MAXIMUM DEMAND CONTROLLER
MDC -20

USER MANUAL

(M98251101-03-14A)

LOG OF REVISIONS

Date	Revision	Description
20/02/2014	14A	Initial version.

SAFETY PRECAUTIONS

Follow the warnings described in this manual with the symbols shown below.

	**DANGER:** Warns of a risk, which could result in personal injury or material damage.
	**WARNING:** Indicates that special attention should be paid to a specific point.

If you have to handle the unit for its installation, start-up or maintenance, bear in mind the following:

	Incorrect handling or installation of the unit may result in injury to personnel as well as damage to the unit. In particular, handling with voltage applied may result in electric shock, which may cause death or serious injury to the personnel involved. Defective installation or maintenance may also lead to the risk of fire. Carefully read the manual prior to connecting the unit. Follow all installation and maintenance instructions throughout the unit's working life. Pay special attention to the installation standards of the National Electrical Code. If in order to install the unit it is necessary to work in areas with high-voltage (HV) units; bear in mind that the personnel that handle units in this area must be trained and authorised to work in HV installations.

	**Refer to the user manual before using the unit** If the instructions preceded by the danger or warning symbol are not respected, this can result in personal injury or damage to the unit and/or installations.

DISCLAIMER

CIRCUTOR, SA reserves the right to make modifications to the unit or the unit specifications set out in this user manual without prior notice.

The term of the CIRCUTOR guarantee is two years from the date of purchase and is limited to a refund of the purchase price, free repair or replacement of the faulty unit that is returned to the CIRCUTOR after-sales service within the term of the guarantee.

CIRCUTOR, SA provides its customers with the latest versions of unit specifications and the most updated manuals on its web site. www.circutor.com

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1 VERIFICATION UPON RECEPTION

Check the following points when you receive the unit:

- The unit meets the specifications on your order.
- The unit has not suffered any damage during transport.
- Perform an external visual inspection of the unit prior to switching it on
- Check that the power supply voltage of the unit is right for the mains to which it is to be connected

	If any problem is detected upon reception, immediately contact the transport company and/or CIRCUTOR's after-sales service

Read this manual carefully before connecting the unit in order to avoid incorrect use that may cause permanent damage.

This manual contains all the necessary information for the safe use of the units and getting the best performance out of them.

1.1 Storage

The unit should be stored according to the following recommendations:

- Avoid placing it on uneven surfaces.
- Do not store in outdoor areas, humid areas or areas exposed to the splashing of water.
- Do not install near hot spots (maximum ambient temperature: 45 ºC)
- Avoid saline and corrosive environments.
- Avoid storing the unit in areas where dust is generated or where the risk of chemical or other types of contamination is present.
- Do not place any weight on top of the unit.

2 PRODUCT DESCRIPTION

The **MDC-20** is a maximum demand controller, which controls the power demanded by an installation (or part of it) based on disconnecting certain dispensable loads before the power exceeds certain limits. This prevents the consumption of excess power or peaks, which generally result in high penalties in the electricity bill or unwanted tripping of the current limiters. It is recommended that non-priority loads are disconnected, so that demand management does not affect the normal working of the installation.

The MDC-20 has an internal web server from which the user can view in real time the variables measured and others obtained by calculation, and the status of the unit inputs and outputs with the possibility of managing them.

In addition to providing data reading/writing via the web, the unit has an XML server, enabling the user to send GET and PUT type requests.

2.1 Internal WEB SERVER

The MDC-20 has an internal WEB server that allows you to connect to an Ethernet network. This allows the user to read internal variables in real time or obtain historic logs as graphics or tables.

To connect to the Ethernet network, the MDC-20 must be correctly configured. Once configured and integrated in the Ethernet network, the unit variables are visible to the user via a conventional Internet browser, provided the appropriate Java virtual machine is available and installed on the computer. The machine is available at the following address: http://www.java.com/es/download. Another way of viewing the variables on the unit is through the PowerStudio® Scada Client which must be installed on the computer.

To communicate with the unit via the web and view the variables on the browser, the user must access an IP address or an alias in DHCP (Dynamic Host Configuration Protocol) page name format:

http://xxx.xxx.xxx.xxx ,

or the DHCP name, http://name_dhcp ; where:

xxx.xxx.xxx.xxx is the IP address assigned by the user and
name_dhcp is the name assigned and authenticated by the local area network (LAN) name server.

2.2 XML server

XML, which stands for eXtensible Markup Language, is a mark-up language developed by the World Wide Web Consortium (W3C) used to store machine-readable data.

XML is a standard for exchanging structured information between different platforms (databases, tables of variables, text editors, spreadsheets, etc.)

The XML server is an excellent tool for integrating MDC-20 with external applications.

2.3 Digital inputs

The MDC-20 has 8 digital inputs, whose function is to count impulses from external analyzers or to detect the logic state of external sensors (voltage free contacts). The contacts for activating the unit's digital inputs must be voltage-free contacts (the device provides an internal power supply). The unit detects an open or closed contact between a common terminal and the corresponding input terminal.

2.3.1 Impulse counter function

It is normal for fluid or energy meters to be equipped with an impulse output with a frequency proportional to the measured energy or flow. The MDC-20 can be used as a centralising metering unit, using its 8 digital inputs for reading as many meters as available inputs. Note that this enables centralising electrical energy metering, as well as water, gas, hot water meters, etc. which have a pulse output channel.

The unit is equipped with 8 non-volatile memory logs that add together the logs of the above-mentioned energy meters. Each log is 32 bits (4 bytes), so it counts a maximum of up to 4,294,967,295 impulses. When a log reaches said maximum value, the next impulse resets the energy meter to zero.

2.4 Digital outputs

The unit has 6 relay digital outputs. Through the communication servers, the user can remotely manage the outputs (i.e. you can open, close, generate an impulse, etc.).

These actions can be carried out manually or by a program, determined by events detected by the unit (see PowerStudio® Scada software manual).

2.5 RS-485 communication bus

The unit has a RS-485 communication bus for linking to external peripherals through a field bus. The MDC-20 can act as a field bus master and temporarily store data on the peripherals in a 200MB internal memory, which is filled cyclically, deleting the oldest data. That memory and the web access capacity enables real time viewing for the user and being able to record the data from the units connected to the field bus, although it is not read immediately. The PowerStudio® Scada software allows the simple production of calculations using the measured variables and the display in graphics and tables of the various parameters recorded.

2.6 PowerStudio® and PowerStudio® SCADA Software

To configure the field bus and manage both real time and historical data, the user must connect the MDC-20 to a computer (normally via the Ethernet) and install in that computer one of the PowerStudio® or PowerStudio® Scada applications. This makes it possible to export the configuration of the unit and add or remove analyzers or slaves connected to the field bus. The MDC-20 allows you to configure up to a maximum of 5 slave units connected to your network.

For more details on how to configure all the system features, read the PowerStudio®/Scada Editor manual, where you can find all the information on:

- Importing or exporting the configuration of the MDC-20 system
- Configuring new units or slaves
- Tariff discriminators / calendars
- Calculated variables.
- System events and alarms.
- Authentication configuration.
- Web system security.
- Etc.

	Without the PowerStudio® or PowerStudio®Scada Editor, it is not possible to configure the power control application, and equip the MDC-20 with all its features.

3 UNIT INSTALLATION

3.1 Prior recommendations

	Unit installation and maintenance must only be carried out by authorised and qualified personnel. Before carrying out any maintenance work, make sure you disconnect the unit's power supply. Those people who handle the unit must follow the safety measures set out in the EN standards and the electrical code of the country where it is being used, using the necessary personal protective equipment and heeding the various warnings indicated in the user manual. The unit must be connected to the power circuit protected with GL or M type fuses, in accordance with IEC 269, with gauges ranging from 0.5 to 1 A. The unit must be connected to the mains with a magneto-thermal or equivalent switch, so that it can be disconnected. The power supply cable must have a minimum cross-section of 1 mm².
	**Check the earth connection** before connecting the unit to the power supply. Any fault in the earth connection might cause a risk of electrocution to the user and damage to the unit in case of lightning or other transients.

3.2 Installation location

The unit must be installed in an environment where the environmental conditions indicated in the technical features section are respected.

3.3 Wiring diagrams

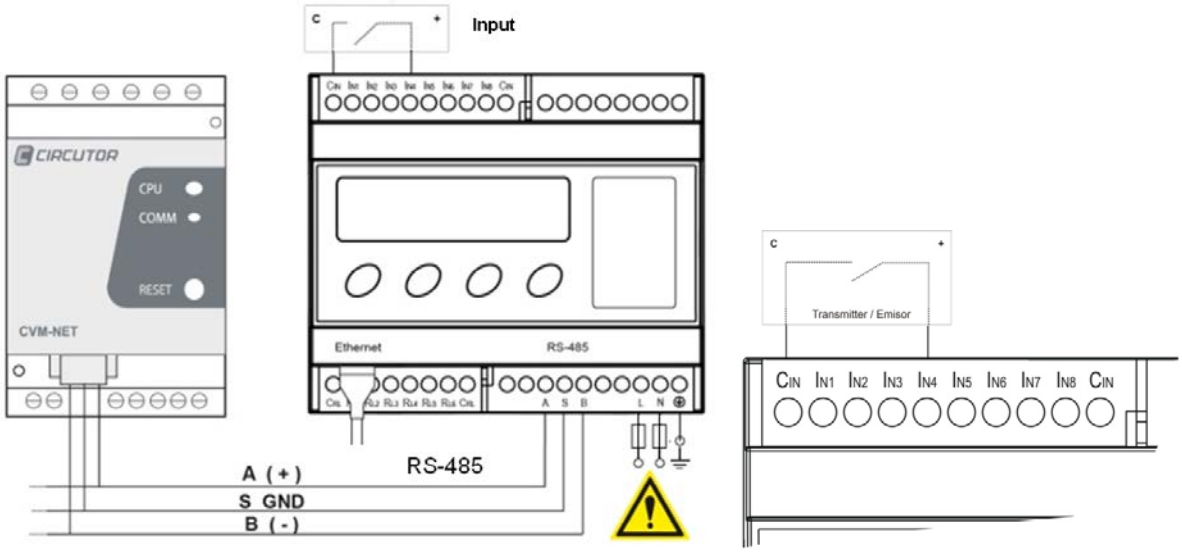


Fig.3-1 . –Basic connection diagram with RS-485 communications and illustration of input activation contact I_{N4}

4 CONFIGURATION

The unit requires two types of configuration:

1) Configuration of the Ethernet network (IP addressing)
2) Functional configuration of the internal application and possible association with other field units through the RS-485 bus.

4.1 Buttons

The front panel of the MDC-20 comes with an alphanumeric LCD screen and four buttons for navigating through the different screens for the configuration of the unit.

Buttons - short and long press:

SHORT PRESS: Less than two seconds.

LONG PRESS: More than two seconds.

4.1.1 Button functions

The functions of the buttons are shown in Table 4-1

Table 4-1.- Button functions:

	Move the cursor to the left to make another change to the numeric or alphanumeric digit.
	Move the cursor to the right to make another change to the numeric or alphanumeric digit.
	If there is no cursor on the screen change to the previous setup menu option. If there is a cursor, press the button to increase the digit being indicated by the cursor.
	If there is no cursor on the screen change to the next setup menu option. If there is a cursor, press the button to decrease the digit being indicated by the cursor.

4.2 Configuration of ETHERNET network communications

The MDC-20 can be connected to a 10/100BaseTX self-detecting ETHERNET network. To integrate the unit in a Local Area Network (LAN), previously configure the unit.

To configure the communications of the MDC-20 for its integration in the ETHERNET network, you can press the unit's buttons or, if you know its IP address, you can use a conventional Internet browser and access the configuration page.

To see the unit's IP address simultaneously press for 2 seconds the buttons  . See Fig. 4-1

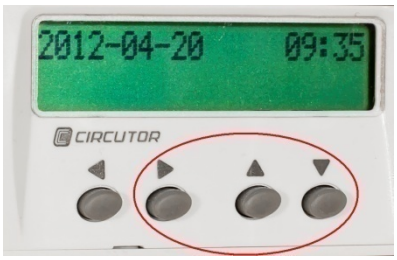


Fig. 4-1 . – Pressing of buttons to configure the IP address

5 Configuration of network parameters with the unit's buttons

The ETHERNET network parameters can be fully configured using the function buttons on the front panel of the unit.

To access the setup menu, simultaneously hold down the arrow buttons  for more than 2 seconds (long press). While the buttons are pressed, the unit displays the text hold on 2 SEconds to EntEr SEtUP (hold for 2 seconds, until accessing the configuration); after this time has elapsed, the unit will show on the screen EntEring SEtUP rELEASE tHE HEYS ,after entering the configuration, stop pressing the buttons

5.1 MAC address

After entering the setup menu, the unit displays the caption EDS-CPP, the version and MAC (Media Access Control) physical address on screen, with a 00:26:45:XX:XX:XX type format. This is an information panel that the user can use to check the physical address of the unit. To go to the next configuration screen press the button 

5.2 DHCP assignment

After entering the setup menu, the unit displays the DHCP (Dynamic Host Configuration Protocol), and shows by default the "no" option. To change the on-screen option, press the button  , until the “yes” option appears. If you repeat this action, the unit cyclically displays both options “yes”/”no”, until one of them is validated with  . With the DHCP server activated, as described in the above paragraph (“yes” selection), press the button  to validate and move to the next option.

5.3 Configuration with the DHCP “no” option

If the DHCP server is not enabled, see section 5.2, validate the “no” option in the DHCP assignment with the button  to move to the next screen.

5.3.1 IP - (with DHCP “no”)*

With this option the user can configure an IP address for the MDC-20 unit. For this press the button  , activating the edit cursor on the first digit. With the buttons  parameterise a numerical data entry of the type 000.000.000.000. After establishing the parameters, press the  button repeatedly until the edit cursor disappears and validate the data with the  button, moving to the next screen.

5.3.2 NetMask - (with DHCP “no”)*

To configure the NetMask press the  button, activating the edit cursor on the first digit. With the buttons  parameterise a numerical data entry of the type 000.000.000.000. After establishing the parameters, press the  button repeatedly until the edit cursor disappears and validate the data with the  button, moving to the next screen.

5.3.3 Gateway – (with DHCP “no”)*

To configure the Gateway press the button  , and the edit cursor will be placed on the first digit. With the buttons  edit the IP address of the type 000.000.000.000. Once edited, press the  button repeatedly until the edit cursor disappears and validate the data with the  button, moving to the next screen.

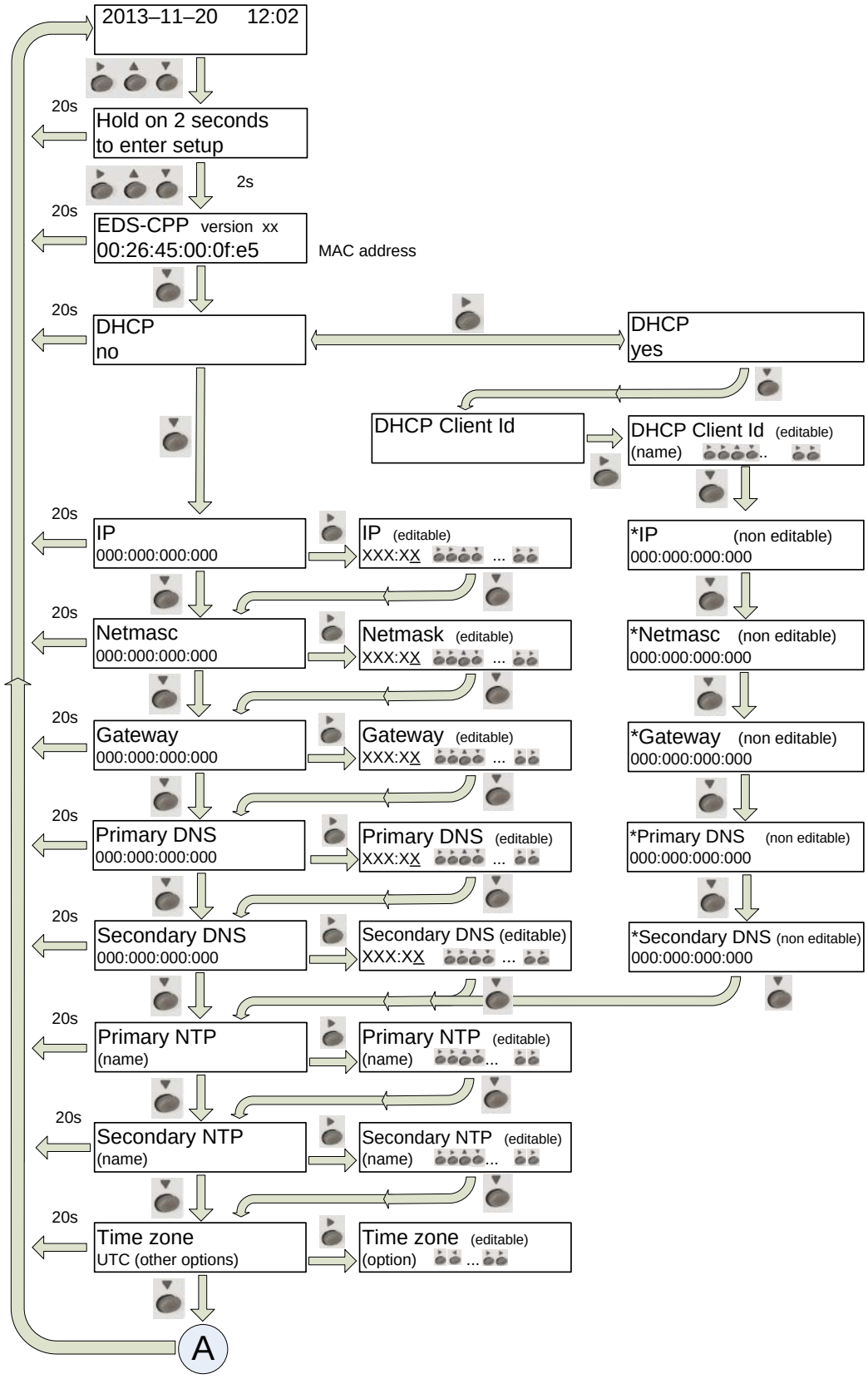


Fig.5-1 . – Menu flow diagram (1)

NOTE: When selecting DHCP yes, given that the DHCP server has still not assigned the Ethernet addressing values, all the parameters will appear with 000.000.000.000, but they are not editable.

