SUBMETERING
ELECTRICAL BOXES

INDUSTRIAL
*Perfect **TOOL***

- Analysis
- Energy Efficiency

DOMESTIC
*Perfect **SOLUTION***

- Save Energy
- Alerts & phone

1 Introduction 3
2 Installation and operation 3
2.1 Windows version 3
2.2 Linux (Ubuntu) version 4
3 Graphic User Interface (GUI) 4
3.1 Installations 5
3.1.1 Add 6
3.1.2 Modify 6
3.1.3 Remove 6
3.1.4 Select installation 6
3.2 Electrical boxes 6
3.2.1 Add 7
3.2.2 Modify 12
3.2.3 Remove 12
3.3 Synchronization 12
3.4 Electric Diagram 13
4 EnergyCcM Portal 14

1 INTRODUCTION

The aim of this manual is to explain the characteristics and functionalities of the CcManager software tool as well as to provide the user with a guidance on how to use it.

This software tool is used to manage devices from the CcM product range. It is aimed at industrial networks. The CcManager facilitates network configuration and enables data collection from the devices in local mode.

Any system, which sends commands via the Modbus RTU protocol, may be used to configure and collect data from the CcM product range devices.

CcManager offers the following functionalities:

- Configure the CcM devices both on an individual and on a network level.
- Access instant measurements.
- View the circuit diagram on Communications level.
- View the circuit diagram on Electrical level.
- Access the collected data by downloading the file in CSV format.

The software may be downloaded from the web:

www.energyccm.com

Depending on the operating system of the device on which it is going to be installed, you should choose between its version for Linux or its version for Windows 7 or higher.

2 INSTALLATION AND OPERATION

2.1 WINDOWS VERSION

Once you have downloaded the Windows executable file, run the installation file to start the process.

- Click on “Next” to start the installation (Figure 1).

Figure 1. Windows – Installation process 1 of 4

- Select the address where you wish the application to be installed (if you want to change the one that comes as default, you can click on the “Browse” button or manually write it in the text box) and then, once it is done, click on “Next” (Figure 2).

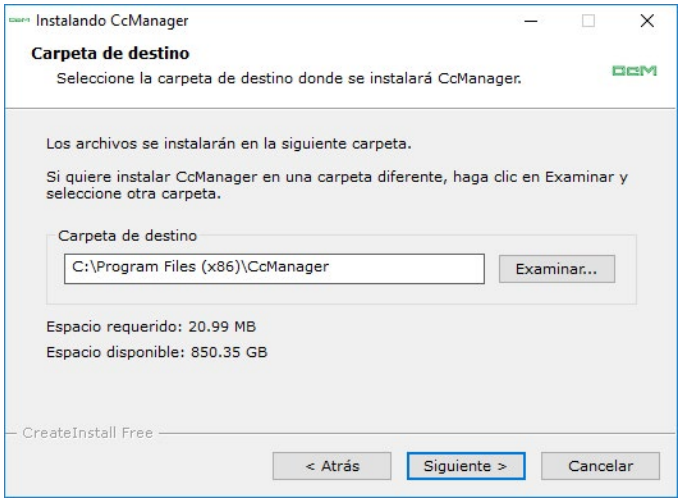

Figure 2. Windows – Installation process 2 of 4

- The files which are necessary to run the programme, will start copying in your system (you will see that on the progress bar as shown in Figure 3).

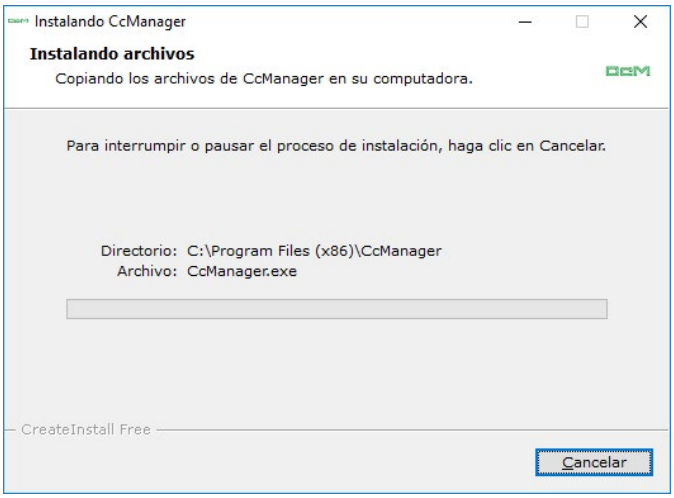

Figure 3. Windows – Installation process 3 of 4

- Unless there is an issue, the installation process will be finished. To close the installation assistant, click on the "Finish" button.

To run the programme, double click on the shortcut created on your desktop or access the location where you installed the file (selected in Figure 2, by default "C:\Program Files (x86)\CcManager") and run the 'CcManager.exe file.

2.2 LINUX (UBUNTU) VERSION

Once you have downloaded the Ubuntu executable file, run the installation file to start the process. You should access it as a superuser.

- Click on "Install package" to start the installation (Figure 4).

