

# Circuitor

DC Multimeter

**DHC-96 CPM**



## INSTRUCTION MANUAL

(M246B01-03-22A)





## 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 device may result in injury to personnel as well as damage to the device. 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 device. Follow all installation and maintenance instructions throughout the device's working life. Pay special attention to the installation standards of the National Electrical Code.



### Refer to the instruction manual before using the device

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 device and /or installations.

CIRCUTOR S.A.U. reserves the right to modify features or the product manual without prior notification.

## DISCLAIMER

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

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

[www.circutor.com](http://www.circutor.com)



CIRCUTOR S.A.U. recommends using the original cables and accessories that are supplied with the device.

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## REVISION LOG

Table 1: Revision log.

Date	Revision	Description
09/20	M246B01-03-19A	Initial version
12/22	M246B01-03-22A	Changes in the following sections: 3.4.1. - 3.4.2. - 5.1. - 5.1.4. - 5.1.5. - 5.1.6. - 5.3.3. - 5.3.4. - 5.4.5. -5.4.6. - 5.6. - 5.6.6. - 6.3.6.1. - 6.3.6.3. - 6.3.6.4. - 6.3.6.5. - 7. - Annex A

## SYMBOLS

Table 2: Symbols.

Symbol	Description
	In compliance with the relevant European 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.
	DC current
	AC current

*Note: Devices images are for illustrative purposes only and may differ from the actual device.*

## 1.- VERIFICATION UPON RECEPTION

Check the following points when you receive the device:

- 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 **DHC-96 CPM** is designed to measure and display the DC voltage, DC current, power, energy and electric charge.



Depending on the input current, **Circutor** has two models:

- ✓ **DHC-96 CPM**, current measurement using shunt.
- ✓ **DHC-96 CPM-HS**, current measurement using a Hall effect sensor.

The device features:

- **4 keys** that allow you to browse between the various screens and program the device.
- **LED display**, displays all parameters.
- **2 fully programmable relay outputs**
- **2 digital inputs**.
- **1 programmable analog output**, voltage or current.
- Communications **RS-485**.

**CIRCUTOR** has different models, see **Table 3**.

Table 3: DHC-96 CPM Models.

Model		Power Supply			Analog output	
		80... 270 V ~	80... 270 V ===	20... 60 V ===	V	A
DHC-96 CPM	M223A8	✓	✓	-	-	✓
	M223A80040000	-	-	✓	-	✓
	M223AA	✓	✓	-	✓	-
	M223AA0040000	-	-	✓	✓	-
DHC-96 CPM-HS	M223B8	✓	✓	-	-	✓
	M223B80040000	-	-	✓	-	✓
	M223BA	✓	✓	-	✓	-
	M223BA0040000	-	-	✓	✓	-



### 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, use the necessary personal protective equipment, and pay attention to the various warnings indicated in this instruction manual.

The **DHC-96 CPM** device must be installed by authorised and qualified staff.

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

Also, it is critical to keep the cables in perfect condition in order to avoid accidents, personal injury and damage to installations.

The device's functionality is limited to the category of measuring voltage or specific current 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.

If an anomaly or malfunction is detected in the device, do not use it to take any measurements.



Disconnect the device from the power supply (device and measuring system power supply) before maintaining, repairing or handling the device's connections. Please contact the after-sales service if you suspect that there is an operational fault in the device.

### 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.

To install it, take the following steps:

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

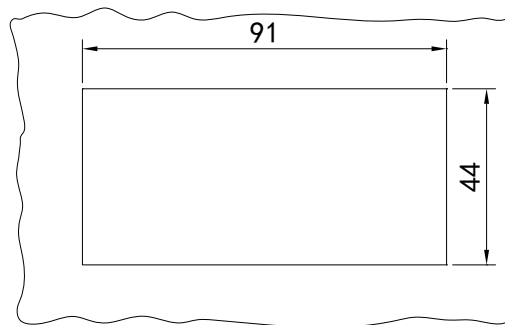
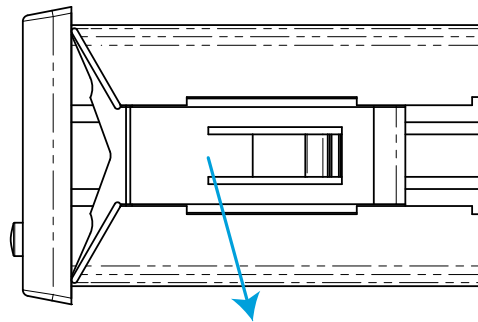


Figure 1: Cut in the panel.

2.- Remove the device's fixing clips (**Figure 2**).



Clip de fijación / Fixing clip

Figure 2: Fixing clips.

3.- Insert the device into the cut in the panel.

4.- Fit the fixing clips until the device is fixed to the panel.

The device should be connected to a power circuit protected by a fuse with a maximum nominal current of **0.25 A**.

### 3.3.- DEVICE TERMINALS

Table 4: List of terminals of the DHC-96 CPM.

Device terminals	
1: L, Power supply	29: D01, Relay output 1 (NO)
2: N, Power supply	31: D02, Relay output 2 (common)
4: I +, Current measurement input	32: D02, Relay output 2 (NO)
5: -, Current measurement input	58: A, RS-485
11: U+, Voltage measurement input	59: B, RS-485
15: -, Analog output	70: DIC, Common digital input
16: +, Analog output	71: 1, Digital input 1
28: D01, Relay output 1 (common)	72: 2, Digital input 2

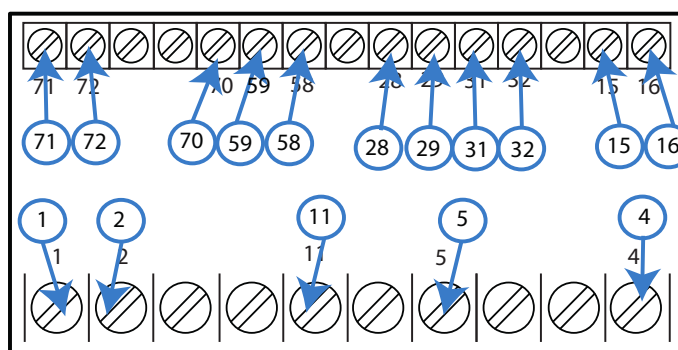


Figure 3: DHC-96 CPM terminals.