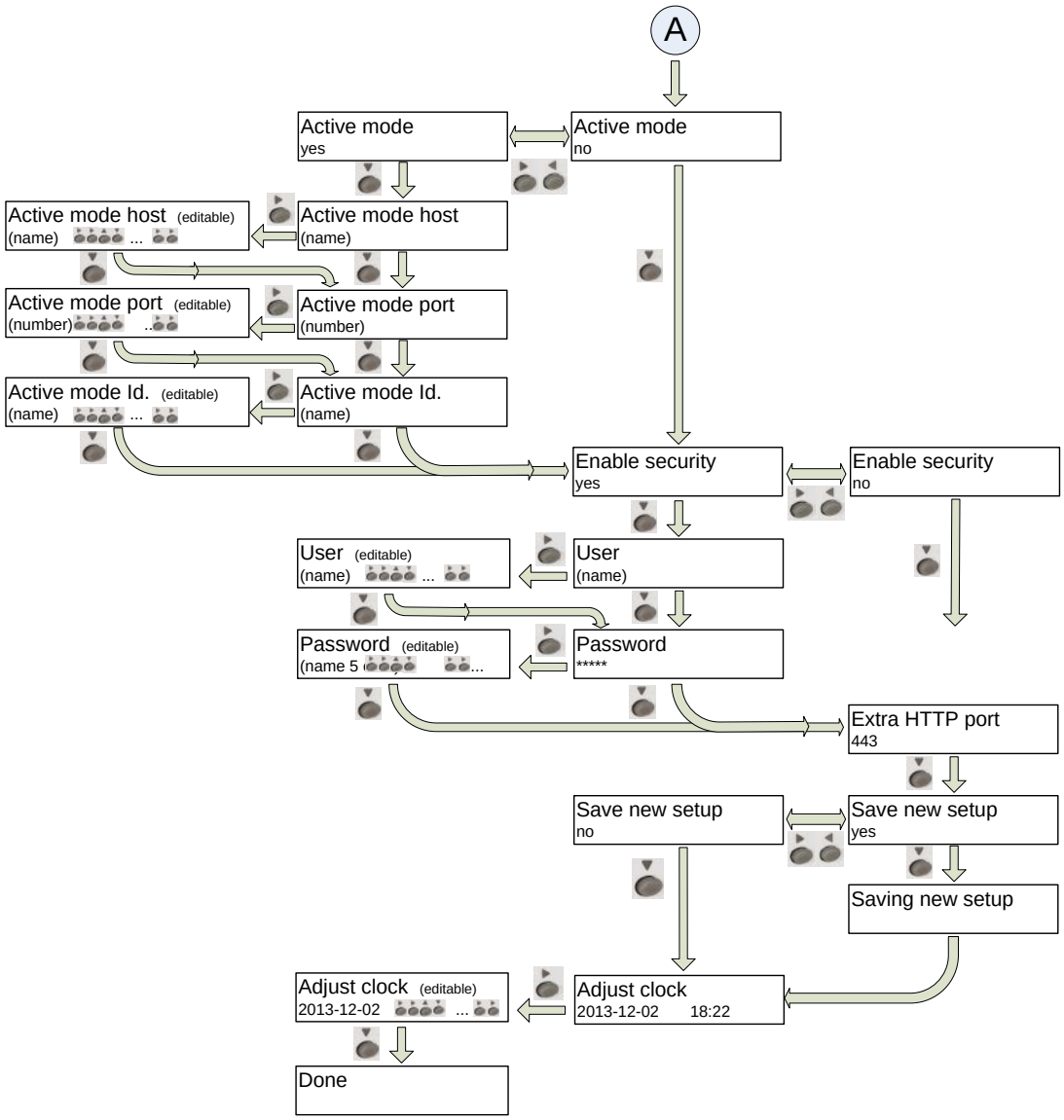


Fig.5-2 . – Menu flow diagram (2)

5.3.4 Primary DNS - (with DHCP “no”)*

To configure the Primary DNS press the button , activating the edit cursor on the first digit. With the buttons parameterise a numerical data entry of the type 000.000.000.000. After establishing the parameters, press the button repeatedly until the edit cursor disappears and validate the data with the button, moving to the next screen.

5.3.5 Secondary DNS - (with DHCP “no”)*

To configure the Secondary DNS server, carry out the same procedure as with the Primary DNS.

5.3.6 Other configurations - (with DHCP “no”)*

After configuring the Secondary DNS, the other setup screens correspond to the same ones as in the DHCP "yes" mode (activated); consequently the configuration procedure will be the same as the one for sections: 5.4.3, 5.4.4, 5.4.5

5.4 Configuration with the DHCP “yes” option

If you have chosen the DHCP “yes” option, the following fields must be configured:

5.4.1 Client ID - (with DHCP “yes”)

After activation of the DHCP authentication and the subsequent validation, the unit displays the Client ID parameter configuration on the screen, which refers to the DHCP name of the unit to be logged into the Ethernet network.

The button is used to activate the edit cursor on the first digit. With the buttons and you can edit an alphanumeric data field up to a maximum of 20 characters. After entering the data, press the button repeatedly until the edit cursor disappears and validate the data with the button, moving to the next screen.

5.4.2 Assigned values- (with DHCP “yes”)

After entering the Client ID name in the unit for the first time, the parameters assigned by the DHCP server are displayed on the screen. As the parameters are being edited and not stored until the unit is fully configured, the unit will display the following fields: **IP, NetMask, Gateway, Primary DNS, Secondary DNS**, with an asterisk at the top left which indicates that no changes can be made.

You can move from one parameter to the next by pressing the button .

5.4.3 Primary NTP (with DHCP “yes” or “no”)

The unit can synchronise the date and time through an NTP (Network Time Protocol) server in the UTC time system. By default, the MDC-20 does not display any value, indicating that synchronisation is completed via DHCP, provided the network server allows this.

To configure a different NTP server to the DHCP (0.0.0.0), press the button, enabling the edit cursor on the first digit. With the buttons edit the alphanumeric data field (up to a maximum of 20 characters), indicating an http address or an internal or external IP (if the unit expects Internet access to be available). After entering this parameter, repeatedly press the button until the edit cursor disappears, and validate the data with the button.

After the Primary NTP option you will move to the Secondary NTP screen pressing the button. The NTP servers available on the Internet have the following address: pool.ntp.org , in Spain the address would be: es.pool.ntp.org

5.4.4 Secondary NTP (with DHCP “yes” or “no”)

For the configuration of the secondary NTP server, carry out the same procedure as with the Primary NTP.

5.4.5 Time Zone (with DHCP “yes” or “no”)

To configure the time zone, press the button until selecting the time zone in which the MDC-20 unit is located.

After selecting the zone, press the button, moving to the next screen.

After validating this option, you will move to the Active Mode menu, section 5.5

5.5 Active Mode AMB®

The AMB (Active Mode Bridge) system reverses the server client role in the process of connecting remote units. The remote units start the communication process with the connection server located in a central computer, creating a transparent communication tunnel between the unit and that server. This means the user does not have to contract or maintain a fixed IP or dynDNS for their remote control locations.

To configure an access route, press the  button, until the “yes” option appears. With the “Active Mode” service activated with the “yes” caption, press the  button to move to the next Active Mode Host option.

5.5.1 Active Mode Host - (with Active Mode “yes”)

The “Act. Mode Host” option determines the destination IP where the unit is actively connected. It is an alphanumeric field that can be configured by providing an IP address in the following format xxxx.xxxx.xxxx.xxxx or the name in http format.

5.5.2 Act. Mode Port - (with Active Mode “yes”)

The “Act.ModePort” option allows you to configure the access port to the central server peripherals, in which the AMB (Active Mode Bridge) connection software will have been installed. This computer must have an access port for connecting all remote units, in order to establish a transparent communications tunnel.

The central server is connected to the Internet through a router, in which a NAT (Network Address Translation) access rule is established which assigns floating IP, in order to establish the connection path to the various peripherals.

An access port must be activated in the Internet access router which will internally transfer the public communication frames to the AMB internal connection server and to a port specified by and known to the user.

The port enabled in the communication router must be configured in the "Port" section.

5.5.3 Act. Mode Id. - (with Active Mode “yes”)

Each element connected to the AMB system must have an identifier or alias (“Act. Mode Id.”). This identifier is alphanumeric and the user must record it in order to enable the server connection.

NOTE: In no case can an "Identifier" be duplicated within the same connection server.

After this option, you will move to the “Enable Security” menu, section 5.6

5.5.4 If Active Mode “no” is selected

If you select the Active Mode no option, you will move directly to the “Enable Security” menu, section 5.6

5.6 Enable Security

A user and edition password can be activated in the unit, to prevent the modification of the configuration parameters by unauthorised personnel. By default the unit displays “no” because it has no password configured. If you want to enable it, this password will be requested in all the unit's configuration and display accesses (unit's buttons, web configuration and internal applications).

To modify the option displayed (“yes” or “no”), press  and then the  buttons until the required option appears, and then validate with the  button.

5.7 Case Enable security = “yes”

If you validate the “yes” option it means that you can define a user and password. When validating the “yes” option a screen appears requesting a “User” and “Password”. If you choose the “no” option, you will go directly to the Extra HTTP port menu, section 5.8.

To configure the “User” name, press the button, and a cursor will appear. With the buttons you can change the character and with you will move to the next character and so on until completing the user name entry (maximum of 20 alphanumeric characters). After configuring the user name, press and validate with the button. The “Password” option then appears.

To configure the “Password”, press the button and repeat the operations explained in the above paragraph. After configuring the password, press and validate with the button. The Extra HTTP port option will then appear, section 5.8.

5.8 Extra HTTP port.

By default the HTTP (Hypertext Transfer Protocol) uses port 80 to communicate with an application. The MDC-20, like all web servers, uses this port by default but allows you to change it to configure other options. For example, secure access to certain web sites is with the HTTPS protocol, which normally uses port 443 instead of 80.

This menu option allows you to open an additional port for communication with the MDC-20, without losing the possibility of communicating by port 80.

To modify the option shown on screen, press and a cursor will appear under the first editable character. You can change the value with the buttons. You can move to the next character with the button and if pressed repeatedly, the cursor will disappear and the port number can be validated with the button.

5.9 Save new setup

The information must be validated to save the configuration. After the Extra HTTP port option, the Save new setup option appears. The unit displays "yes" by default. If you want to validate the configuration, press the button and the unit will exit the configuration saving all the data entered.

If you do not want to save the configuration, press until the “no” option appears. If you repeat this action, the unit cyclically displays the options “yes”/”no”, until one of them is validated with the button .

5.10 Manual date and time configuration

If there is no authentication configuration by the DHCP system, and if there is no Primary and Secondary NTP server available, MDC-20 allows the time and date to be configured manually when validating the changes by displaying the caption "Adjust clock". The date and time are displayed on screen with the following format: YYYY-MM-DD HH:MM. To configure them press the button, activating the edit cursor on the first digit. With the buttons parameterise the numerical data entry. After entering this parameter, repeatedly press the button until the edit cursor disappears, and validate the data with the button, exiting the configuration and validating it.

When the configuration is validated, the DONE caption appears, returning to the main screen.

5.11 Display of configuration parameters

To display the configuration parameters, the user must enter the setup menu by simultaneously pressing the  buttons. By repeatedly pressing the  button, the user can fully view the unit configuration.

If the configuration is protected with a user name and password, all the configuration parameters can be viewed without having to enter the password, although in this mode there is no way of editing them (asterisk in the top left-hand part).

5.12 "PING" test.

To confirm connectivity through a Local Area Network (LAN), or through the Internet, with a DSL or 3G router, the user needs to ask the network whether there is a connection with a certain IP address. In the most usual operating systems, this check is normally known as doing a "PING" test on a certain IP address. (PING = Packet Internet Groper)

The MDC-20 offers the possibility of doing a "PING" test. For this on the first configuration screen where the MAC address is displayed (section 5.1), press the  button so that the unit displays the caption HOST PING and allows you to enter an IP address or a web site address.

To enter the IP address or the name of the web site to which to direct the "PING" test, press the  button to activate the edit cursor on the first digit. With this button and the  buttons you can establish the parameters of an alphanumeric data entry of up to 20 characters. After entering the data, repeatedly press the  button until the edit cursor disappears and validate the data with the  button. The screen will display the caption DOING "PING", and after a few seconds the unit will display one of the following results:

a) PING RESULT: OK - a response was obtained from the host

b) PING RESULT: time out - no response was obtained from the host

Having obtained the result, press the  button and the unit will return to the default display screens.

After completing the configuration and Ethernet network connection, the unit has a configuration web site assigned where the user can change any of the data entered with the unit's buttons. The configuration web site is at the following address:
http://xxx.xxx.xxx.xxx/html/setup.html

http://name_dhcp/html/setup.html

Where xxx.xxx.xxx.xxx is the IP address assigned by the user and name_dhcp is the name assigned and authenticated by the LAN name server.

6 CONFIGURATION OF NETWORK PARAMETERS BY SOFTWARE

The network address can be configured by both the unit's buttons and on a PC, by means of an executable program provided by CIRCUTOR, called **IPSetup.exe**. This program is supplied on a CD with the unit.

6.1 Fixed IP assignment

For fixed IP assignment, you must execute the program **IPSetup.exe** and the template shown in Fig.6-1 will appear on the computer screen.

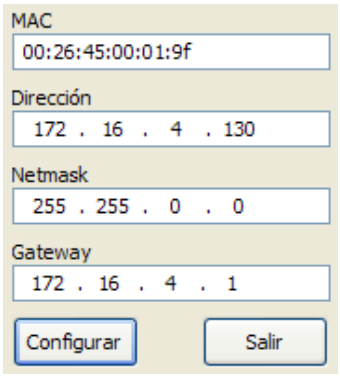


Fig.6-1 . –Network address configuration template

Complete the various fields as follows

a) Enter the MAC address. This is visible through the unit screen as indicated in section 5.1. The format of that address is 00:26:45:XX:XX:XX.

b) In the Address field, enter the unit's IP address.

c) Do the same with the Netmask and Gateway, if necessary.

d) After entering the unit's configuration, click on the “Configure” button on the computer screen to send the configuration to the unit.

6.2 DHCP IP assignment

To assign the DHCP name, activate that option using the upper right-hand arrow on the computer screen and select the ON option. See Fig.6-2

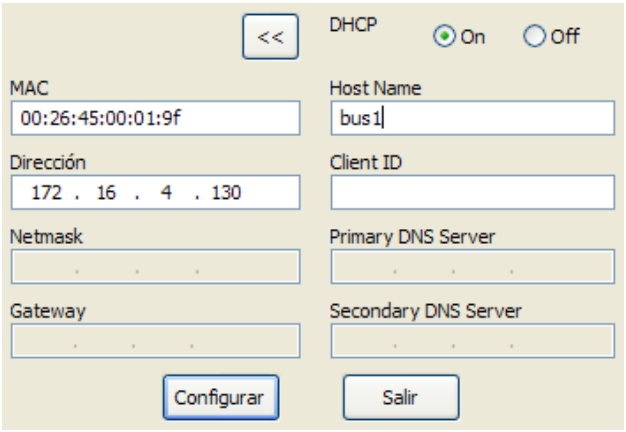


Fig.6-2 . – DHCP name configuration template

Once the configuration fields have been enabled:

a) Enter the MAC address.

b) In the Address field, enter an unused, temporary IP address, which is within the working range of your computer.

c) In the Host Name field, enter the DHCP name to be assigned to the unit.

d) Optionally, the user can configure the parameters of the ClientID field. The default VendorID of the unit is CIRCUTOR.

6.3 Configuration web site

Once connected to the Local Area Network (LAN) and the IP address or DHCP name is configured, the unit has an internal web site where the user can fully modify all the network configuration parameters, see Fig.6-4, or even modify the date and time data.

6.3.1 Password access.

If a user and access password have been configured, when trying to access via Web, the unit will request those access parameters in the pop-up window shown in Fig.6-3:

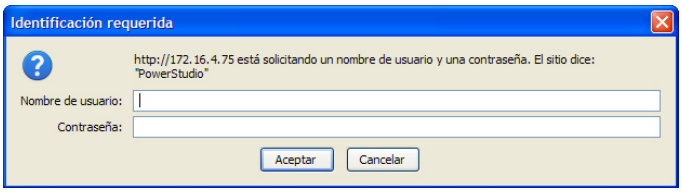


Fig.6-3 . – Password request screen

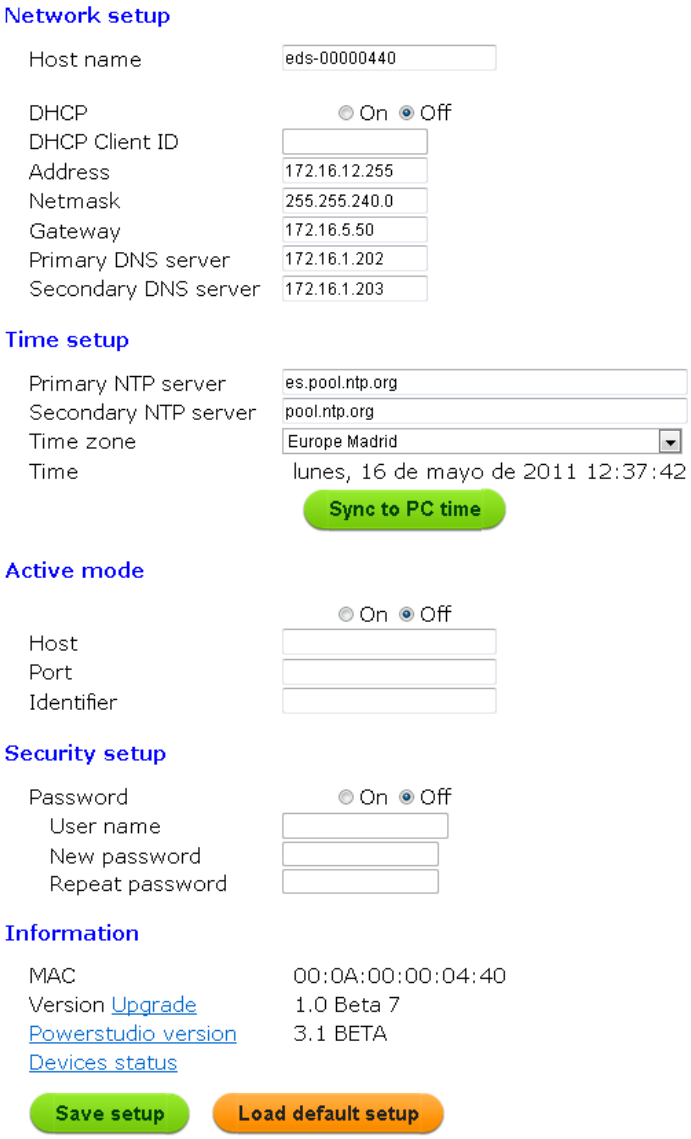


Fig.6-4 . – Internal configuration web site

7 FUNCTIONAL CONFIGURATION OF THE MDC-20

PowerStudio® or PowerStudioScada® software is necessary for the functional configuration of the MDC-20. Either of them can be downloaded from the Circutor web site, www.circutor.es.

7.1 Software installation

To create a SCADA application, a PC with the following minimum features is required:

- Operating System: Microsoft Windows in versions: 2003, 2008 and 2012, Server, XP Home, XP Professional (Service Pack 1), Vista, Windows 7 and 8, 32-bit versions or 7 and 8, 64-bit versions.
- Client in any operating system where the Java JRE 1.7.0 virtual machine is installed (Linux, Windows, etc.) Machine with i86 architecture (Intel or AMD) for the engine and editor, 1 GHz or more.
- Minimum RAM 1 GB.
- 1 GB available hard drive space (depending on the number and type of units connected, space should be increased at a rate of approximately 30 MB per unit and year of data that you want to save).
- CD-ROM.
- SVGA monitor 1024x768 or higher.
- Windows compatible mouse and keyboard.

