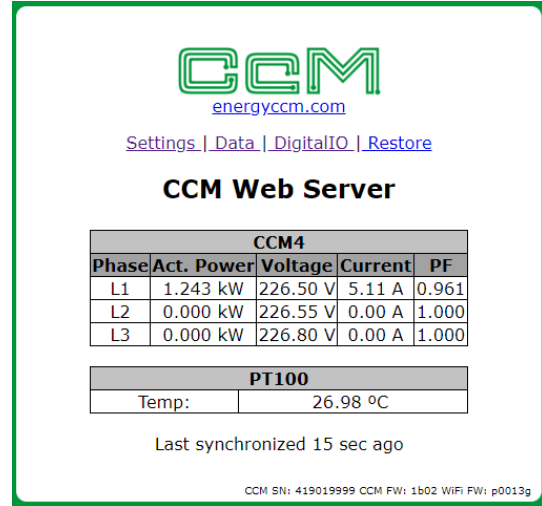


Figure 21 CcM Web Server – Data

In the “CCM4” table, you can see the following parameters related to the metering realized by the principal CcM device in the phases L1, L2 and L3. In each case:

- “Act. Power”: Active RMS Energy.
- “Voltage”: RMS Voltage.
- “Current”: RMS Current.
- “PF”: Power Factor.

In table “PT100” you may view the temperature measurement calculated using the PT100 probe, in °C.



For data visualisation, graphs, reports and storage of historical data, it is recommended to use the Energy CcM Android app to configure and register the device in the Energy CcM server and to use the free EnergyCcM tool (www.energyccm.com), configuring the CcM-W in Cloud mode. To do this, it is necessary to create a user on the Energy CcM platform, and to associate the principal device through its serial number.

6.2.3 Digital IO

The digital outputs are configured and activated through this page (Figure 22).

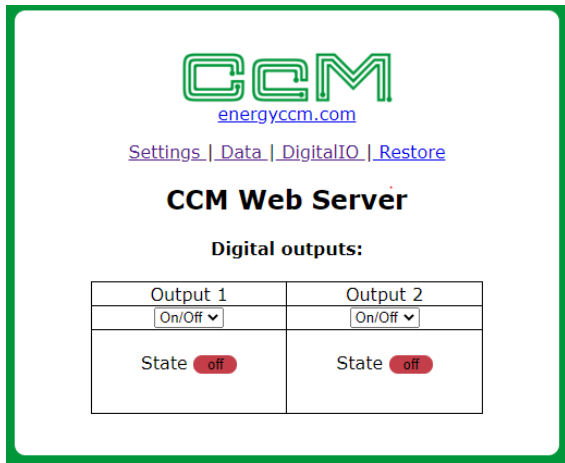


Figure 22 CCM Web Server – Digital IO

- **“Digital outputs”:** The two outputs can be configured through the drop-down list that appears under “output 1” and “output 2”. If the device is configured as “On/Off”, you can change the output status from off (open) to on (closed). If configured as “Pulse”, activating the output (on -> off) will close the output for 2 seconds, sending a pulse.

6.2.3.1 Command interaction

When the device is configured in Gateway mode (section 6.1.1.2), the “Digital IO” tab is not available, meaning that it is necessary to use Modbus commands to interact with it, both RTU and TCP. To perform this task, the user must take into account that the Modbus address of the CcM-W PT100 is ‘249’.

- **Outputs:**
 - Reading: The digital outputs status is read with operation code ‘4’ in register ‘1’. They operate with direct logic, meaning that an open contact will be depicted as a ‘0’, and a closed contact as a ‘1’.

Salida 1		Salida 2		Registro 1	
Contacto cerrado (1)	Contacto abierto (0)	Contacto cerrado (1)	Contacto abierto (0)	Binario	Decimal
	X		X	0b00000000	0
	X	X		0b00000001	1
X			X	0b00000010	2
X		X		0b00000011	3

Table 1 Digital outputs reading truth table

- Writing: The digital outputs may also be configured as standard output or pulse output, as mentioned above. Outputs are commanded with operation code ‘6’ in register ‘1’. They operate with direct logic, meaning that an open contact will be depicted as a ‘0’, and a closed contact as a ‘1’. The actuation command (1 byte) must be duplicated in the register (2 bytes). That is to say, if the command byte is 0x12 (in hexadecimal) the user must write 0x1212 in register ‘1’. The first quartet of the byte refers to the state to be commanded, and the second quartet to the output in question.
 - Most significant quartet (state): ‘0’ means to open, and ‘1’ means to close.
 - Least significant quartet (output): ‘1’ means output 1, ‘2’ means output 2, and ‘3’ both outputs.