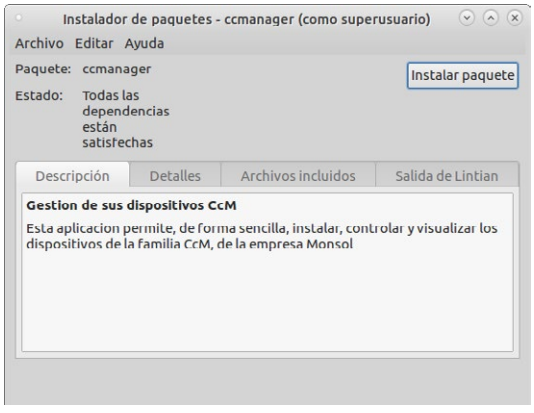

Figure 4 Linux – Installation process 1 of 3

- A pop-up window will appear showing the installation process (Figure 5). If you select the "Close automatically once the changes are successfully applied" option, you will see a window similar to the previous one once the process finishes.

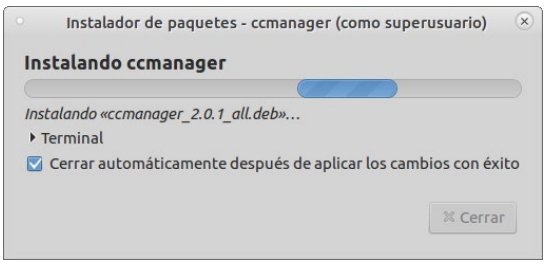

Figura 5 Linux – Proceso de instalación 2 de 3

- In the package installation window, you will see that the CcManager is installed in the system (Figure 6).

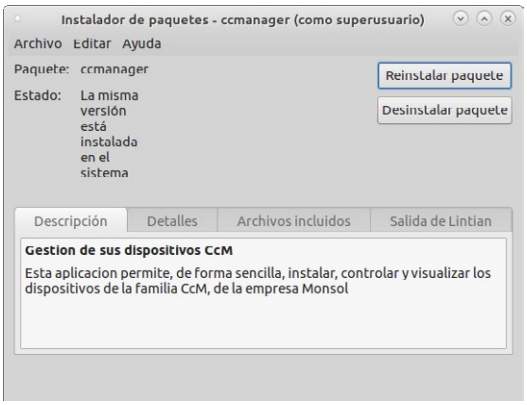

Figure 6 Linux – Installation process 3 of 3

3 GRAPHIC USER INTERFACE (GUI)

This section describes the CcManager GUI and its different windows and options.

When configuring and managing the installations, it is important to be clear about the hierarchy of the objects, which appear in the CcManager interface (Figure 7). The installation will be the principal element, for example: "factory". The installation may contain one or more electrical boxes, for example; "engine room". Each electrical box will act as an electrical unit, in which the CcM devices will be installed and connected between themselves via buses. The buses may be connected using either cables or WiFi (for more information regarding how to create the buses, consult the manual of the CcM

devices in question available at www.energyccm.com). Each electrical box will contain one or more buses, for example: "USB"..

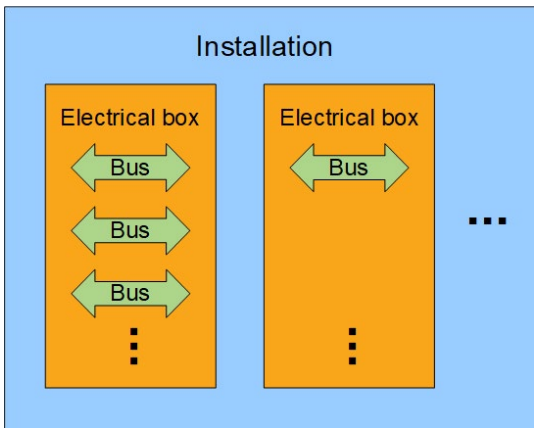

Figure 7 CcManager object hierarchy

3.1 INSTALLATIONS

In this menu the user can manage the installations using three options, which appear in a drop-down menu:

- "Add": Add installations
- "Modify": Modify installations
- "Remove": Remove installations

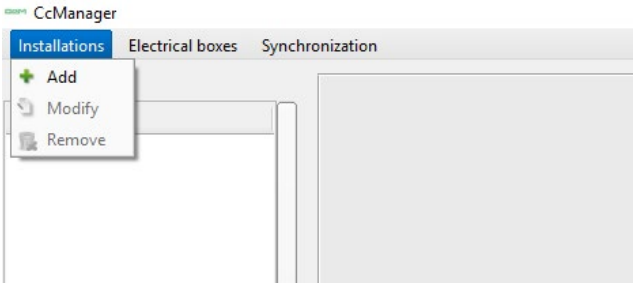

Figure 9 Installations menu

Figure 8 CcManager GUI

In the upper menu bar of the main interface, you can see the following options as shown in Figure 8:

1. Installations
2. Electrical boxes
3. Synchronization
4. Select installation
5. Data synchronization
6. Electric Diagram
7. Data display

They are described in the following sections.

3.1.1 Add

This button from the "Installations" drop-down menu allows you to add a new installation. In the "Manage Installations" pop-up window you should:

- Write the name of the new installation in the "Name" field.
- Click on the "OK" button.