Before creating the application, PowerStudioScada® software, version 4.0 or later, must be installed in the PC. The manual for this software can be downloaded from the Circutor web site, www.circutor.es

7.2 Registration of the unit

After you have installed the PowerStudio® program, to create a MDC-20 power control application you must register a MDC-20 embedded in the PowerStudioScada® application or import the application to the Editor from the IP address of the MDC-20.

To create the unit select the icon  and then go to “Add unit” and then select the MDC-20 driver in the Embedded option

Fig.7-1 . – MDC-20 unit icon

7.3 Importing the application

Once the unit has been registered, the application must be imported using the button  . You can import the application from the MDC-20 to an active application in the PowerStudioScada® or to a new application.

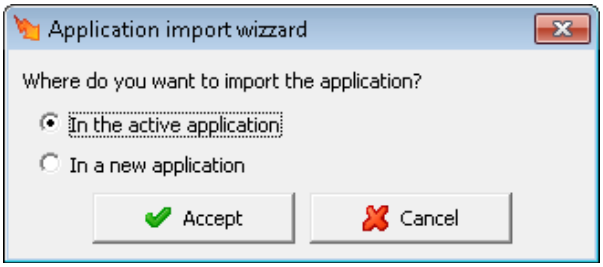


Fig.7-2 . – Import window of MDC-20 application

Once the application has been imported, you can access the configuration of the unit's parameters. To configure the unit and the maximum demand control, see section 7.5. For events, discriminators and advanced configurations see the EDS tutorial and manual available at: http://www.circutor.es/software.aspx

7.4 Exporting the application

Once the unit configuration application has been generated, it must be exported to the MDC-20 so that this can execute it. To export the application, select the button . The application shows the following window (Fig.7-3)

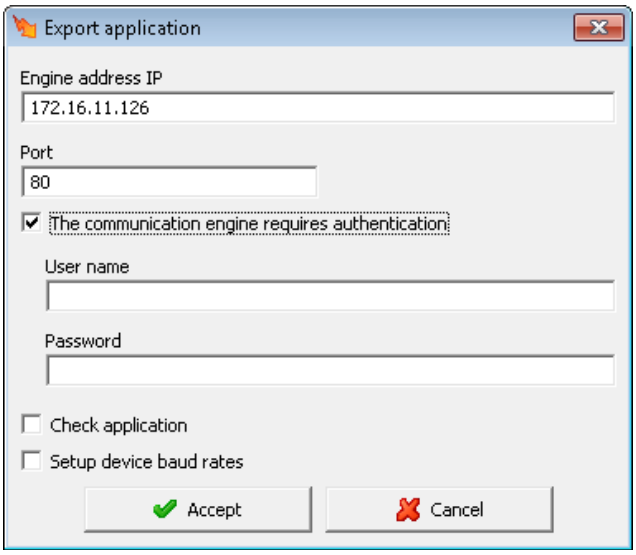


Fig.7-3 . – Export window of the application

The IP address of the MDC-20 and the port used by the unit (by default port 80) must be configured in this window.

The default options are shown in 'Engine preferences', but can be modified to send the application to any other communications engine.

If the 'Verify application' option is selected, before sending the application to the engine it is checked that this is correct; if not, invalid elements are reported.

If the 'Configure communication speeds with the units' option is selected, it will try to communicate with the units before sending the application and display a summary of the units it could not communicate with.

7.5 MDC-20 configuration options

The PowerStudio® software configuration options for the MDC-20 are those shown in Fig.7-4 and detailed below:

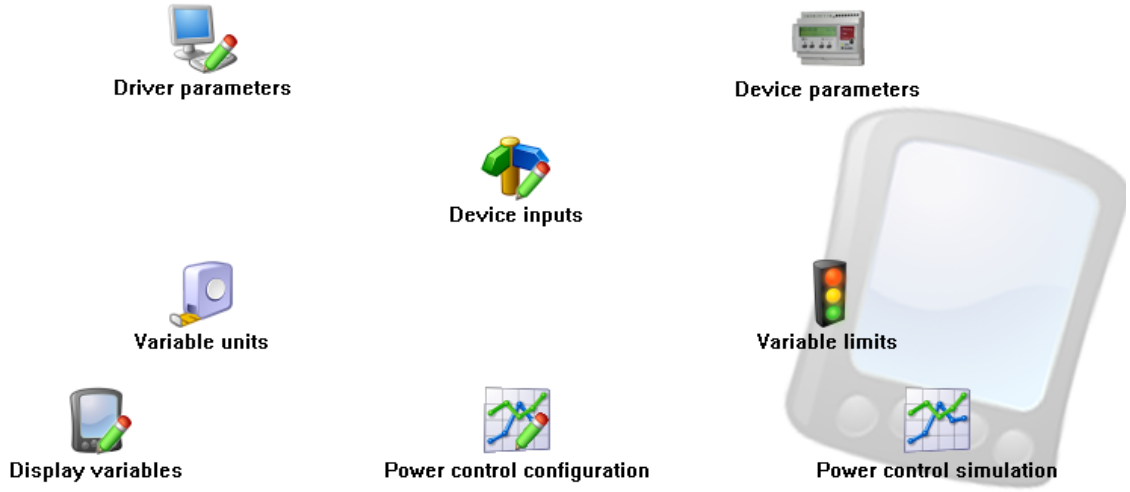


Fig.7-4 . – Configuration options

7.5.1 Driver Parameters

This menu option (see Fig.7-4) enables the basic configuration of what must be the unit's driver and display of values to be shown in the client (see Fig.7-5).

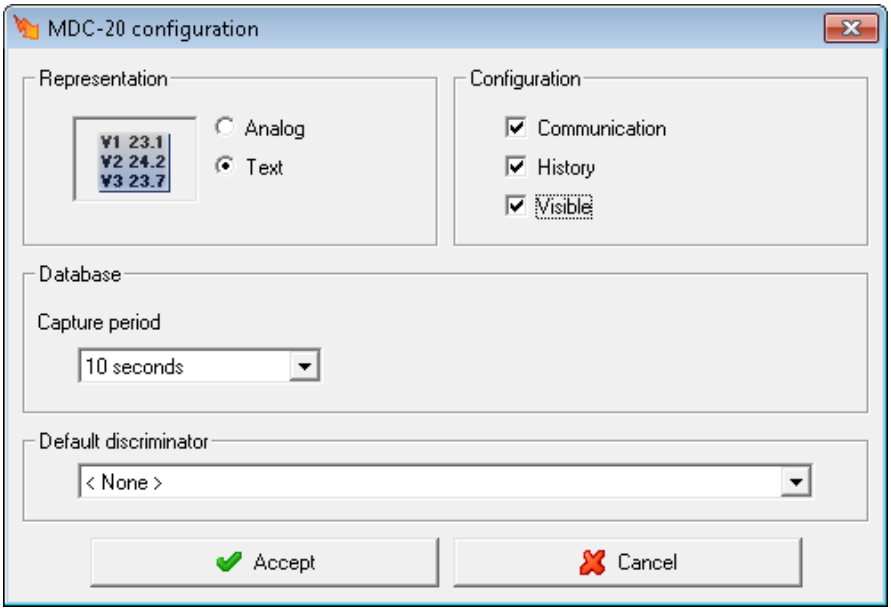


Fig.7-5 . – Driver parameters

7.5.2 Device parameters

This menu option (see Fig.7-4) will allow you to configure the internal parameters of the unit (see Fig.7-6). On opening the dialogue box, the software will read the configuration of the unit. Changes can be made if required; if you click 'Accept' after making changes the software will send the information to the unit.

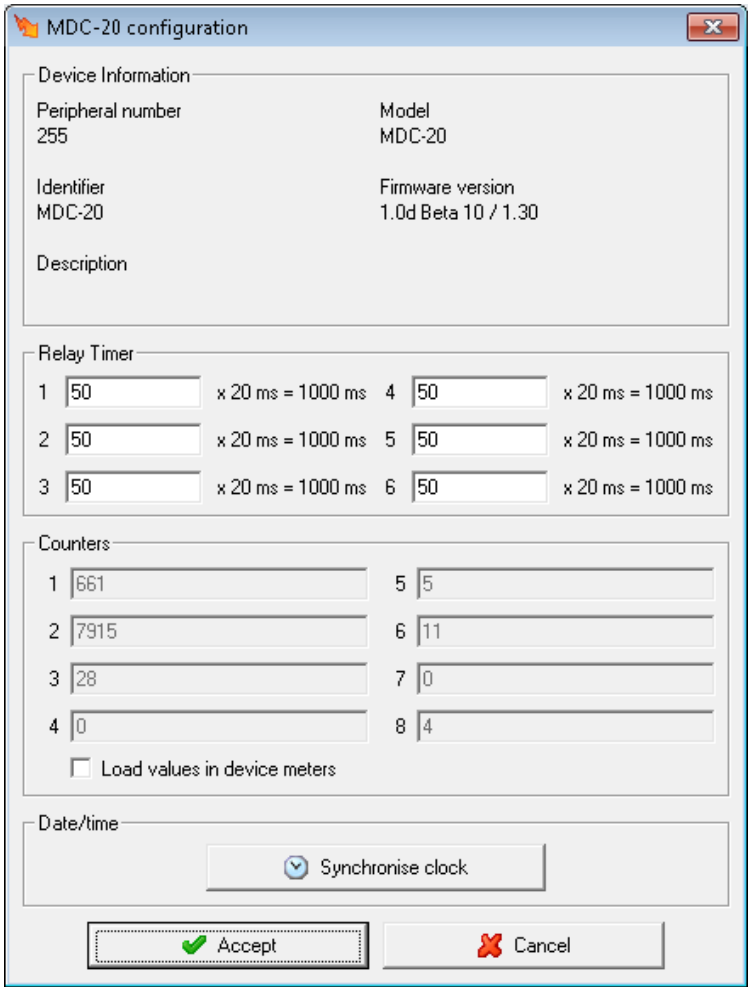


Fig.7-6 . – Unit parameters

The screen shows the following information:

- **Unit information**: General information of configured unit.
- **Relay timer**: Configuration of activation time, in milliseconds, of the impulses generated with each of the unit relay outputs.**(configurable ON time)**
- **Counters**: Accumulated number of pulses of each of the counters. (Accumulated count).
- **Load values in the meters**: Select to edit the total value of each of the unit inputs.
- **Synchronise clock**: Press to synchronise the MDC-20 clock with the computer clock.

7.5.3 Unit inputs and outputs

The unit inputs menu option (see Fig.7-4) lets you configure the input and output parameters of the unit. It lets you choose the function of the inputs from the following options: meters, flows or digital inputs.

This option also allows you to configure the name given to the digital outputs.

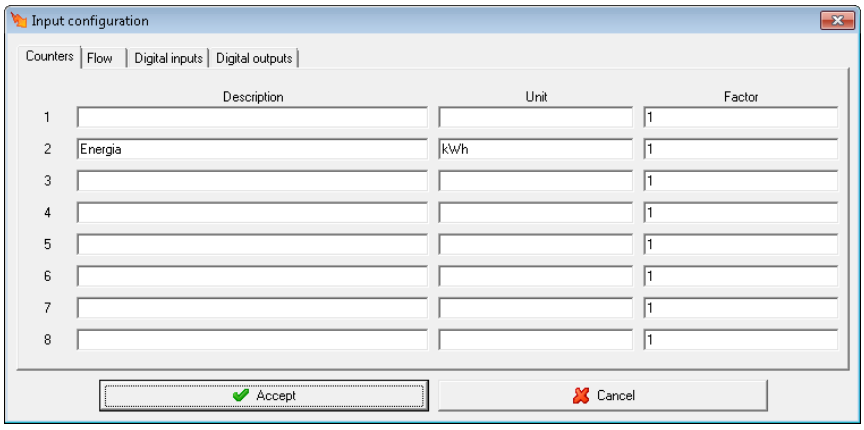


Fig.7-7 . – Configuration of counter / meters

Meters: It is possible to configure the following parameters for each of the eight meters:

- **Description**: Alphanumeric name to identify the meter on the unit screen.
- **Unit**: Alphanumeric type data to identify the meter units.
- **Factor:** Multiplier value of each pulse, (for example kWh/impulse ratio)

Flows: Checking the selector will activate the flow variable. If this selector is not activated, it will not be possible to view the flow value of the corresponding controller input.

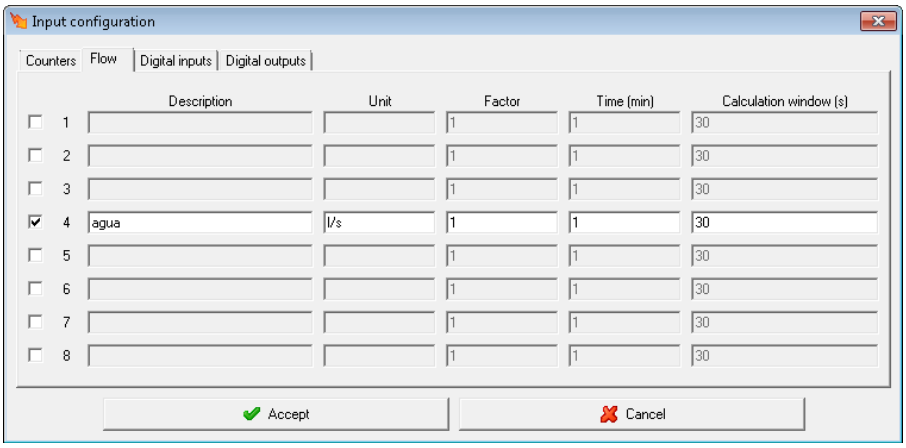


Fig.7-8 . – Configuration of flow meters

To configure the flow meters the following fields must be defined:

- **Description:** Alphanumeric type data which allows you to enter a brief description of the flow for better identification.
- **Unit:** Alphanumeric type data which permits a brief description of the units where the flow is shown to be entered.
- **Factor:** Multiplier value of each input impulse, (for example litres/impulse)
- **Time (min):** Time in minutes for calculating the flow value.
- **Calculation window (s):** Time window, in seconds, that the software uses to calculate an estimate of the flow, taking into account the value of the unit 's meter.

Digital inputs: To configure digital inputs, a description must be defined for each of them.

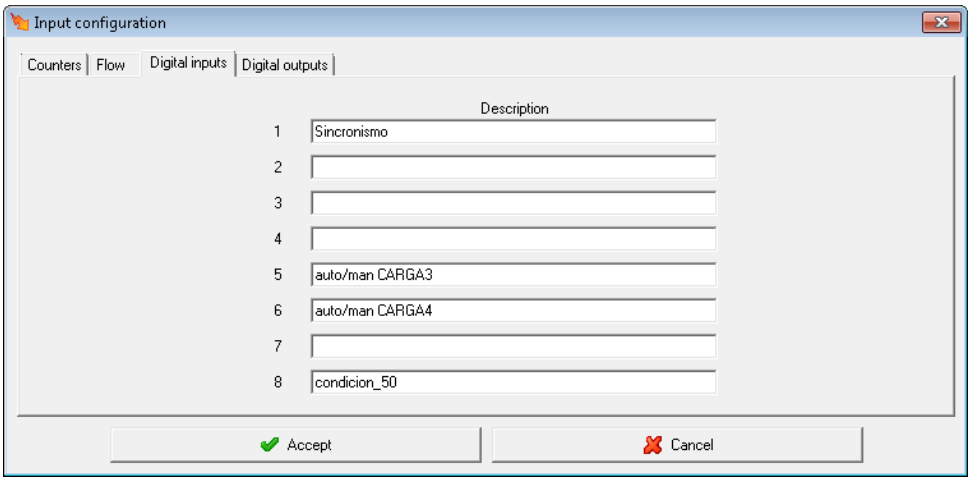


Fig.7-9 . – Configuration of digital inputs

- **Description:** Alphanumeric type data which lets you enter a brief description of the digital input for better identification.

Digital outputs: To configure the digital outputs, a description must be defined for each of them.

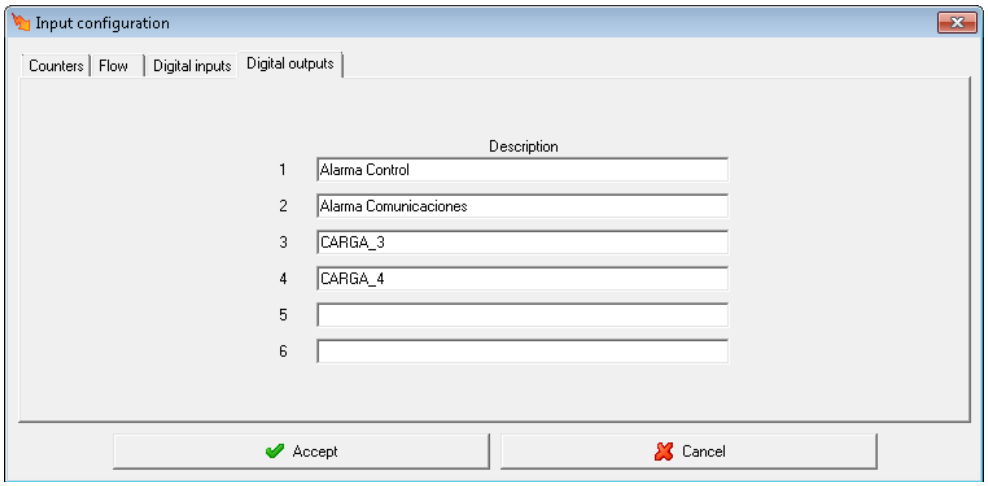


Fig.7-10 . – Configuration of digital outputs

- **Description:** Alphanumeric type data which lets you enter a brief description of the digital output for better identification.

7.5.4 Variable units

This menu option (see Fig.7-4) allows you to configure the units and number of decimals to be displayed on the screen. This type of configuration only affects the value display on the screen and does not affect the unit.

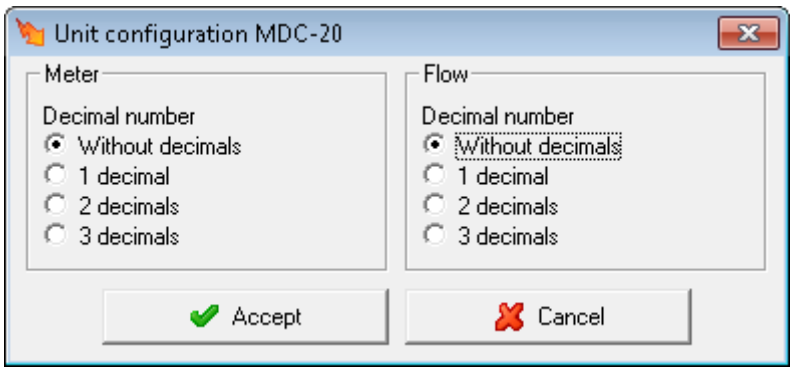


Fig.7-11 . – Configuration of units

7.5.5 Variable limits

This menu option (see Fig.7-4) lets you configure the nominal values of the variables, as well as a series of margins to display on screen when a variable measures values outside the configured range, in order to easily detect anomalous values.