Output 1		Output 2		Register 1	
Open contact (0)	Closed contact (1)	Open contact (0)	Closed contact (1)	Hex	Decimal
X				0x0101	257
	X			0x1111	4369
		X		0x0202	514
			X	0x1212	4626
X		X		0x0303	1403
	X		X	0x1313	4883

Table 2 Digital outputs writing truth table

6.2.4 Restore

By selecting “Restore” in the upper menu, the screen will appear as per Figure 23.



Figure 23 CcM Web Server – Restore

By pressing the “Restore” button on this screen, the factory settings of CcM-W will be restored (device configuration, network parameters, name of the WiFi network, to which the device connects, and its password), returning to the Access Point mode (section 6.1).

Another way to restore the CcM-W device is by using the available push button. If at any time the button is pressed for more than 10 seconds, it will reset both the CcM-W device and the principal CcM device, to which it is connected, to factory settings (see reset mode section in the manual of the principal CcM device in question available at www.energyccm.com).



If the user has assigned a password to lock the configuration (see section 6.1.1), it will be necessary to enter it in order to restore the device (Figure 20). Once logged in, the session may be closed on the “Restore” page (Figure 24).

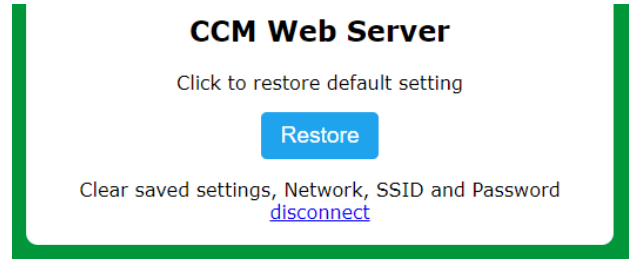


Figure 24 CcM Web Server – Restore – Disconnect

6.4 FIRMWARE UPDATE

It is possible to update the firmware of the CcM-W locally. To do this, the user must access the IP address of the device, for example:

`http://192.168.1.220/firmware`

When accessing the “/firmware” page, a pop-up window for logging in will appear:

- User: ‘ccm’
- Password: Password defined by the user in the configuration process (section 6.1.1). By default, ‘update’.

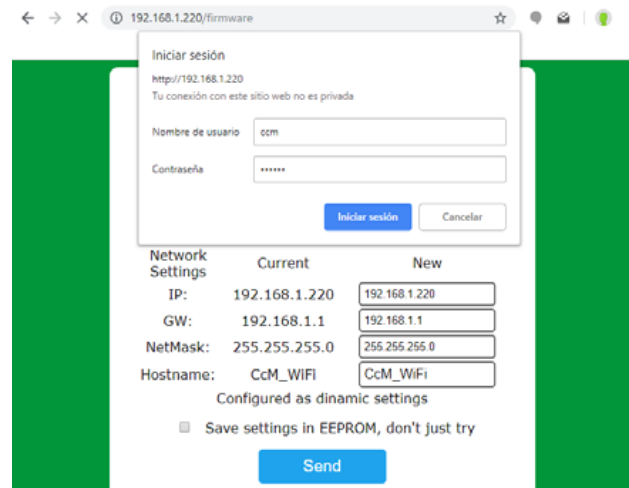


Figure 25 Firmware update

Once logged in, the user shall select the firmware update file and upload it by pressing the “Update” button. If the update has been successful, the message “Update Success! Rebooting...” shall appear, and the device will reboot.

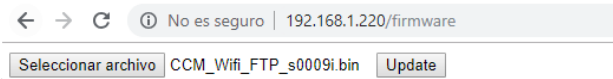


Figura 26 Actualización de firmware – Fichero

The firmware update may also be carried out through the app (section 7).

7. SCHEDULE

When the CcM-W PT100 is configured in Cloud mode, the data is uploaded to the Energy CcM server and showed on the web portal (scada.energyccm.com). In addition to being able to view the data obtained from the principal CcM where the CcM-W PT100 is installed and the temperature measurement, it is possible to act on the outputs in order to interact with the device remotely, provided that the device has Internet connection.

