Power analyzer

CVM-C4

INSTRUCTION MANUAL

(M267B01-03-20A)

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.

	**ATTENTION** Indicates that special attention should be paid to a specific point.

If you must handle the unit for its installation, start-up or maintenance, the following should be taken into consideration:

	Incorrect handling or installation of the unit may result in injury to personnel as well as damage to the unit. In particular, handling with voltages applied may result in electric shock, which may cause death or serious injury to personnel. Defective installation or maintenance may also lead to the risk of fire. Read the manual carefully 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.
	**Refer to the instruction manual before using the unit** In this manual, if the instructions marked with this symbol are not respected or carried out correctly, it can result in injury or damage to the unit and /or installations.

CIRCUTOR, SA reserves the right to modify features or the product manual without prior notification.

DISCLAIMER

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

CIRCUTOR, SA on its web site, supplies its customers with the latest versions of the device specifications and the most updated manuals.

www.circutor.com

	**CIRCUTOR,** recommends using the original cables and accessories that are supplied with the device.

CONTENTS

REVISION LOG

Table 1: Revision log

Date	Revision	Description
11/19	M267B01-03-19A	First Version
02/20	M267B01-03-20A	Changes in the following sections: 3.4. - 8.

SYMBOLS

Table 2: Symbols.

Symbol	Description
CE	In accordance with the relevant European directive.
	In accordance with the CMiM directive.
	Device covered by European Directive 2012/19/EC. At the end of its useful life, do not leave the unit in a household waste container. Follow local regulations on electronic equipment recycling.
⎓	Direct current.
~	Alternating current.

Note: *The images on the devices are for illustrative use only and may differ from the original device.*

1 .- VERIFICATION UPON RECEPTION

Upon reception of the device check the following points:

a) The device meets the specifications described in your order
b) The device has not suffered any damage during transport
c) Perform an external visual inspection of the device prior to switching it on
d) Check that it has been delivered with the following:

- An installation guide

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

2 .- PRODUCT DESCRIPTION

The **CVM-C4** is a device that measures, calculates and displays the main electrical parameters in single-phase and three-phase networks.
The device has RS-485 communications, relay outputs, impulse outputs and digital inputs.
Current measurement is indirectly carried out by /5A or /1A transformers.

The device features:

- **3 keys** that allow you to browse between the various screens and program the device
- **LED Display** to display all the parameters
- **2 relay outputs,** fully programmable
- **2 digital inputs**
- **2 impulse outputs,** programmable
- **RS-485** communications.

Table 3: List of CVM-C4 models

CVM-C4			
Model	Auxiliary power supply		
	80... 270 V ~	80... 270 V ⎓	18.. 36 V ⎓
M52706	✓	✓	-
M527060030000	-	-	✓

3 .- DEVICE INSTALLATION

3.1.- PRIOR RECOMMENDATIONS

	In order to use the device safely, it is critical that individuals who handle it follow the safety measures set out in the standards of the country where it is being used, using the personal protective equipment necessary (rubber gloves, face protection and approved flame-resistant clothing) to prevent injuries due to electric shock or electric arc as a consequence of exposure to current-carrying conductors and paying attention to the various warnings indicated in this instruction manual.

The **CVM-C4** device must be installed by authorised and qualified staff.

The power supply plug must be disconnected and measurement systems switched off before handling, altering the connections or replacing the device. It is dangerous to handle the device while it is powered.

It is critical to keep wires in perfect condition to avoid accidents, personal injury or damage to installations.

Limit the operation of the device to measuring the specified current or voltage values.

The manufacturer of the device is not responsible for any damage resulting from failure by the user or installer to heed the warnings and/or recommendations set out in this manual, nor for damage resulting from the use of non-original products or accessories or those made by other manufacturers.

Do not use the device to take measurements if you detect an anomaly or malfunction.

	Disconnect the device from the mains and from the power supply (both the device and its measuring system) before performing any maintenance work, repairs or handling any of the connections of the device. Contact the after-sales service if you detect that the device is not working properly.

3.2.- INSTALLATION

⚠	Terminals, opening covers or removing elements can expose parts that are hazardous to the touch while the device is powered. Do not use the device until it is fully installed.

The device should be installed inside an electric panel or enclosure, and panel-mounted.

The following steps must be taken for correct installation:

1.- Make a cut in the panel, according to the dimensions in **Figure 1**

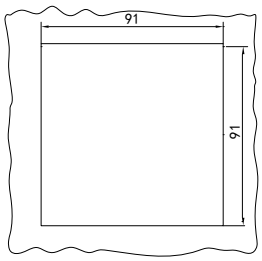


Figure 1: Cut in the panel

2.- From outside, insert the device into the panel cut-out (**Figure 2**)

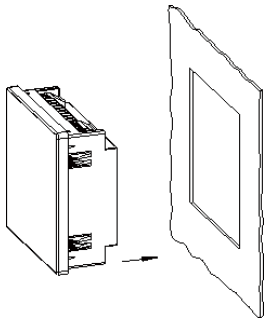


Figure 2: Insert the device

3 .- Fully insert the device and fasten it by using the spring (**Figure 3**)

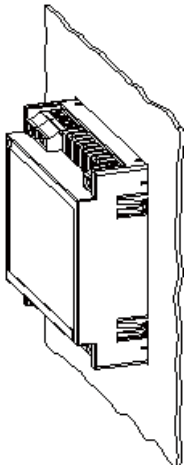


Figure 3: Fully insert the device

The device must be connected to a power circuit protected by a fuse with a maximum nominal

current of **0.25 A**.

If the voltage to be measured is higher than the nominal input voltage, a voltage transformer must be connected to the device.

If more than one device is connected to the current transformer, they must be connected in series.

Before disconnecting the current measurement connection cables, be sure to disconnect the transformer's primary cables and bridge the secondary.

The device can operate in three-wire, three-phase mode or four-wire, three-phase mode, the user selecting the corresponding connection mode according to the installation. An incorrect type of connection or an error in phase sequence may cause measurement errors.

3.3.- DEVICE TERMINALS

Table 4: List of CVM-C4 terminals

Device terminals	
1: L/+, Power supply	**15: RO1,** Relay Output 1 (Common)
2: N/-, Power supply	**16:** Relay Output 1 (NO) / Relay Output 2 (Common)
4: I1 S1, Current input L1	**17: RO2:** Relay output 2 (NO)
5: I1 S2, Current input L1	**47: +,** Impulse output 1
6: I2 S1, Current input L2	**48: -,** Impulse output 1
7: I2 S2, Current input L2	**49: +,** Impulse output 2
8: I3 S1, Current input L3	**50: -,** Impulse output 2
9: I3 S2, Current input L3	**58: A**, RS-485
11: U1, Voltage input L1	**59: B**, RS-485
12: U2, Voltage input L2	**70:** Common digital inputs
13: U3, Voltage input L3	**71: DI1**, Digital input 1
14: UN / U2, Voltage input N/L2	**72: DI2**, Digital input 2

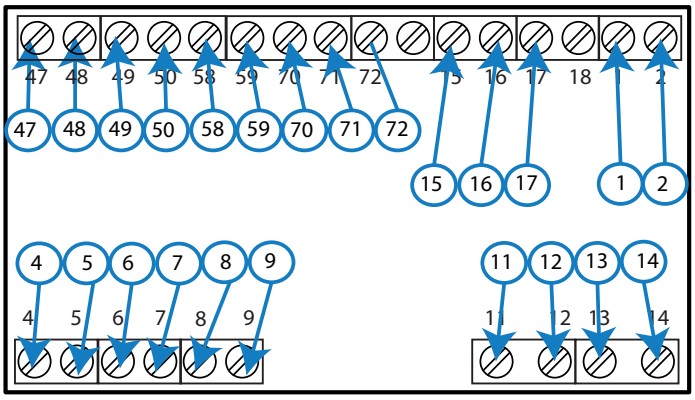


Figure 4: CVM-C4 terminals

3.4.- CONNECTION DIAGRAM

3.4.1.- THREE-PHASE NETWORK MEASURING WITH 4-WIRE CONNECTION

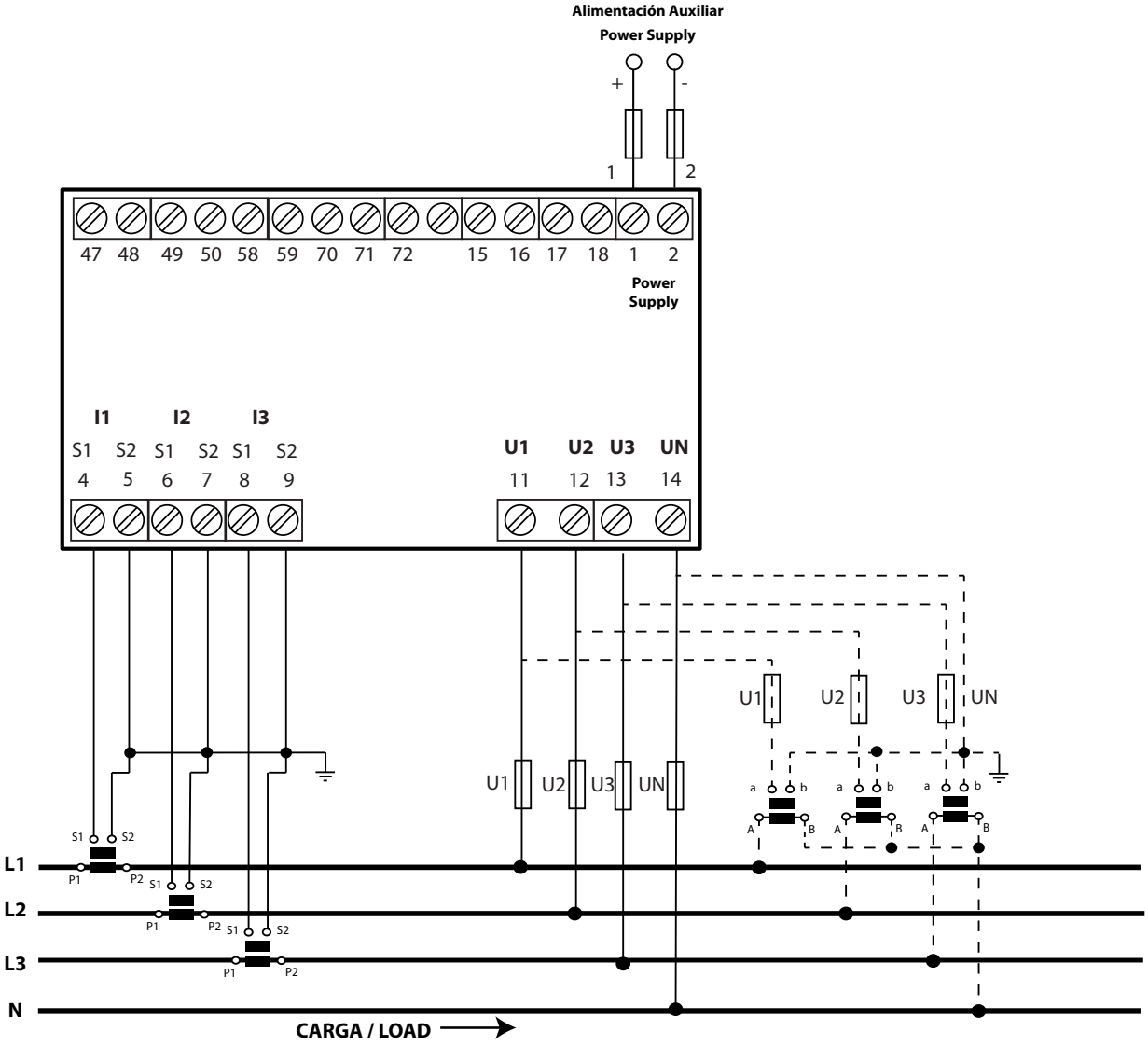


Figure 5: Three-phase network measuring with 4-wire connection.

3.4.2.- THREE-PHASE NETWORK MEASURING WITH 3-WIRE CONNECTION

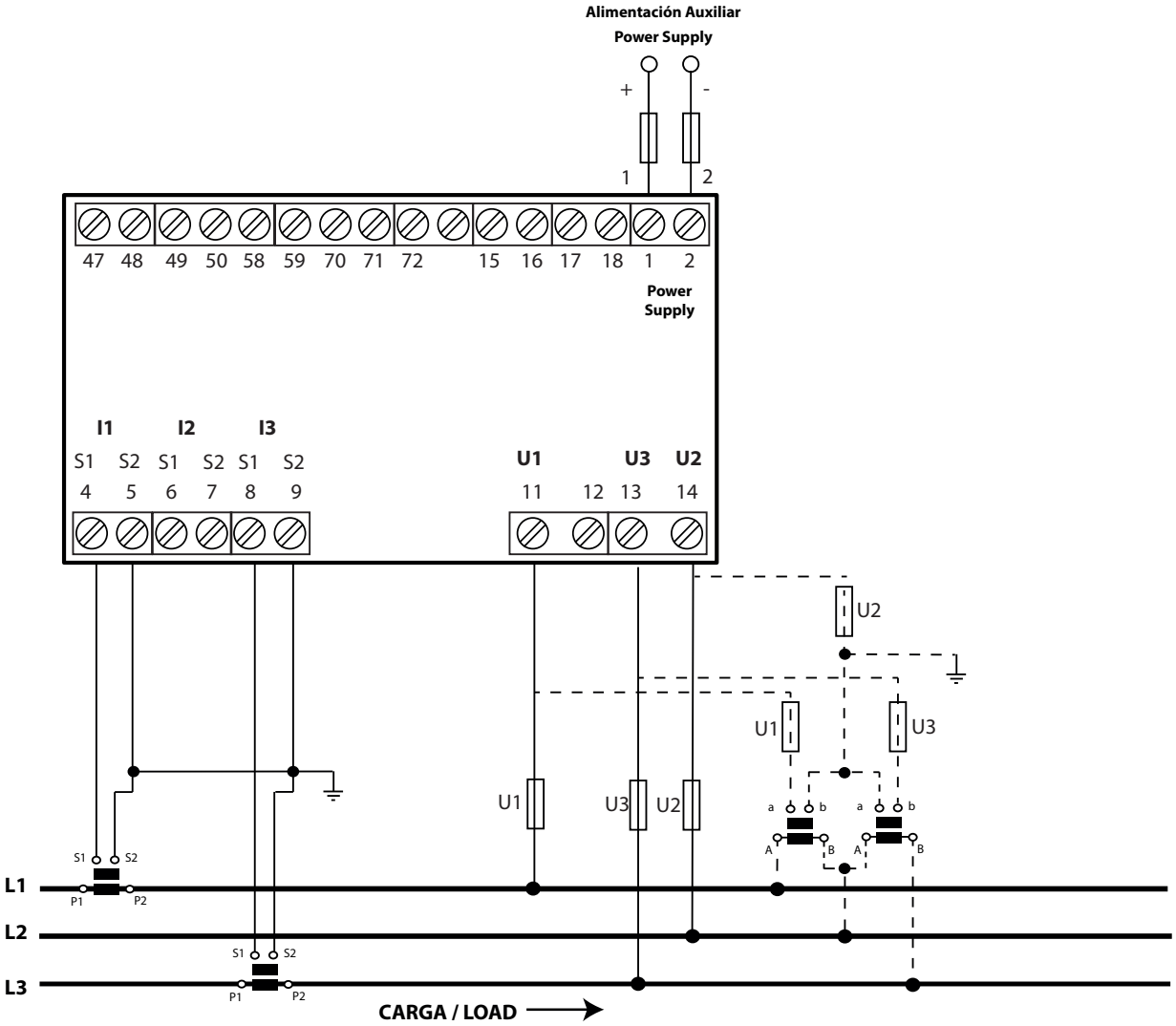


Figure 6: Three-phase network measuring with 3-wire connection

4.- OPERATION

4.1.- MEASURING PARAMETERS

The **CVM-C4** is a four-quadrant power analyzer (consumption and generation) that operates according to the **IEC** measurement convention (**Figure 7**).