In the MDC-20 the limits of the variables only refer to flow values as there is no point referencing them to either impulse or status values. For this reason the fields appear disabled if the inputs have not been configured as flow meters.

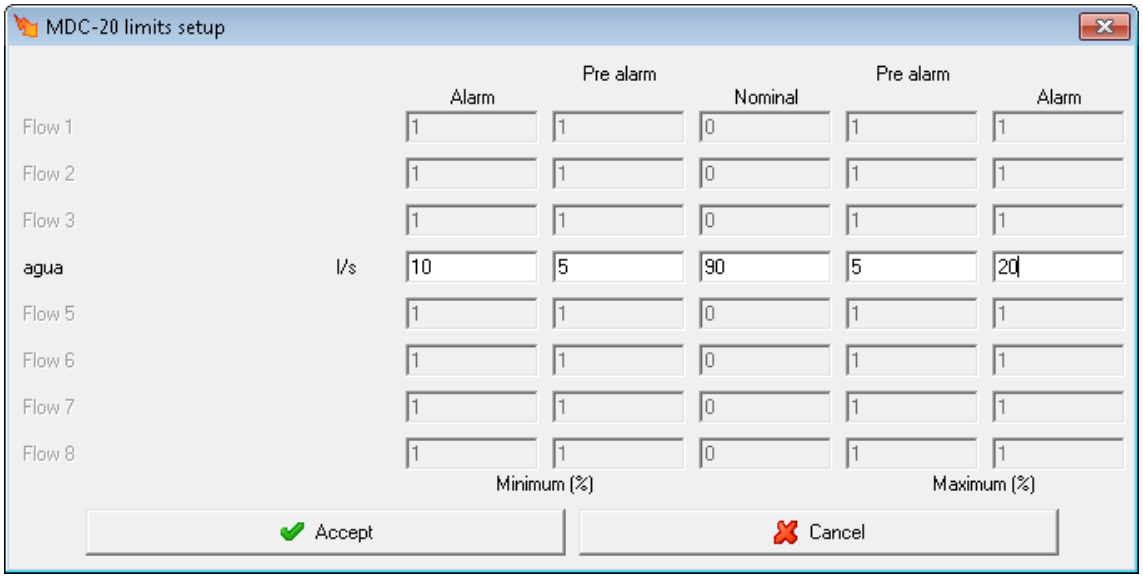


Fig.7-12 . – Limit values setup

- **Nominal Value:** Indicate the nominal flow value for each channel. If the nominal value is 0, the alarm is disabled.
- **Pre-alarm or lower alarm:** In the channel 1 example, when the value of the variable is between 5% and 10% below the nominal value, there will be a pre-alarm signal; if it is below 10% the alarm will sound.
- **Pre-alarm or upper alarm:** In this case when the variable value is between 5% and 20% above the nominal value, there will be a pre-alarm signal; if it is above 20% the alarm will sound. If the pre-alarm value is equal to the alarm value, the pre-alarm zone will be disabled, passing directly from normal to alarm status.

7.5.6 Display of variables

This menu option (see Fig.7-4) lets you configure the variables to be displayed on the MDC-20 screen.

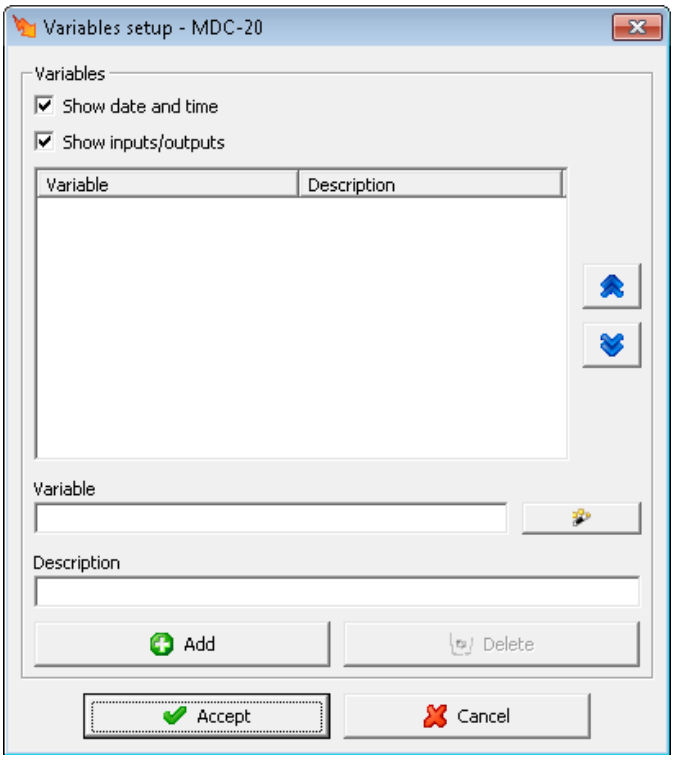


Fig.7-13 . – Setup of variables to be displayed on screen

Show date and time: Allows you to activate the unit date and time display

Show inputs/outputs: Displays on screen the status of the unit inputs and outputs, showing 0 if they are deactivated and 1 if they are active.

Variable: Lets you select any variable accessible from the unit to show its value on screen, entering it by hand or with the help button .

You can associate a description for display instead of viewing the name of the variable. If the description text field is empty, the name of the variable will be displayed.

The variables can be ordered so that they are displayed in correct order on the screen of the unit, using the and buttons.

8 POWER CONTROL CONFIGURATION

The MDC-20 is especially designed for Power Control. With a correct configuration you can connect and disconnect loads to and from your installation according to the total current demand value and instantaneous consumption, to ensure that the maximum power contracted is not exceeded. You can therefore avoid penalties for power peak consumption.

The parameters to be configured for adapting the MDC-20 to your installation are programmed in the following submenus: Parameters, Groups and Loads.

8.1 Power control parameters

The power control configuration parameters are shown in the following menu (Fig.8-1), explained in detail below.

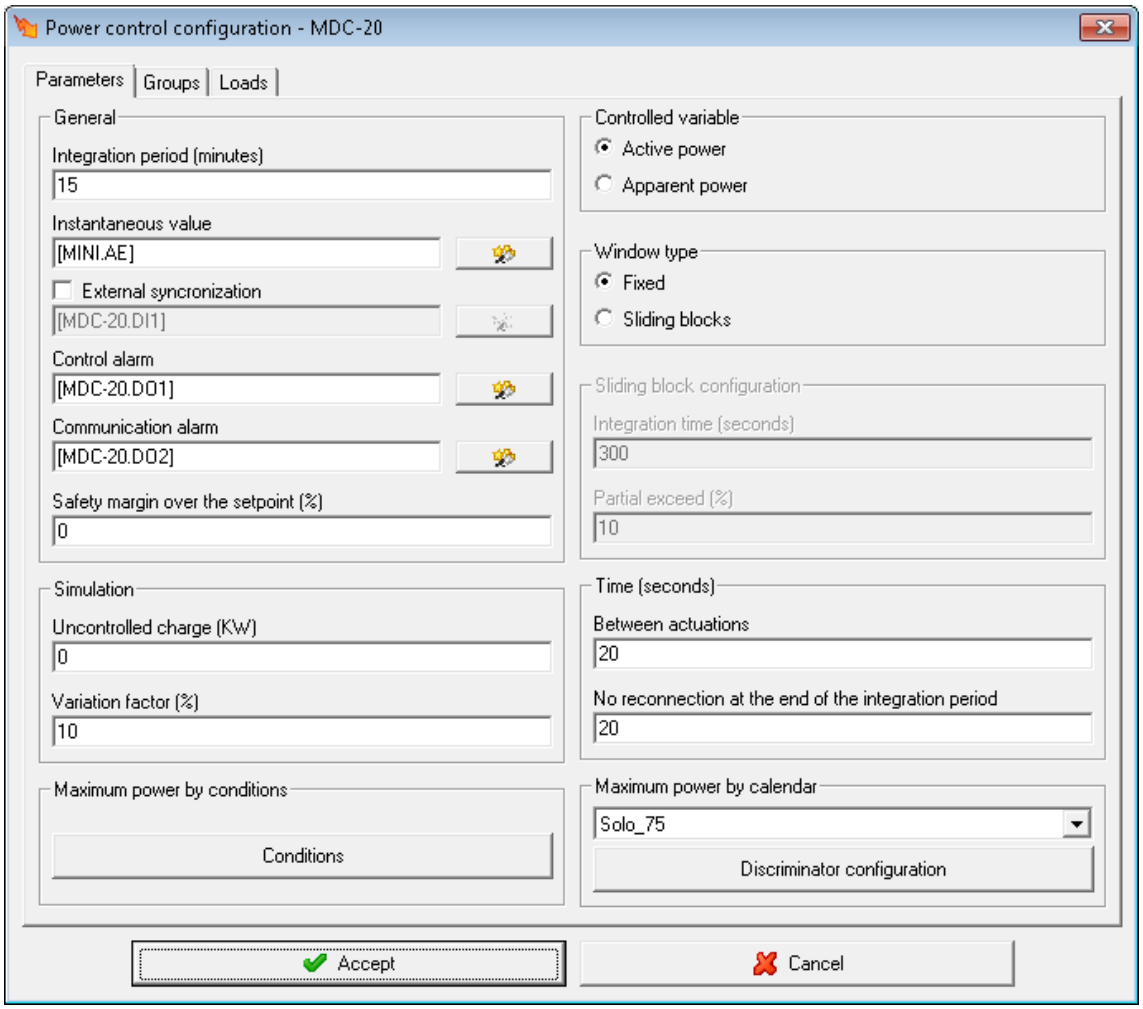


Fig.8-1 . – Power control parameters to be configured

8.1.1 General

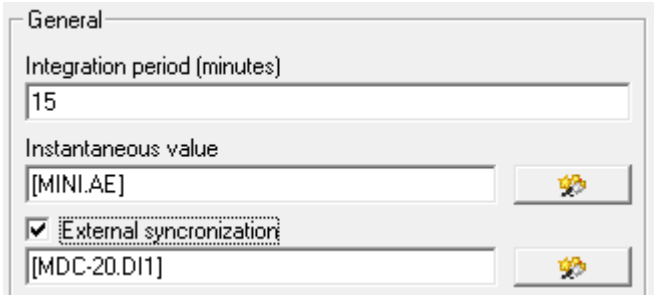


Fig.8-2 . – General parameters configuration screen

- **Integration period (minutes):** Configure the time in minutes of the energy values integration window. After this time, the calculation will return to zero.
- **Instantaneous value:** You need to enter an incremental energy variable or incremental energy impulse meter. You can use the help button to enter a unit's energy variable, an impulse meter or a formula whose result is an incremental energy value .
- **External synchronisation:** In general, all billing meters have a sync output. This output is used so that other units that measure the installation's electrical parameters do so in

sync with the main meter. This sync pulse output must lead to one of the unit inputs to be synchronised, in this case, the MDC-20. The input used for synchronisation must be configured in the corresponding field after selecting the external synchronisation checkbox. It is understood that there is a sync pulse when there is a change in the logic state from 0 to 1 in the variable or configured input. If the external synchronisation box is not selected, the internal clock of the MDC-20 will be used for synchronisation.

8.1.2 Alarms

The unit has two very useful alarms for managing the installation that can be used so that the system warns the user of any anomaly.

Fig.8-3 . – Alarm setup screen.

- **Control alarm:** Variable or physical output to be activated as an alarm in case of exceeding the maximum power configured in the MDC-20 and the unit has no more loads to disconnect.
- **Communications alarm:** Variable physical output to be activated as an alarm if one of the installation units does not communicate with the controller or is in any of the error states.

8.1.3 Safety margin over the setpoint (%):

- Safety margin in % over the maximum set point at the end of a period. For example, if you configure 10% in the set point margin and the maximum energy is 150 kWh, your real set point will be: 150-10%=135 kWh

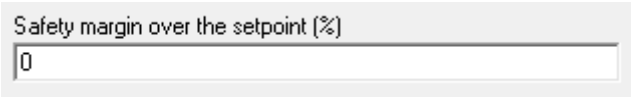


Fig.8-4 . – Configuration of safety margin

8.1.4 Simulation

The information entered in these fields is only used in the simulation window (see section0). The simulation shows how the system will respond when it starts working. The more accurate the information entered, the more real the simulation by the program.

Fig.8-5 . – Simulation configuration screen

- **Uncontrolled load (kW):**Enter in this field the total power of the installation not subject to power control (loads not controlled by the MDC-20), which generally coincide with priority loads that cannot be disconnected.
- **Variation factor (%):** Variation of total power of installation in %, so that the simulation does not always work with the maximum theoretical values configured and is more real.

8.1.5 Maximum power by conditions.

With this menu option you can configure a maximum power for the installation according to the status of any input on the unit or any external condition that can be measured or detected with the MDC-20.

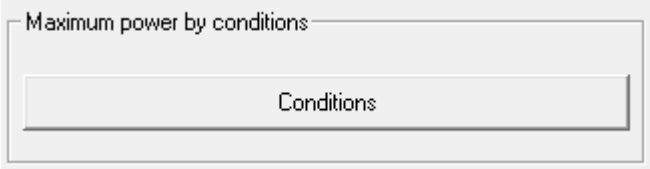


Fig.8-6 . – Configuration of conditions

The list of conditions configured by the user will be applied by the controller to manage the maximum power permitted in the installation. The conditions entered on the screen can be any valid expression in the Power Studio language, with variables of any unit integrated in the network or input of the MDC-20 itself.

The set point is the maximum power value permitted in the installation when the condition is active.

The controller will follow the order of assessment of conditions established in the list and the first condition met will be applied.

⚠	The set point configured in this section takes priority over that configured in the maximum demand control by calendar.

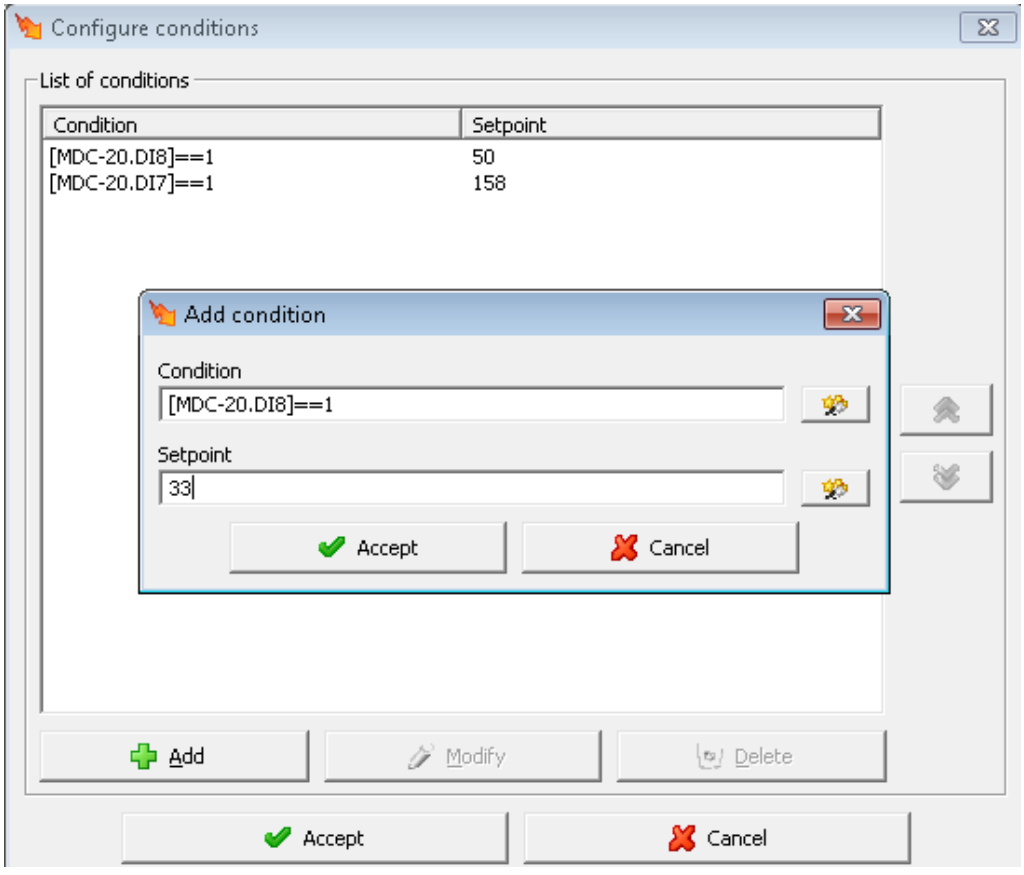


Fig.8-7 . – Configuration of Power Control by conditions screen

8.1.6 Controlled variable

Allows you to select the parameter to control in the installation between Active Power or Apparent Power.

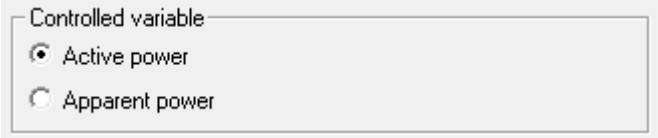


Fig.8-8 . – Power to control

⚠	Confirm that the units selected in this section are consistent with the variable selected in the control variable field.

8.1.7 Window type:

Allows you to select the type of integration window used to apply the power control.

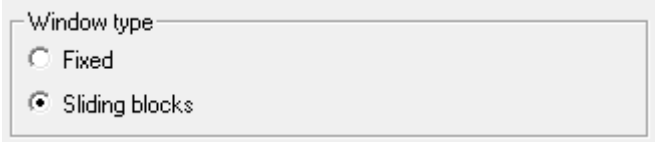


Fig.8-9 . – Integration window

- **Fixed window:** The integration window time is of equal duration to that configured in the “integration period” field (chapter 8.1.1). If there is an external sync pulse, the window time will be equal to the time between impulses. If a sync pulse occurs or the integration period configured by the user has finished, that integration period will be restarted by resetting the energy meter for the period back to zero.

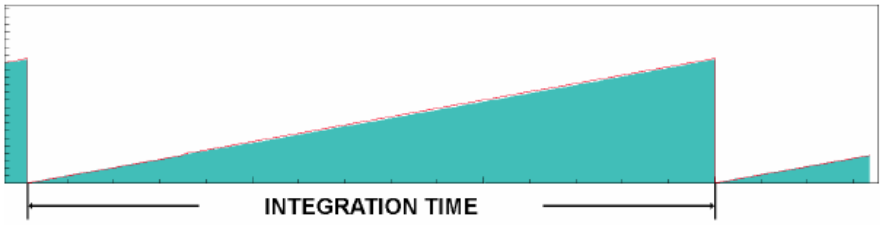


Fig.8-10 . – Fixed integration window

- **Sliding blocks:** The integration period is divided into N time intervals equal to that configured in the “integration time” field. The calculation window therefore consists of N sliding blocks.