7.1 INSTANT ACTION

Immediate action on outputs is possible in the following ways:

- **Local:** through the app (Figure 27) and the device's embedded web. It is possible to change the configuration of the outputs and change their status.
- **Remote:** through the scada web (Figure 28). It is possible to read the configuration of the outputs and change their status.

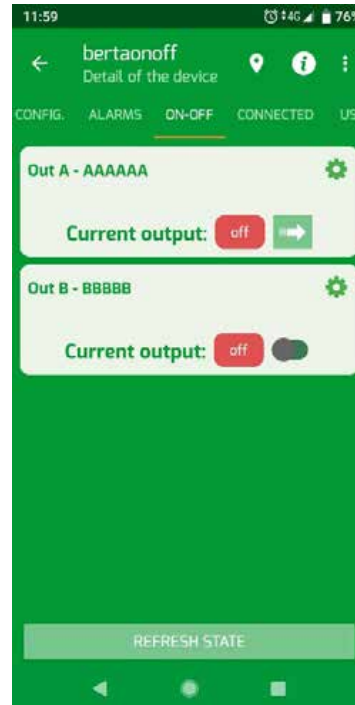


Figura 27 App - ON/OFF status

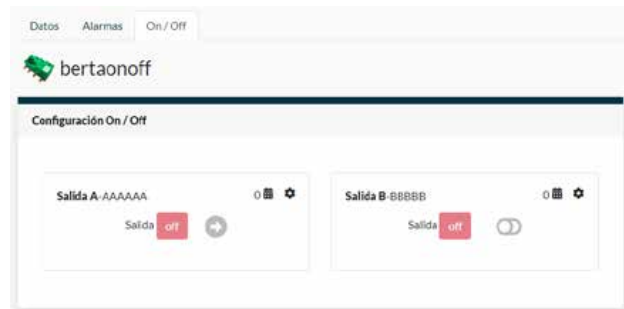


Figure 28 Scada web – ON/OFF status

7.2 AGENDA

The agenda function consists of programming the switching on and off of the digital outputs, at a specific time and date. This programming is performed through the web scada remotely.

When creating a new event on an output, the user has the following configuration options (Figure 29):

- Name and duration of the event.
- Type of action (ON/OFF).
- Date: specific or detailed (range of dates or days of the week).
- Time: specific or programmed.



Figure 29 Scada web – ON/OFF event

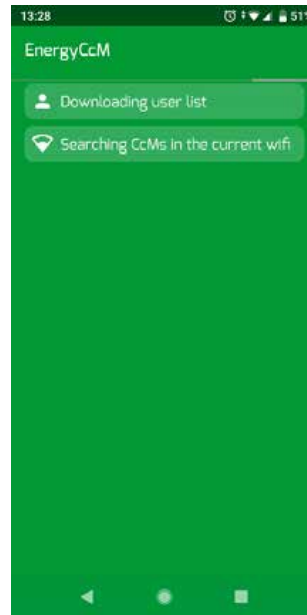


Figure 30 Energy CcM App – Home

8. ENERGY CcM APP

If you decide to configure the CcM-W using the Android application, you should download it from the Google Play Store by searching “Energy CcM” or using the following link:

<https://play.google.com/store/apps/details?id=com.energyccm.app>

Once the application is downloaded and installed, run it. At startup, the app will check the following (Figure 27):

- Registered users
- CcMs to be configured
- Configured CcMs in the user history
- Configured CcMs and connected to the same WiFi network than the Android device



Figure 31 Energy CcM App – Main Menu

On the first screen (Figure 28) you will see the main menu with various sections:

- Users in the app: Manage EnergyCcM users (section 8).
- CcM to be configured: Search new CcM devices, which have not been configured (new reachable WiFi network searches).
- WiFi network to which the Android device is connected: Search for CcM devices, which have been configured and are connected to the same WiFi network.

8.1 USER MANAGEMENT

By clicking the user management icon, the first screen as shown in Figure 29 will appear. In this section you may:

- Create new users of the EnergyCcM web portal
- Register a user in the application, which already exists and which you created before using the EnergyCcM web portal.

The user will enter its credentials and will be able to check the configured and linked (Figure 32).