3.4.- CONNECTION DIAGRAM

3.4.1.- DHC-96 CPM: VOLTAGE AND CURRENT MEASUREMENT WITH SHUNT AT THE NEGATIVE POLE OF THE INSTALLATION

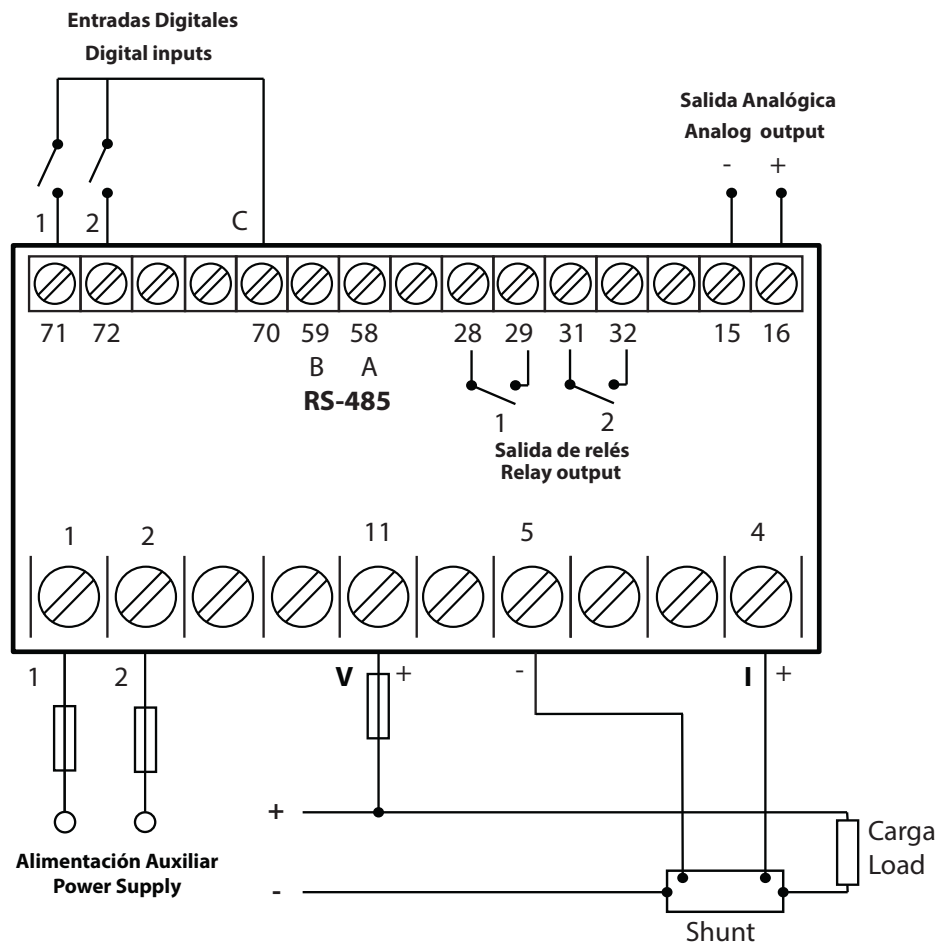


Figure 4: Voltage and Current Measurement (Shunt negative pole).

Make sure that the positive and negative voltage terminals are as shown in the connection diagram.

**Note:** In the configuration section "5.1.5.- SHUNT POSITION" the position of the shunt in the installation must be selected.

### 3.4.2.- DHC-96 CPM: VOLTAGE AND CURRENT MEASUREMENT WITH SHUNT AT THE POSITIVE POLE OF THE INSTALLATION

**Note:** Installation available from version **1009** of the device.

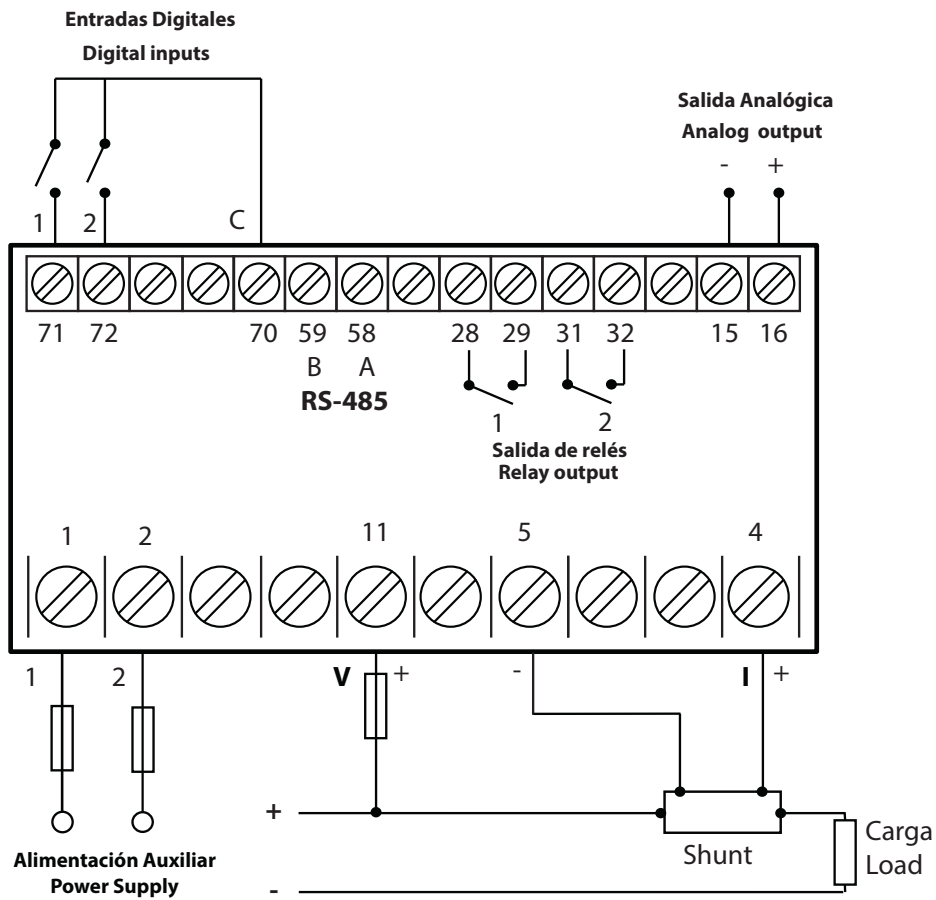


Figure 5: Voltage and Current Measurement (Shunt positive pole).

Make sure that the positive and negative voltage terminals are as shown in the connection diagram.

**Note:** In the configuration section **"5.1.5.- SHUNT POSITION"** the position of the shunt in the installation must be selected.

3.4.3.- DHC-96 CPM-HS: CURRENT MEASUREMENT USING HALL EFFECT SENSOR

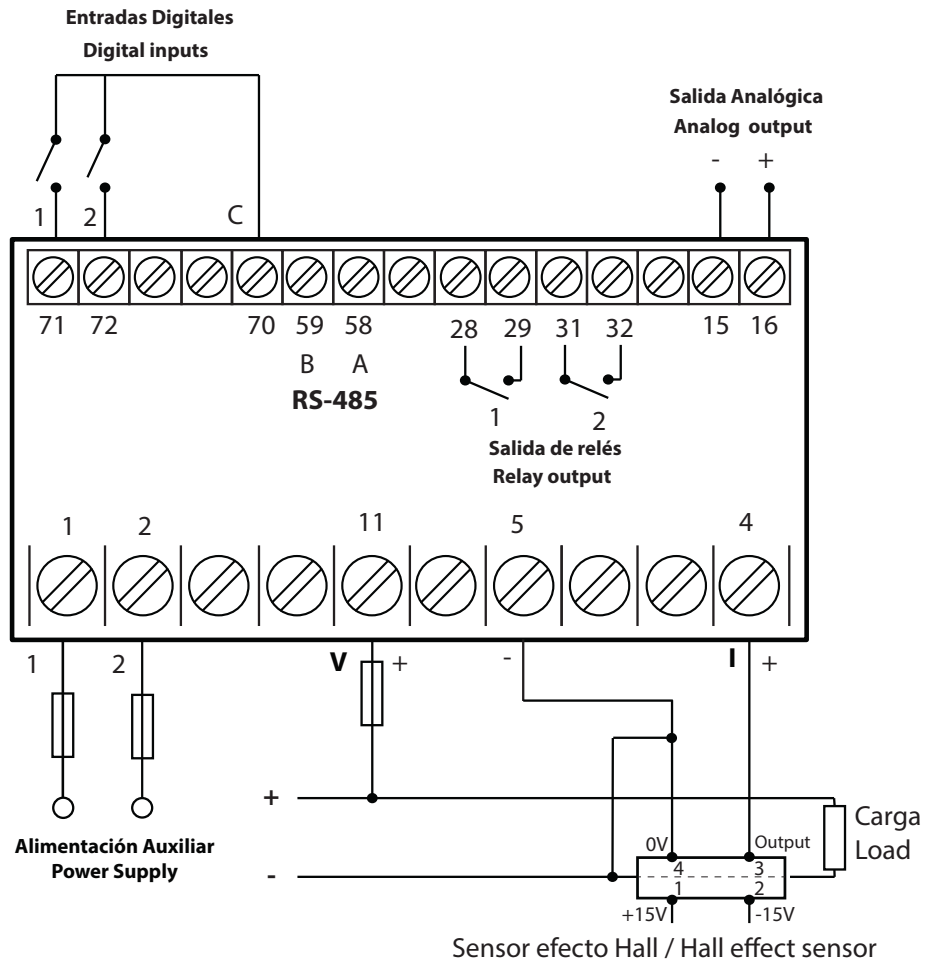


Figure 6: Current measurement using Hall effect sensor.

Make sure that the positive and negative voltage terminals are as shown in the connection diagram.