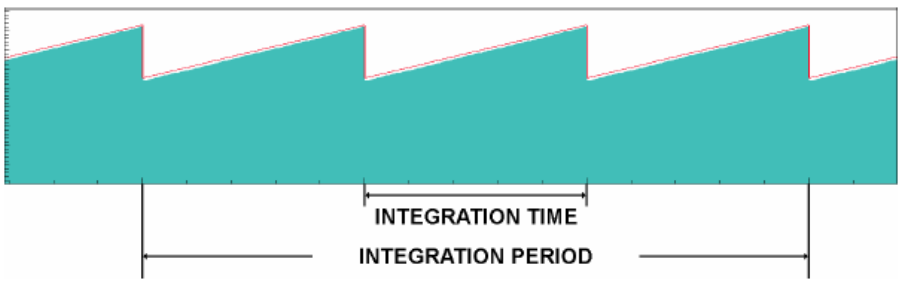


Fig.8-11 . – Sliding blocks integration window

The following fields must be configured when selecting the sliding blocks window:

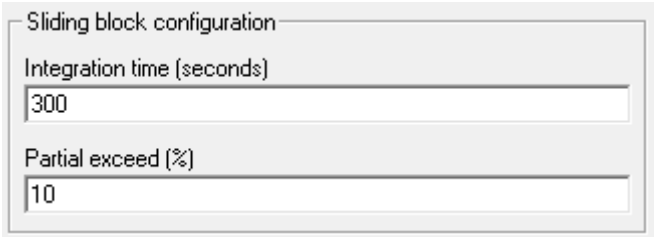


Fig.8-12 . – Parameters to be configured in the sliding window

- **Integration time (seconds):**Duration time of each of the N partial integration intervals included in an Integration Period.

⚠	The Integration Period must be a multiple of the Integration Time (chapter 8.1.1).

- **Excess (%):** Excess energy allowed in the integration subinterval always ensuring that the total energy for the period is less than the configured maximum.

8.1.8 Response time (seconds)

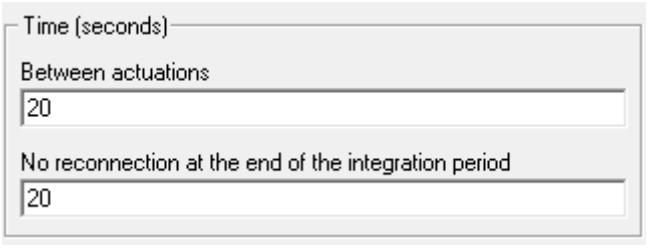


Fig.8-13 . – Response times

- **Time between actions:** This is the time established between actions. A value of 60 seconds means that once a load has been connected or disconnected, the controller will wait 60 seconds before carrying out any other operation.
- **Non-reclosing time at end of period:** Time before the end of an integration period, during which no new loads are connected until a new integration period has begun.

8.1.9 Maximum power per calendar:

Within the maximum power calendar option you can configure a maximum set point power according to a time discriminator or calendar, in cases in which the maximum power changes are based on time intervals or other conditions.

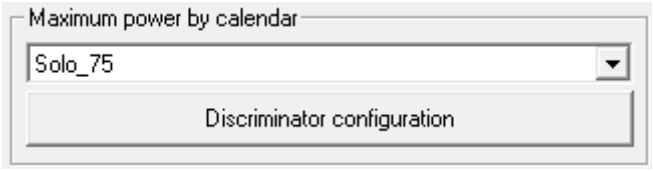


Fig.8-14 . – Selection of calendar

To create a new discriminators calendar press “Add”. (seeFig.8-15). If you right-click the mouse on the discriminators list, a drop-down menu will appear for copying and pasting discriminators to enable the creation of new discriminators.

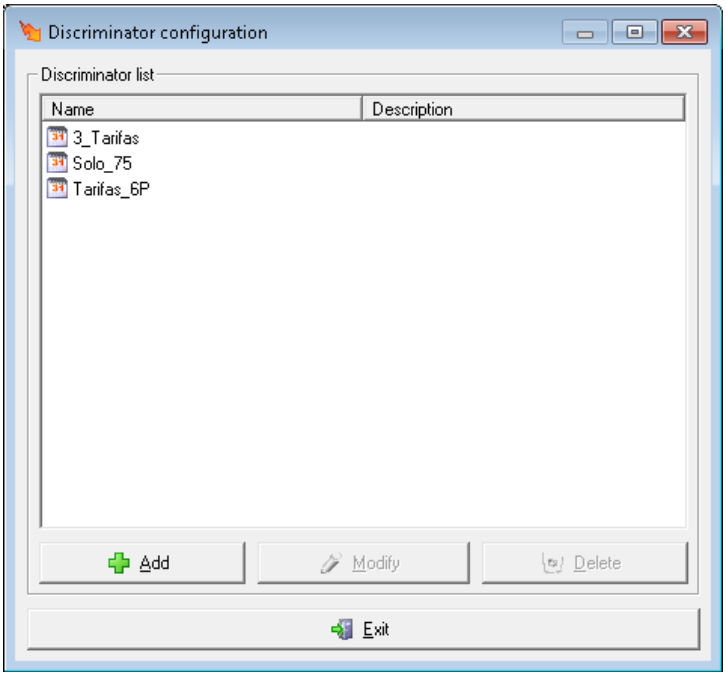


Fig.8-15 . – Creation of new calendar

The menu displayed (Fig.8-16) lets you configure the name of the discriminator, a description and to define the different maximum powers for each time interval or discriminator.

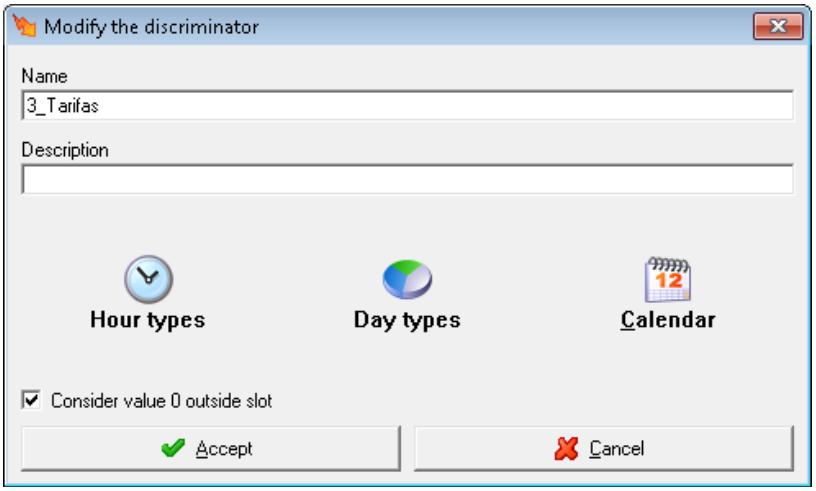
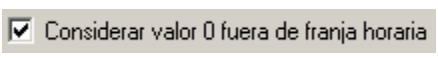


Fig.8-16 . – Selection of type of discriminator



In a formula with another variable, the value of the variable outside the slot defined by the user for the discriminator is considered invalid if the option is not marked. This option considers value 0 for the variables, outside the discriminators interval. This option is usually selected if you want to process one or several discriminated variables.

HOUR TYPES (Fig.8-17)

This menu allows you to create different time intervals and assign a maximum power for each of them, if the power to control varies according to the time interval.

A colour must be defined for each type of hour, name and maximum power value.

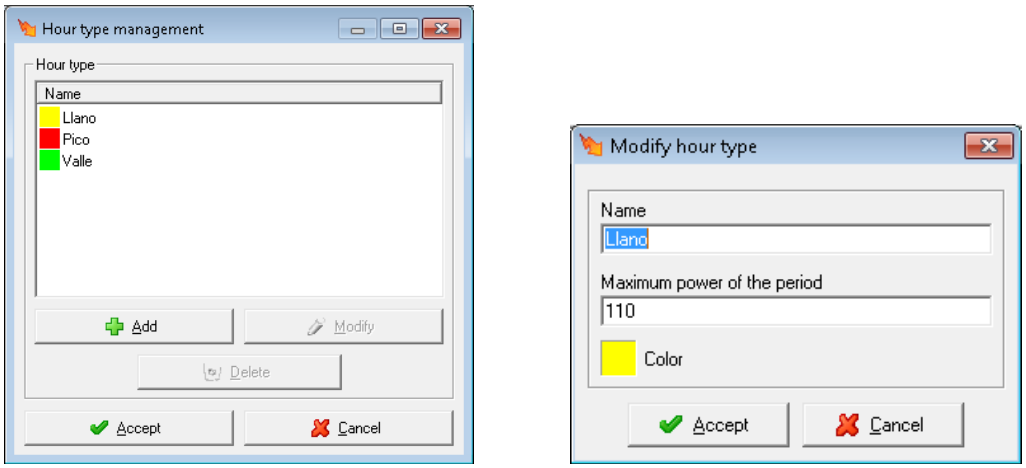


Fig.8-17 . – Hour types

DAY TYPES (Fig.8-18 , Fig.8-19)

This menu option allows you to create days with time intervals with different maximum powers. When adding or modifying a day type, the dialogue window appears (Fig.8-18) in which the identifier name of the day should be entered and the hour types that comprise it and which time intervals they include must be indicated (see Fig.8-19). A colour must also be defined that is representative for each type of day.

The dialogue window lets you add, remove or modify the different existing day types.

NOTE: A day is configured from 00:00 h to 24:00 h.

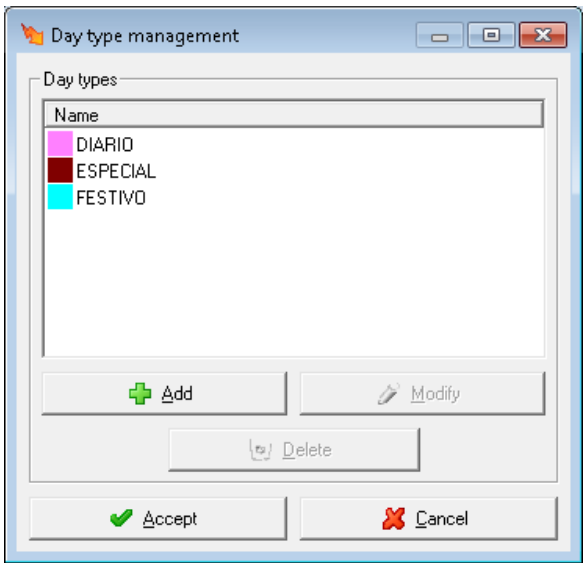


Fig.8-18 . – Day types

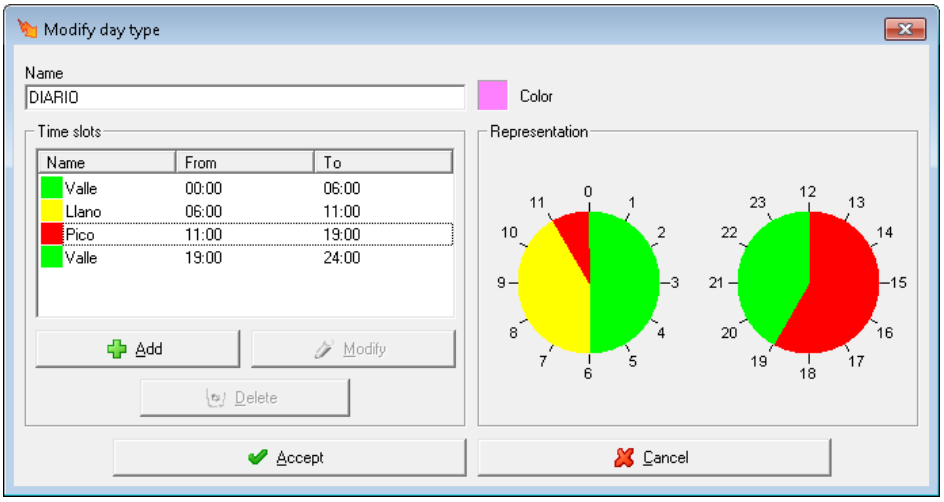


Fig.8-19 . – Day types

To enter or modify hour types, you must select ADD and the following menu will be displayed (Fig.8-20).

Fig.8-20 . – Definition of hour types

The start and end of each hour type must be defined. Note that the day starts at 00:00 h (Fig.8-21).

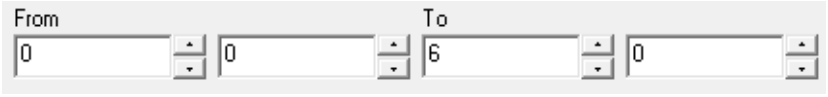


Fig.8-21 . – Time slot for each hour type (numerical definition)

The time intervals for each of the hour types can be entered numerically in the from - to fields or in the graphic area by selecting with the cursor (Fig.8-22). The graphic selection does not permit a resolution of less than 15 minutes.

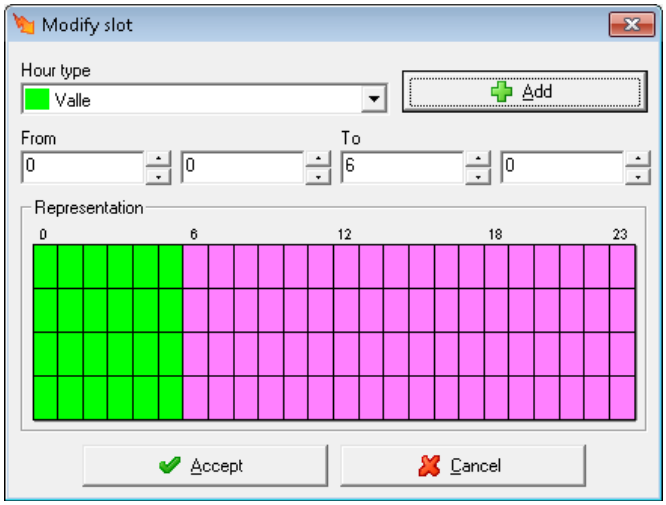


Fig.8-22 . – Time slot for each hour type (graphic definition)

CALENDAR (Fig.8-23)

After defining the day types that make up the discriminator, they must be distributed in the annual calendar.

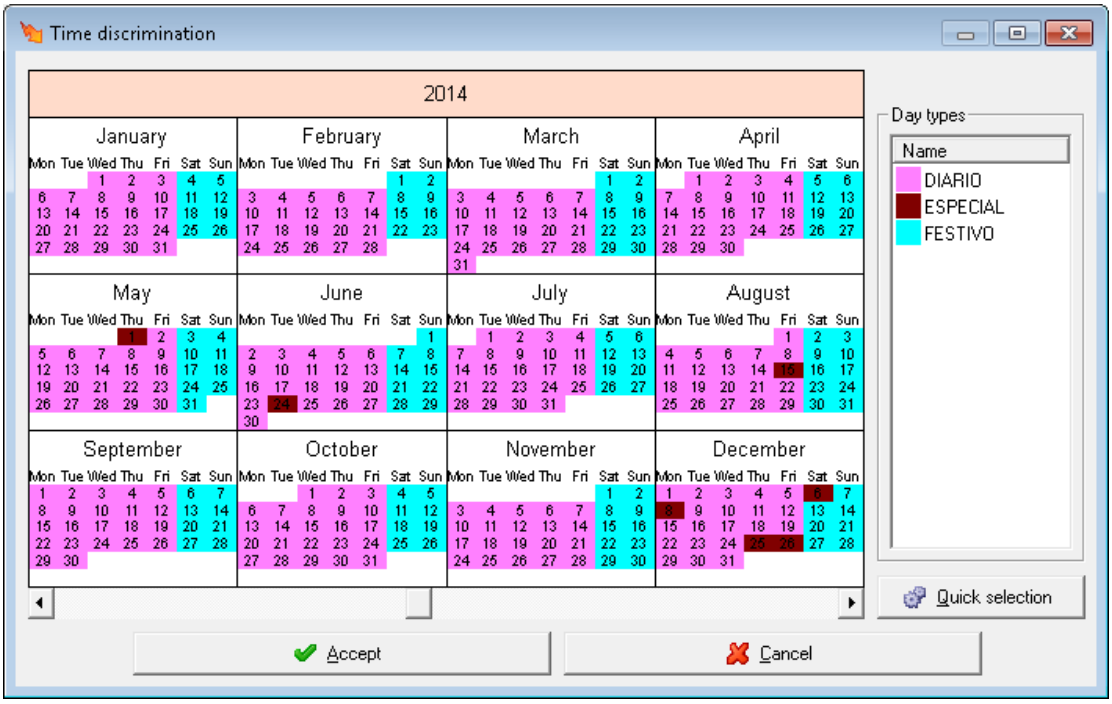


Fig.8-23 . – Hourly discrimination calendar

You can assign day types during the year in progress, but in later years. Day selection is done as follows:

- Pressing on the desired day.
- Pressing on the day of the week selects all the days of the month for that day of the week.
- Pressing on the month name selects all the days of the month.
- Pressing on the year selects all the days of the year.
- Left click on a starting day and drag to select all the days that the cursor has passed through.
- Using the fast selection option.

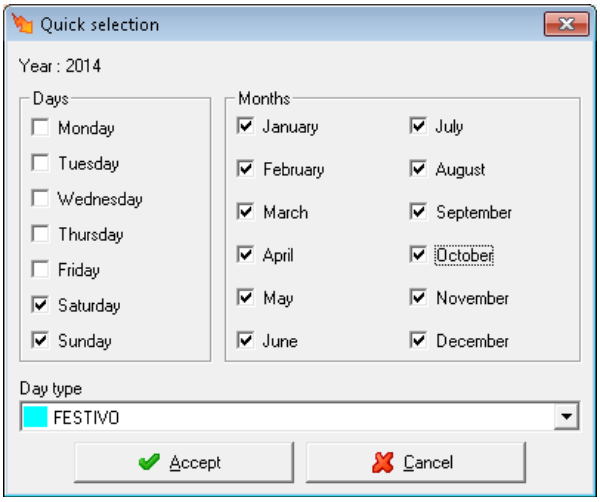


Fig.8-24 . – Quick selection

8.1.10 Load groups:

You can create load groups in the menu option. The groups acquire a different property depending on their place in the list, with the first group in the list having the highest priority and the last group the lowest. This allows the user to group together loads within groups depending on their connection and disconnection priority.

Each group shows the load disconnection sequence that has been configured and the total powers of the loads for the group. The load list in the group, the power configured for each load and the associated disconnection calendar, if applicable, are shown on the right-hand side.

When accessing the load group tab (Fig.8-25) you can add new groups or modify or remove existing groups. You can also add or remove loads to and from a group.

With the buttons / you can modify the position of the groups and loads in the table, thus changing the order of priority.