Operation in the 4 quadrants (Q1, Q2, Q3, Q4)

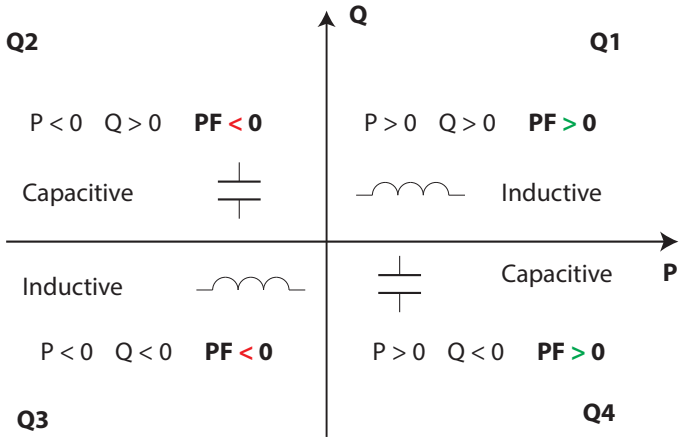


Figure 7: IEC measurement convention.

The device displays the electrical parameters shown in **Table 5**.

Table 5: Measuring parameters

Parameter	Units	Phases L1-L2-L3	Total III
Phase-Neutral Voltage	k/V	✓	
Phase-Phase Voltage	k/V	✓	
Current	k/A	✓	
Frequency	Hz		✓
Active Power	M/kW	✓	✓
Reactive Power	M/kvar	✓	✓
Apparent Power	M/kVA	✓	✓
Power factor	PF	✓	✓
THD Voltage	%	✓	
THD Current	%	✓	
Reactive energy (consumption and generation)	M/kWh		✓
Active energy Tariff 1 and 2	M/kWh		✓
Reactive energy (consumption and generation)	M/kvar		✓
Reactive energy Tariff 1 and 2	M/kvar		✓

4.2.- DISPLAY

The device has a LCD display with 3 lines, 4 digits each, to view the measured parameters and to configure the device.

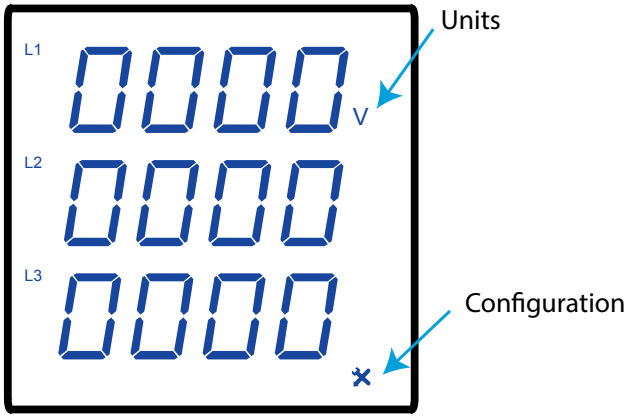


Figure 8: Display CVM-C4.

4.3.- KEYBOARD FUNCTIONS

The **CVM-C4** has 3 keys that allow you to browse through and program the device, **Table 6** and **Table 7**.

✓ Display screens:

Table 6: Keyboard function: Display screens.

Key	Keystroke
<	Previous screen.
>	Next screen.
≡	**Long keystroke (> 3s):** Accesses the configuration menu

✓ Configuration screens:

Table 7: Keyboard function: Configuration screens.

Key	Keystroke
<	Browses through the different menu screens. Browses through the different options.
>	Browses through the different menu screens. Browses through the different options.
≡	Skips to the next configuration menu. Changes the digit's value. **Long keystroke (> 3s):** Enables the value's configuration Validates the configuration parameter

4.4.- RELAY OUTPUTS

The device features two programmable relay outputs (terminals 15, 16 and 17 in **Figure 9**) that can be programmed as remote control signals or alarms in the configuration menu (***"6.3.- RELAY OUTPUT 1"*** and ***"6.4.- RELAY OUTPUT 2"***).

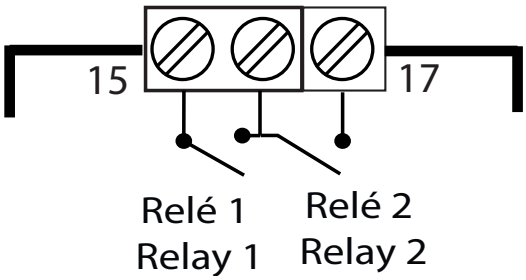


Figure 9: Relay outputs

4.5.- ENERGY IMPULSE OUTPUTS

The device features energy impulse outputs (terminals 47, 48, 49 and 50 in **Figure 10**).

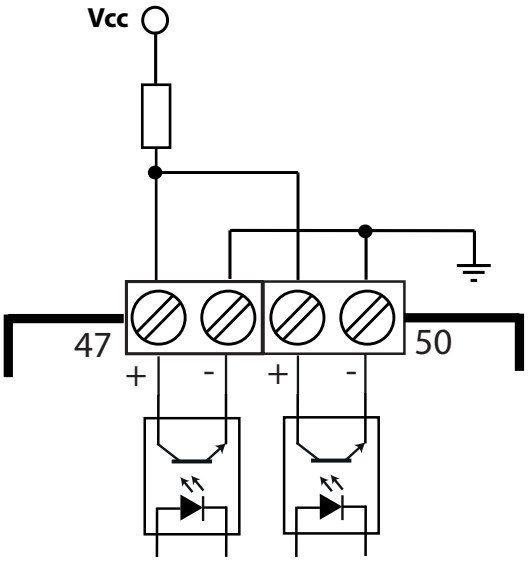


Figure 10: Energy impulse outputs

The type of energy impulses is selected in section ***"6.5.1.- ENERGY ACCUMULATION MODE".***

If option 49 is selected, the device generates:

- ✓ Impulse output 1 (terminals 47 and 48): Active energy impulses consumed (positive).
- ✓ Impulse output 2 (terminals 49 and 50): Active energy impulses generated (negative).

If option 2t is selected, the device generates:

- ✓ Impulse output 1 (terminals 47 and 48): Active energy impulses consumed (positive) in tariff 1.
- ✓ Impulse output 2 (terminals 49 and 50): Active energy impulses consumed (positive) in tariff 2.

The impulse output ratio is set to **5000 imp /kWh**, that is, when the device accumulates an energy of 1 kWh, 5000 impulses exit the impulse output.

We have to consider that in relation to this ratio the energy is calculated by the device, taking into account the programmed voltage and current transformation ratios.

Thus, the actual energy can be calculated as:

$$Actual\ Energy = N * \frac{1kWh}{5000\ impulses} * R_V * R_c$$

Where:

N: No. of impulses.
Rv: Voltage ratio, ratio between primary and secondary voltage.

$$R_V = \frac{Pt1}{Pt2}$$

Rc: Current ratio, ratio between primary and secondary current.

$$R_c = \frac{Ct1}{Ct2}$$

Note: *The device calculates and displays the active and reactive energy, but the energy impulse output is only active energy.*

4.6.- DIGITAL INPUTS

The device has two digital inputs (terminals 70, 71 and 72 in **Figure 11**). The relay outputs can be activated depending on the value of the digital inputs (see ***"6.3.- RELAY OUTPUT 1"*** and ***"6.4.- RELAY OUTPUT 2"***).

If the energy accumulation mode programmed is 2t (***"6.5.1.- ENERGY ACCUMULATION MODE"***) digital input 1,**DI1**, is used to change the tariff:

- ✓**DI1** open: tariff 1.
- ✓**DI1** closed: tariff 2.

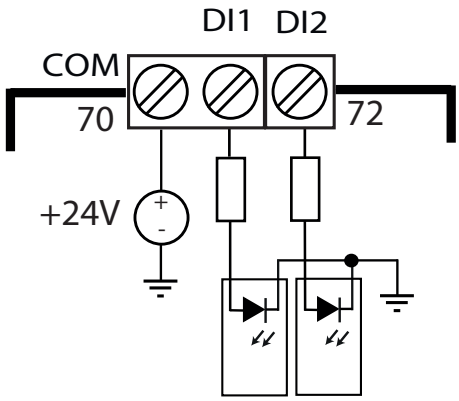


Figure 11: Digital inputs.

5.- DISPLAY

The **CVM-C4** has up to 24 display screens depending on the measurement system, see ***"6.1.1.- MEASUREMENT SYSTEM"***.

5.1.- SINGLE-PHASE NETWORK MEASURING

The **CVM-C4** has 15 display screens in the single-phase network measurement system, **Table 8**.

Use the keys  and  to browse through the different screens.

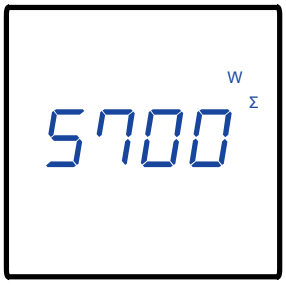
The display screens can change automatically depending on the time programmed in the section ***"6.5.2.- CYCLIC DISPLAY"***.

The initial display screen, i.e. the first screen displayed when feeding the device or when exiting the configuration menu, can be programmed in section ***"6.5.4.- INITIAL DISPLAY SCREEN"*.**

Table 8: Display menu: Single-phase network measuring

Display menu: Single-phase network measuring
 **Voltage** (V)
 **Current** (A)
 **Frequency** (Hz)

Table 8 (Continued). Display menu: Single-phase network measuring

Display menu: Single-phase network measuring
 **Active Power** (W)
 **Reactive power** (var)
 **Apparent power** (VA)
 **Power factor**

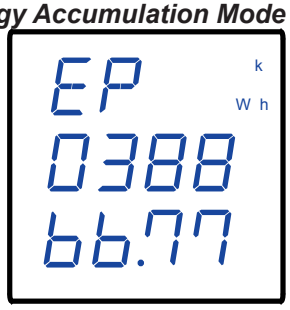
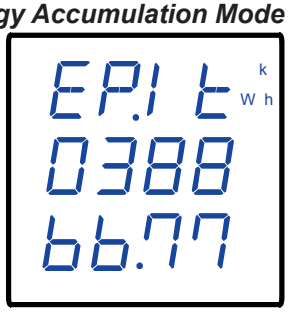
Energy Accumulation Mode : 49	*Energy Accumulation Mode* : 2E
 **Total positive active energy** (kWh)	 **Total positive active energy, Tariff 1** (kWh)

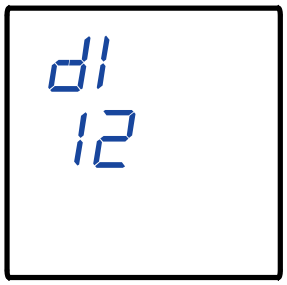
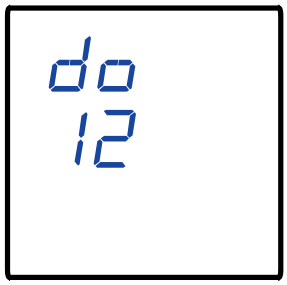
Table 8 (Continued). Display menu: Single-phase network measuring

Display menu: Single-phase network measuring	
Energy Accumulation Mode : 49  **Total negative active energy** (kWh)	***Energy Accumulation Mode*** : 2t  **Total positive active energy, Tariff 2** (kWh)
Energy Accumulation Mode : 49  **Total positive reactive energy** (kvarh)	***Energy Accumulation Mode*** : 2t  **Total positive reactive energy, Tariff 1** (kvarh)
Energy Accumulation Mode : 49  **Total negative reactive energy** (kvarh)	***Energy Accumulation Mode*** : 2t  **Total positive reactive energy, Tariff 2** (kvarh)

Voltage THD

Current THD

Table 8 (Continued). Display menu: Single-phase network measuring

Display menu: Single-phase network measuring
 **Status of digital inputs** 1, status of digital input 1: flashes when the input has been activated. 2, status of digital input 2: flashes when the input has been activated.
 **Status of relay outputs** 1, status of relay output 1: flashes when the relay has been activated. 2, status of relay output 2: flashes when the relay has been activated.

If the input voltage or current value higher than a % of the nominal value, the device can make the digits on the display start flashing, in the form of a light alarm. See ***"6.5.6.- LIGHT ALARM"***

Note: *If a display screen shows* FFFF *, check the programming of the transformation ratios.*

5.2.- THREE-PHASE NETWORK MEASURING WITH 4-WIRE CONNECTION

The **CVM-C4** has 24 display screens in the three-phase network measurement system with a 4-wire connection, **Table 9**.

Use the keys  and  to browse through the different screens.

The display screens can change automatically depending on the time programmed in the section ***"6.5.2.- CYCLIC DISPLAY"***.

The initial display screen, i.e. the first screen displayed when feeding the device or when exiting the configuration menu, can be programmed in section ***"6.5.4.- INITIAL DISPLAY SCREEN".***

Table 9: Display menu: Three-phase network measuring with 4-wire connection.

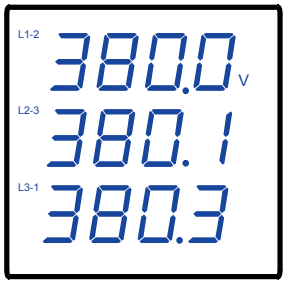
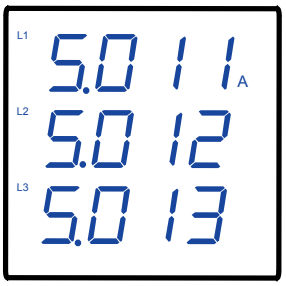
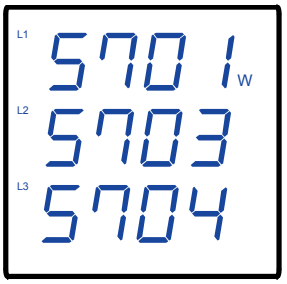
Display menu: Three-phase network measuring with 4-wire connection.
 **Phase-Neutral Voltage** (V)
 **Phase-Phase Voltage** (V)
 **Current** (A)
 **Frequency** (Hz)
 **Active power per phase** (W)

Table 9 (Cont.). Display menu: Three-phase network measuring with 4-wire connection.

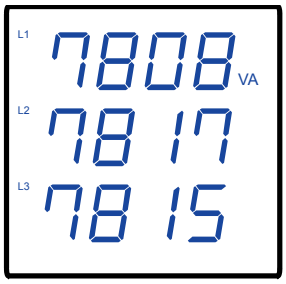
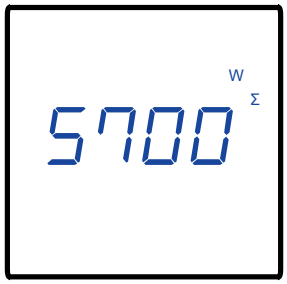
Display menu: Three-phase network measuring with 4-wire connection.
 **Reactive power per phase** (var)
 **Apparent power per phase** (VA)
 **Total Active Power** (W)
 **Total Reactive Power.** (var)
 **Total Apparent Power** (VA)

Table 9 (Cont.). Display menu: Three-phase network measuring with 4-wire connection.