## 4.- OPERATION

### 4.1.- DISPLAY

The device features a 5-digit LED display, which is used to display the measured parameters and to configure these parameters

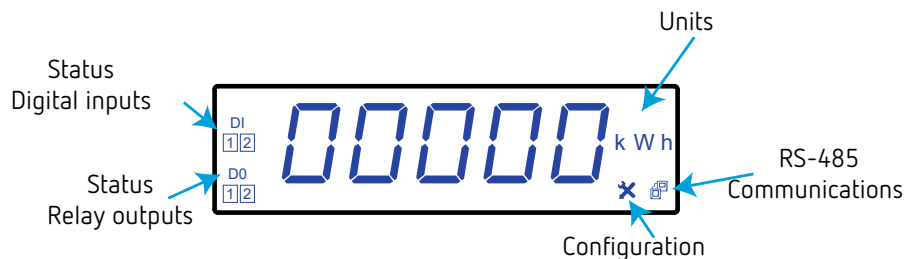


Figure 7: DHC-96 CPM display.





The display also shows:

- ✓ the status of the **digital inputs**, if an input is connected, its corresponding number flashes.
- ✓ the status of the **relay outputs**, if a relay is closed, its corresponding number flashes.

### 4.2.- KEYBOARD FUNCTIONS

The **DHC-96 CPM** features 4 keys to display and configure the device, **Table 5**.

Table 5: Keyboard functions.

Key	Keystroke
	Previous screen <b>In the configuration menu:</b> Scroll through the digits
	Next screen <b>In the configuration menu:</b> Increase the value of the digit
	<b>Long keystroke (&gt; 3s):</b> Enter in configuration menu
	<b>In the configuration menu:</b> Jump to the next level / Confirm an operation

4.3.- RELAY OUTPUTS

The device features two programmable relay outputs (terminals 28, 29, 31 and 32, as shown in Figure 8) that can be programmed as remote control signals or alarms in the setup menu (“5.4.- RELAY OUTPUT 1” and “5.5.- RELAY OUTPUT 2”).

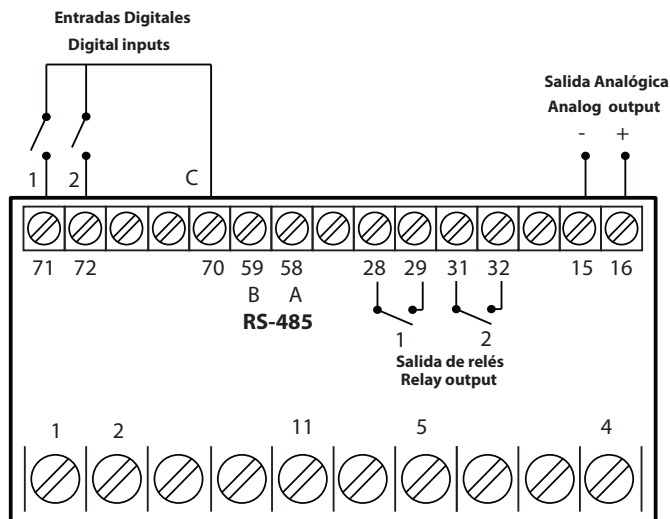


Figure 8: Relay outputs, digital inputs and Analog output.

4.4.- ANALOG OUTPUT

The device has an analog output (terminals 15 and 16 of Figure 8) programmable through the configuration menu (“5.3.- ANALOG OUTPUT”)

The analogue output can be voltage or current, depending on the device model, Table 6:

Table 6: Device model based on the analogue output.

Model		Analog output	
		Voltage	Current
DHC-96 CPM	M223A8	-	✓
	M223A80040000	-	✓
	M223AA	✓	-
	M223AA0040000	✓	-
DHC-96 CPM-HS	M223B8	-	✓
	M223B80040000	-	✓
	M223BA	✓	-
	M223BA0040000	✓	-

4.5.- DIGITAL INPUTS

The device has two digital inputs (terminals 70, 71 and 72 of Figure 8). The relay outputs can be activated depending on the value of the digital inputs (See “5.4.- RELAY OUTPUT 1” and “5.5.- RELAY OUTPUT 2”)










## 4.6.- DISPLAY

The **DHC-96 CPM** features 7 display screens, **Table 7**. Use keys  and  to browse through the different screens.

The display screens can change automatically depending on the time programmed in section "**5.6.2.- CYCLIC DISPLAY**".


Table 7: Display menu.


Display menu	
Voltage	
Current	
Power	
Positive energy	
Negative energy	
Positive electric charge	
Negative electric charge	


The home screen, meaning the first screen displayed when powering up the device or when exiting the settings menu, can be programmed in section **"5.6.5.- DISPLAY HOME SCREEN"**.


If the voltage value measured by the device is % higher than the nominal value, the device can make the digits on the display start flashing to provide a visual alarm. See **"5.6.4.- LIGHT ALARM"**

#### 4.6.1.- MAXIMUM & MINIMUM VALUES

The maximum and minimum values for the **voltage, current** and **power** parameters can be displayed by pressing the key  while the corresponding parameter is being displayed.


When the key  is first pressed the minimum value is displayed and the word **MIN** is shown at the top right of the display.


When the key  is pressed for the second time, the maximum value is displayed and the word **MAX** is shown at the top right of the display.

Press the key  again to return to the instantaneous value.

The maximum and minimum values can be deleted in the settings menu (**"5.6.7.- DELETING THE MAXIMUM AND MINIMUM VALUES"**) or through the communications options (**"6.3.5.- DELETING VALUES"**).

#### 4.6.2.- TOTALISERS

For the **Positive Energy, Negative Energy, Positive Electric Charge** and **Negative Electric Charge** parameters, the value of Energy or Electric Charge since the device was started can be viewed by pressing the key  while the corresponding parameter is being displayed.

The total value is displayed in 3 totalisers, **A, B** and **C**. When the key  is first pressed, totaliser **A** is displayed and the letter **A** is shown at the top left of the display.



Press key  to view the different totalisers.

Table 8: Display range of the Totalisers.

Totaliser	Display range
D	0... 9.999 k W/Ah
B	10 k W/Ah ... 99.99 M W/Ah
A	100 M W/Ah ... 999.9 G W/Ah

The totalisers can be cleared in the settings menu (**"5.6.8.- CLEARING THE ELECTRIC CHARGE TOTALISERS"** and **"5.6.9.- CLEARING THE ENERGY TOTALISERS"**) or through the communications options (**"6.3.5.- DELETING VALUES"**).

## 5.- CONFIGURATION

Press and hold the  key for more than 3 seconds to enter the configuration menu of the device. The configuration of the device is organized in different menus, **Figure 9**.