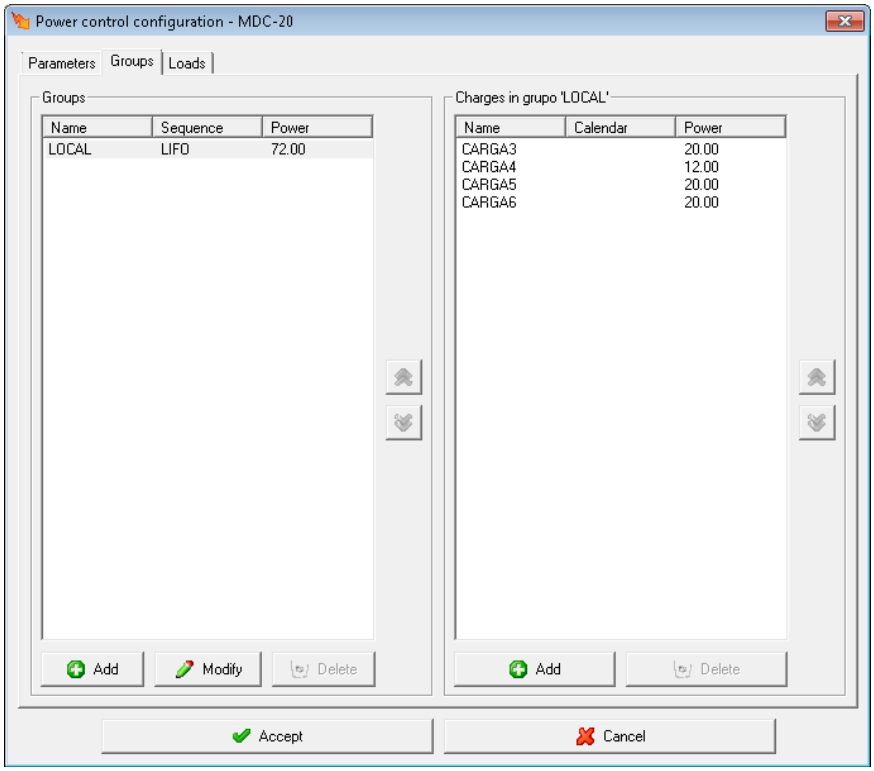


Fig.8-25 . – Configuration of load groups

To add a new load group you must select the button “Add” from the left-hand side of the menu. When adding a new load group, the user must indicate the name and sequence of the load group.

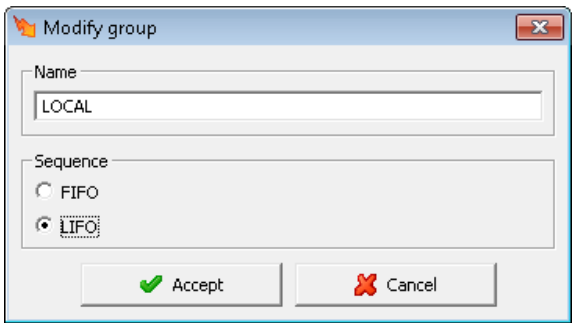


Fig.8-26 . – Add groups

Name: Define the required name for that load group.

Sequence: Define the order in which the loads will be connected/disconnected in the group.

- **LIFO**: The last load that is disconnected will be the first to be connected.
- **FIFO**: The load that has been disconnected the longest will be the first to be connected, cyclic queue.

The load order affects the first time that actions are carried out with the loads; the rest of the parameters configured are then assessed for connection or disconnection.

8.1.11 Loads within a group

This option shows a table with all the loads configured in the control system. The table shows very important information on each of the loads such as the group to which they belong, the input or variable associated with controlling the load status, the output or variable associated with carrying out load actions, the disconnection calendar assigned to it (if applicable) and the configured power.

The user can therefore check the configuration of the system and detect faults quickly.

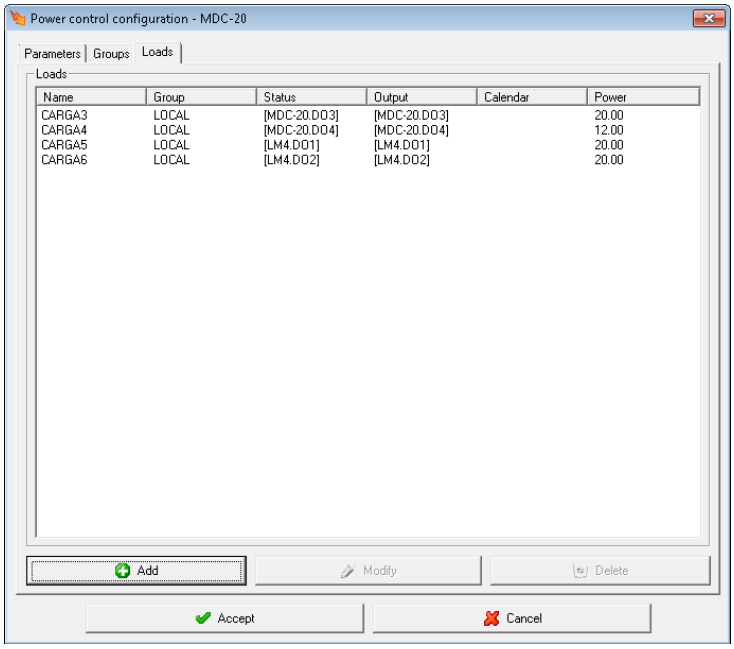


Fig.8-27 . – Configuration of loads

Press ADD to open the setup menu for a new load. The setup menu of the load properties is as follows.

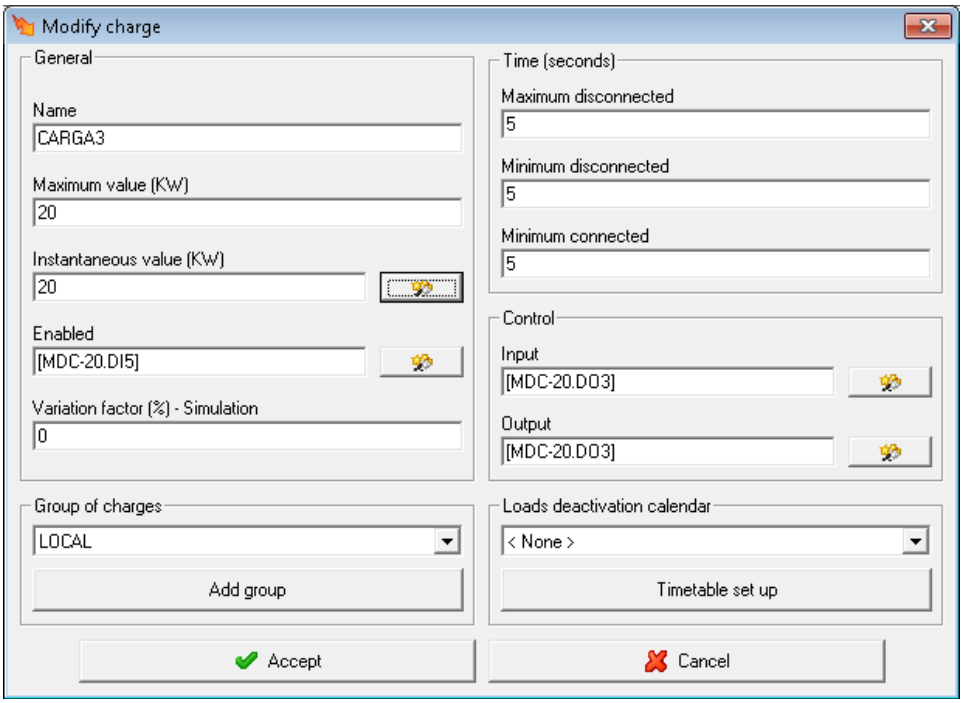


Fig.8-28 . – Modify load

8.1.11.1 General

Name: Load name.

Maximum value: Theoretical maximum power value of load. This value is considered when connecting the load.

Instantaneous value: Instantaneous power value of the load. This power must be read by a power analyzer or unit that calculates this variable. If there is no measurement unit, the value to be entered must be the same as the maximum theoretical value. This value is taken into account when disconnecting the load.

Enabled: Allows you to enable/disable the load. If the value is 1 (or positive) it means that the load is available for power control. If the value is 0 (or negative) it means that the load is not available for power control (disabled) and is disconnected. This can be used as manual load disconnection.

If the load is disabled, a grey icon will be displayed in the client  and no actions will be permitted with the load in the load action window.

Variation factor %: Percentage value that causes the power of the load to vary so that the consumption in the simulation is not constant (0% – 20%).

8.1.11.2 Load group

Group to which the load belongs. A load must necessarily belong to a single group.

If the user has not created a group previously to which to associate the load or if the load should be assigned to a new group, you can access the group creation menu directly with the Add group button.

8.1.11.3 Time (seconds)

Maximum disconnection time: Maximum time that the load can be disconnected.

Minimum disconnection time: Minimum time that the load must be disconnected.

Minimum connected time: Minimum time that the load must be connected.

8.1.11.4 Control

The inputs used to control the status of the loads and outputs used for actions on them must be configured in the following fields.

Status control: Variable used to read the status of the load. Normally an input in a local or remote unit is used, wiring the status of the relay that controls the load. If the status of the relay that controls the load has not been wired, the same output can be configured, although this does not guarantee having accurate information on the load status.

Action control: Variable used to modify the status of the load. Normally a unit output is used, either local or remote, which acts directly on the load or on an actuator that regulates the load.

8.1.11.5 Load deactivation calendar

This section allows you to configure time intervals when you want the loads to remain disconnected and, therefore, outside the power control system.

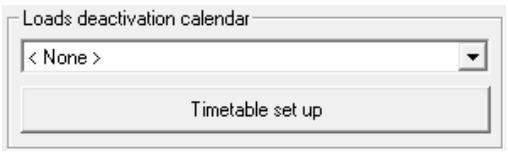


Fig.8-29 . – Load deactivation calendar

Press  "Add! to configure different time intervals to apply them subsequently in a weekly or annual calendar, depending on the needs of each load.

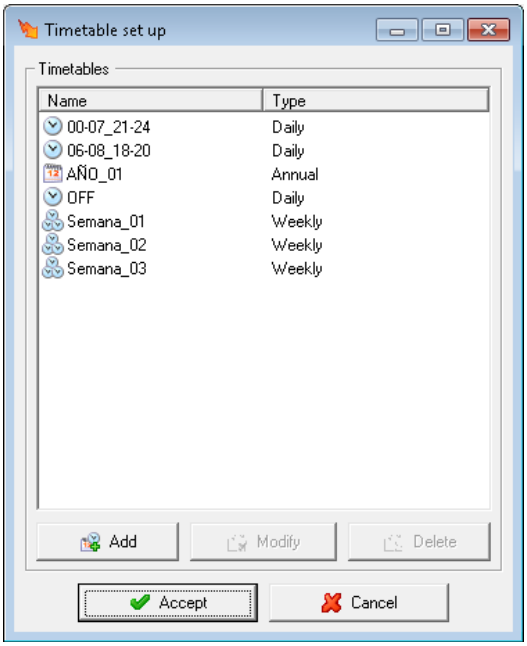


Fig.8-30 . – Daily calendar

Select the required type of configuration in the following menu.

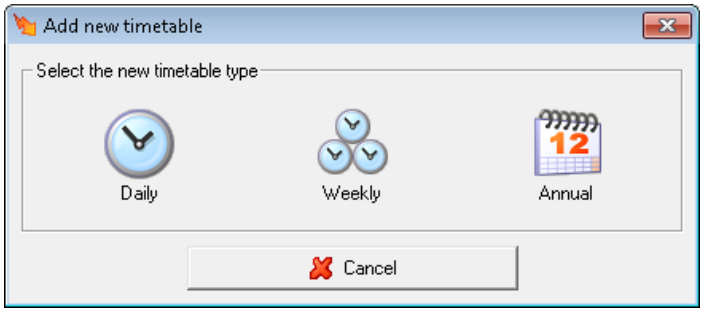


Fig.8-31 . – Type of calendar

 DAILY This menu lets you select the time intervals when you want loads to be disconnected without being able to be controlled by the system.

The user must indicate in red the time intervals when they want the loads to be disconnected. In the green time intervals, the loads are available for management by the power control system.

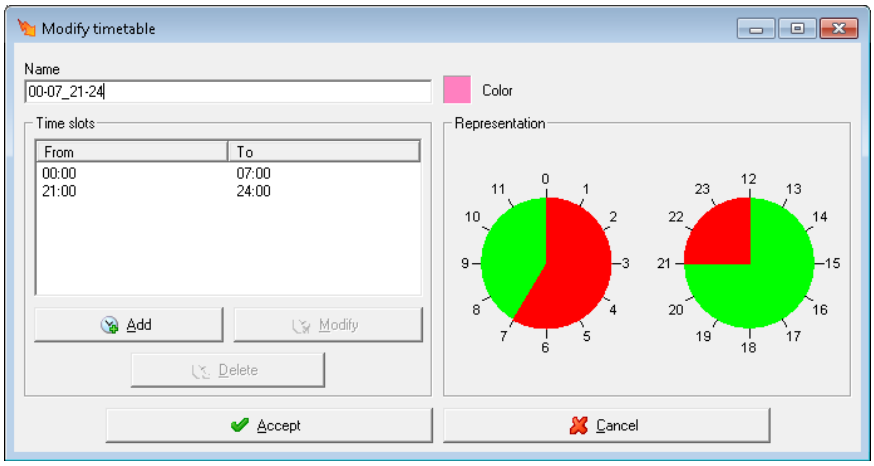


Fig.8-32 . – Configuration of day time intervals

WEEKLY: The weekly time control allows you to configure the disabling of loads during the days of the week, using the daily types of time control configured previously.

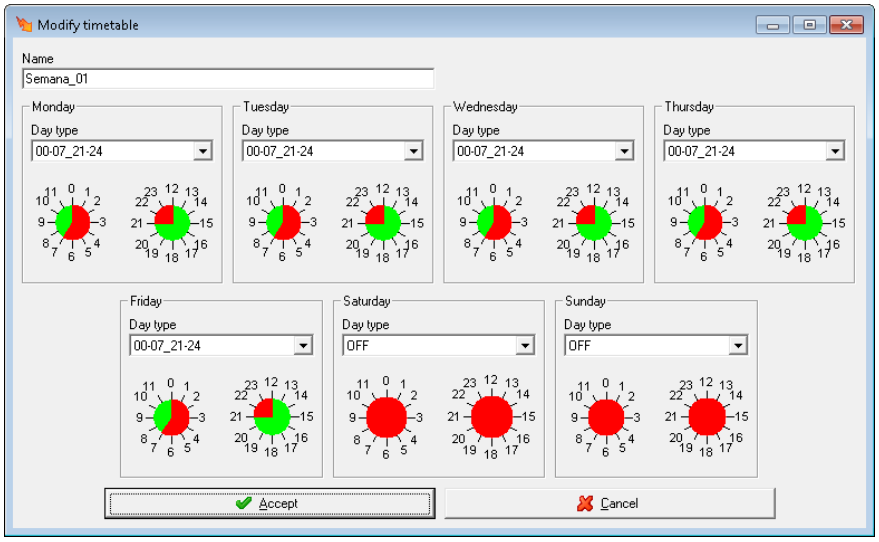


Fig.8-33 . – Configuration of week periods

ANNUAL: The annual time control allows you to configure the disconnection of loads every day of the year according to the daily types of time control configured previously.

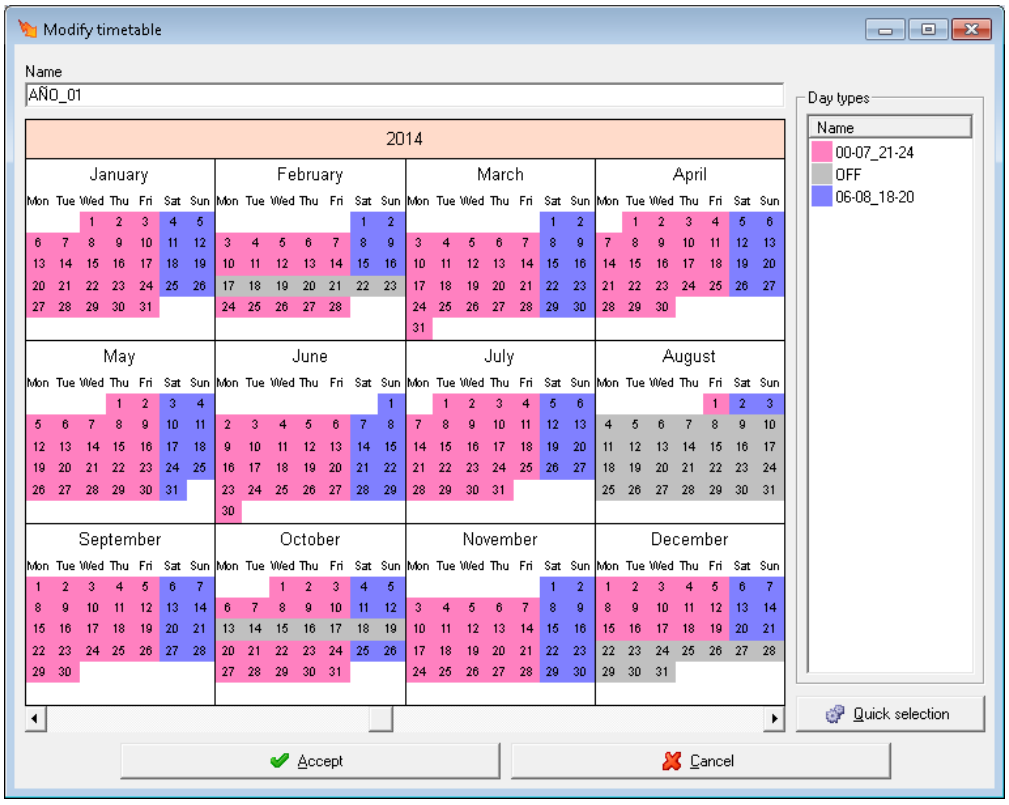


Fig.8-34 . – Configuration of year periods

The configured calendars are associated with each load, selecting them from the drop-down menu in the main load setup window.

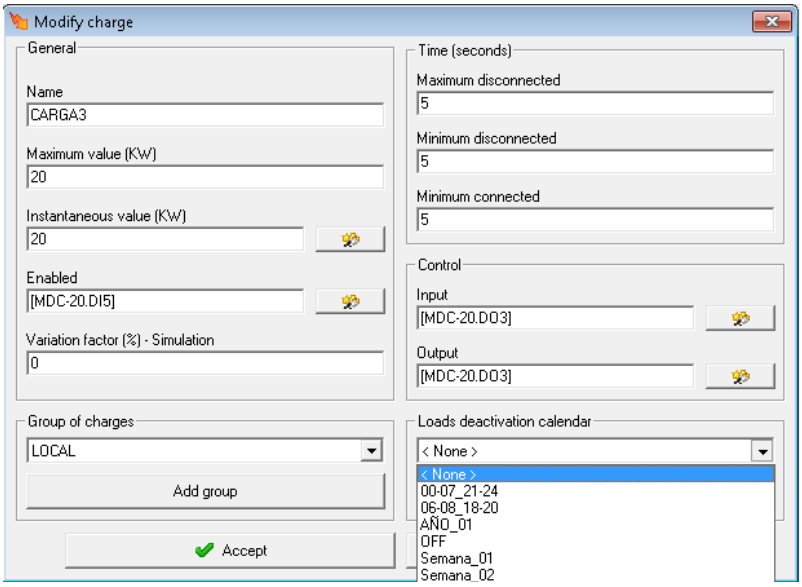


Fig.8-35 . – Associating calendars with loads

8.2 POWER CONTROL SIMULATION

The application has a tool that allows the user to check the correct working of their configuration.