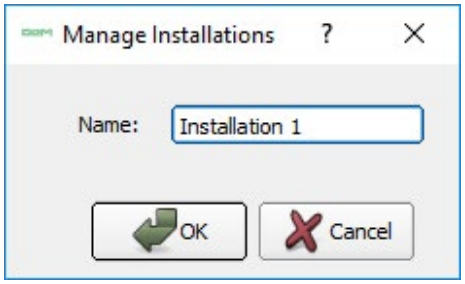

Figure 10 Installations – Add

Once this is done, the new installation will appear in the "Select Installation" drop-down menu of the CcManager GUI (Figure 8).

3.1.2 Modify

This button from the "Installations" drop-down menu allows you to change the name of an existing installation. In the "Manage Installations" pop-up window you should:

- Select the installation you wish to modify in the "Select Installation" drop-down menu.
- Fill the "Name" field with the new name.
- Click on the "OK" button.

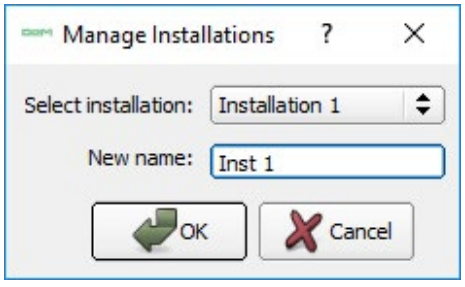

Figure 11. Installations – Modify

Once this is done, the name of the installation will be updated in the "Select Installation" drop-down menu of the CcManager GUI (Figure 8).

3.1.3 Remove

This button from the "Installations" drop-down menu allows you to remove an existing installation. In the "Manage Installations" pop-up window you should:

- Select the installation you want to remove in the "Select Installation" drop-down menu.
- Check the option "Are you sure? This will be permanent" to confirm that you really want to remove the installation.
- Click on the "OK" button.

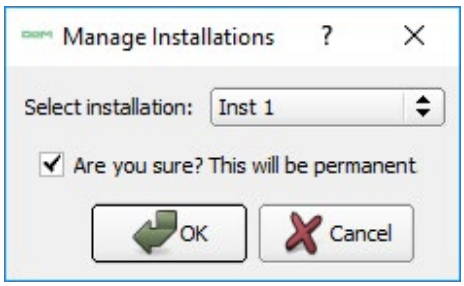

Figure 12 Installations – Remove

After that the installation will disappear from the "Select Installation" drop-down menu in the CcManager GUI (Figure 8).

3.1.4 Select Installation

Using the "Select installation" drop-down menu the user can select the installation that they want to manage.

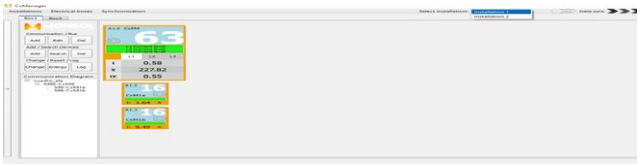

Figure 13 Installations – Select installation

3.2 ELECTRICAL BOXES

In this menu the user can manage the electrical boxes using three options, which appear in a drop-down menu:

- "Add": Add electrical boxes
- "Modify": Modify electrical boxes
- "Remove": Remove electrical boxes

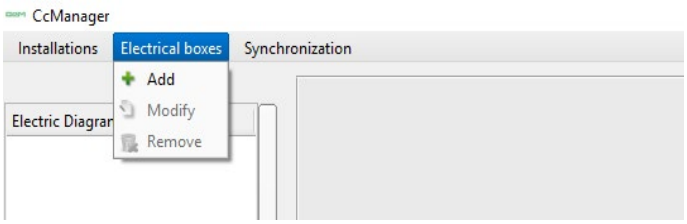

Figure 14 Electrical Boxes menu

3.2.1 Add

This button from the "Electrical boxes" drop-down menu allows you to add a new electrical box. In the "Manage Electrical boxes" pop-up window you should:

- Write the name of the new box in the "Name" field.
- Click on the "OK" button.

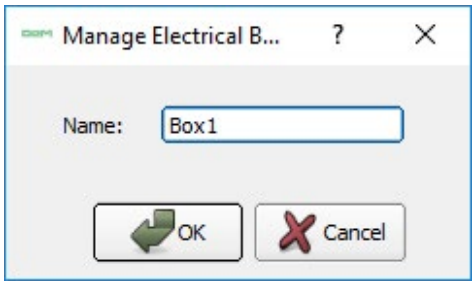

Figure 15 Electrical Boxes – Add

Once you have created an electrical box, the interface will change with new buttons appearing as shown in Figure 16. In this interface you can see five clearly differentiated sections:

- Communication / Bus
- Add / Search Devices
- Change / Reset / Log
- Communication Diagram
- Data display