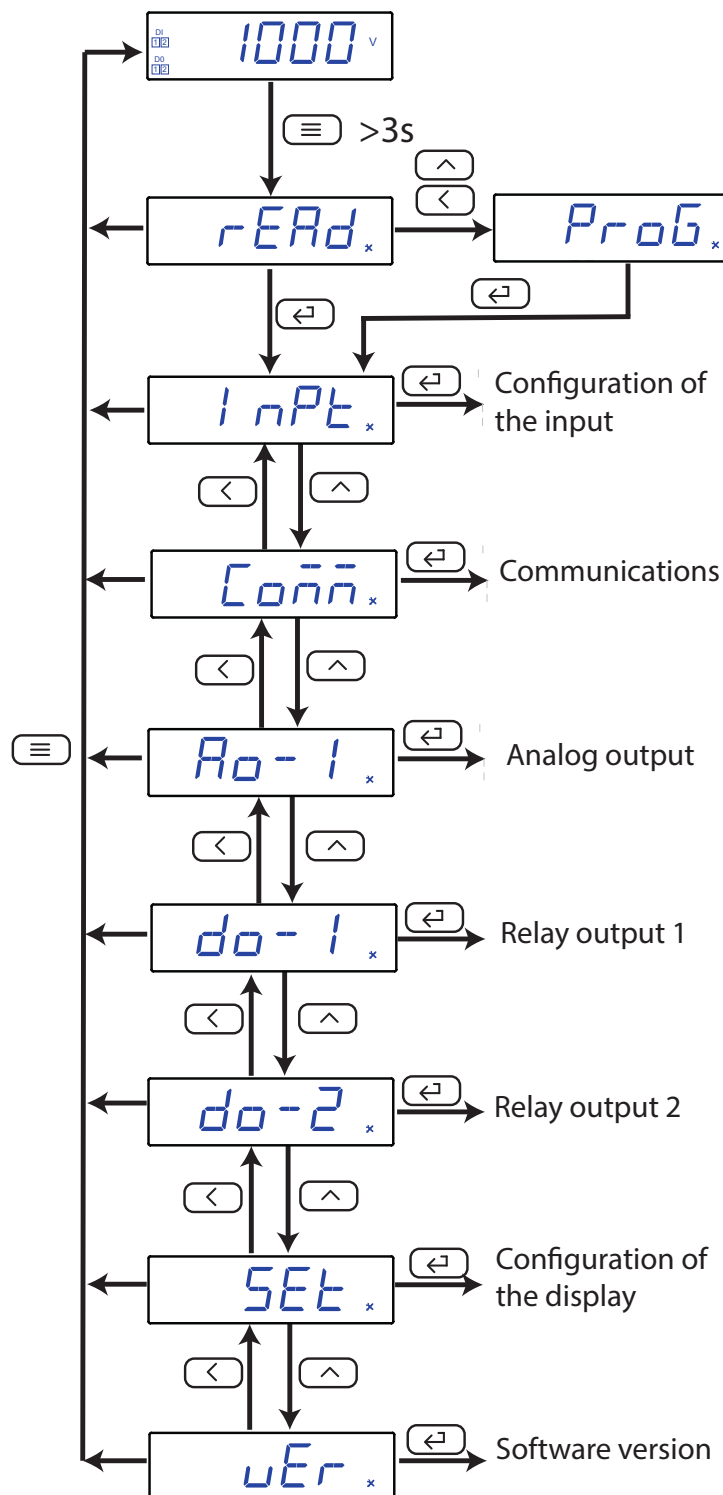





Figure 9: DHC-96 CPM configuration menu.

From any screen of the configuration menus, if no key is pressed for 4 minutes, 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.

On the *rEAd* screen, press the  key to access the configuration menu in the **display mode**, i.e., the configuration parameters cannot be modified.

On the *rEAd* screen, press the  or  keys to access the configuration menu in the **programming mode**, i.e., the configuration parameters can be modified.

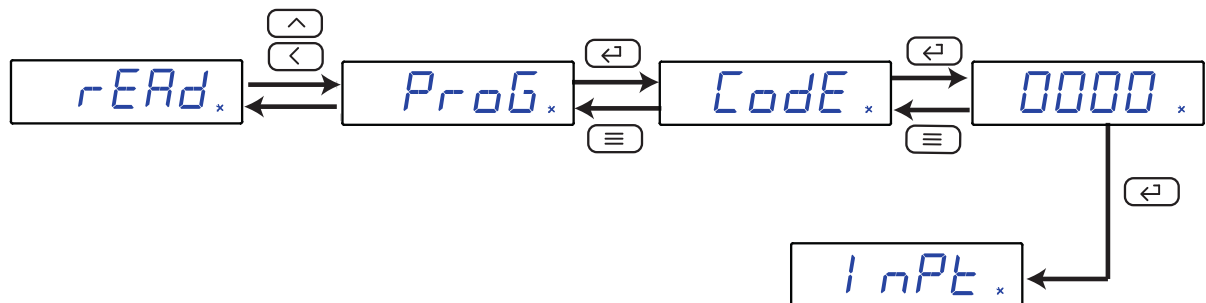


Figure 10: Access the configuration menu in the programming mode.

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

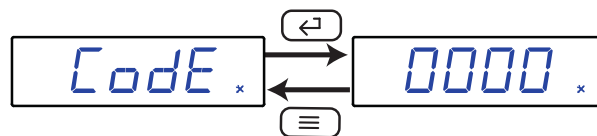





Figure 11: Login password.

Use the  key to modify the value of the flashing digit  
When the desired value is shown on the screen, press the  key to skip the digit.

**Default password:** 0001

**Note:** The password can be modified, see "5.6.1.- LOGIN PASSWORD" .

To validate the data, press the  key.

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 11**.

## 5.1.- CONFIGURATION OF THE INPUT

Figure 11 shows the main screen of the input configuration menu, where the input measurement range and the display value are configured.



Figure 12: Input configuration menu, main screen.

Press the  key to open the configuration menu.

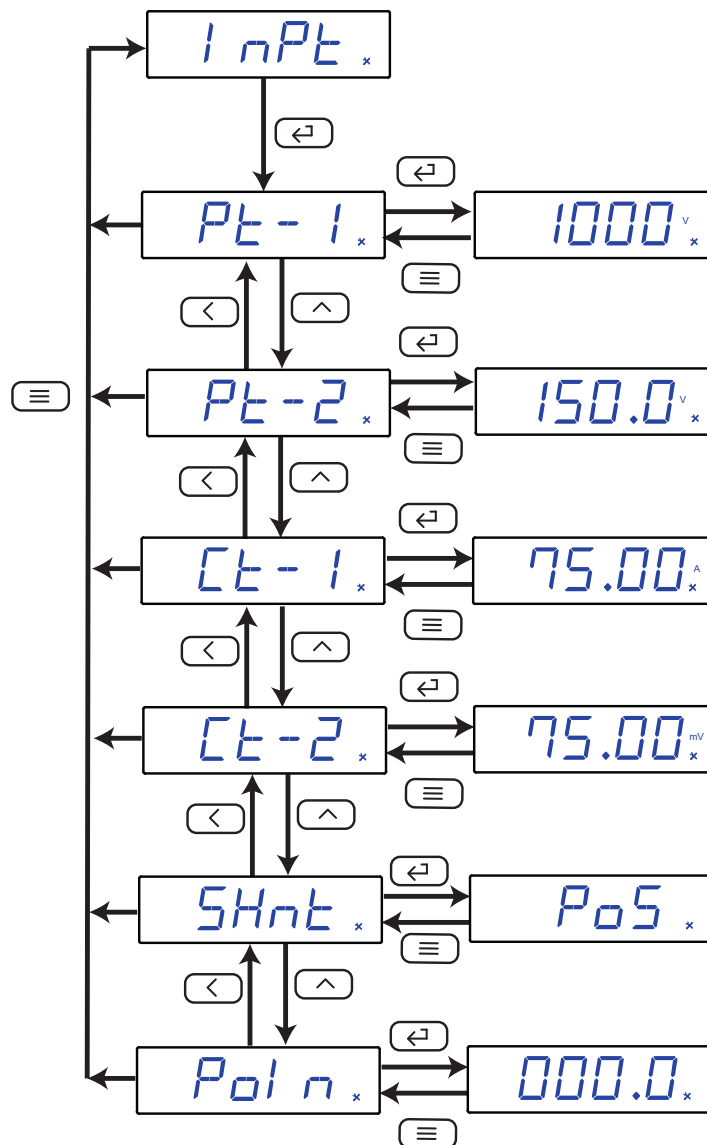
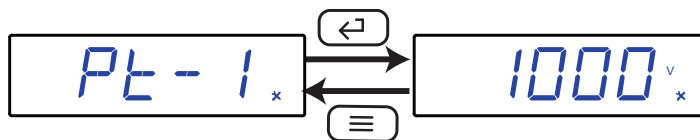




Figure 13: Input configuration menu.

### 5.1.1.- VOLTAGE DISPLAY VALUE

This screen is used to configure the voltage value to display when the maximum value of the voltage measurement range is input to the device.






Use the  key to modify the value of the flashing digit. When the desired value is shown on the screen, press the  key to skip the digit.

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

#### ✓ Configuration values

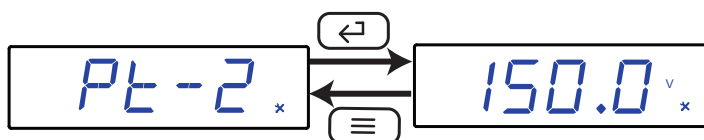
Table 9: Configuration values: Voltage display value.