8.2.1 Simulation

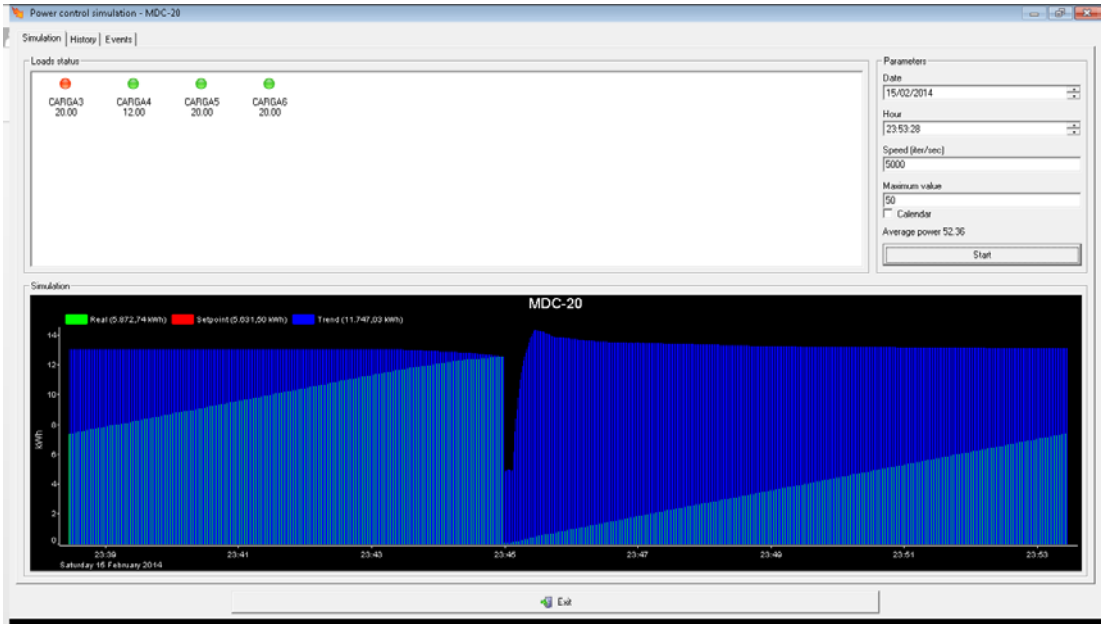


Fig.8-36 . – Graphic obtained by simulation

The graphic part shows all the configured loads. The load status is indicated by a light indicator. If the indicator is red it indicates that the load is disconnected. If the indicator is green it indicates that the load is connected.

- **Date and Time:** The date and time of the simulation will appear in real time. You can modify and enter another date and time.
- **Speed (iter/sec):** Number of iterations per second. A value of 60 means that for every real second the program will advance 60 simulated seconds.
- **Maximum value:** When pressing the right-hand button, the set point value will be that on the general calendar. If it is not pressed, a set point value can be entered manually.
- **Calendar:** Indicates whether hourly discrimination per calendar needs to be used in the simulation and selects the calendar that has been configured in section 8.1.9.
- **Average power:** It is the average power value of the installation.
- **Start:** Starts or stops the simulation of the installation.

In the list where the loads configured in the system are displayed, if you right-click the mouse a menu will appear where you can select the forced connection, forced disconnection or release of each of the loads.

The light indications of the loads vary according to their status.

Load connected. Automatic management determined by programming.

Load disconnected. Automatic management determined by programming.

Forced load connection. This load cannot be disconnected until it is released.

Forced load disconnection. This load cannot be connected until it is released.

8.2.2 Simulation log

The simulation menu log tab shows a graphic with the simulated data log.

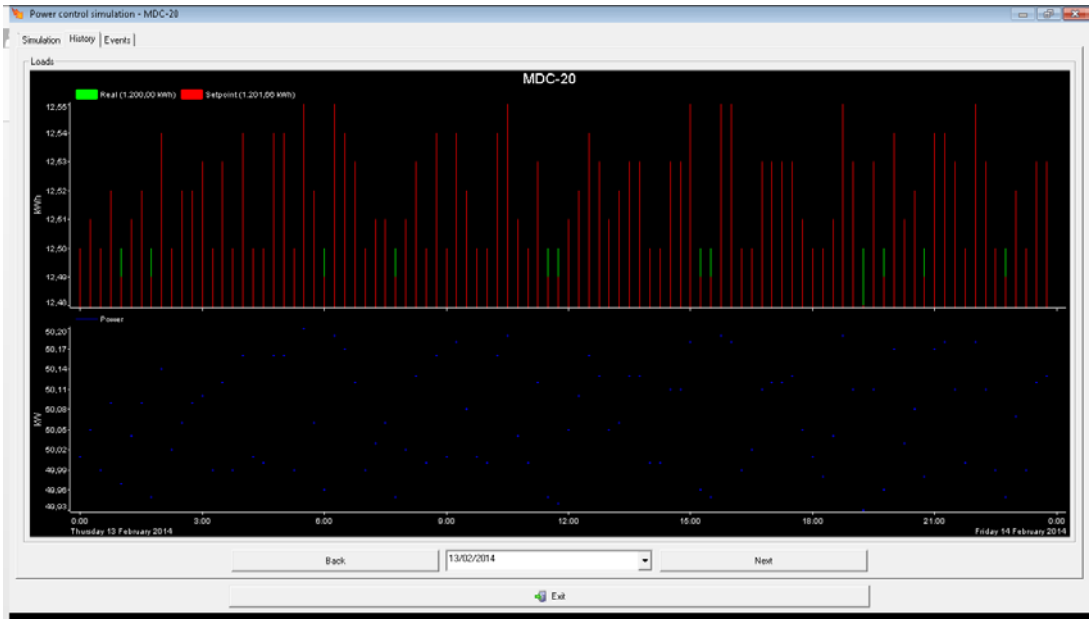


Fig.8-37 . – Simulated data log

When carrying out the simulation, the program creates a file where it saves the values being simulated. This file saves the data each month. The graphics and events represented are data which has been stored in that file.

The file start date and end date are displayed. The graphic shows the simulation consumption (KWh), set point and average power of the simulation (KW med). Time is shown as a whole day in the graphic.

To view a different interval to that shown, open the date menu and select the required date.

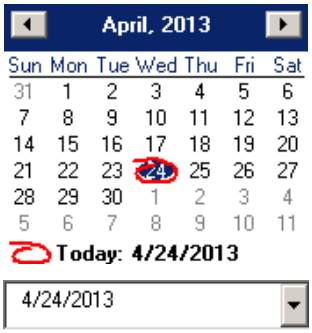


Fig.8-38 . – Date selection

8.2.3 Simulated events

The events option allows you to separately view the connection/disconnection of each of the simulated installation loads. When pressing events the following screen is displayed.

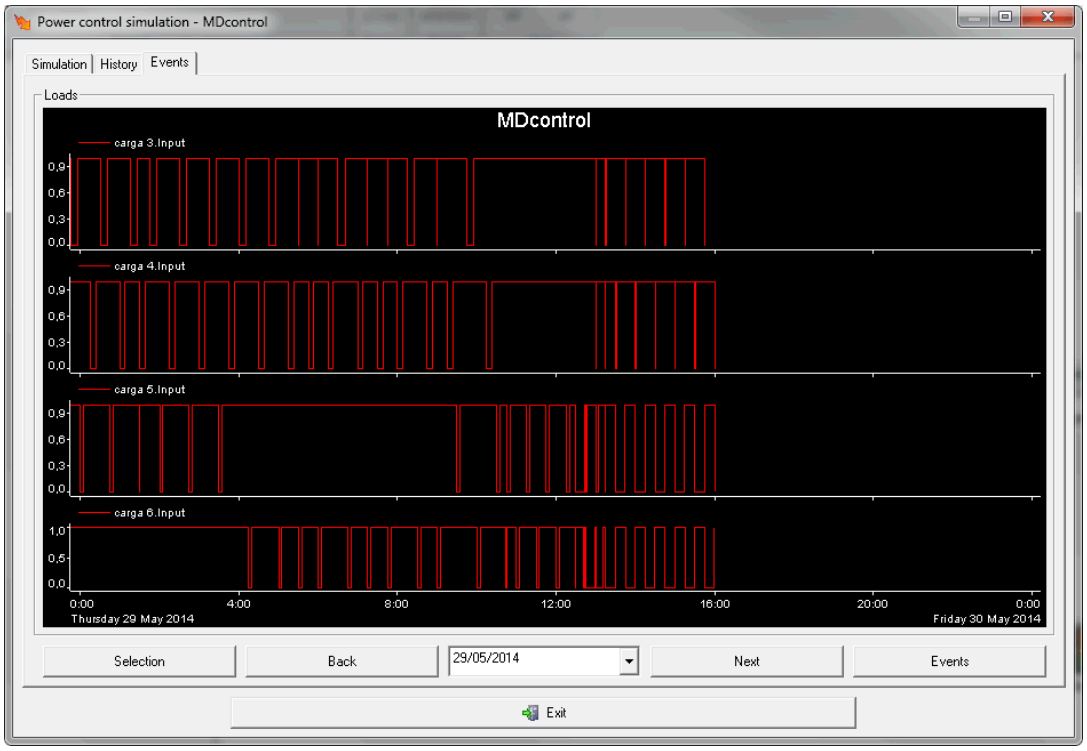


Fig.8-39 . – Display of events (simulated)

In the graphic, time is divided into two hour intervals. If you left-click the mouse on the graphic, a cursor will appear where with the arrow buttons you can move along each point of the graphic and view the time at that point.

There are various tabs in the Events screen that enable different options for representing events. The options are as follows:

Selección View the data selection screen to be represented in the graphic.

When pressing selection, the load group selection window that we want to view in the log graphic is opened. The loads to be viewed must be moved to the table on the right with the arrow  . To delete the load display, move the load to the left-hand column with the arrow  .

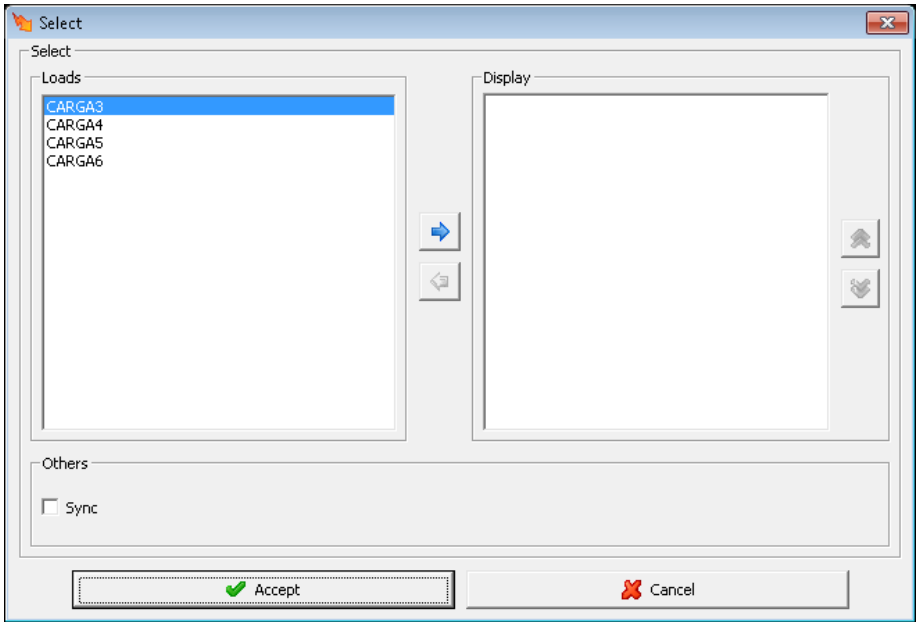


Fig.8-40 . – Selection of data for logs

Previous — Show previous day.

Next — Show next day.

Events — Shows the list of events of the loads selected in chronological order.

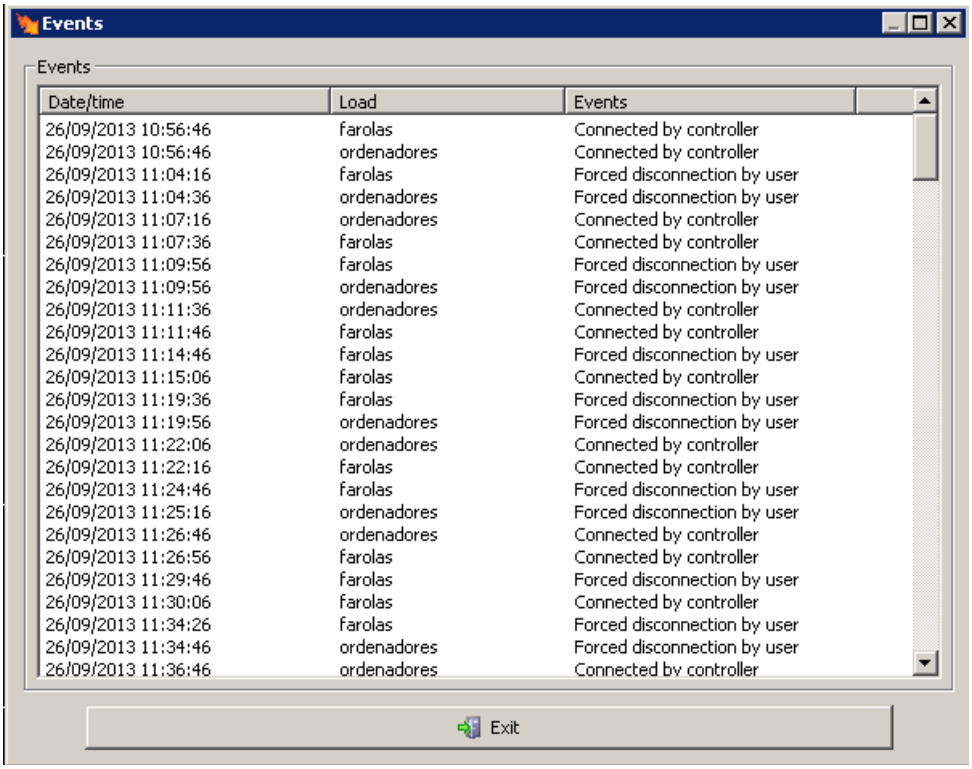


Fig.8-41 . – List of events

8.3 CLIENT DISPLAY

When the client communicates with the power control unit, the units configured in the application are displayed on the screen.

The Power Studio client icons are displayed at the top of the screen.

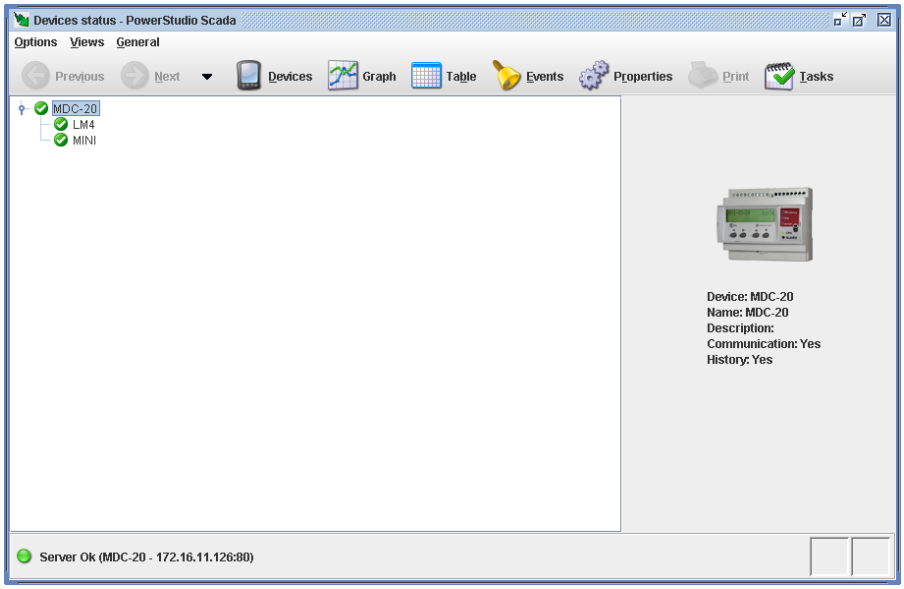


Fig.8-42 . – List of events

8.3.1 MDC-20 unit

If the MDC-20 display is selected, in the General window you can see the values of the meters and the status of the inputs and outputs of the units previously configured in the menu of section 7.5.3.

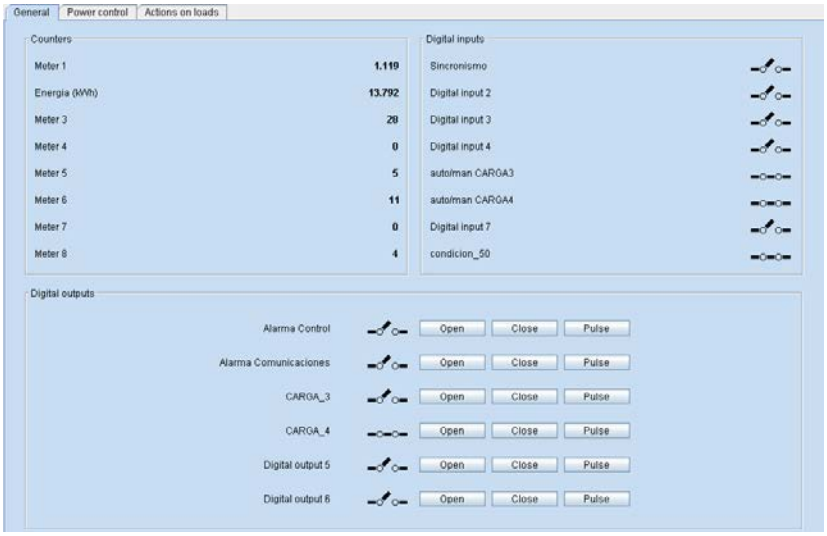


Fig.8-43 . – Display of MDC-20

Communications can be used to manage the digital outputs of the unit making it possible to open, close or generate an impulse remotely. These commands have priority over the power control so if an output is opened or closed, the associated load will be connected or disconnected until a new action is determined for it by the algorithm.

8.3.2 Power control

The power control option displays the window of the real evolution of the system. The REAL, SETPOINT and TREND variables are shown in real time in the window.

- **Real**: This is the total consumption for the period in progress calculated according to the configured energy variable.
- **Set point**: Consumption value that cannot be exceeded and depends on the maximum power configured.
- **Trend**: Estimated consumption value at the end of the period based on current (real) consumption.