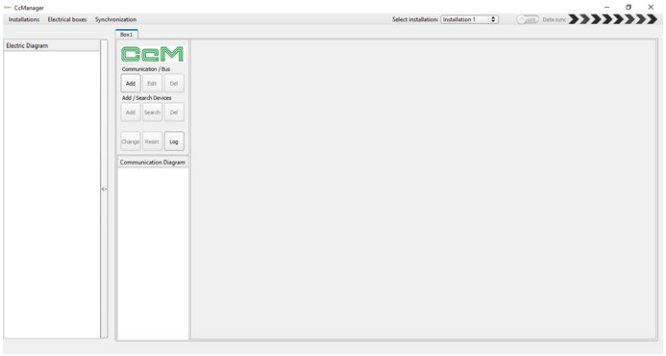

Figure 16 Interface - Electrical box

3.2.1.1 Communication/Bus

In the "Communication/Bus" section in the electrical box, there are three buttons: "Add", "Edit" and "Del".

3.2.1.1.1 Add

This button allows you to add a new communication bus to the electrical box. When you click on this button, the following pop-up window will appear:

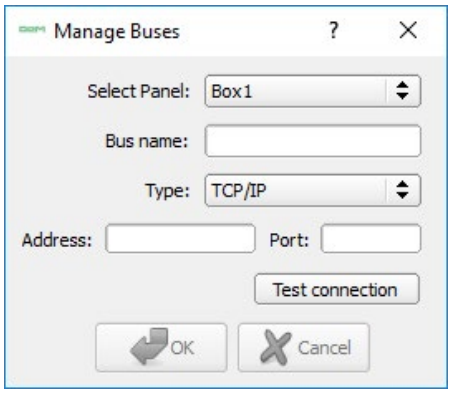

Figure 17 Electrical Boxes – Communication/Bus – Add

- "Select Panel": On this drop-down menu, you should select the electrical box.
- "Bus name": In this field, you should write the name of the bus that you want to add.
- "Type": You will be able to select whether the bus to be added is TCP/IP or COM.

If you select TCP/IP bus, the following fields will appear:

- o "Address": IP address of the bus
- o "Port": Connection port of the device
- o "Test connection": Once you have selected the Address and Port, you will be able to test the connection using this button. In case that it was configured correctly, you will see the ✅ symbol, otherwise ❌.

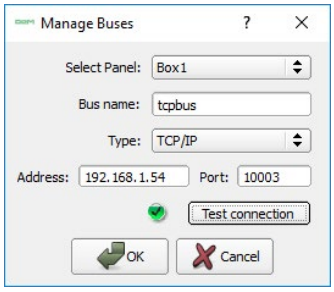

Figure 18 Electrical Boxes – Communication/Buses – Test Connection OK

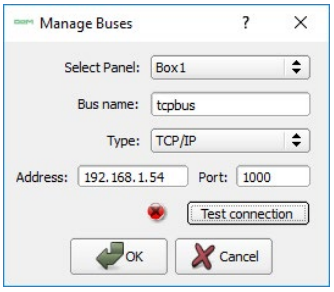

Figure 19 Electrical Boxes – Communication/Buses – Test Connection FAIL

If you select the COM bus, the following fields will appear:

- o A drop-down menu with all the COM ports detected in the device.
- o "Test connection" button: Similarly to the TCP/IP case, you will be able to test the connection. In case it was successfully established, you will see the ✅ symbol, otherwise ❌.

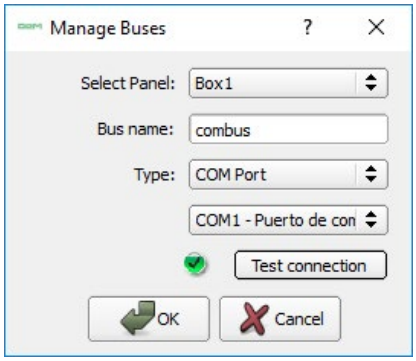

Figure 20 Electrical Boxes – Communication/Buses – Bus COM

Once all the fields are filled out, you should click on the "OK" button and the new bus will appear in the "Communication Diagram" box.

3.2.1.1.2 Edit

By clicking on this button, the user can edit a bus and modify its configuration parameters.

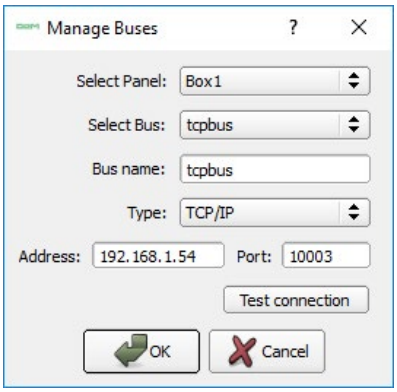

Figure 21 Electrical Boxes – Communication/Buses – Edit

To do that, you should:

- Select the electrical box, which corresponds to the installation ("Select Electric Box").
- Select the bus to be modified ("Select Bus").
- Write the new bus name ("Bus Name").
- Indicate the bus type (TCP/IP or COM Port in "Type").
  - o If it is TCP/IP, specify the address ("Address") and port ("Port").
  - o If it is COM, specify the port to which it is connected.
- It is optional but recommended to test the communication ("Test Connection").