	Voltage display value
Minimum value	1.000 V
Maximum value	9999 V

To validate the data, press the  key. Use the  and  keys to browse the configuration screens of the menu.

### 5.1.2.- VOLTAGE MEASUREMENT RANGE

This screen displays the voltage measurement range of the input signal.






Use the  and  keys at the same time to configure the value. Use the  key to browse the different options.

#### ✓ Configuration values

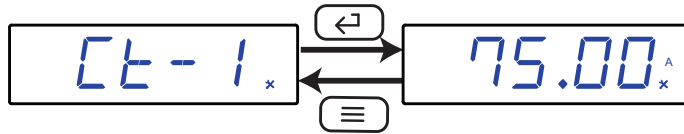
Table 10: Configuration values: Voltage measurement range.

	Voltage measurement range	
Possible values	150.0	150.0 V.
	300.0	300.0 V.
	600.0	600 V.

To validate the data, press the  key. Use the  and  keys to browse the configuration screens of the menu.

### 5.1.3.- CURRENT DISPLAY VALUE

This screen is used to configure the current value to display when the maximum value of the current is input to the device.



Use the  $\uparrow$  key to modify the value of the flashing digit

When the desired value is shown on the screen, press the  $\leftarrow$  key to skip the digit.

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

#### ✓ Configuration values

Table 11: Configuration values: Current display value.

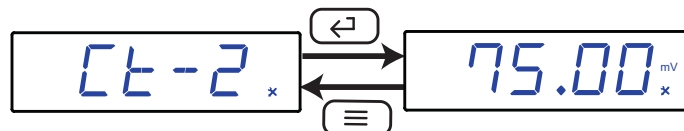
	Current display value
Minimum value	1.000 A
Maximum value	9999 A

To validate the data, press the  $\leftarrow$  key.

Use the  $\leftarrow$  and  $\uparrow$  keys to browse the configuration screens of the menu.

### 5.1.4.- CURRENT INPUT

The shunt for the input current is selected on this screen.



Use the  $\leftarrow$  and  $\leftarrow$  keys at the same time to configure the value.

Use the  $\uparrow$  key to browse the different options.



#### ✓ Configuration values

Table 12: Configuration values: Current input.

	Current input			
	DHC-96 CPM			
Possible values	50.00 (50.00 mV)	60.00 (60.00 mV)	75.00 (75.00 mV)	100.0 (100.0 mV)
	150.0 (150.0 mV)	200.0 (200.0 mV)	250.0 (250.0 mV)	300.0 (300.0 mV)
	400.0 (400.0 mV)	600.0 (600.0 mV)		
	DHC-96 CPM-HS			
	4.000 (4.000 V)		5.000 (5.000 V) <sup>(1)</sup>	

<sup>(1)</sup> Option available for the DHC-96 CPM-HS models from the 100A version of the device.

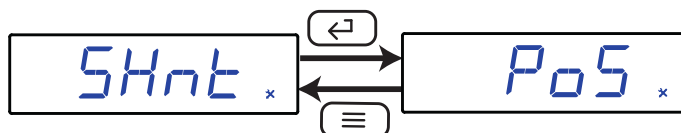
To validate the data, press the  key.

Use the  and  keys to browse the configuration screens of the menu.

### 5.1.5.- SHUNT POSITION

**Note:** Parameter available for **DHC-96 CPM** models from version **1009** of the device.

On this screen, select where the shunt has been inserted to measure the current in the installation.





Use the  key to browse the different options.

#### ✓ Configuration values

Table 13: Configuration values: Shunt position.

	Shunt position
Possible values	Pos, Shunt on the positive pole of the installation
	NEG, Shunt on the negative pole of the installation

To validate the data, press the  key.

Use the  and  keys to browse the configuration screens of the menu.

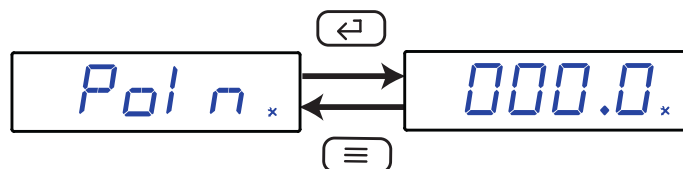
### 5.1.6.- DECIMAL POINT FOR VOLTAGE DISPLAY

**Note:** Parameter available from version **1008** of the device.

On this screen, the decimal point is selected when displaying the lower voltage values.

**Example:** If a Voltage Display Value ( $P_{L1} - I$ ) = 300.0 V has been programmed and the display of 2 decimal points ( $P_{OL1}$ ) = 00.00.

- For voltage values < 100.0 V the voltage is displayed as xx.xx V.
- For voltage values  $\geq$  100.0 V the voltage is displayed as xxx.x V.



Use the  key to browse the different options.



#### ✓ Configuration values

Table 14: Configuration values: Decimal point for voltage display.


	Decimal point for voltage display
Possible values	0000, no decimals
	000.0, display with 1 decimal point
	00.00, display with 2 decimal points




To validate the data, press the  key.

Use the  and  keys to browse the configuration screens of the menu.

### 5.1.7.- SAVE CONFIGURATION

To save the configuration of the device, press the  key, until the main screen of the input configuration menu is opened, **Figure 12**.

Press the  key again to show the validation screen.



Use the  key to browse the different options.

#### ✓ Configuration values

Table 15: Configuration values: Save configuration.

Save configuration		
Possible values	no	Exit the configuration without saving the changed values.
	YES	Save the changed configuration values.

Press the  key to validate the data and exit the configuration menu.

5.2.- RS-485 COMMUNICATIONS

Figure 14, shows the main screen of the communications menu, where the parameters of the RS-485 communications are configured.



Figure 14: RS-485 communications menu, main screen.

Press the  key to open the configuration menu.

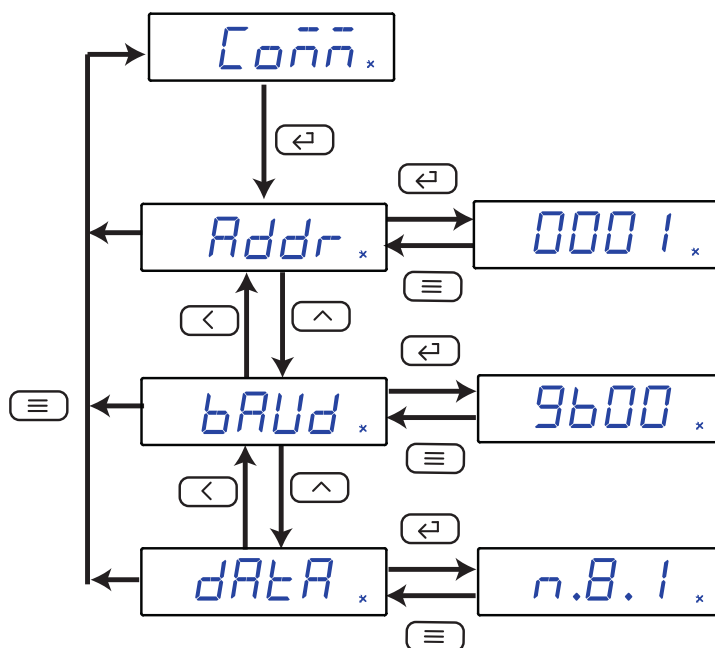
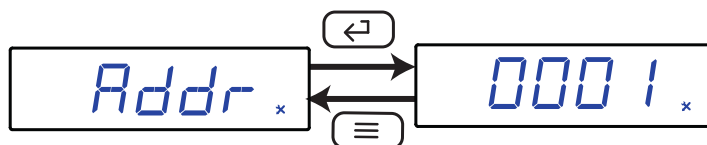




Figure 15: Communications menu.

5.2.1.- MODBUS ADDRESS

This screen is used to configure the modbus address of the device.






Use the  key to modify the value of the flashing digit. When the desired value is shown on the screen, press the  key to skip the digit.

✓ Configuration values

Table 16: Configuration values: Modbus address.