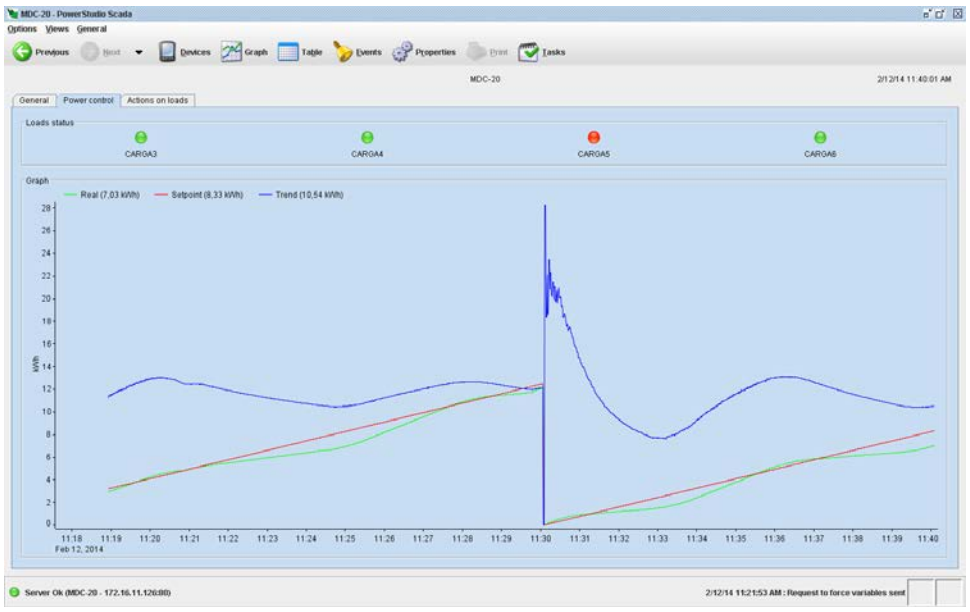


Fig.8-44 . – Real evolution of the system

8.3.3 Load action

The load action option displays the loads configured in the system associated with several buttons that allow you to force the connection or disconnection of the load or release the load from any lock for its management by the system. If the load is not enabled, all the deactivated fields appear so it is not possible to take any action on the load.

Fig.8-45 . – Screen for forcing loads

- **Connect:** This option connects the load permanently, with it no longer being available for the power control system until its disconnection is released or forced manually.
- **Disconnect**: This option disconnects the load permanently, with it no longer being available for the power control system until its connection is released or forced manually.
- **Free**: This cancels the forced connection or disconnection so that the load becomes available again for the power control system.

When there is a change in status of the loads in this option, the load icon in the power control option changes.

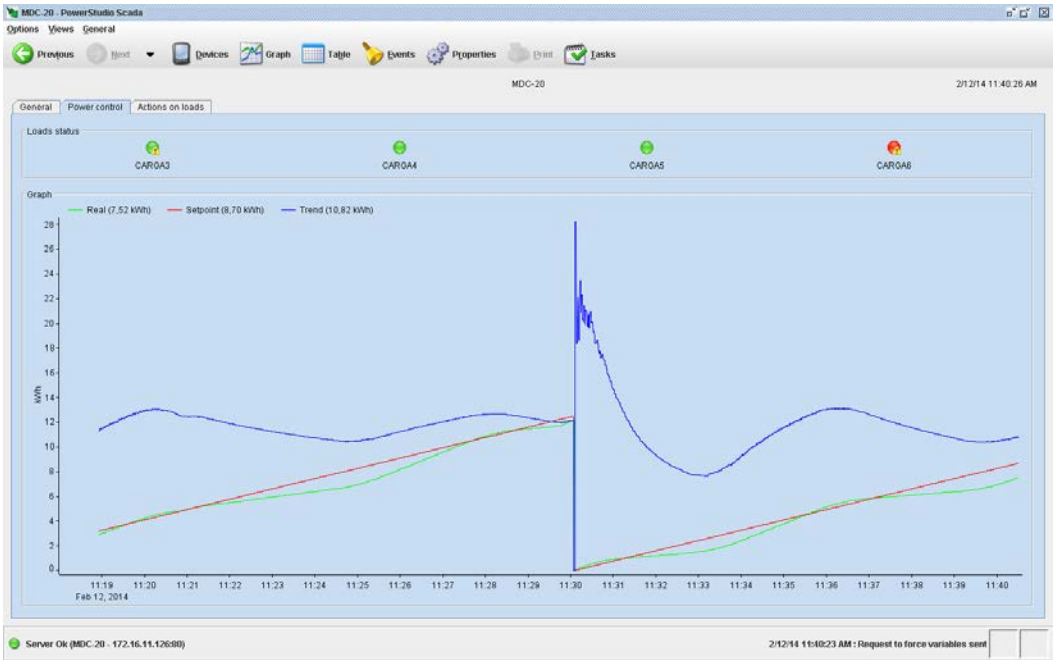


Fig.8-46 . – Forced load icons

The various icons and their description are:

Load connected in automatic management by the MDC.

Load disconnected in automatic management by the MDC.

Manually connected load. This load cannot be disconnected until it is released

Manually disconnected load. This load cannot be connected until it is released.

Load not enabled for management by the system. See enable in chapter 0.

Load without information on status. The remote unit does not communicate and it is not possible to know the status of the loads. These can be connected or disconnected.

8.3.4 Graphic display

This unit allows the following graphic options: the display of the value of the impulse meters (if the inputs have been configured as meters) or the status of the inputs, the graphic display of the variables belonging to the power controller or information on the status of the system loads.

Fig.8-47 . – Selection of meters

The meter value shows the incremental value of the meter for a period selected in a set interval.

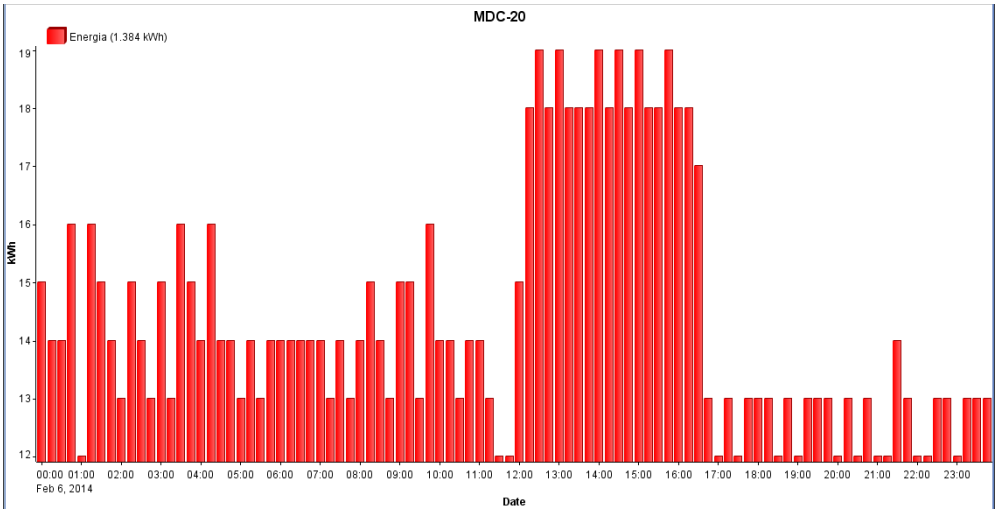


Fig.8-48 . – Meter display

The variables for the maximum demand controller are shown in the image.

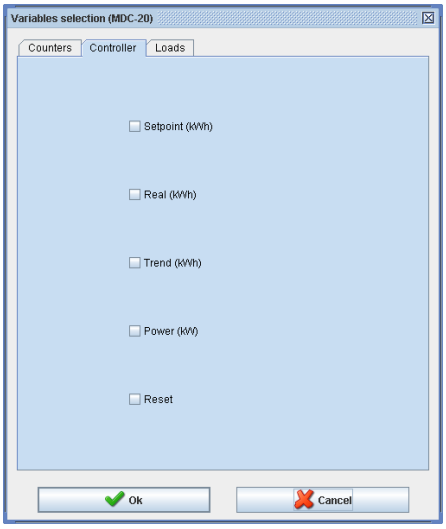


Fig.8-49 . – Variables of the MD controller

- **Set point (kWh)**: Consumption value that cannot be exceeded and depends on the maximum power configured.
- **Real (kWh)**: This is the total consumption for the period in progress calculated according to the configured energy variable.
- **Trend (kWh)**: Estimated consumption value at the end of the period based on current (real) consumption.
- **Power (kW)**: Power value calculated by the unit according to the energy measured in a period.
- **Synchrony**: This option only appears if external synchronisation has been activated in the editor. Indicates the date and time when it was activated.
- **Reset**: Moments when the demand control unit has been restarted.

The load variables that can be represented as graphics are

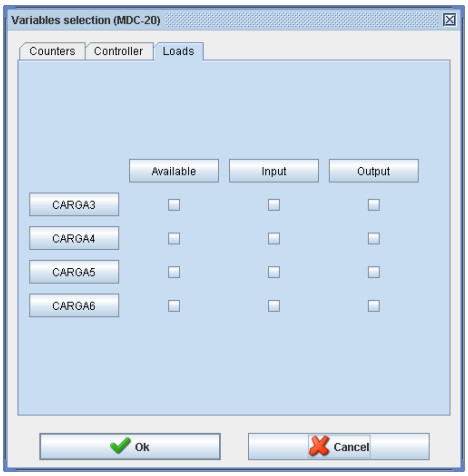


Fig.8-50 . – Variables for graphic representation

- **Available**: Value of variable configured for enabling the load. Indicate whether it is available or not for the power control. Normally its value changes between 1 and 0; otherwise it must change between a positive and negative value.

- **Input**: Value of the variable configured in the load status field. Normally its value changes between 1 and 0; otherwise it must change between a positive and negative value.
- **Output**: Value of the variable configured in the load action field. Its value = 1 or positive when the output that connects the load is activated.

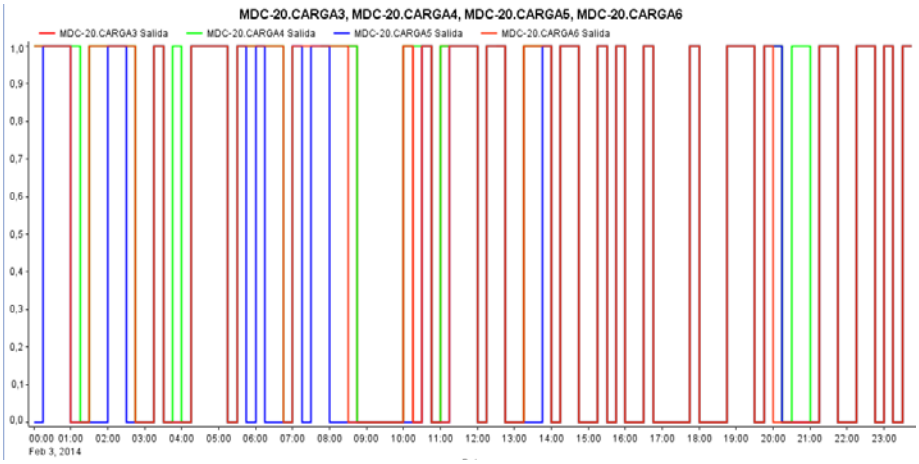


Fig.8-51 . – Outputs

8.3.5 Discriminator Unit

You can access the information on the discriminators that have been created in the power control application.

The user must select the discriminator from the list of units.

Fig. 8-52 . – List of discriminator units

The information displayed on the screen of these discriminators is very important as it allows the user to know the time accumulated in each time interval, the time remaining until deactivation and how much time is left until that time period is reactivated.

The active interval is also permanently identified with an icon that changes to green when the period is active and grey when it is deactivated.

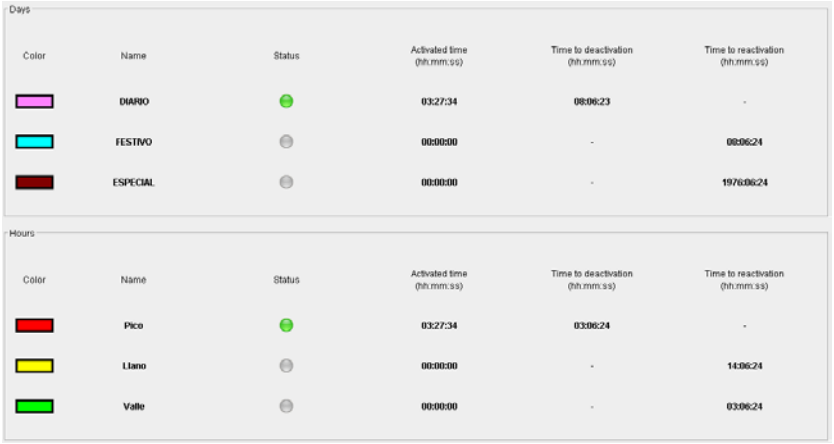


Fig.8-53 . – Status display

9 TECHNICAL FEATURES

Power supply of the unit	
Single-phase	85…264V~ / 120…300V ⎓
Frequency	50/60 Hz
Consumption	5…8VA (depending on the number of connected relays)
Installation category	Category III according to EN 61010. Double-insulated electric shock protection class II.

Inputs	
Type	Potencial free contact - NPN
Insulation	Optoisolated
Duration of metering impulses	Minimum 50 ms
Time between impulses	Minimum 50 ms
Maximum frequency of impulses	10 Hz

Outputs	
Type	Relay
Maximum power of operation	750 VA
Maximum voltage of operation	250 Vac
Maximum current AC1 (resistive load)	5 A
Electrical life (250 Vac / 5A)	3×10^4 operations
Mechanical working life	2×10^7 operations

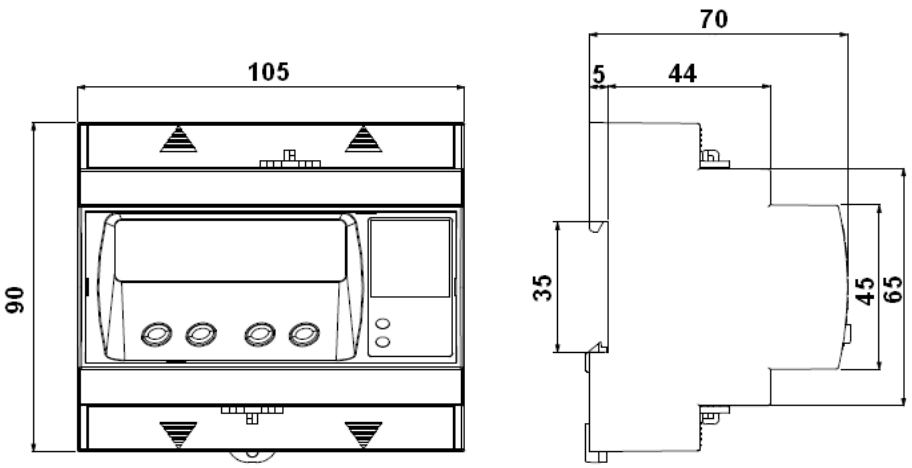
Screen	
Type	LCD, Alphanumeric, 2 lines of 20 characters, with backlight

Communications	
Channels	1 Ethernet channel + 1 RS485 channel
Ethernet channel	
Type	Ethernet 10BaseT / 100 Base TX self-detecting
Connector	RJ-45
Network protocols	HTTP/ Modbus RTU

RS-485 channel	
Type	RS-485 (A-B-S)
Protocol	Modbus RTU
Speed (bps)	Configurable 4800, 9600,19,200, 34,800, 57,600, 115,200
Data bits	8
Parity	No parity, even, odd
Stop bits	1 or 2

Environmental features	
Operating temperature	-10…+60ºC
Storage temperature	-10…+70ºC
Maximum operating altitude	2,000 m
Humidity (without condensation)	5 - 95%

Mechanical features	
Box material	UL94–V0 self-extinguishing plastic
Protection degree	IP 20
Weight	250 g
Outer dimensions (mm)	105 x 90 x 65 mm (6 modules)



STANDARDS	
Box / Flammability	UL 94
Electrical safety	EN61010-1
Electromagnetic compatibility (EMC)	EN 61000-6-1, EN 61000-6-2 , EN 61000-6-3, EN 61000-6-4

10 MAINTENANCE AND TECHNICAL SERVICE

In the case of any query in relation to unit operation or malfunction, please contact the **CIRCUTOR, SA** Technical Assistance Service.

CIRCUTOR Technical Assistance Service

Vial SantJordi, s/n 08232 - Viladecavalls (Barcelona)

Tel.: 902 449 459 (Spain) / +34 937 452 900 (outside of Spain)

email: sat@circutor.es

11 GUARANTEE

CIRCUTOR guarantees its products against any manufacturing defect for two years after the delivery of the unit.

CIRCUTOR will repair or replace any defective factory product returned during the guarantee period.

- No returns will be accepted and no unit will be repaired or replaced if it is not accompanied by a report indicating the defect detected or the reason for the return.
- The guarantee will be void if the unit has been improperly used or the storage, installation and maintenance instructions listed in this manual have not been followed. "Improper usage" is defined as any operating or storage condition contrary to the National Electrical Code or that surpassing the limits indicated in the technical and environmental features of this manual.
- **CIRCUTOR** accepts no liability due to the possible damage to the unit or other parts of the installation, nor will it cover any possible sanctions derived from a possible failure, improper installation or "improper usage" of the unit. Consequently, this guarantee does not apply to failures occurring in the following cases:

  - Overvoltages and/or electrical disturbances in the supply;
  - Water, if the product does not have the appropriate IP classification;
  - Poor ventilation and/or excessive temperatures;
  - Improper installation and/or lack of maintenance;
  - Buyer repairs or modifications without the manufacturer's authorisation.

12 CE CERTIFICATION

DECLARACION DE CONFORMIDAD CE
CE DECLARATION OF CONFORMITY
DECLARATION DE CONFORMITE CE

Por la presente — **CIRCUTOR, S.A.**
We hereby
Par le présent

Con dirección en: — **Vial Sant Jordi, s/n**
With address in: — **08232 VILADECAVALLS (Barcelona)**
Avec adresse à: — **ESPAÑA**

Declaramos bajo nuestra responsabilidad que el producto:
We declare under our responsibility that the product:
Nous déclarons sous notre responsabilité que le produit:

Autómata energético con tecnología PowerStudio Embedded y control de máxima demanda
Energy device with embedded PowerStudio technology and maximun demand control

Serie: MDC-20

Marca CIRCUTOR
Brand
Marque

Siempre que sea instalado, mantenido y usado en la aplicación para la que ha sido fabricado, de acuerdo con las normas de instalación aplicables y las instrucciones del fabricante,
Provided that it is installed, maintained and used in application for which it was made, in accordance with relevant installation standards and manufacturer's instructions,
Toujours qu'il soit installé, maintenu et utilisé pour l'application par lequelle il a été fabriqué, d'accord avec les normes d'installation applicables et suivant les instructions du fabricant,

Cumple con las prescripciones de la(s) Directiva(s):
Complies with the provisions of Directive(s):
Accomplie avec les prescriptions de la (les) Directive(s):

2006/95/CE
2004/108/CE
2011/65/CE

Está en conformidad con la(s) siguiente(s) norma(s) u otro(s) documento(s) normativo(s) :
It is in conformity with the following standard(s) or other normative document(s) :
Il est en conformité avec la (les) norme(s) suivante(s) ou autre(s) document(s) normatif (ves) :

IEC 61010-1:2010
IEC 61000-6-2:2005
IEC 61000-6-4:2011

Año de colocación del marcado "CE": 2013
Year of affixing "CE" marking:
An de mise en application du marquage "CE":

Revisado en Viladecavalls	**Nombre y Firma:**	**Ferran Gil Torné**	**Sello**
Fecha: 14/07/2014	*Name and signature :*	*General Manager*	*Stamp*
Date:	*Nom et signature :*	*Directeur Général*	*Tampon*
Date :			

CIRCUTOR, SA – Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) Spain – Tel.(+34) 937 452 900 - central@circutor.es