Once all the fields are filled in, you should click on the "OK" button and the bus name will be updated in the "Communication Diagram" field.

3.2.1.1.3 Del

By clicking on this button, the user can delete an existing bus.

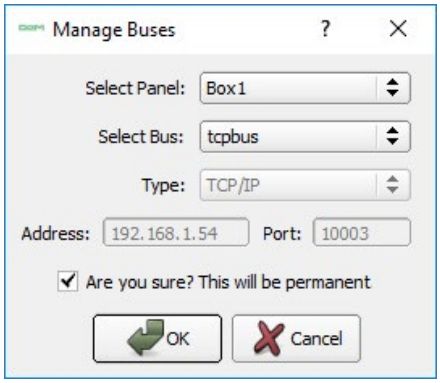

Figure 22 Electrical Boxes – Communication/Buses – Del

To do that you should:

- Select the panel, to which the bus belongs ("Select Panel").
- Select the bus to be removed ("Select Bus").
- Select the option "Are you sure? This will be permanent" to confirm that you really want to remove the communication bus.

Once all the fields are filled out, you should click on the "OK" button and the name of the bus will disappear from the "Communication Diagram" box, together with other possible devices connected to it.

3.2.1.2 Add/Search Devices

In the "Add/Search Devices" section in the electrical box, there are three buttons: "Add", "Search" and "Del".

3.2.1.2.1 Add

Using this button, you can manually add a device. By clicking on it, the following pop-up window will appear:

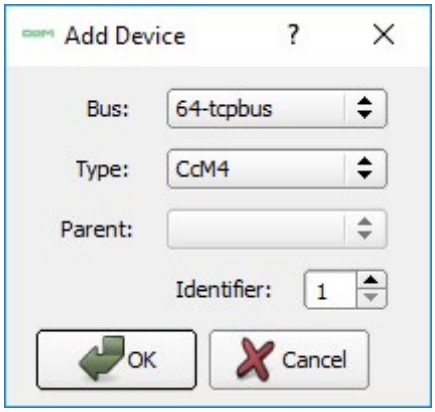

Figure 23 Electrical Boxes – Add/Search Devices – Add

- "Bus": Drop-down menu to select the bus, to which the devices will be connected.
- "Type": Type of connected device.
- "Parent": "Electrical" parent of the device, in case it has one.
- "Identifier": Device identifier.

Once all the fields are filled out, you should click on the "OK" button and the new device will appear in the "Communication Diagram" box.

Once a device is added to the electrical box, CcManager will start to store all the data collected by the device in question on the PC/PLC. The data will be accessible for the user in the installation path of the programme, in the "CcManager/Database/CSV/[year]/[month]" folder, showing the year and month when the data was collected. CcManager will create a .csv file for every device and day of data collection.

3.2.1.2.2 Search

When you click on this button, the programme will automatically start to search for devices in the added buses. A progress bar will appear showing the number of devices found in the bus:

Figure 24 Electrical Boxes – Add/Search Devices – Search

Once the search operation finishes, the communication diagram ("Communication Diagram") will be updated and the new devices will appear in the "Data Display":

Figure 25 Electrical Boxes – Devices

In case of Figure 25 there is a principal CcM4 device and two CcM1 secondary devices connected to the same secondary bus.

For more information regarding the type of buses (principal or secondary) see the manual of the CcM device connected to the bus in question available at www.energyccm.com.

By clicking on the configuration section of each of the devices, a configuration window ("Advanced settings") will appear. The configuration window type will depend on the device to be configured (section 3.2.1.3).

3.2.1.2.3 Del

This button enables to delete an existing device.

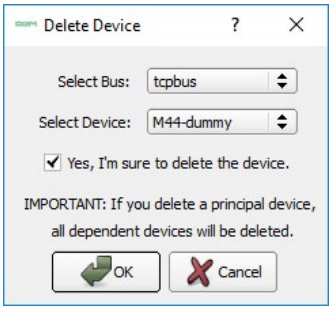

Figure 26 Electrical Boxes – Add/Search Devices – Del

To do that it is necessary to:

- Select the bus, which is currently connected to the device ("Select Bus").
- Select the device ("Select Device").
- Select the option "Yes, I'm sure to delete the device" to confirm that you really want to delete the device.

Once all the fields are filled in, you should press the "OK" button and the device name will disappear from the "Communication Diagram" box, together with all the other possible secondary devices connected to it.

⚠ *Keep in mind that if you delete a principal CcM device and it has a secondary bus with secondary CcM devices connected to it, all the devices of the secondary bus will be deleted.*

3.2.1.3 Data Display

This will be the part of the user interface where the devices appear in a block diagram following the communication diagram topology ("Communication Diagram").

The distribution of the different buses will be vertical, which means that there will be as many columns as many different buses there are within the same electrical box.

As you can see in Figure 25, the devices appear in rectangles. There are two types of rectangles with regards to whether the device is secondary or principal.