Display menu: Three-phase network measuring with 4-wire connection.	
	**Power factor per phase**
	**Total Power Factor**

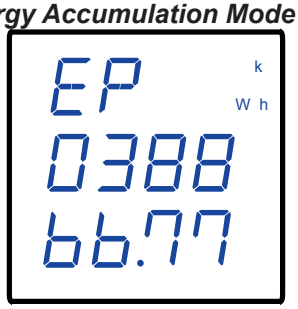
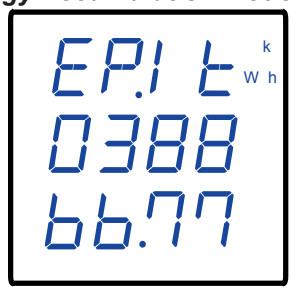
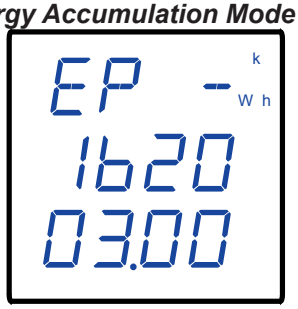
Energy Accumulation Mode : 49 	***Energy Accumulation Mode*** : 2t 
Total positive active energy (kWh)	**Total positive active energy, Tariff 1** (kWh)
Energy Accumulation Mode : 49 	***Energy Accumulation Mode*** : 2t 
Total negative active energy (kWh)	**Total positive active energy, Tariff 2** (kWh)
Energy Accumulation Mode : 49 	***Energy Accumulation Mode*** : 2t 
Total positive reactive energy (kvarh)	**Total positive reactive energy, Tariff 1** (kvarh)

Table 9 (Continued). Display menu: Three-phase network measuring with 4-wire connection.

Display menu: Three-phase network measuring with 4-wire connection.	
Energy Accumulation Mode: 49  **Total negative reactive energy** (kvarh)	***Energy Accumulation Mode***: 2t  **Total positive reactive energy, Tariff 2** (kvarh)

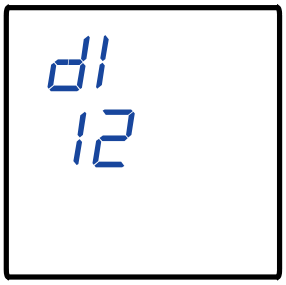
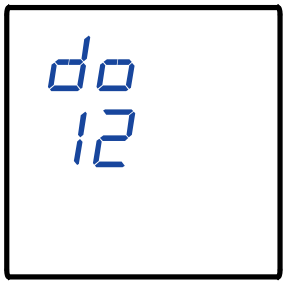
THD Voltage L1

THD Voltage L2

THD Voltage L3

THD Current L1

Table 9 (Cont.). Display menu: Three-phase network measuring with 4-wire connection.

Display menu: Three-phase network measuring with 4-wire connection.
 **THD Current L2**
 **THD Current L3**
 **Status of digital inputs** 1, status of digital input 1: flashes when the input has been activated. 2, status of digital input 2: flashes when the input has been activated.
 **Status of relay outputs:** 1, status of relay output 1: flashes when the relay has been activated. 2, status of relay output 2: flashes when the relay has been activated.

If the input voltage or current value is higher than a % of the nominal value, the device can make the digits on the display start flashing, in the form of a light alarm. See ***"6.5.6.- LIGHT ALARM"***

Note: *If a display screen shows* FFFF *, check the programming of the transformation ratios.*

5.3 THREE-PHASE NETWORK MEASURING WITH A 3-WIRE CONNECTION

The **CVM-C4** has 18 display screens in the three-phase network measurement system with a 3-wire connection, **Table 10**.

Use the keys < and > to browse through the different screens.

The display screens can change automatically depending on the time programmed in the section ***"6.5.2.- CYCLIC DISPLAY"***.

The initial display screen, i.e. the first screen displayed when feeding the device or when exiting the configuration menu, can be programmed in section ***"6.5.4.- INITIAL DISPLAY SCREEN"*.**

Table 10: Display menu: Three-phase network measuring with 3-wire connection.

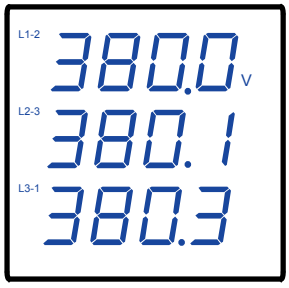
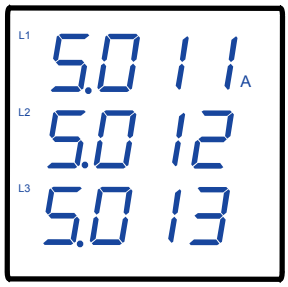
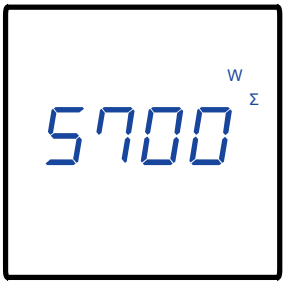
Display menu: Three-phase network measuring with 3-wire connection.
 **Phase-Phase Voltage** (V)
 **Current** (A)
 **Frequency** (Hz)
 **Total Active Power** (W)

Table 10 (Cont.): Display menu: Three-phase network measuring with 3-wire connection.

Display menu: Three-phase network measuring with 3-wire connection.
 **Total Reactive Power.** (var)
 **Total Apparent Power** (VA)
 **Total Power Factor**

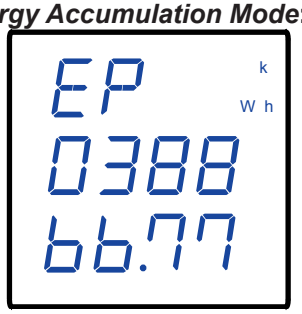
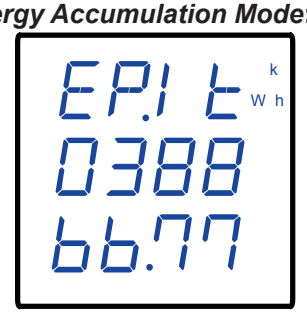
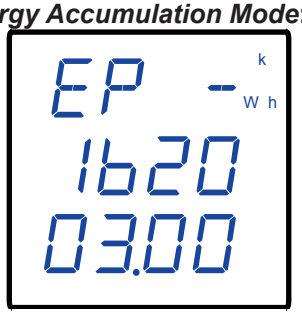
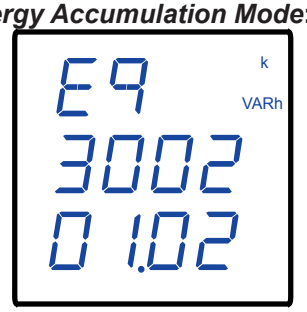
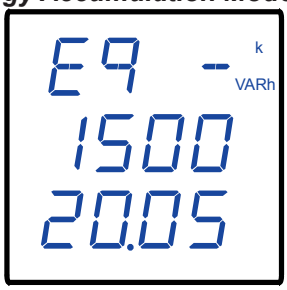
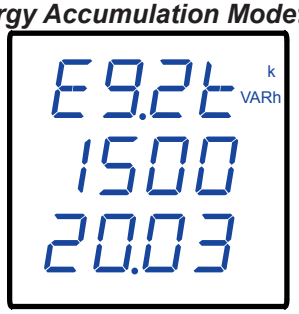
Energy Accumulation Mode: 49  **Total positive active energy** (kWh)	***Energy Accumulation Mode***: 2t  **Total positive active energy, Tariff 1** (kWh)
Energy Accumulation Mode: 49  **Total negative active energy** (kWh)	***Energy Accumulation Mode***: 2t  **Total positive active energy, Tariff 2** (kWh)

Table 10 (Continued): Display menu: Three-phase network measuring with 3-wire connection.

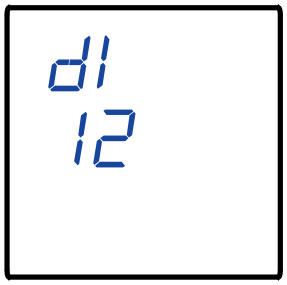
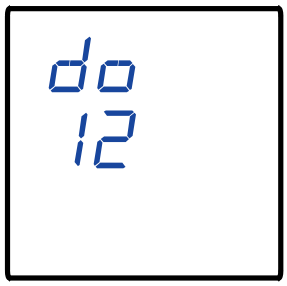
Display menu: Three-phase network measuring with 3-wire connection.	
Energy Accumulation Mode: 49  **Total positive reactive energy** (kvarh)	***Energy Accumulation Mode***: 2t  **Total positive reactive energy, Tariff 1** (kvarh)
Energy Accumulation Mode: 49  **Total negative reactive energy** (kvarh)	***Energy Accumulation Mode***: 2t  **Total positive reactive energy, Tariff 2** (kvarh)

THD Voltage L1-L2

THD Voltage L3-L1

THD Current L1

Table 10 (Cont.). Display menu: Three-phase network measuring with 3-wire connection.

Display menu: Three-phase network measuring with 3-wire connection.
 **THD Current L2**
 **THD Current L3**
 **Status of digital inputs** 1, status of digital input 1: flashes when the input has been activated. 2, status of digital input 2: flashes when the input has been activated.
 **Status of relay outputs** 1, status of relay output 1: flashes when the relay has been activated. 2, status of relay output 2: flashes when the relay has been activated.

If the input voltage or current value is higher than a % of the nominal value, the device can make the digits on the display start flashing, in the form of a light alarm. See ***"6.5.6.- LIGHT ALARM"***

Note: *If a display screen shows* FFFF *, check the programming of the transformation ratios.*

6.- CONFIGURATION

Press and hold the key for more than 3 seconds to enter the device's configuration menu. The device's configuration is organised in different menus, **Figure 12**.

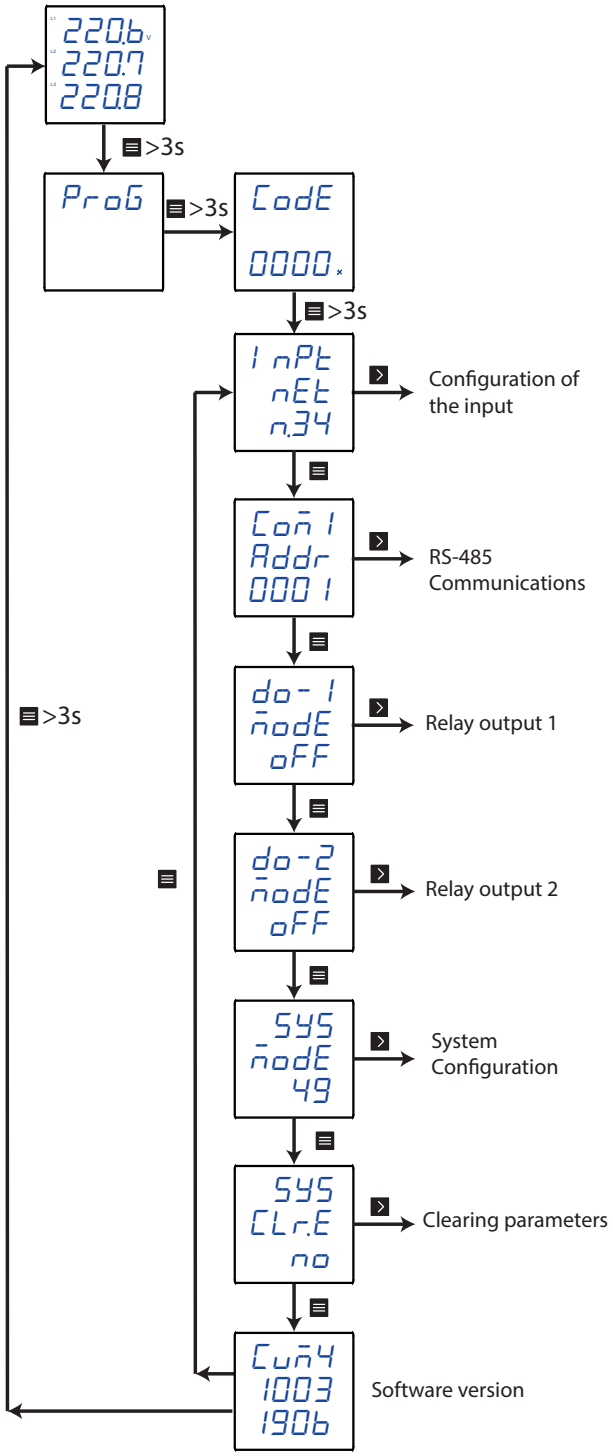


Figure 12: CVM-C4 configuration menu.

From any screen of the configuration menus, if no key is pressed for 1 minute, the device leaves the configuration menu and returns to the display screen.

Note: *In* ***"ANNEX A.- CONFIGURATION MENU"*** *you can see the complete configuration menu.*

Before accessing the configuration menu, it is necessary to enter the access password.

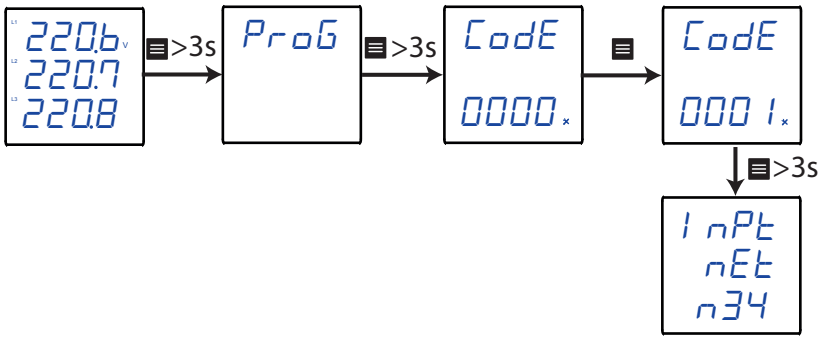


Figure 13: Access to the configuration menu in the programming mode.

Use the key to modify the value of the flashing digit.

When the desired value is shown on the screen, press the and keys to skip the digit.

Default password: 0001

Note: *The password can be modified, see* ***"6.5.5.- ACCESS PASSWORD".***

With a long keystroke (>3s), press to validate the data.

If the password entered is incorrect, the Err message will appear for a few seconds and the device will return to the password configuration screen, **Figure 13**.

6.1.- CONFIGURATION OF THE INPUT

Figure 14 shows the input configuration menu from which the measurement system and the primary and secondary current and voltage are configured.

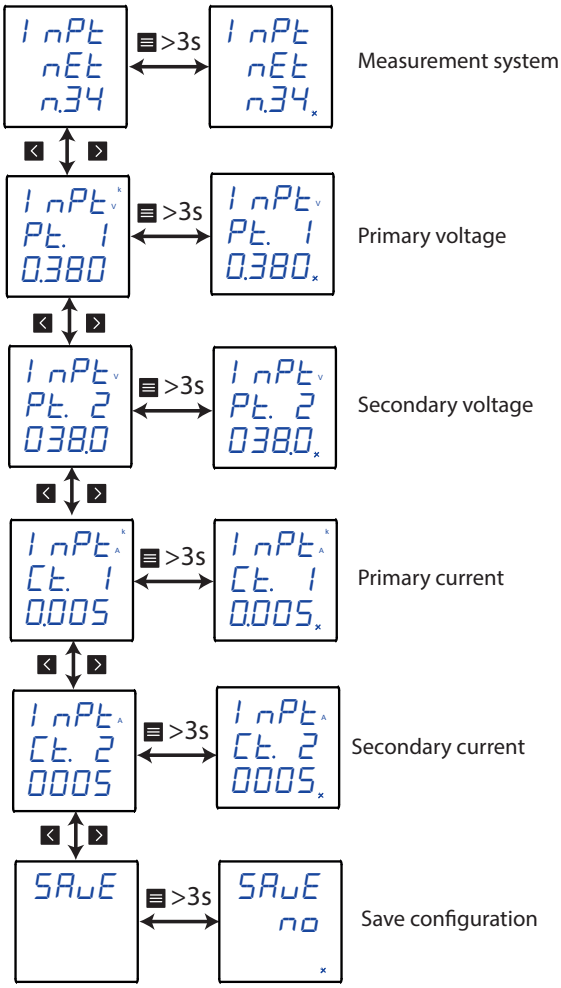
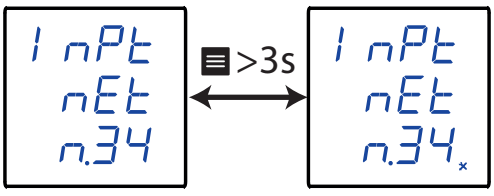


Figure 14: Input configuration menu

6.1.1.- MEASUREMENT SYSTEM

In this screen we can configure the measurement system used in the installation.