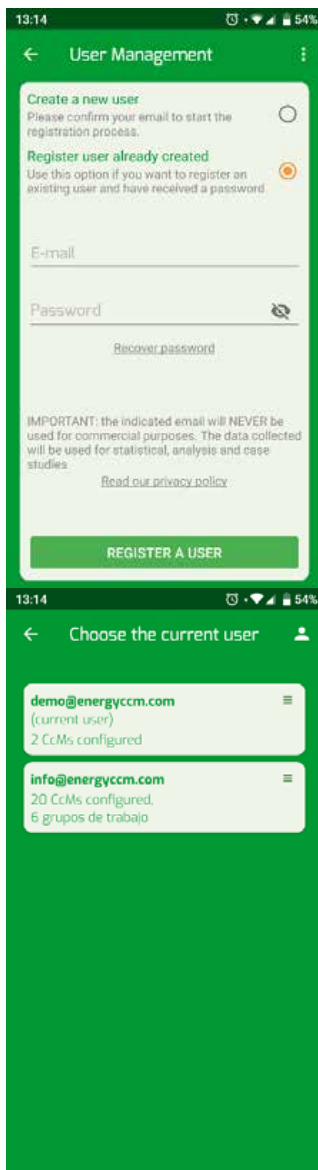


Figure 32 Energy CcM App – EnergyCcM User management

8.2 CCMS TO BE CONFIGURED

At the “CcM to be configured” section a list of the nearby CcM WiFi or CcM2-W devices in Access Point mode will appear. They generate their own WiFi network “CCM_XX:XX”, as per the example in Figure 30. By selecting the nearby device that you wish, the user will be able to see the consumption in real time, directly connecting to the device WiFi network; or to configure it, in a similar way as explained in section 6.

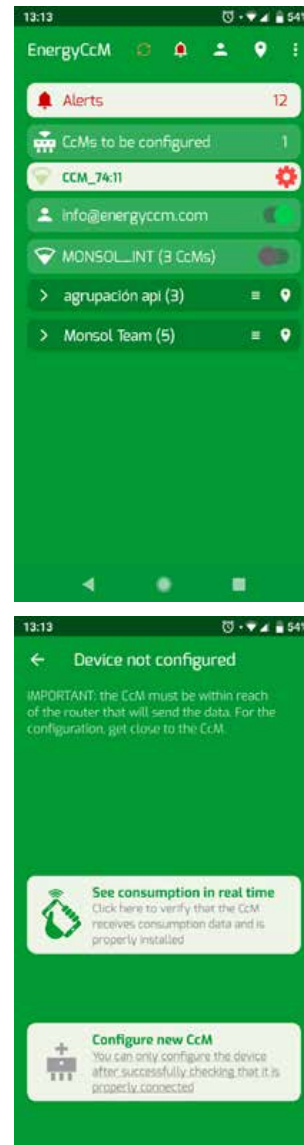


Figure 33 Energy CcM App – search for new CcM devices

To configure the device, the user will only have to follow the steps indicated in the app (Figure 31):

1. Choose the WiFi to which the CcM device will be connected
2. Name the device (hostname)
3. Configure the current direction (see manual of the principal CcM device)
4. Configure the communication mode: Cloud, FTP or Gateway (section 6.1.1)
5. Set device time zone
6. Associate user and group
7. Detail auxiliary information (notes, location and photo)
8. Set configuration password (optional)