3.2.1.3.1 Principal CcM device

Below the symbol used for a principal CcM device is shown, with further details regarding its meaning in each field:

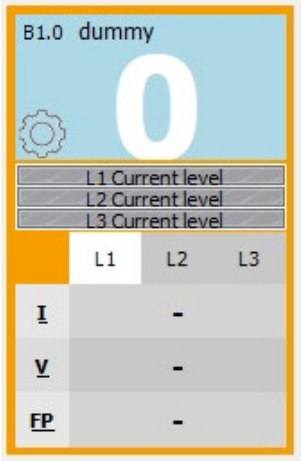

Figure 27 Electrical Boxes – Data display – Principal CcM device

1. Name of the device and communication diagram hierarchy
2. Device configuration button.
3. Nominal value of the maximum current of the associated breaker (thermal-magnetic switch, residual-current circuit breaker, etc.).
4. Indicator of breaker charge with regards to the maximum current it can handle.
5. RMS Current, RMS Voltage and Power Factor.

When you click the device configuration button, a pop-up window "advanced settings" will appear as the one shown in Figure 28, which corresponds to a CcM4 device.

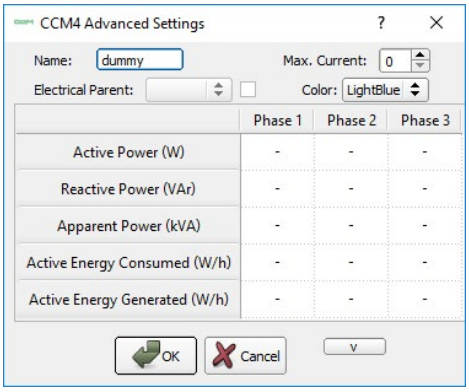

Figure 28 Electrical Boxes – Data display – Principal CcM device – Advanced settings

In the header, there are parameters, which can be configured by the user:

- "Name": Device name (by default "dummy").
- "Color": Color of the box showing the device name and the nominal value of the maximum current.
- "Max. Current": Nominal value of the maximum current of the thermal-magnetic switch or residual-current circuit breaker, to which it is connected. Based on this parameter, the color of the indicator of the circulating current will change with regards to the maximum value of the electrical device (Figure 27).

In the table, all the parameters measured by the principal device are shown, such as the active, reactive and apparent power and consumed and generated energy.

3.2.1.3.2 Secondary CcM device

Below the symbol used for a secondary CcM device (CcM1) is shown with further details of its meaning in each field:

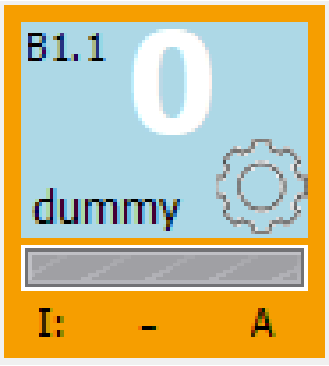

Figure 29 Electrical Boxes – Data Display – Secondary CcM device

1. Name of the device and communication diagram hierarchy
2. Nominal value of the maximum current of the associated breaker (thermal-magnetic switch, residual-current circuit breaker, etc.).
3. Device configuration button.
4. Indicator of breaker charge with regards to the maximum current it can handle.
5. RMS current.

When you click the device configuration button, a pop-up window "CcM1 advanced settings" (Figure 30) which shows various parameters associated to a secondary device, will appear.

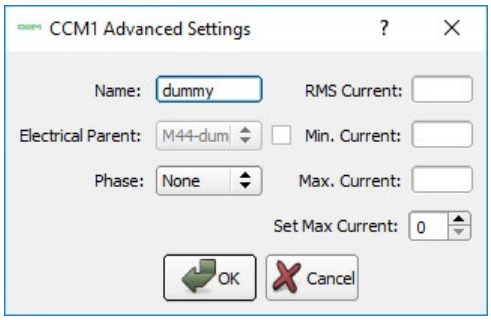

Figure 30 Electrical Boxes – Data Display – Secondary CcM device – Advanced settings

In the first column, there are parameters, which can be configured by the user:

- "Name": Device name (by default "dummy").
- "Electrical Parent": Superior device in the electrical hierarchy. This will appear reflected in the "Electric Diagram" (see section 3.4).
- "Phase": In case the device receives as an input a specific phase of a three-phase line which is monitored by the "electrical parent", this parameter can show which phase it is (Phase 1, Phase 2 or Phase 3).
- "Set Max. Current": Nominal value of the maximum current of the thermal-magnetic switch or residual-current circuit breaker, to which it is connected. Based on this parameter, the colour of the indicator of the circulating current will change with regards to the maximum value of the electrical device (Figure 29).

In the second column, there are parameters measured by the device:

- "RMS Current": Measured RMS current.
- "Max. Current": Maximum recorded current.
- "Min Current": Minimum recorded current.

3.2.1.4 Change/Reset/Log

3.2.1.4.1 Change

Using the "Change" button, it is possible to change the identifier of any principal device connected to a principal bus. To do that, the user must first put the device in question in synchronization mode (for more information regarding the mode change, see the manual of the principal CcM device). Once you have done this, click on the "Change" button and a window will appear as shown in Figure 31.