With a long keystroke (>3s), press to access the value's configuration.

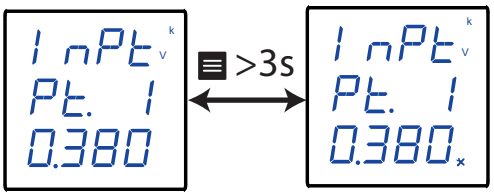
Use the keys and to browse through the different options:

- n34, three-phase network measuring with 4-wire connection.
- n.33, three-phase network measuring with 3-wire connection.
- n. 12, single-phase measuring.

With a long keystroke, press [≡] to validate the option.
Use the keys [<] and [>] to browse through the menu screens.

6.1.2.- PRIMARY VOLTAGE

This screen is used to configure the value of the primary voltage.



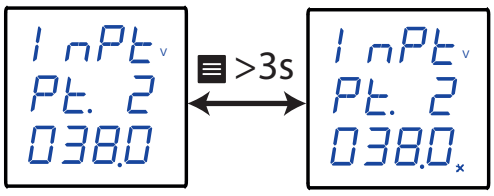
With a long keystroke (>3s), press [≡] to access the value's configuration.
Use the key [≡] to modify the value of the flashing digit.
When the desired value is shown on the screen, press the [<] and [>] keys to skip the digit.
When you reach the last digit and press the [<] key, you select the position of the decimal point. Use the key [≡] to modify the decimal point.

Minimum configuration value: 0.001 kV
Maximum configuration value: 100 kV

With a long keystroke, press [≡] to validate the data.
Use the keys [<] and [>] to browse through the menu screens.

6.1.3.- SECONDARY VOLTAGE

This screen is used to configure the value of the secondary voltage.



With a long keystroke (>3s), press [≡] to access the value's configuration.
Use the key [≡] to modify the value of the flashing digit.
When the desired value is shown on the screen, press the [<] and [>] keys to skip the digit.

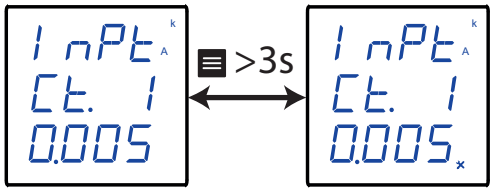
Minimum configuration value: 0.1 kV
Maximum configuration value: 63.5 V

With a long keystroke, press [≡] to validate the data.

Use the keys ◄ and ► to browse through the menu screens.

6.1.4.- PRIMARY CURRENT

This screen is used to configure the value of the primary current.



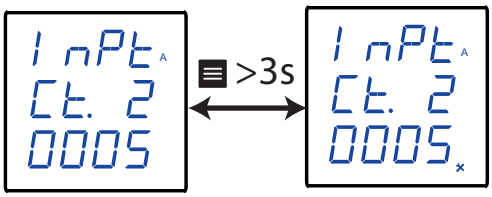
With a long keystroke (>3s), press ☰ to access the value's configuration.
Use the key ☰ to modify the value of the flashing digit.
When the desired value is shown on the screen, press the ◄ and ► keys to skip the digit.
When you reach the last digit and press the ◄ key, you select the position of the decimal point. Use the key ☰ to modify the decimal point.

Minimum configuration value: 0.001 kA
Maximum configuration value: 20 kA

With a long keystroke, press ☰ to validate the data.
Use the keys ◄ and ► to browse through the menu screens.

6.1.5.- SECONDARY CURRENT

This screen is used to configure the value of the secondary current.



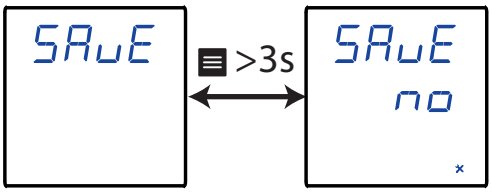
With a long keystroke (>3s), press ☰ to access the value's configuration.
Use the key ☰ to modify the value of the flashing digit.
When the desired value is shown on the screen, press the ◄ and ► keys to skip the digit.

Minimum configuration value: 1 A
Maximum configuration value: 6 A

With a long keystroke, press ☰ to validate the data.
Use the keys ◄ and ► to browse through the menu screens.

6.1.6.- SAVE CONFIGURATION

This screen is used to save the device's configuration.



With a long keystroke (>3s), press to access the value's configuration.

Use the keys and to browse through the different options:

no, to not save the configuration.

YES, to save the configuration.

With a long keystroke, press to validate the option. The device skips to the main screen of the next configuration menu.

6.2.- RS-485 COMMUNICATIONS

Figure 15 shows the main screen of the communications menu, where the parameters of the RS-485 communications are configured.

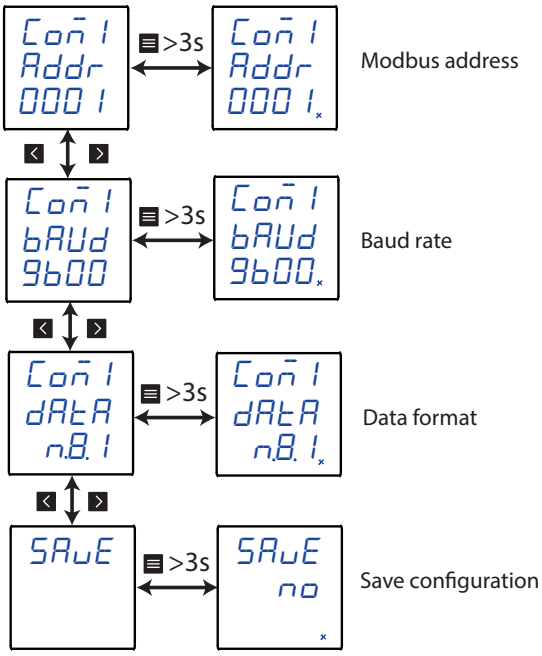
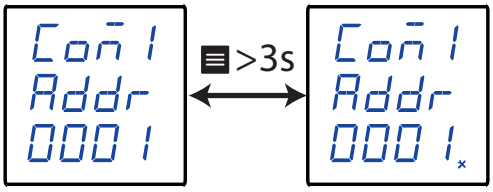


Figure 15: RS-485 communications configuration menu.

6.2.1.- MODBUS ADDRESS

This screen is used to configure the device's modbus address.



With a long keystroke (>3s), press to access the value's configuration.

Use the key to modify the value of the flashing digit.

When the desired value is shown on the screen, press the and keys to skip the digit.

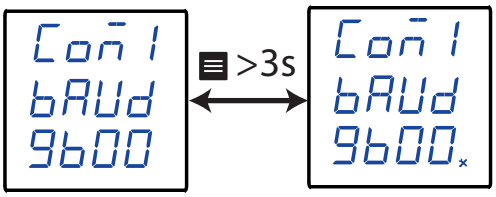
Minimum configuration value: 1
Maximum configuration value: 247

With a long keystroke, press to validate the data.

Use the keys and to browse through the menu screens.

6.2.2.- BAUD RATE

In this screen, the baud rate of the RS-485 communications is selected.



With a long keystroke (>3s), press to access the value's configuration.

Use the keys and to browse through the different options:

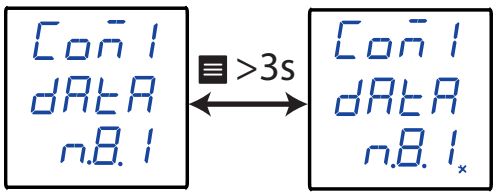
1200, 1200 bps.
2400, 2400 bps.
4800, 4800 bps.
9600, 9600 bps.
19, 20, 19200 bps.

With a long keystroke, press to validate the option.

Use the keys and to browse through the menu screens.

6.2.3.- DATA FORMAT

This screen is used to configure the data format.



With a long keystroke (>3s), press ☰ to access the value's configuration.

Use the keys ‹ and › to browse through the different options:

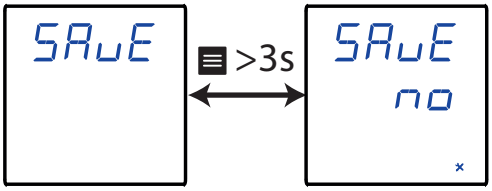
- n.8.1, no parity, 8 data bits, 1 stop bit
- E.8.1, even parity, 8 data bits, 1 stop bit
- o.8.1 odd parity, 8 data bits, 1 stop bit
- n.8.2, no parity, 8 data bits, 2 stop bit

With a long keystroke, press ☰ to validate the option.

Use the keys ‹ and › to browse through the menu screens.

6.2.4.- SAVE CONFIGURATION

This screen is used to save the device's configuration.



With a long keystroke (>3s), press ☰ to access the value's configuration.

Use the keys ‹ and › to browse through the different options:

- no, to not save the configuration.
- YES, to save the configuration.

With a long keystroke, press ☰ to validate the option. The device skips to the main screen of the next configuration menu.

6.3.- RELAY OUTPUT 1

Figure 16 shows the configuration menu of relay output 1.

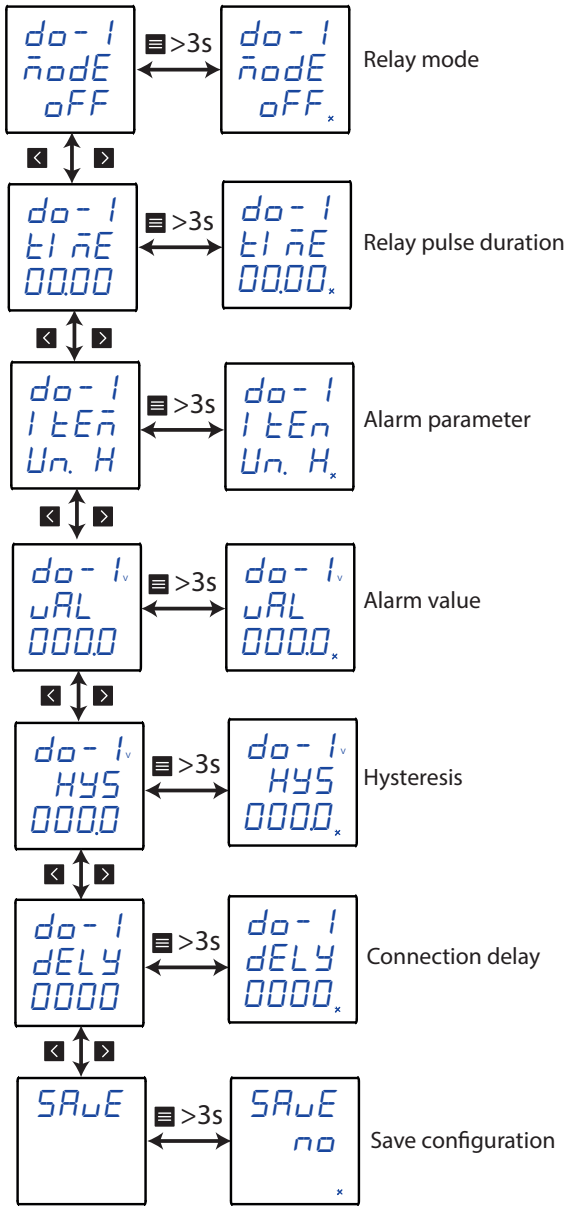
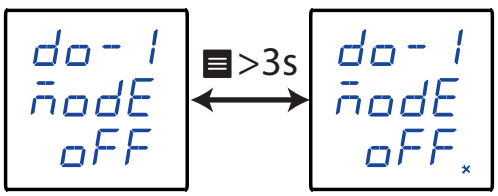


Figure 16: Configuration menu of relay output 1.

6.3.1.- RELAY MODE

This screen is used to configure the operating mode of relay 1.



With a long keystroke (>3s), press to access the value's configuration.

Use the keys and to browse through the different options:

oFF, relay output 1 is disabled.

rEn, remote control output.

ALr, alarm output.

With a long keystroke, press ☰ to validate the option.

Use the keys ‹ and › to browse through the menu screens.

6.3.2.- RELAY PULSE DURATION

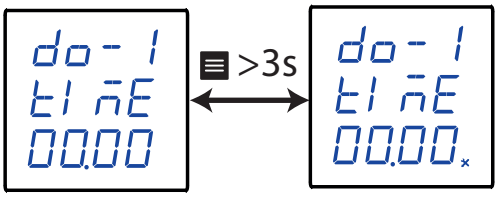
Note: *Visible variable if the relay operating mode has been configured as a remote control output or alarm output.*

The alarm relay can behave in 2 different ways:

1 .- The relay is activated when the alarm is triggered and is deactivated when the alarm is deactivated.

2 .- The relay is activated when the alarm is triggered and is deactivated after a programmed period of time, even though the alarm condition has not been cancelled.

This screen is used to configure the programmed time, i.e., the relay pulse duration.
To make the relay operate in mode **No. 1**, program the value to **0**.



With a long keystroke (>3s), press ☰ to access the value's configuration.

Use the key ☰ to modify the value of the flashing digit.

When the desired value is shown on the screen, press the ‹ and › keys to skip the digit.

Minimum configuration value: 00.00 s
Maximum configuration value: 99.99 s

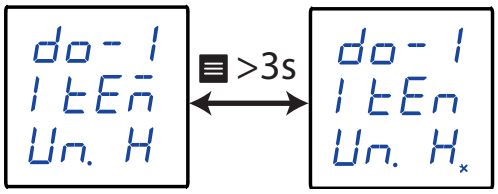
With a long keystroke, press ☰ to validate the data.

Use the keys ‹ and › to browse through the menu screens.

6.3.3.- ALARM PARAMETER

Note: *Visible variable if the relay operating mode has been configured as an alarm output.*

This screen is used to configure the parameter on which the alarm will be activated.



With a long keystroke (>3s), press to access the value's configuration.
Use the keys and to browse through the different options:

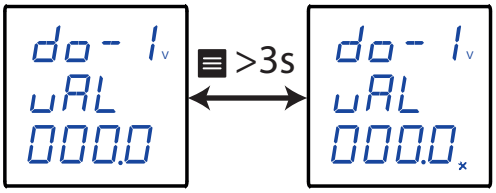
- Un. H, Active alarm when the Phase - Neutral voltage is higher than the alarm value
- Un. L, Active alarm when the Phase - Neutral voltage is lower than the alarm value
- UL. H, Active alarm when the Phase - Phase voltage is higher than the alarm value
- UL. L, Active alarm when the Phase - Phase voltage is lower than the alarm value
- I . H, , Active alarm when the current is higher than the alarm value
- I . L, Active alarm when the current is lower than the alarm value
- P. H, Active alarm when the total active power is higher than the alarm value.
- P. L, Active alarm when the total active power is lower than the alarm value
- Q. H, Active alarm when the total reactive power is higher than the alarm value.
- Q. L, Active alarm when the total reactive power is lower than the alarm value.
- S. H, Active alarm when the total apparent power is higher than the alarm value.
- S. L, Active alarm when the total apparent power is lower than the alarm value.
- PF. H, Active alarm when the power factor is higher than the alarm value.
- PF. L, Active alarm when the power factor is lower than the alarm value.
- F. H, Active alarm when the frequency is higher than the alarm value.
- F. L, Active alarm when the frequency is lower than the alarm value.
- UtH.H, Active alarm when the THD voltage is higher than the alarm value.
- UtH.L, Active alarm when the THD voltage is lower than the alarm value.
- ItH.H, Active alarm when the THD current is higher than the alarm value.
- ItH.L, Active alarm when the THD current is lower than the alarm value.
- dI - 1,Active alarm when digital input 1 is connected.
- dI -0,Active alarm when digital input 1 is disconnected.
- d2- 1,Active alarm when digital input 2 is connected.
- d2-0,Active alarm when digital input 2 is disconnected.