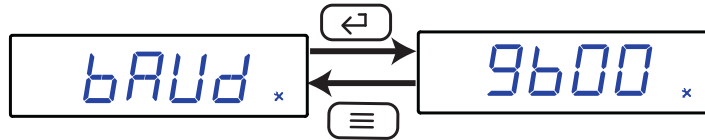
	Modbus address
Minimum value	1
Maximum value	247

To validate the data, press the  key.

Use the  and  keys to browse the configuration screens of the menu.

### 5.2.2.- BAUD RATE

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






Use the  key to browse the different options.

#### ✓ Configuration values

Table 17: Configuration values: Baud rate.

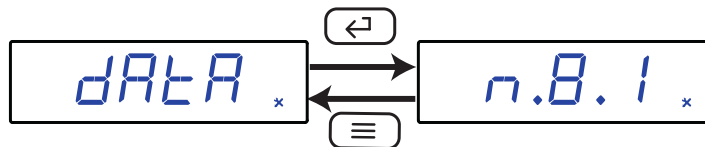
	Baud rate			
Possible values	2400 (2400 bps)	4800 (4800 bps)	9600 (9600 bps)	19.20 (19200 bps)

To validate the data, press the  key.

Use the  and  keys to browse the configuration screens of the menu.

### 5.2.3.- DATA FORMAT

This screen is used to configure the data format.





Use the  key to browse the different options.

#### ✓ Configuration values

Table 18: Configuration values: Data format

	Data format	
Possible values	n.8.1	No parity, 8 data bits, 1 stop bit
	o.8.1	Odd parity, 8 data bits, 1 stop bit
	E.8.1	Even parity, 8 data bits, 1 stop bit
	n.8.2	No parity, 8 data bits, 2 stop bit

To validate the data, press the  key.

Use the  and  keys to browse the configuration screens of the menu.

### 5.2.4.- SAVE CONFIGURATION

To save the configuration of the device, see "5.1.7.- SAVE CONFIGURATION".

5.3.- ANALOG OUTPUT

Figure 16, shows the main screen of the analog output menu.



Figure 16: Analog output menu, main screen.

Press the key to open the configuration menu.

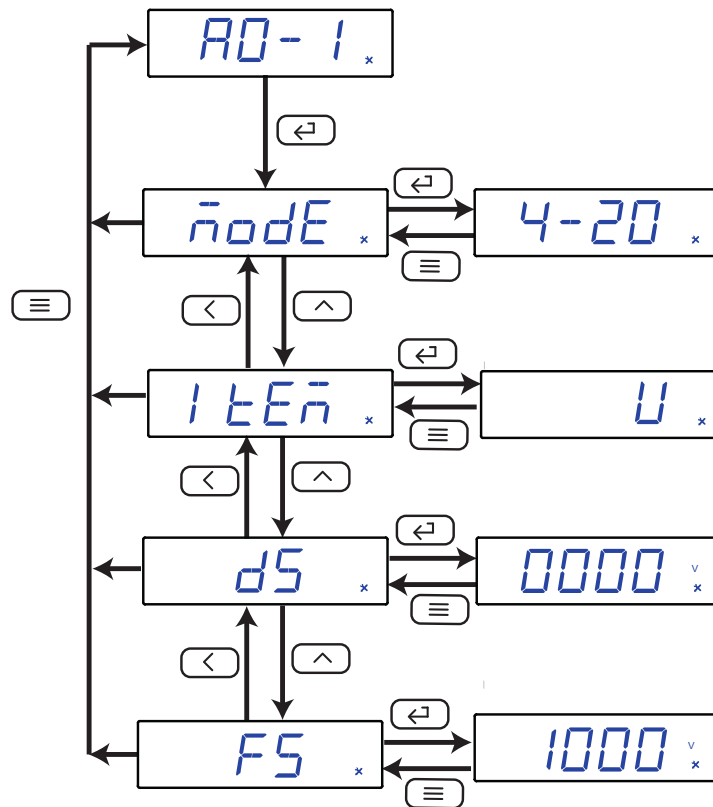
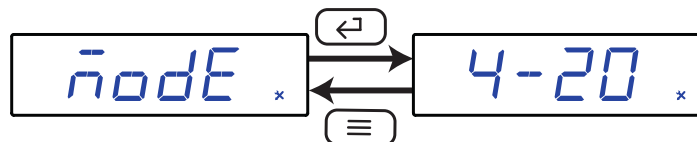


Figure 17: Analog output menu.

5.3.1.- TYPE OF OUTPUT

In this screen the output type of the analog output is configured



Use the and keys at the same time to configure the value.



Use the key to browse the different options.

### ✓ Configuration values

Table 19: Configuration values: Type of output

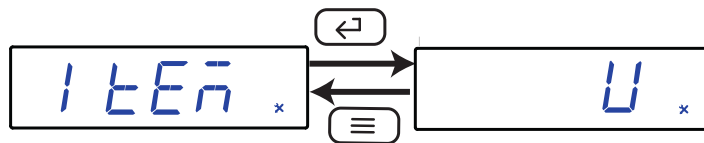
Type of output	
Possible values	<i>Current output model:</i>
	4-20   Current output 4 ... 20 mA
	0-20   Current output 0 ... 20 mA
	12.20   Current output 4 ...12 ... 20 mA
	<i>Voltage output model:</i>
	0- 10   Voltage output 0 ... 10 V
	2- 10   Voltage output 2 ... 10 V

To validate the data, press the  key.

Use the  and  keys to browse the configuration screens of the menu.

### 5.3.2.- ANALOG OUTPUT PARAMETER

This screen is used to configure the parameter that is acted upon by the analogue output.




Use the  key to browse the different options.

### ✓ Configuration values

Table 20: Configuration values: Analog output parameter.

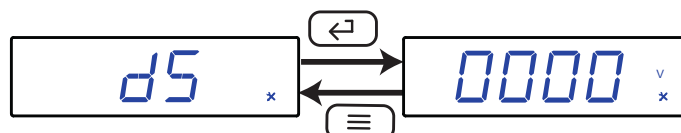
Analog output parameter	
Possible values	U   Analog output of the voltage measurement.
	I   Analog output of the current measurement.
	P   Analog output of the power measurement.

To validate the data, press the  key.

Use the  and  keys to browse the configuration screens of the menu.

### 5.3.3.- READING FOR THE START OF THE ANALOG OUTPUT

In this screen, the reading value from which the analog output is started is configured.



Use the  $\wedge$  key to modify the value of the flashing digit  
 When the desired value is shown on the screen, press the  $\lt$  key to skip the digit.

✓ Configuration values

Table 21: Configuration values: Reading for the start of the analog output.

	Reading for the start of the analog output
Minimum value	0
Maximum value	$0.5 \times A$ .

**Note:** The value of the A variable varies depending on the **analog output parameter** and the programmed **measurement range**, see Table 22.

Table 22: Value of the A variable and Reading decimal point for the start of the analog output.

Analog output parameter	Measurement range	A	Decimal point $d5$
V, voltage	150,0	1500	$= P\text{E} - 1$
	300,0	3000	
	600,0	6000	
I, current	-	CT-1	$= [C\text{E} - 1$
P, power	-	$PT-1 \times CT-1^{(2)}$	$= P\text{E} - 1 \times [C\text{E} - 1$

<sup>(2)</sup>The 4 most significant digits.

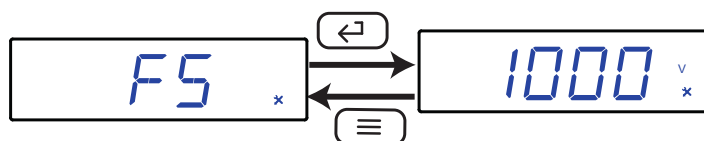
**Note:**  $FS$  (End of the analog output) -  $DS$  (Start of the analog output)  $\geq 500$

To validate the data, press the  $\leftarrow$  key.

Use the  $\lt$  and  $\wedge$  keys to browse the configuration screens of the menu.

5.3.4.-READING FOR THE END OF THE ANALOG OUTPUT

In this screen, the reading value from which the analog output ends is configured.