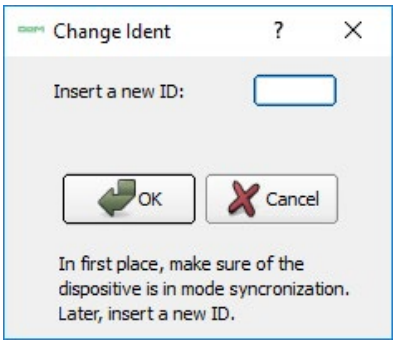

Figure 31 Electrical Boxes – Change ID

Select the new identifier of the principal device and click "OK". In case the operation was successful, the message "The ID has been changed" will appear and there will be an option to change another ID (Figure 32). Nevertheless, if the operation has failed because there was no device in the synchronization mode or because the ID to be assigned is already used by another device in the bus, the message "The change of ID has failed" will appear (Figure 33).

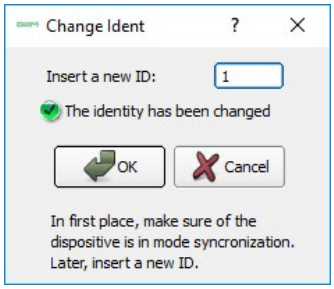

Figure 32 Electrical Boxes – Change ID success

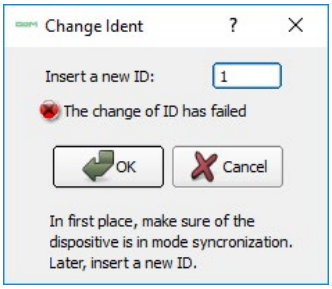

Figure 33 Electrical Boxes – Change ID fail

⚠ *Keep in mind that only one principal CcM device must be configured in synchronization mode when the ID change takes place. Otherwise, the CcManager will assign the same address to all the devices in synchronization mode, which causes collisions in the bus.*

3.2.1.4.2 Reset

Using the "Reset Energy" button, you can reset to zero all the energy records of the principal CcM device of your choice in the window that we can see in Figure 34.

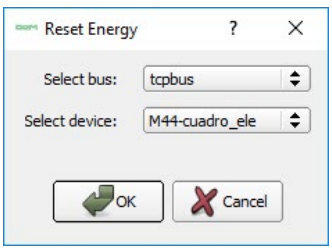

Figure 34 Electrical Boxes – Reset Energy

The energy values are recorded even though the device is turned off and it is only possible to reset them through this button. To do that, you should:

- Select the bus to which the device you wish to reset is connected, using the drop-down menu "Select bus".
- Select the device using the drop-down menu "Select device"
- Click "OK".

If the operation was successful, the confirmation message "Energy accumulation has been reset" will appear.

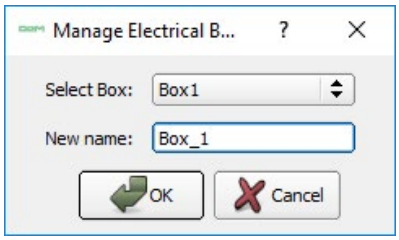

Figure 35 Electrical Boxes – Reset Energy success

3.2.14.3 Log

Using the "Log" button, the user will obtain information regarding any events, which occurred in any of the buses.

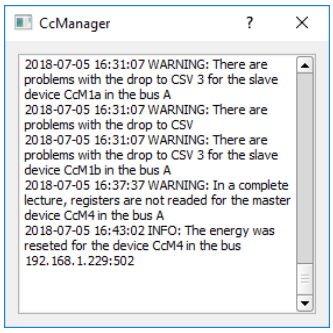

Figure 36 Electrical Boxes – Log

The information available in this window will also be accessible to the user in the installation pathway of the program in the "CcManager/Database/Log" folder. CcManager will create a text file .log for every device and day of data collection.

3.2.2 Modify

This button from the "Electrical boxes" drop-down menu allows you to change the name of an existing electrical box. In the "Manage Electrical boxes" pop-up window (Figure 37), you should:

- Select the correct electrical box in the "Select Box" drop-down menu.
- Fill out the "New name" field with the new name of the electrical box.
- Click on the "OK" button.

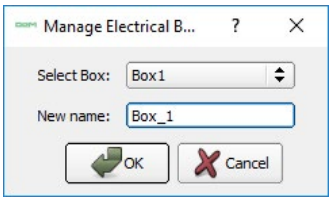

Figure 37 Electrical Boxes – Modify

3.2.3 Remove

This button from the "Electrical boxes" drop-down menu allows you to remove an existing electrical box. In the "Manage Electrical boxes" pop-up window (Figure 38), you should:

- Select the name of the electrical box that you wish to remove in the "Select Box" drop-down menu.
- Check the option "Are you sure? This will be permanent" to confirm that you really want to remove the electrical box.
- Click on the "OK" button.

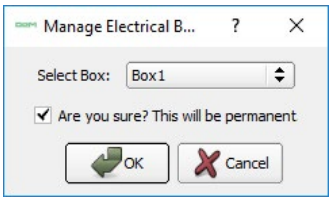

Figure 38 Electrical Boxes – Remove

⚠ *Keep in mind that if you remove an electrical box, it will also make disappear all the buses and devices that you might have previously configured in that box.*

3.3 SYNCHRONIZATION

In this menu, the user may enter the credentials to prove that he or she has a licence to use the application. With this licence you will be able to access the data using the EnergyCcM website (section 4) remotely.