With a long keystroke, press to validate the option.
Use the keys and to browse through the menu screens.

6.3.4.- ALARM VALUE

Note: *Visible variable if the relay operating mode has been configured as an alarm output. Not visible if the alarm parameter is the digital inputs (dI - 1, dI -0, d2- 1, d2-0).*

The display value after which the alarm will be activated is configured on this screen.



With a long keystroke (>3s), press to access the value's configuration.

When the desired value is shown on the screen, press the and keys to skip the digit.

When you reach the last digit and press the key, you select the position of the decimal point. Use the key to modify the decimal point.

If you press again the key, the following units are selected: V, kV, MV

Minimum configuration value:

0.000 V, For alarm parameters: Un. H, Un. L, UL. H and UL. L

0.000 A, For alarm parameters: I . H and I . L

0.000 W, For alarm parameters: P. H and P. L

0.000 var, For alarm parameters: 9. H and 9. L

0.000 VA, For alarm parameters: S. H and S. L

-1.000, For alarm parameters: PF. H and PF. L

00.00 Hz, For alarm parameters: F. H and F. L

00.00%, For alarm parameters: UtH.H, UtH.L, ItH.H and ItH.L

Maximum configuration value:

9999 MV, For alarm parameters: Un. H, Un. L, UL. H and UL. L

9999 MA, For alarm parameters: I . H and I . L

9999 MW, For alarm parameters: P. H and P. L

9999 Mvar, For alarm parameters: 9. H and 9. L

9999 MVA, For alarm parameters: S. H and S. L

1.000, For alarm parameters: PF. H and PF. L

99.99 Hz, For alarm parameters: F. H and F. L

99.99%, For alarm parameters: UtH.H, UtH.L, ItH.H and ItH.L

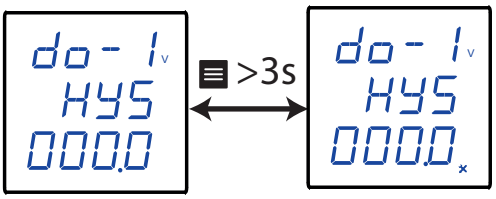
With a long keystroke, press to validate the data.

Use the keys and to browse through the menu screens.

6.3.5.- HYSTERESIS

Note: *Visible variable if the relay operating mode has been configured as an alarm output. Not visible if the alarm parameter is the digital inputs (dI - 1, dI -0, d2- 1, d2-0).*

This screen is used to configure the hysteresis value, i.e., the difference between the alarm connection and disconnection value.



With a long keystroke (>3s), press [≡] to access the value's configuration.

When the desired value is shown on the screen, press the [<] and [>] keys to skip the digit.

When you reach the last digit and press the [<] key, you select the position of the decimal point. Use the key [≡] to modify the decimal point.

If you press again the key, [<] the following units are selected: V, kV, MV

Minimum configuration value:

0.000 V, For alarm parameters: Un. H, Un. L, UL. H and UL. L

0.000 A, For alarm parameters: I . H and I . L

0.000 W, For alarm parameters: P. H and P. L

0.000 var, For alarm parameters: Q. H and Q. L

0.000 VA, For alarm parameters: S. H and S. L

-1.000, For alarm parameters: PF. H and PF. L

00.00 Hz, For alarm parameters: F. H and F. L

00.00%, For alarm parameters: UtH.H, UtH.L, ItH.H and ItH.L

Maximum configuration value:

9999 MV, For alarm parameters: Un. H, Un. L, UL. H and UL. L

9999 MA, For alarm parameters: I . H and I . L

9999 MW, For alarm parameters: P. H and P. L

9999 Mvar, For alarm parameters: Q. H and Q. L

9999 MVA, For alarm parameters: S. H and S. L

1.000, For alarm parameters: PF. H and PF. L

99.99 Hz, For alarm parameters: F. H and F. L

99.99%, For alarm parameters: UtH.H, UtH.L, ItH.H and ItH.L

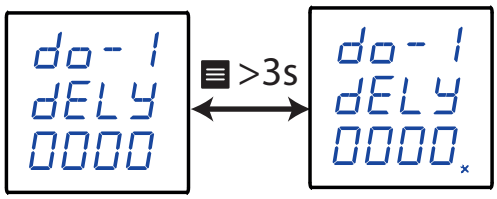
With a long keystroke, press [≡] to validate the data.

Use the keys [<] and [>] to browse through the menu screens.

6.3.6.- CONNECTION DELAY

Note: *Visible variable if the relay operating mode has been configured as an alarm output.*

This screen is used to configure the alarm connection delay



With a long keystroke (>3s), press to access the value's configuration.

When the desired value is shown on the screen, press the and keys to skip the digit.

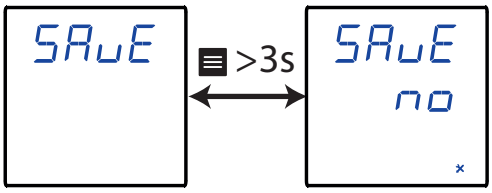
Minimum configuration value: 00.00 s
Maximum configuration value: 99.99 s

With a long keystroke, press to validate the data.

Use the keys and to browse through the menu screens.

6.3.7.- SAVE CONFIGURATION

This screen is used to save the device's configuration.



With a long keystroke (>3s), press to access the value's configuration.

Use the keys and to browse through the different options:

no, to not save the configuration.

YES, to save the configuration.

With a long keystroke, press to validate the option. The device skips to the main screen of the next configuration menu.

6.4.- RELAY OUTPUT 2

The configuration of relay output 2 is the same as for alarm relay 1, see ***"6.3.- RELAY OUTPUT 1".***

6.5.- SYSTEM CONFIGURATION

Figure 17 shows the system configuration menu.

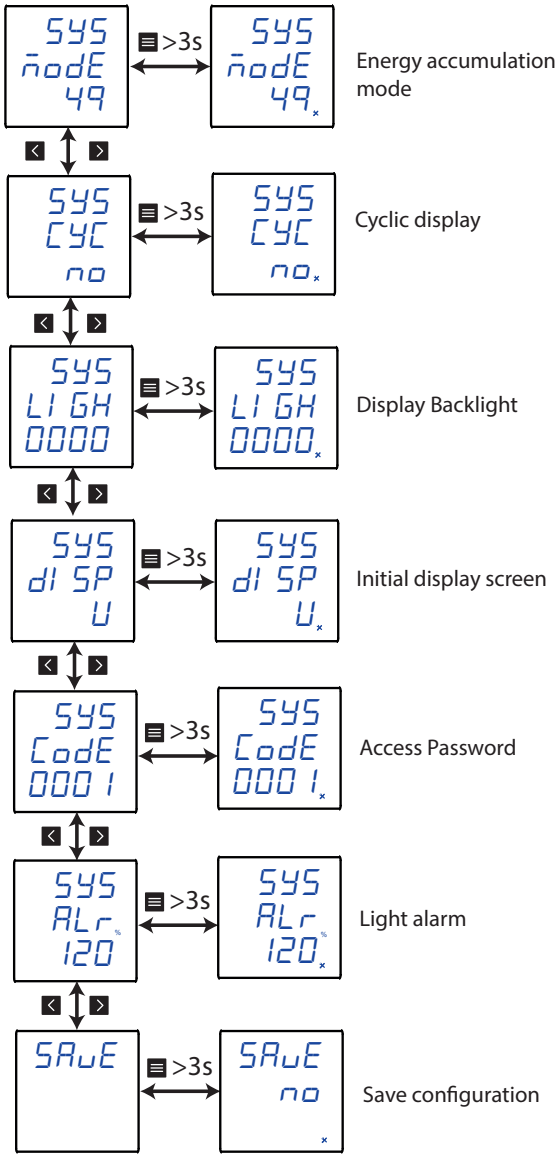
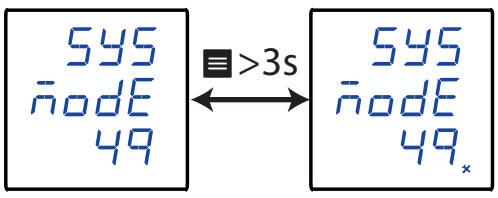


Figure 17: System configuration menu.

6.5.1.- ENERGY ACCUMULATION MODE

This screen is used to configure the type of energy accumulation performed by the device.



With a long keystroke (>3s), press to access the value's configuration.

Use the keys and to browse through the different options:

49, the active and reactive energy accumulate in consumption and generation.

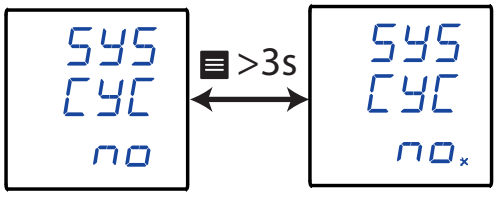
2t, the active and reactive energy accumulate in consumption (positive). Tariffs 1 and 2 are displayed for each of them.

With a long keystroke, press ☰ to validate the option.

Use the keys ‹ and › to browse through the menu screens.

6.5.2.- CYCLIC DISPLAY

The display screens can change automatically or not.



With a long keystroke (>3s), press ☰ to access the value's configuration.

Use the keys ‹ and › to browse through the different options:

no, the cyclic display is not activated.

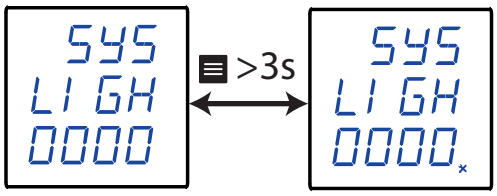
YES, the cyclic display is activated; the display screen changes every 3 s.

With a long keystroke, press ☰ to validate the option.

Use the keys ‹ and › to browse through the menu screens.

6.5.3.- DISPLAY BACKLIGHT

The time that the display backlight will stay lit in seconds if no key is pressed is programmed on this screen.



With a long keystroke (>3s), press ☰ to access the value's configuration.

When the desired value is shown on the screen, press the ‹ and › keys to skip the digit.

Minimum configuration value: 0 s.
Maximum configuration value: 255 s.

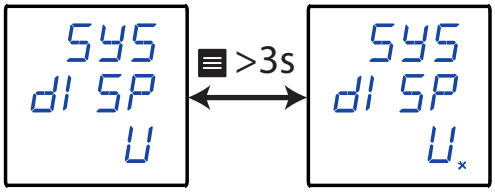
Note: *If the value* **0** *is programmed, the display backlight is not turned off.*

With a long keystroke, press ☰ to validate the data.

Use the keys ‹ and › to browse through the menu screens.

6.5.4.- INITIAL DISPLAY SCREEN

In this section the initial display screen is configured.



With a long keystroke (>3s), press to access the value's configuration.

Use the keys and to browse through the different options:

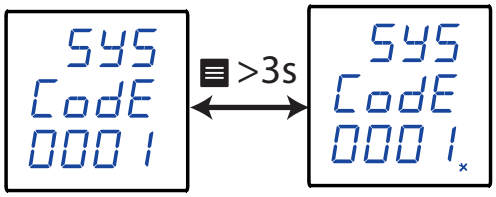
- U, voltage screen.
- I , current screen.
- F, frequency screen.
- P, power screen.
- PF, power factor screen.
- EP, energy screen.

With a long keystroke, press to validate the data.

Use the keys and to browse through the menu screens.

6.5.5.- ACCESS PASSWORD

This screen is used to configure the value of the password used to access the configuration menu.



With a long keystroke (>3s), press to access the value's configuration.

When the desired value is shown on the screen, press the and keys to skip the digit.

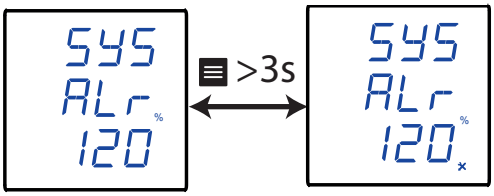
Minimum configuration value: 0
Maximum configuration value: 9999

With a long keystroke, press to validate the data.

Use the keys and to browse through the menu screens.

6.5.6.- LIGHT ALARM

If the device's input voltage or current value is higher than a % of the nominal value, the device can make the digits on the display start flashing, in the form of a light alarm.



With a long keystroke (>3s), press [≡] to access the value's configuration.

When the desired value is shown on the screen, press the [<] and [>] keys to skip the digit.

Minimum configuration value: 1%
Maximum configuration value: 180%

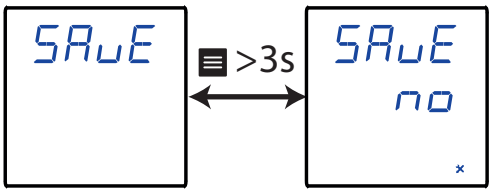
Note: *If the value* **0** *is programmed, the light alarm will be deactivated.*

With a long keystroke, press [≡] to validate the data.

Use the keys [<] and [>] to browse through the menu screens.

6.5.7.- SAVE CONFIGURATION

This screen is used to save the device's configuration.



With a long keystroke (>3s), press [≡] to access the value's configuration.

Use the keys [<] and [>] to browse through the different options:

no, to not save the configuration.

YES, to save the configuration.

With a long keystroke, press [≡] to validate the option. The device skips to the main screen of the next configuration menu.

6.6.- CLEARING PARAMETERS

Figure 18 shows the configuration menu for clearing parameters.

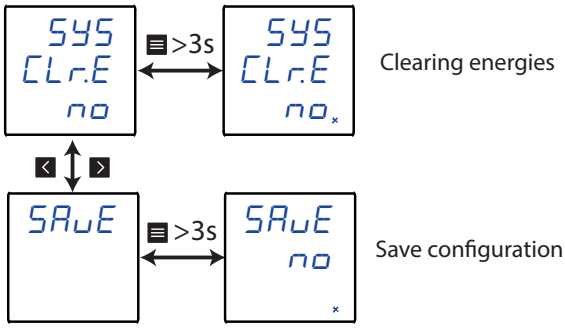
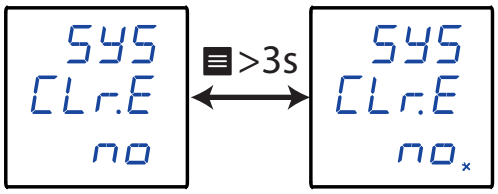


Figure 18: Configuration menu for clearing parameters.

6.6.1.- CLEARING ENERGIES

This screen is used to configure clearing or not energy parameters.



With a long keystroke (>3s), press to access the value's configuration.

Use the keys and to browse through the different options:

no, the energy parameters are not deleted.

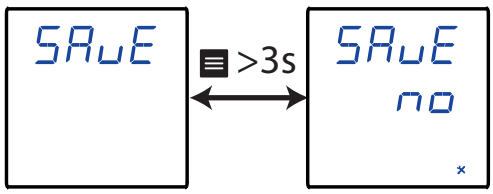
YES, the energy parameters are deleted.

With a long keystroke, press to validate the option.

Use the keys and to browse through the menu screens.

6.6.2.- SAVE CONFIGURATION

This screen is used to save the device's configuration.



With a long keystroke (>3s), press to access the value's configuration.

Use the keys and to browse through the different options:

no, to not save the configuration.