Use the  $\wedge$  key to modify the value of the flashing digit  
 When the desired value is shown on the screen, press the  $\lt$  key to skip the digit.

✓ Configuration values

Table 23: Configuration values: Reading for the end of the analog output.

	Reading for the end of the analog output
Minimum value	$> 0.5 \times A$ .
Maximum value	$P\text{E} - 1 \times 1.2$ , for the analog output of the voltage measurement,
	$[C\text{E} - 1 \times 1.2$ , for the analog output of the current measurement
	$(P\text{E} - 1 \times [C\text{E} - 1) \times 1.2$ for the analog output of the power measurement.

**Note:** The value of the **A** variable varies depending on the **analog output parameter** and the programmed **measurement range**, see **Table 22**.

**Note:** See **Table 23** for the **Decimal Point for the Reading for the end of the analog output**.

**Note:** **FS** (End of the analog output) - **DS** (Start of the analog output)  $\geq 500$

To validate the data, press the key.

Use the and keys to browse the configuration screens of the menu.

### 5.3.5.- SAVE CONFIGURATION

To save the configuration of the device, see **"5.1.7.- SAVE CONFIGURATION"**.

### 5.4.- RELAY OUTPUT 1

Figure 18, shows the main screen of the configuration menu of relay output 1.



Figure 18: Configuration menu of relay output 1, main screen.

Press the key to open the setup menu.

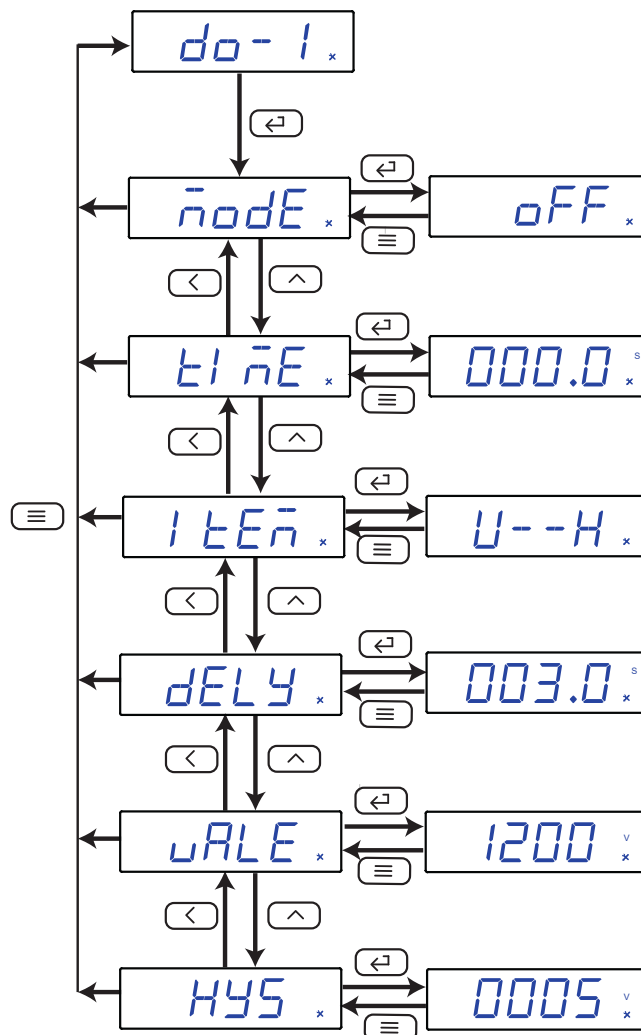
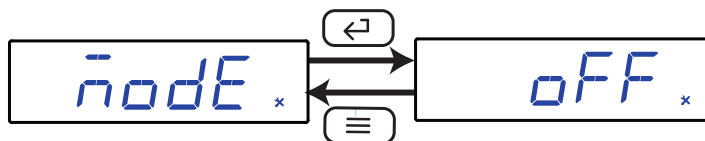


Figure 19: Configuration menu of relay output 1.

### 5.4.1.- RELAY MODE

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



Use the key to browse the different options.

#### ✓ Configuration values

Table 24: Configuration values: Relay mode.

	Relay mode	
Possible values	oFF	relay output 1 is disabled.
	rEn	remote control output.
	ALr	alarm output.

To validate the data, press the key.

Use the and keys to browse the configuration screens of the menu.

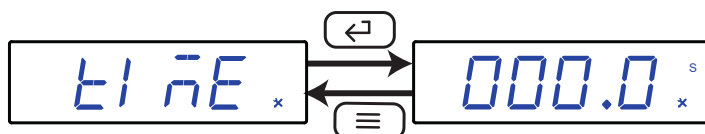
### 5.4.2.- RELAY PULSE DURATION

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**.



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

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



#### ✓ Configuration values

Table 25: Configuration values: Relay pulse duration.

	Relay pulse duration
Minimum value	000.0 s
Maximum value	999.9 s

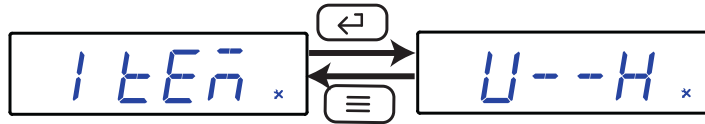
To validate the data, press the key.



Use the  and  keys to browse the configuration screens of the menu.

### 5.4.3.- ALARM PARAMETER

This screen is used to configure the parameter that will be used to activate the alarm.





Use the  key to browse the different options.

#### ✓ Configuration values

Table 26: Configuration values: Alarm parameter.

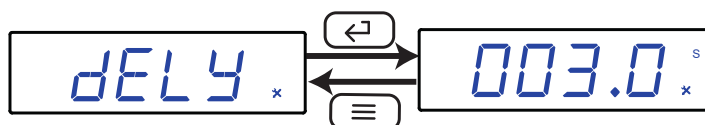
Alarm parameter		
Possible values	U--L	Active alarm when the voltage is less than the alarm value.
	I--L	Active alarm when the current is less than the alarm value.
	P--L	Active alarm when the power is less than the alarm value.
	dI 1L	Active alarm when digital input 1 is disconnected.
	dI 2L	Active alarm when digital input 2 is disconnected.
	U--H	Active alarm when the voltage is higher than the alarm value.
	I--H	Active alarm when the current is higher than the alarm value.
	P--H	Active alarm when the power is higher than the alarm value.
	dI 1H	Active alarm when digital input 1 is connected.
	dI 2H	Active alarm when digital input 2 is connected.

To validate the data, press the  key.


Use the  and  keys to browse the configuration screens of the menu.

### 5.4.4.- CONNECTION DELAY

This screen is used to configure the alarm connection delay.




Use the  key to modify the value of the flashing digit

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

✓ Configuration values

Table 27: Configuration values: Connection delay.

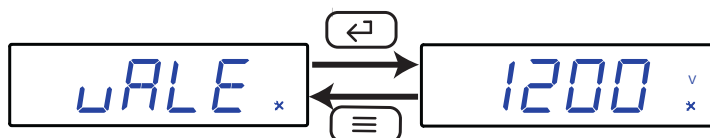
	Connection delay
Minimum value	000.0 s
Maximum value	999.9 s



To validate the data, press the  key.

Use the  and  keys to browse the configuration screens of the menu.

5.4.5.- ALARM VALUE

The display value for voltage, current or power after which the alarm will be activated is configured on this screen.




Use the , key to modify the value of the flashing digit  
 When the desired value is shown on the screen, press the  key to skip the digit.

✓ Configuration values

Table 28: Configuration values: Alarm value.