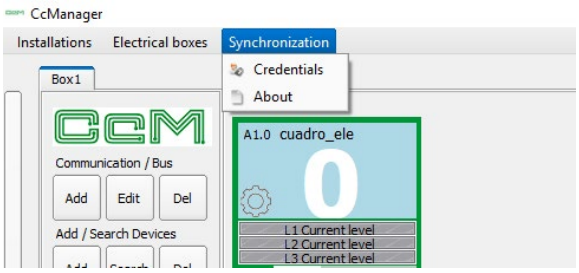

Figure 39 Synchronization menu

First, the user should register on the web portal www.energyccm.com. When you register a new product such as CcManager, you will receive all the credentials required for the synchronization via email: "Client code" and "Client password". For more information consult the EnergyCcM manual, available at www.energyccm.com.

Once you have the credentials, you should:

- Click on "Synchronization".
- Click on "Credentials". A pop-up window will appear as the one shown in Figure 40.
- Enter the "Client code" and "Client password" you received via the portal www.energyccm.com and click OK.

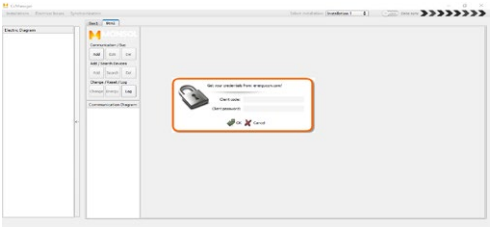

Figure 40 Synchronization – Credentials

Once the credentials are entered, you should click the sliding button next to the "Data sync" option (Figure 41). By activating it, the data synchronization will start to synchronize with the Monsol server. In this way, the user may access the data of his installation remotely using the EnergyCcM web platform (section 4).

Figure 41 Synchronization – Data sync

3.4 ELECTRIC DIAGRAM

In this section, you will find the electric connection tree of the installation devices. The tree will show the possible electrical dependency between the principal and secondary devices. In the example in Figure 42, there is a CcM4 with a secondary bus, which has two CcM1 connected to it (CcM1a and CcM1b), however, only one of them (the CcM1a) is connected to a phase monitored by the CcM4. The CcM1b is connected to a different line, therefore it does not have any superior device in the electrical hierarchy.

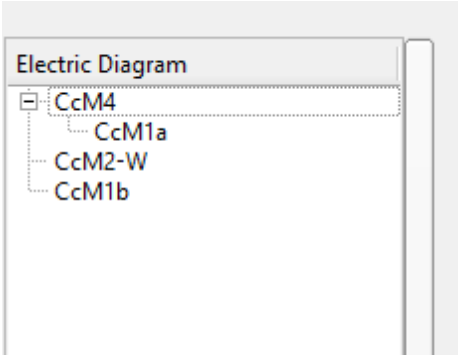

Figure 42 Electric Diagram

4 ENERGYCCM PORTAL

The EnergyCcM Portal is a web platform created by Monsol to offer its users a tool to visualize data from their CcM devices. The link to access the web portal is the following:
http://www.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. It is also possible to link complete local installations previously managed using the CcManager software (for more information regarding CcManager, see the manual available at www.energyccm.com).

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 via 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 reports and to send the data via FTP to other servers.

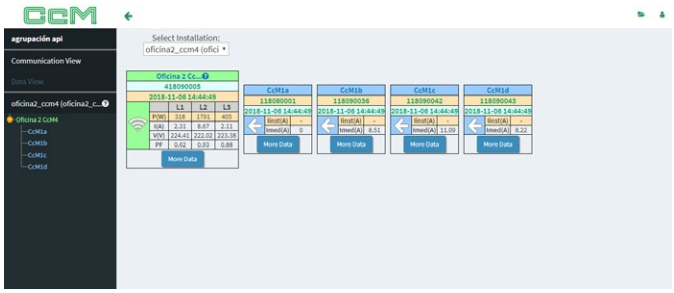

Figura 43 EnergyCcM – Communication View

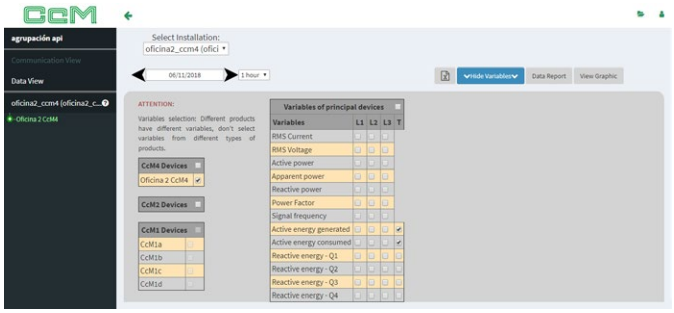

Figura 44 EnergyCcM – Data View

For more information consult the EnergyCcM manual, available at www.energyccm.com.

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