YES, to save the configuration.

With a long keystroke, press to validate the option. The device skips to the main screen of the next configuration menu.

7.- RS-485 COMMUNICATIONS

The **CVM-C4** devices have an **RS-485**communications port, with communications protocol: **MODBUS RTU ®**.

7.1.- CONNECTIONS

The RS-485 cable must be wired using twisted pair cable with mesh shield, leaving a maximum distance between the **CVM-C4** and the master device of 1200 metres .
A maximum of 32 **CVM-C4** devices can be connected to this bus.

To establish the communications with the master device, we must use a smart RS-232 to RS-485 network protocol converter.

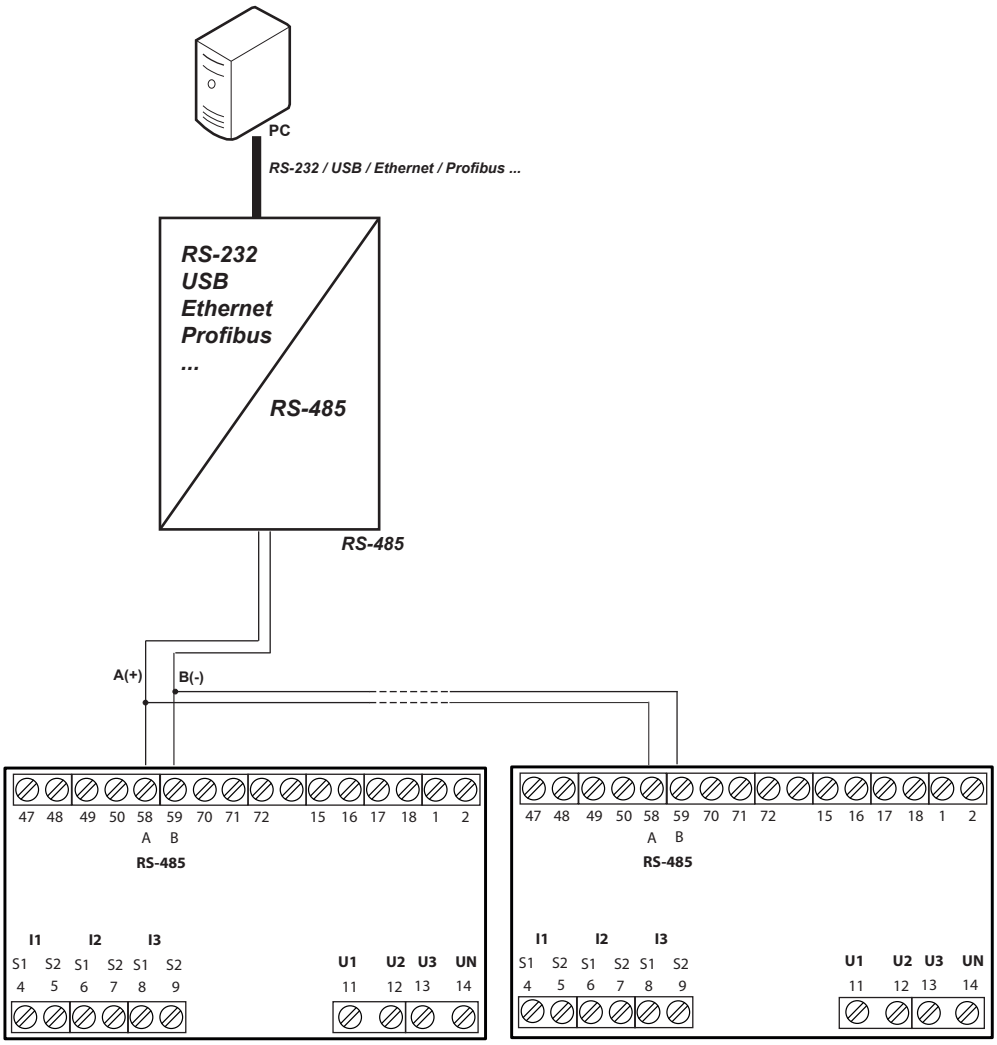


Figure 19: RS-485 connection diagram.

Note:** Default values of the RS-485 communication: **19200 bps**, **No parity**, **8 data bits** and **1 stop bit.

7.2.- MODBUS PROTOCOL

In the Modbus protocol, the **CVM-C4** device uses the RTU (Remote Terminal Unit) mode. The Modbus functions implemented in the device are as follows:

Function 0x01: Reading a relay.
Function 0x02: Reading input status.
Function 0x03 and 0x04: Reading integer registers.
Function 0x05: Writing a relay.
Function 0x0F: Writing multiple relays.
Function 0x10: Writing multiple registers.

7.2.1. READING EXAMPLE: FUNCTION 0x01.

Question: Status of output relays

Address	Function	Initial register	No. of registers	CRC
01	01	0000	0002	BDCB

Address: 01, Peripheral number 1 in decimal.
Function: 01, Read function.
Initial Register: 0000, register on which you want the reading to start.
Nº of registers: 0002, number of registers to read.
CRC: BDCB, CRC character.

Response:

Address	Function	No. of bytes	Register no. 1:	CRC
01	01	01	03	1189

Address: 01, Responding peripheral number: 1 in decimal.
Function: 01, Read function.
No. of Bytes: 01, No. of bytes received.
Register: 03, in binary it is: 0000 0011, output relays 1 and 2 closed.
CRC: 1189, CRC character.

7.2.2. EXAMPLE OF OPERATION OF THE REMOTE CONTROL: FUNCTION 0x05.

Question: Activate the output of relay 1, programmed to work in remote control mode.

Address	Function	Initial Register	Relay action	CRC
01	05	0000	FF00	8C3A

Address: 01, Peripheral number: 1 in decimal.
Function: 05, Writing a relay
Initial Register: 0000, relay 1 address.
Relay action: FF00, We indicate that we want to close the relay.
CRC: 8C3A, CRC Character.

Response:

Address	Function	Initial Register	Relay action	CRC
01	05	0000	FF00	8C3A

7.3.- MODBUS COMMANDS

7.3.1 .- MEASUREMENT VARIABLES AND DEVICE STATUS

All Modbus map addresses are in Hexadecimal format.
Function 0x03 and **0x04** are implemented for these variables.

Table 11: Modbus Memory Map (Table 1)

Measurement Variables			
Parameter	**Format**	**Address**	**Units**
Phase-Neutral Voltage L1	float	06 - 07	V
Phase-Neutral Voltage L2	float	08 - 09	V
Phase-Neutral Voltage L3	float	0A - 0B	V
Phase L1 - Phase L2 Voltage	float	0C - 0D	V
Phase L2 - Phase L3 Voltage	float	0E - 0F	V
Phase L3 - Phase L1 Voltage	float	10 - 11	V
Current L1	float	12 - 13	A
Current L2	float	14 - 15	A
Current L3	float	16 - 17	A
Active Power L1	float	18 - 19	kW
Active Power L2	float	1A - 1B	kW
Active Power L3	float	1C - 1D	kW
Total Active Power	float	1E - 1F	kW
Reactive Power L1	float	20 - 21	kvar
Reactive Power L2	float	22 - 23	kvar
Reactive Power L3	float	24 - 25	kvar
Total Reactive Power	float	26 - 27	kvar
Apparent Power L1	float	28 - 29	kVA
Apparent Power L2	float	2A - 2B	kVA
Apparent Power L3	float	2C - 2D	kVA
Total Apparent Power	float	2E - 2F	kVA
Power factor L1	float	30 - 31	-
Power factor L2	float	32 - 33	-
Power factor L3	float	34-35	-
Total Power Factor	float	36 - 37	-
Frequency	float	38 - 39	Hz
Positive active energy	float	3A - 3B	kWh
Negative active energy	float	3C - 3D	kWh
Positive reactive energy	float	3E - 3F	kvarh
Negative reactive energy	float	40 - 41	kvarh
Positive active energy Tariff 1	float	42 - 43	kWh
Positive active energy Tariff 2	float	44 - 45	kWh

Table 11 (Continued). Modbus Memory Map (Table 1)

Parameter	Format	Address	Units
Positive reactive energy, Tariff 1	float	46 - 47	kWh
Positive reactive energy, Tariff 2	float	48 - 49	kWh

Table 12: Modbus Memory Map (Table 2)

Measurement Variables			
Parameter	**Format**	**Address**	**Units**
Phase-Neutral Voltage L1	int	4E	0.1 V
Phase-Neutral Voltage L2	int	4F	0.1 V
Phase-Neutral Voltage L3	int	50	0.1 V
Phase L1 - Phase L2 Voltage	int	51	0.1 V
Phase L2 - Phase L3 Voltage	int	52	0.1 V
Phase L3 - Phase L1 Voltage	int	53	0.1 V
Current L1	int	54	0.001 A
Current L2	int	55	0.001 A
Current L3	int	56	0.001 A
Active Power L1	int	57	W
Active Power L2	int	58	W
Active Power L3	int	59	W
Total Active Power	int	5A	W
Reactive Power L1	int	5B	var
Reactive Power L2	int	5C	var
Reactive Power L3	int	5D	var
Total Reactive Power	int	5E	var
Apparent Power L1	int	5F	VA
Apparent Power L2	int	60	VA
Apparent Power L3	int	61	VA
Total Apparent Power	int	62	VA
Power factor L1	int	63	0,001
Power factor L2	int	64	0,001
Power factor L3	int	65	0,001
Total Power Factor	int	66	0,001
Frequency	int	67	0.01 Hz
Positive active energy	long	6A - 6B	Wh
Negative active energy	long	6C - 6D	Wh
Inductive reactive energy	long	6E - 6F	varh
Capacitive reactive energy	long	70 - 71	varh
Apparent energy	long	72 - 73	VAh
First quadrant of Reactive energy	long	74 - 75	varh
Second quadrant of Reactive energy	long	76 - 77	varh
Third quadrant of Reactive energy	long	78 - 79	varh
Fourth quadrant of Reactive energy	long	7A - 7B	varh
Positive active energy Tariff 1	long	7C - 7D	Wh
Positive active energy Tariff 2	long	7E - 7F	Wh
Positive reactive energy, Tariff 1	long	80 - 81	Wh
Positive reactive energy, Tariff 2	long	82 - 83	Wh

Table 13: Modbus Memory Map (Table 3)

THD values			
Parameter	**Format**	**Address**	**Units**
THD Voltage L1	int	244	0.01 %
THD Voltage L2	int	245	0.01 %
THD Voltage L3	int	246	0.01 %
THD Current L1	int	247	0.01 %
THD Current L2	int	248	0.01 %
THD Current L3	int	249	0.01 %

Table 14: Modbus Memory Map (Table 4)

Status of outputs and inputs		
Parameter	**Format**	**Address**
Status of relay outputs	int	4A
Status of digital inputs	int	4B

The parameter format **Status of relay outputs and Digital inputs** is shown in **Table 15:**

Table 15: Variable format: Status of relay outputs and digital inputs.

Bit 15 ... 2	Bit 1	Bit 0
0	**Relay 2 / Digital input 2** **1:** Closed **0:** Open	**Relay 1 / Digital input 1** **1:** Closed **0:** Open

7.3.2.- OUTPUT RELAYS

All the addresses of Modbus memory are in Hexadecimal.
For these variables is implemented the **Function 0x01, 0x05** and **0x0F.**

Table 16: Modbus Memory Map (Table 5)

Parameter	Format	Address
Output relays	bit	0000

The format of the parameter is shown in **Table 17:**

Table 17:Variable format: Output relays.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	**0**	**0**	**0**	**0**	**0**	**Relay 2** **1:** Closed **0:** Open	**Relay 1** **1:** Closed **0:** Open

7.3.3.- DIGITAL INPUTS

All the addresses of Modbus memory are in Hexadecimal.
For these variables is implemented the **Function 0x02.**

Table 18:Modbus Memory Map (Table 6)

Parameter	Format	Address
Digital inputs	bit	0000

The format of the parameter is shown in **Table 19:**

Table 19: Variable format: Digital inputs.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	0	0	**Digital input 2** **1:** Closed **0:** Open	**Digital input 1** **1:** Closed **0:** Open

7.3.4.- REMOTE CONTROL OUTPUT (Relay output)

All the addresses of Modbus memory are in Hexadecimal.
For these variables is implemented the **Function 0x05:**

Table 20: Modbus Memory Map (Table 7)

Parameter	Format	Address	Value
Remote control, Relay output 1	bit	0000	**0000:** Open **FF00:** Closed
Remote control, Relay output 2	bit	0001	**0000:** Open **FF00:** Closed

Function 0x0F, multiple relay control:

Table 21: Modbus Memory Map (Table 8)

Parameter	Format	Address
Remote control	bit	0000

The format of the parameter is shown in **Table 22:**

Table 22: Variable format: Remote control.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	0	0	**Relay 2** **1:** Closed **0:** Open	**Relay 1** **1:** Closed **0:** Open

7.3.5.- DEVICE CONFIGURATION VARIABLES

All Modbus map addresses are in Hexadecimal format. **Function 0x10** is implemented for this variable.

7.3.5.1. Input configuration

Table 23: Modbus Memory Map: Input configuration

Input configuration			
Variable	**Format**	**Address**	**Valid data range**
Measurement system	int	808	*Byte 1:* **0:** n.3Y, three-phase network measuring with 4-wire. **1:** n.33, three-phase network measuring with 3-wire . **2:** n. 12, single-phase measuring
Network frequency			*Byte 0:* **0:** 50 Hz - **1:** 60 Hz
Primary voltage	long	80E - 80F	0.001 ... 100 kV
Secondary voltage	int	80A	1... 6660 V (0.1V units)
Primary current	long	810 - 811	0.001 ... 20 kA
Secondary current	int	80B	1... 6 A

7.3.5.2. RS-485 Communications

Table 24: Modbus Memory Map: RS-485 Communications

RS-485 Communications			
Variable	**Format**	**Address**	**Valid data range**
Modbus address	int	804	*Byte 1:* 1... 247
Baud rate			*Byte 0:* **0:** 1200 bps - **1:** 2400 bps - **2:** 4800 bps - **3:** 9600 bps - **4:** 19200 bps
Data format	int	805	*Byte 1:* **0:** n,8,1 : no parity, 8 data bits, 1 stop bit **1:** e,8,1 : even parity, 8 data bits, 1 stop bit **2:** o,8,1 : odd parity, 8 data bits, 1 stop bit **3:** n,8,2 : no parity, 8 data bits, 2 stop bit

7.3.5.3. Relay Outputs

Table 25: Modbus Memory Map: Relay Outputs

Relay outputs			
Variable	**Format**	**Address**	**Valid data range**
Relay 1 mode	int	81A	**0:** Output is disabled **1:** Alarm output **2:** Remote control output
Relay 2 mode	int	822	
Relay 1 pulse duration	int	81B	00,00(1) ... 99.99 s
Relay 2 pulse duration	int	823	

Table 25 (Continued): Modbus Memory Map: Relay Outputs.