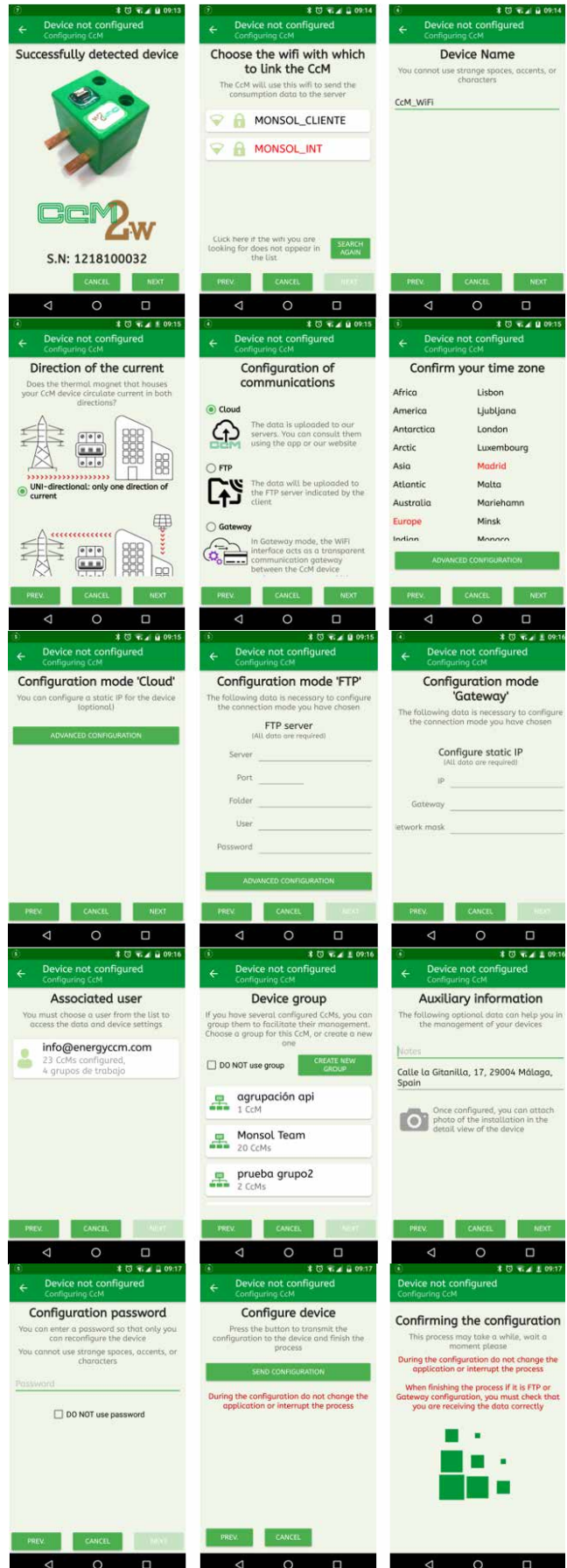


Figure 34 App Energy CcM – CcMs to be configured – Configuration process

Once the configuration is finalized, the device in question will have connected to the local WiFi network and the user will be able to visualize it in the section of already configured CcM devices.

7.3 CCMS ALREADY CONFIGURED

From the app, the user will be able to change the WiFi to which the Android device is connected, in order to search for CcMs configured and connected to the same network. Selecting a CcM already configured, the details of this device are shown (Figure 32):

- Consumption in real time (if the Android device is connected to the same WiFi network as the CcM).
- Consumption study (Cloud mode), based on the data uploaded to the EnergyCcM server.
- Configuration of the device.
- Configuration of alarms



Figure 35 Energy CcM App – Already configured CcM devices

9. ENERGY CcM SCADA WEB

The EnergyCcM Portal is a web platform created by Monsol Electronic in order to offer its users a tool to visualize data from their CcM devices. The link to access the web portal is the following:

scada.energyccm.com

Using this platform, the user may link to his or her EnergyCcM account the principal CcM devices, which have WiFi connectivity either because it is already integrated in the device (CcM2-W) or because it was paired with a CcM WiFi peripheral.

Thus, the EnergyCcM platform enables to unify various types of CcM device installations (wireless or connected with a communication cable, using WiFi or general master data hub such as a PLC or a PC) in a single web portal accessible using any device with Internet connection (PC, smartphone, tablet, etc.)

EnergyCcM does not only enable to link the CcM devices, but also to configure them in working groups, to view real-time and historical data, to download them in files, which may be manipulated by the user, to generate graphs and actuate on the devices.