Relay outputs			
Variable	**Format**	**Address**	**Valid data range**
Relay 1 alarm parameter	int	81C	**0:** Active alarm when the Phase - Neutral voltage is higher than the alarm value (Un. H). **1:** Active alarm when the Phase - Neutral voltage is lower than the alarm value (Un. L). **2:** Active alarm when the Phase - Phase voltage is higher than the alarm value (UL. H). **3:** Active alarm when the Phase - Phase voltage is lower than the alarm value (UL. L). **4:** Active alarm when the current is higher than the alarm value (I . H). **5:** Active alarm when the current is lower than the alarm value (I . L). **6:** Active alarm when the active power is higher than the alarm value (P. H). **7:** Active alarm when the active power is lower than the alarm value (P. L). **8:** Active alarm when the reactive power is higher than the alarm value.q. H). **9:** Active alarm when the reactive power is lower than the alarm value (q. L). **10:** Active alarm when the apparent power is higher than the alarm value (S. H). **11:** Active alarm when the apparent power is lower than the alarm value (S. L). **12:** Active alarm when the power factor is higher than the alarm value (PF. H). **13:** Active alarm when the power factor is lower than the alarm value (PF. L). **14:** Active alarm when the frequency is higher than the alarm value (F. H).
Relay 2 alarm parameter	int	824	
			15: Active alarm when the frequency is lower than the alarm value (F. L). **16:** Active alarm when the THD voltage is higher than the alarm value (UtH. H). **17:** Active alarm when the THD voltage is lower than the alarm value (UTH. L). **18:** Active alarm when the THD current is higher than the alarm value (ItH. H). **19:** Active alarm when the THD current is lower than the alarm value (ITH. L). **20:** Active alarm when digital input 1 is connected (dI - I). **21:** Active alarm when digital input 1 is disconnected (dI -0) **22:** Active alarm when digital input 1 is connected (d2- I). **23:** Active alarm when digital input 1 is disconnected (d2-0)
Relay 1 alarm value	float	81D - 81E	See valid data ranges in section ***"6.3.4.- ALARM VALUE"***
Relay 2 alarm value	float	825 - 826	
Relay 1 hysteresis	float	81F - 820	See valid data ranges in section ***"6.3.5.- HYSTERESIS"***
Relay 2 hysteresis	float	827 - 828	

Table 25 (Continued): Modbus Memory Map: Relay Outputs.

Relay outputs			
Variable	**Format**	**Address**	**Valid data range**
Relay 1 connection delay	int	821	00,00 ... 99.99 s
Relay 2 connection delay	int	829	

(1) If 00.00 is programmed, the relay is activated when the alarm is triggered and is deactivated when the alarm is deactivated.

7.3.5.4. System configuration

Table 26: Modbus Memory Map: System configuration

System configuration			
Variable	**Format**	**Address**	**Valid data range**
Energy accumulation mode	int	801	**0:** 49, The active and reactive energy accumulate in consumption and generation **1:** 2E, The active and reactive energy accumulate in consumption (positive). Tariffs 1 and 2 are displayed for each of them.
Cyclic display	int	802	*Byte 1:* **0:** Cyclic display activated; the display screen changes every 3 s. **1:** Cyclic display deactivated.
Light alarm			*Byte 0:* 1... 180% (2)
Initial display screen	int	803	*Byte 1:* **0:** Voltage - **1:** Current - **2:** Frequency, **3:** Power - **4:** Power factor **5:** Energy - **6:** THD
Backlight			*Byte 0:* 0... 255 s (3)

(2) If the value **0**is programmed, the light alarm will be deactivated.

(3) If the value **0**is programmed, the display backlight is not turned off.

7.3.5.5. Deleting energy parameters

The energy parameters are deleted using **Función 0x0E**.
The deletion frame is:

Address	Function	Relay address	Password	Reset Outputs	Value	CRC
Address Modbus	0E	AACC	1111	01	FF	xxxx

8.- TECHNICAL FEATURES

AC Power supply (4)	
Rated voltage	80... 270 V ~
Frequency	50 / 60 Hz
Consumption	6... 18 VA
Installation category	CAT III 300V

DC Power supply (4)		
Rated voltage	80... 270 V ⎓	18... 36 V ⎓
Consumption	1.5 ...1.8 W	1,8... 2.2 W
Installation category	CAT III 300V	

(4) **Depending on model:**

CVM-C4			
Model	**Power supply**		
	80... 270 V ~	**80... 270 V ⎓**	**18... 36 V ⎓**
M52706	✓	✓	-
M527060030000	-	-	✓

Voltage measurement circuit	
Rated voltage (Un)	3 x 230 V / 400 V ~ ± 20%
Frequency measuring margin	45... 65 Hz
Overvoltage	1.2 Un continuous, 2 Un Instantaneous (1 min)
Consumption	< 0.2 VA (per phase)
Impedance	> 1.7 MΩ
Installation category	Cat III 300V

Current measurement circuit	
Rated current (In)	1 A / 5 A ~
Frequency measuring margin	45... 65 Hz
Overcurrent	1.2 In continuous, 10 In Instantaneous (5s)
Consumption	< 0.2 VA (per phase)
Impedance	< 20 mΩ
Installation category	Cat III 300V

Accuracy	
Voltage measurement	0.2
Current measurement	0.2
Power measurement	0.5
Active and reactive energy measurement	0.5

Relay outputs	
Quantity	2
Contact capacity (resistive)	**AC:** 5A / 250 V~ , **DC:** 5A / 30 V ⎓
Maximum voltage open contacts	277 V~ / 30 V ⎓
Maximum current	5 A
Maximum switching capacity	1385 VA / 150 W
Electrical life (250 V~ / 5A)	1 x 10^5

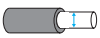
Digital inputs	
Quantity	2
Type	Potential free contact
Insulation	3.5kV rms
Maximum short-circuit current	4 mA
Maximum voltage in open circuit	30V

Impulse outputs	
Type	Passive pulse
Maximum voltage	27 V
Maximum current	27 mA
Maximum frequency	10 Hz
Minimum pulse width	80 mA

RS-485 Communications	
Communications protocol	Modbus RTU
Baud rate	2400 - 4800 - 9600 - 19200 bps
Data bits	8
Stop bits	1 - 2
Parity	without, even, odd

User interface	
Display	LCD
Keyboard	3 keys

Environmental Features	
Operating temperature	-10ºC ... +60ºC
Storage temperature	-20ºC ... +70ºC
Relative humidity (without condensation)	5... 95%
Maximum altitude	2000 m
Protection degree	Front: IP54, Rear: IP20
Pollution degree	2

Mechanical characteristics			
Terminals			
1, 2, 4... 9, 11...17, 47...50, 58, 59, 70 ... 72	2.5 mm^2	0.5 Nm	Flat (SZS 0.6x3.5)
Dimensions	**Figure 20** (mm)		
Weight	265 g.		
Enclosure	pc + abs		

Standards	
Electromagnetic compatibility (EMC) Part 4-2: Testing and measurement techniques. Electrostatic discharge immunity test.	IEC 61000-4-2
Electromagnetic compatibility (EMC) Part 4-3: Testing and measurement techniques. Radiated, radio-frequency, electromagnetic field immunity test.	IEC 61000-4-3
Electromagnetic compatibility (EMC) Part 4-4: Testing and measurement techniques. Electrical fast transient/burst immunity test.	IEC 61000-4-4
Electromagnetic compatibility (EMC) Part 4-5: Testing and measurement techniques. Surge immunity test.	IEC 61000-4-5
Electromagnetic compatibility (EMC) Part 4-6: Testing and measurement techniques. Immunity to conducted disturbances, induced by radio-frequency fields.	IEC 61000-4-6
Electromagnetic compatibility (EMC) Part 4-8:Testing and measurement techniques. Power frequency magnetic field immunity test.	IEC 61000-4-8

(Continued) Standards	
Electromagnetic compatibility (EMC) Part 4-11: Testing and measurement techniques. Voltage dips, short interruptions and voltage variations immunity tests	IEC 61000-4-11
Safety requirements for electrical equipment for measurement, control and laboratory use. Part 1: General requirements.	IEC 61010-1

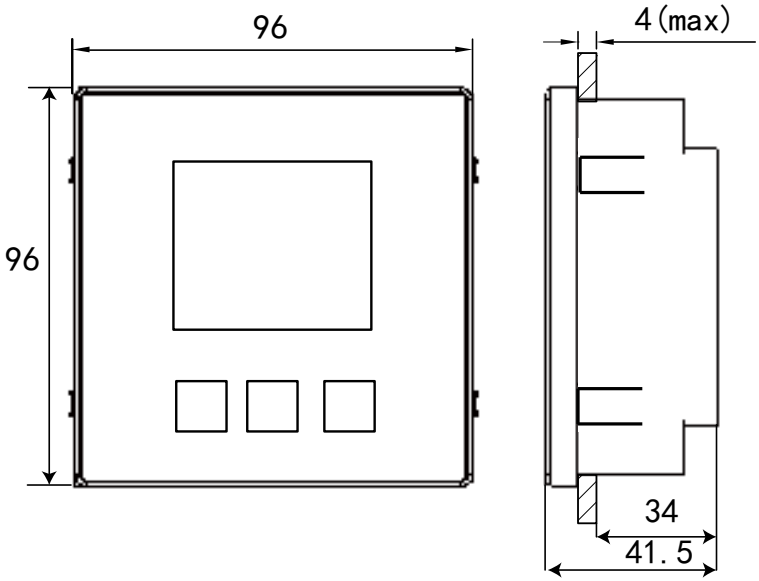


Figure 20: Dimensions of the CVM-C4.

9.- MAINTENANCE AND TECHNICAL SERVICE

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

Technical Assistance Service
Vial Sant Jordi, s/n, 08232 - Viladecavalls (Barcelona)
Tel: 902 449 459 (España) / +34 937 452 919 (outside of Spain)
email: sat@circutor.com

10.- WARRANTY

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

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 units 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 surpasses 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.

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

(ES) DECLARACIÓN UE DE CONFORMIDAD

La presente declaración de conformidad se expide bajo la exclusiva responsabilidad de CIRCUTOR con dirección en **Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) España**

Producto:

Analizadores de redes panel 96x96

Serie:

CVM-C4

Marca:

CIRCUTOR

EL objeto de la declaración es conforme con la legislación de armonización pertinente en la UE, 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

2014/35/UE: Low Voltage Directive	2014/30/UE: EMC Directive
2011/65/UE: RoHS2 Directive	2015/863/UE: RoHS3 Directive

Está en conformidad con la(s) siguiente(s) norma(s) u otro(s) documento(s) normativos(s):

IEC 61010-1:2010+AMD1:2016 Ed 3.0	IEC 61010-2-030:2010 Ed 1.0
IEC 61326-1:2012 Ed 2.0	IEC 61000-6-2:2016 Ed 3.0
IEC 61000-6-4:2006+AMD1:2010 Ed 2.1	

Año de marcado "CE":

2019

(EN) EU DECLARATION OF CONFORMITY

This declaration of conformity is issued under the sole responsibility of CIRCUTOR with registered address at Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) Spain

Product:

Power analyzer mounting panel 96 x96

Series:

CVM-C4

Brand:

CIRCUTOR

The object of the declaration is in conformity with the relevant EU harmonisation legislation, provided that it is installed, maintained and used for the application for which it was manufactured, in accordance with the applicable installation standards and the manufacturer's instructions

2014/35/UE: Low Voltage Directive	2014/30/UE: EMC Directive
2011/65/UE: RoHS2 Directive	2015/863/UE: RoHS3 Directive

It is in conformity with the following standard(s) or other regulatory document(s):

IEC 61010-1:2010+AMD1:2016 Ed 3.0	IEC 61010-2-030:2010 Ed 1.0
IEC 61326-1:2012 Ed 2.0	IEC 61000-6-2:2016 Ed 3.0
IEC 61000-6-4:2006+AMD1:2010 Ed 2.1	

Year of CE mark:

2019

(FR) DÉCLARATION UE DE CONFORMITÉ

La présente déclaration de conformité est délivrée sous la responsabilité exclusive de CIRCUTOR dont l'adresse postale est **Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelone) Espagne**

Produit:

analyseurs de réseaux triphasés panneau 96x96

Série:

CVM-C4

Marque:

CIRCUTOR

L'objet de la déclaration est conforme à la législation d'harmonisation pertinente dans l'UE, à condition d'avoir été installé, entretenu et utilisé dans l'application pour laquelle il a été fabriqué, conformément aux normes d'installation applicables et aux instructions du fabricant

2014/35/UE: Low Voltage Directive	2014/30/UE: EMC Directive
2011/65/UE: RoHS2 Directive	2015/863/UE: RoHS3 Directive

Il est en conformité avec la(les) suivante (s) norme(s) ou autre(s) document(s) réglementaire (s):

IEC 61010-1:2010+AMD1:2016 Ed 3.0	IEC 61010-2-030:2010 Ed 1.0
IEC 61326-1:2012 Ed 2.0	IEC 61000-6-2:2016 Ed 3.0
IEC 61000-6-4:2006+AMD1:2010 Ed 2.1	

Année de marquage « CE »:

2019

Viladecavalls (Spain), 18/10/2019
General Manager: Ferran Gil Torné

Circutor
NIF A-08513178
Vial Sant Jordi s/n.
08232 Viladecavalls
Barcelona (Spain)
t. +34 93 745 29 00

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

(DE) KONFORMITÄTSERKLÄRUNG UE

Vorliegende Konformitätserklärung wird unter alleiniger Verantwortung von CIRCUTOR mit der Anschrift, Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) Spanien, ausgestellt

Produkt:

Dreiphasen-Leistungsanalyser Schalttfel 96 x96

Serie:

CVM-C4

Marke:

CIRCUTOR

Der Gegenstand der Konformitätserklärung ist konform mit der geltenden Gesetzgebung zur Harmonisierung der EU, sofern die Installation, Wartung undVerwendung der Anwendung seinem Verwendungszweck entsprechend gemäß den geltenden Installationsstandards und der Vorgaben des Herstellers erfolgt.

2014/35/UE: Low Voltage Directive	2014/30/UE: EMC Directive
2011/65/UE: RoHS2 Directive	2015/863/UE: RoHS3 Directive

Es besteht Konformität mit der/den folgender/folgenden Norm/Normen oder sonstigem/sonstiger Regelwerk/Regelwerken

IEC 61010-1:2010+AMD1:2016 Ed 3.0	IEC 61010-2-030:2010 Ed 1.0
IEC 61326-1:2012 Ed 2.0	IEC 61000-6-2:2016 Ed 3.0
IEC 61000-6-4:2006+AMD1:2010 Ed 2.1	

Jahr der CE-Kennzeichnung:

2019

(PT) DECLARAÇÃO DA UE DE CONFORMIDADE

A presente declaração de conformidade é expedida sob a exclusiva responsabilidade da CIRCUTOR com morada em **Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) Espanha**

Producto:

Analisadores de redes painel 96 x96

Série:

CVM-C4

Marca:

CIRCUTOR

O objeto da declaração está conforme a legislação de harmonização pertinente na UE, sempre que seja instalado, mantido e utilizado na aplicação para a qual foi fabricado, de acordo com as normas de instalação aplicáveis e as instruções do fabricante.

2014/35/UE: Low Voltage Directive	2014/30/UE: EMC Directive
2011/65/UE: RoHS2 Directive	2015/863/UE: RoHS3 Directive

Está em conformidade com a(s) seguinte(s) norma(s) ou outro(s) documento(s) normativo(s):

IEC 61010-1:2010+AMD1:2016 Ed 3.0	IEC 61010-2-030:2010 Ed 1.0
IEC 61326-1:2012 Ed 2.0	IEC 61000-6-2:2016 Ed 3.0
IEC 61000-6-4:2006+AMD1:2010 Ed 2.1	

Ano de marcação "CE"::

2019

(IT) DICHIARAZIONE DI CONFORMITÀ UE

La presente dichiarazione di conformità viene rilasciata sotto la responsabilità esclusiva di CIRCUTOR, con sede in **Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcellona) Spagna**

prodotto:

Analizzatori di reti pannello 96 x96

Serie:

CVM-C4

MARCHIO:

CIRCUTOR

L'oggetto della dichiarazione è conforme alla pertinente normativa di armonizzazione dell'Unione Europea, a condizione che venga installato, mantenuto e utilizzato nell'ambito dell'applicazione per cui è stato prodotto, secondo le norme di installazione applicabili e le istruzioni del produttore.