Figure 36 EnergyCcM – Real-time data

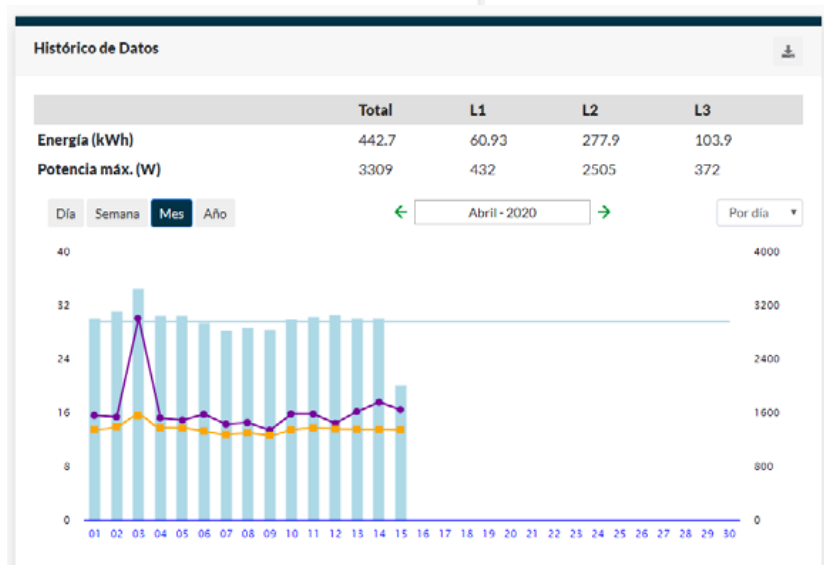
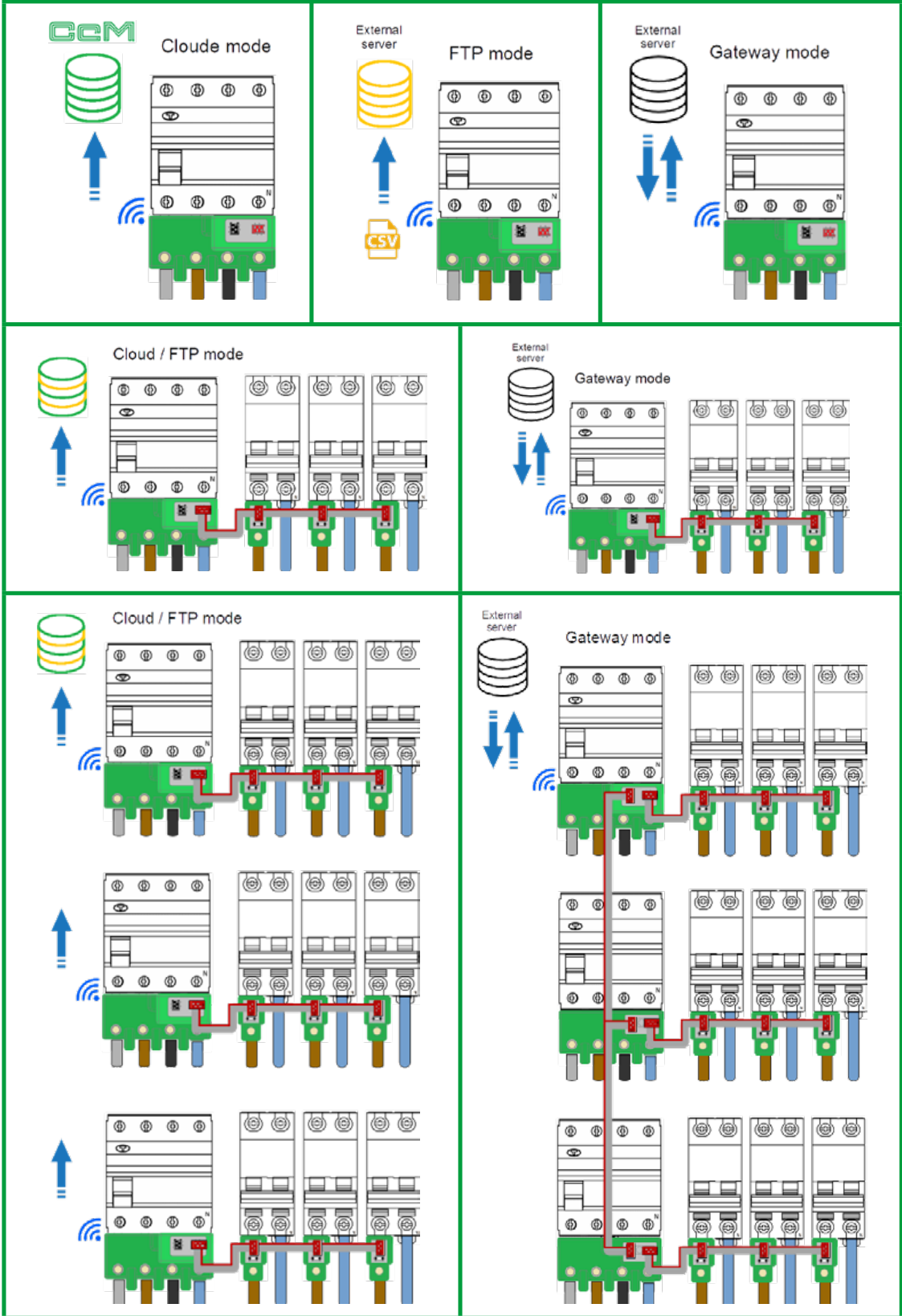


Figure 37 EnergyCcM – Graphics and historical data

10. ANNEX: EXAMPLES OF CLOUD, FTP AND GATEWAY MODE CONNECTIONS



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