2014/35/UE: Low Voltage Directive	2014/30/UE: EMC Directive
2011/65/UE: RoHS2 Directive	2015/863/UE: RoHS3 Directive

È conforme alle seguenti normative o altri documenti normativi:

IEC 61010-1:2010+AMD1:2016 Ed 3.0	IEC 61010-2-030:2010 Ed 1.0
IEC 61326-1:2012 Ed 2.0	IEC 61000-6-2:2016 Ed 3.0
IEC 61000-6-4:2006+AMD1:2010 Ed 2.1	

Anno di marcatura "CE":

2019

Viladecavalls (Spain), 18/10/2019
General Manager: Ferran Gil Torné

Circutor
NIF A-08513178
Vial Sant Jordi s/n.
08232 Viladecavalls
Barcelona (Spain)
t. +34 93 745 29 00

Circutor

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

(PL)

DEKLARACJA ZGODNOŚCI UE

Niniejsza deklaracja zgodności zostaje wydana na wyłączną odpowiedzialność firmy CIRCUTOR z siedzibą pod adresem: **Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) Hiszpania**

produk:

analizator sieciowy tablicowy 96x96

Seria:

CVM-C4

marka:

CIRCUTOR

Przedmiot deklaracji jest zgodny z odnośnymi wymaganiami prawodawstwa harmonizacyjnego w Unii Europejskiej pod warunkiem, że będzie instalowany, konserwowany i użytkowany zgodnie z przeznaczeniem, dla którego został wyprodukowany, zgodnie z mającymi zastosowanie normami dotyczącymi instalacji oraz instrukcjami producenta

2014/35/UE: Low Voltage Directive	2014/30/UE: EMC Directive
2011/65/UE: RoHS2 Directive	2015/863/UE: RoHS3 Directive

Jest zgodny z następującą(ymi) normą(ami) lub innym(i) dokumentem(ami) normatywnym(i):

IEC 61010-1:2010+AMD1:2016 Ed 3.0	IEC 61010-2-030:2010 Ed 1.0
IEC 61326-1:2012 Ed 2.0	IEC 61000-6-2:2016 Ed 3.0
IEC 61000-6-4:2006+AMD1:2010 Ed 2.1	

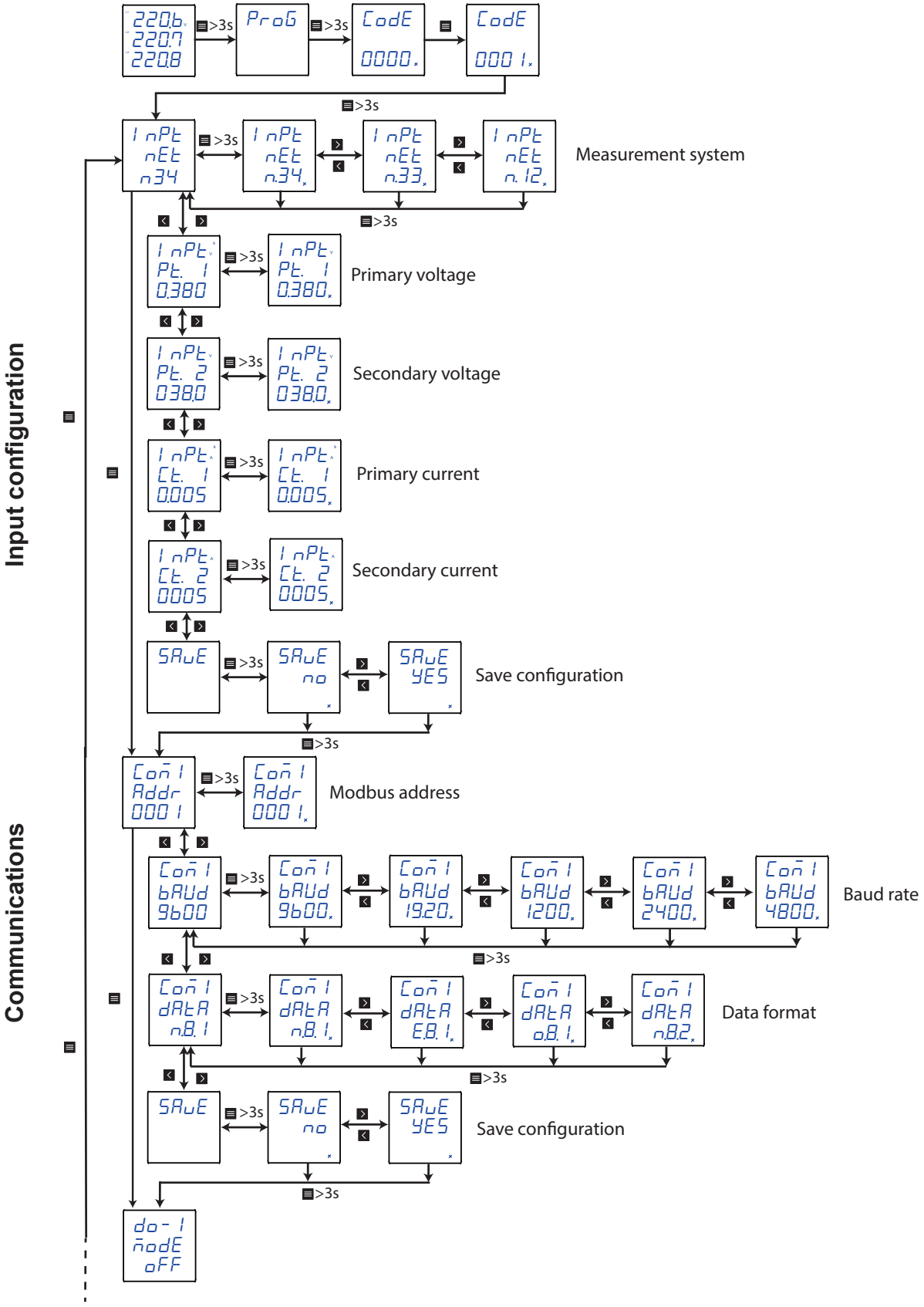
Rok oznakowania "CE":

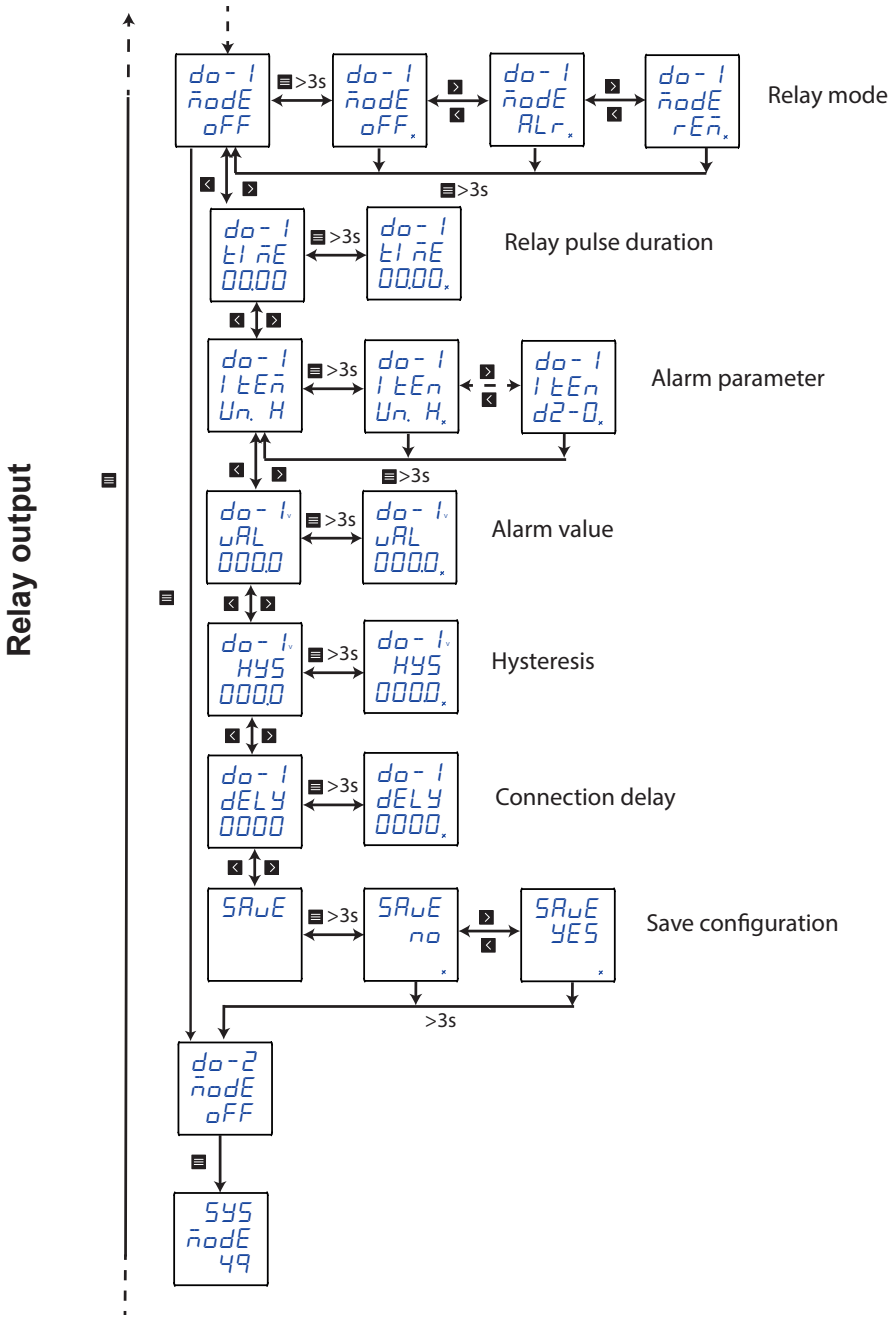
2019

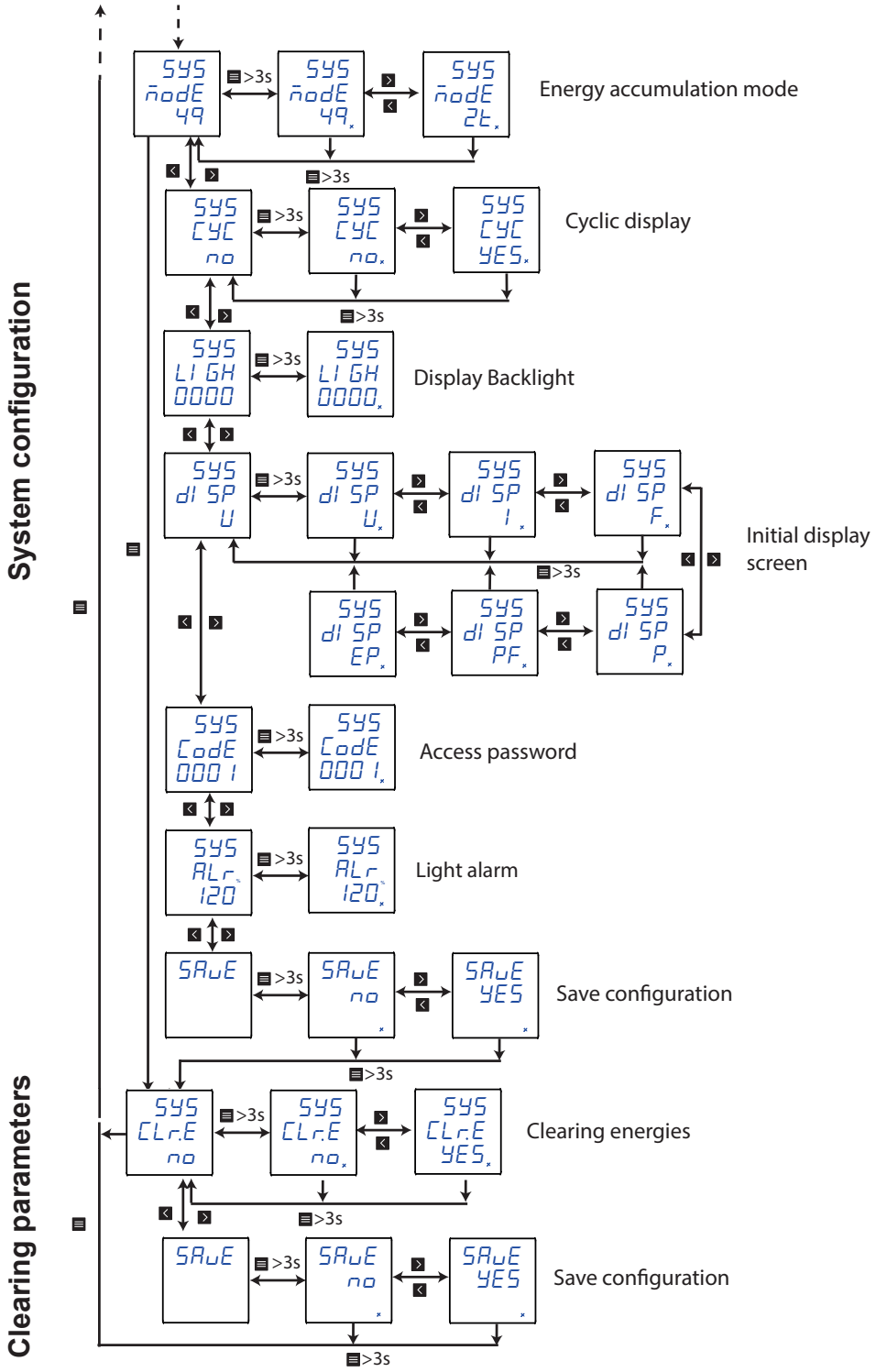
Viladecavalls (Spain), 18/10/2019
General Manager: Ferran Gil Torné

Circutor
NIF A-08513178
Vial Sant Jordi s/n.
08232 Viladecavalls
Barcelona (Spain)
t. +34 93 745 29 00

ANNEX A.- CONFIGURATION MENU




Relay output
do-1 nodE oFF
>3s
do-1 nodE oFF
do-1 nodE ALr
do-1 nodE rEn
Relay mode
>3s
do-1 tI nE 00.00
>3s
do-1 tI nE 00.00
Relay pulse duration
do-1 1tEn Un. H
>3s
do-1 1tEn Un. H
do-1 1tEn d2-0
Alarm parameter
>3s
do-1 uAL 000.0
>3s
do-1 uAL 000.0
Alarm value
do-1 HYS 000.0
>3s
do-1 HYS 0000
Hysteresis
do-1 dELY 0000
>3s
do-1 dELY 0000
Connection delay
SAuE
>3s
SAuE no
SAuE YES
Save configuration
>3s
do-2 nodE oFF
SYS nodE 49


System configuration
Clearing parameters
SYS nodE 49
SYS nodE 49
SYS nodE 2L
Energy accumulation mode
>3s
SYS CYC no
SYS CYC no
SYS CYC YES
Cyclic display
SYS LIGH 0000
SYS LIGH 0000
Display Backlight
SYS diSP U
SYS diSP U
SYS diSP I
SYS diSP F
SYS diSP EP
SYS diSP PF
SYS diSP P
Initial display screen
SYS CodE 0001
SYS CodE 0001
Access password
SYS ALr 120
SYS ALr 120
Light alarm
SAUE
SAUE no
SAUE YES
Save configuration
SYS CLrE no
SYS CLrE no
SYS CLrE YES
Clearing energies
SAUE
SAUE no
SAUE YES
Save configuration

CIRCUTOR, SA
Vial Sant Jordi, s/n
08232 - Viladecavalls (Barcelona)
Tel: (+34) 93 745 29 00 - Fax: (+34) 93 745 29 14
www.circutor.es central@circutor.com