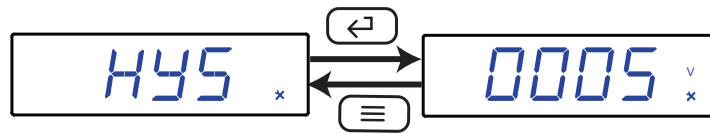
	Alarm parameter	Alarm value	Decimal point
Minimum value	<i>U--H U--L</i>	0	<i>= P<sub>t-1</sub></i>
	<i>I--H I--L</i>	0	<i>= C<sub>t-1</sub></i>
	<i>P--H P--L</i>	0	<i>= P<sub>t-1</sub> x C<sub>t-1</sub></i>
	<i>d1 1 H, d1 1 L, d1 2H, d1 2L</i>	0	-
Maximum value	<i>U--H U--L</i>	9999	<i>= P<sub>t-1</sub></i>
	<i>I--H I--L</i>	9999	<i>= C<sub>t-1</sub></i>
	<i>P--H P--L</i>	9999	<i>= P<sub>t-1</sub> x C<sub>t-1</sub></i>
	<i>d1 1 H, d1 1 L, d1 2H, d1 2L</i>	9999	-



To validate the data, press the  key.

Use the  and  keys to browse the configuration screens of the menu.

### 5.4.6.- HYSTERESIS

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





Use the  key to modify the value of the flashing digit  
When the desired value is shown on the screen, press the  key to skip the digit.

#### ✓ Configuration values

Table 29: Configuration values: Hysteresis.

	Alarm parameter	Hysteresis	Decimal point
Minimum value	<i>U--H U--L</i>	0	= <i>Pt - l</i>
	<i>I --H I --L</i>	0	= <i>[t - l</i>
	<i>P--H P--L</i>	0	= <i>Pt - l x [t - l</i>
	<i>dl 1 H, dl 1 L, dl 2H, dl 2L</i>	0	-
Maximum value	<i>U--H U--L</i>	9999	= <i>Pt - l</i>
	<i>I --H I --L</i>	9999	= <i>[t - l</i>
	<i>P--H P--L</i>	9999	= <i>Pt - l x [t - l</i>
	<i>dl 1 H, dl 1 L, dl 2H, dl 2L</i>	9999	-

To validate the data, press the  key.

Use the  and  keys to browse the configuration screens of the menu.

### 5.4.7.- SAVE CONFIGURATION

To save the configuration of the device, see "5.1.7.- SAVE CONFIGURATION".

## 5.5.- RELAY OUTPUT 2

Figure 20, shows the main screen of the configuration menu of relay output 2.



Figure 20: Configuration menu of relay output 2, main screen.

The configuration is the same as for alarm relay 1, see "5.4.- RELAY OUTPUT 1".

5.6.- CONFIGURATION OF THE DISPLAY

Figure 21, shows the main screen of the configuration menu of the display.



Figure 21: Configuration menu of the display, main screen.

Press the  key to open the configuration menu.

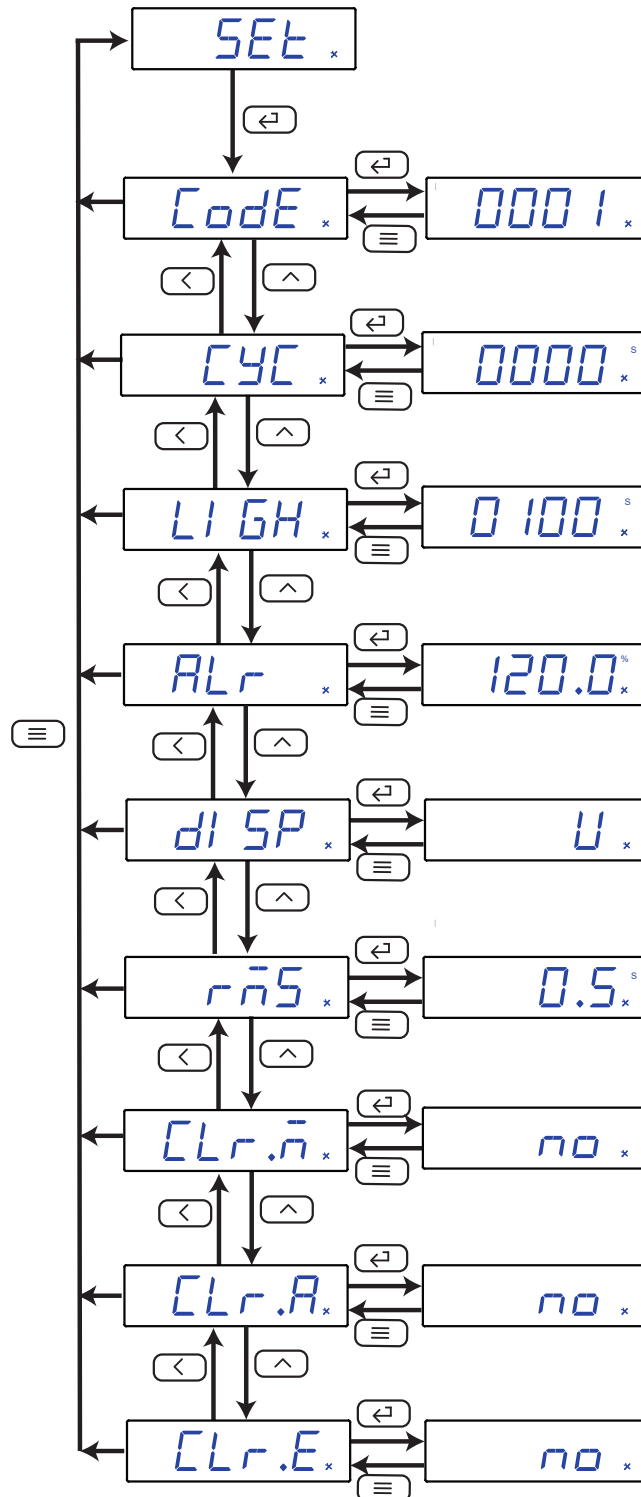
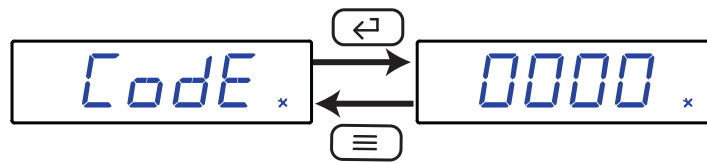



Figure 22: Configuration menu of the display.

### 5.6.1.- LOGIN PASSWORD

This screen is used to configure the value of the password used to access 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  key to skip the digit.

#### ✓ Configuration values

Table 30: Configuration values: Login Password.

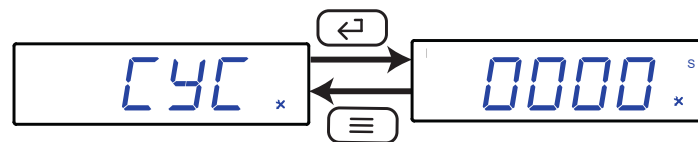
	Login Password
Minimum value	0
Maximum value	9999


To validate the data, press the  key.

Use the  and  keys to browse the configuration screens of the menu.

### 5.6.2.- CYCLIC DISPLAY

The display screens can change automatically depending on the time programmed in this section.



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

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



#### ✓ Configuration values

Table 31: Configuration values: Cyclic display.

	Cyclic display
Minimum value	0 s.
Maximum value	60 s.

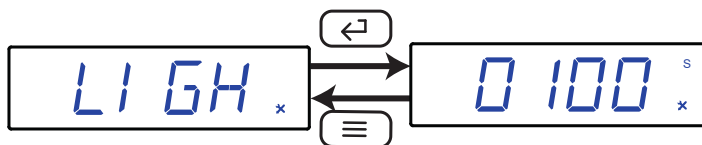
**Note:** If set to 0, the display screens do not cycle automatically.



To validate the data, press the  key.

Use the  and  keys to browse the configuration screens of the menu.

### 5.6.3.- BACKLIGHT OF THE DISPLAY

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






Use the , key to modify the value of the flashing digit  
 When the desired value is shown on the screen, press the  key to skip the digit.

✓ **Configuration values**

Table 32: Configuration values: Backlight of the display.

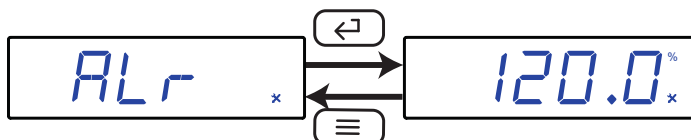
	Backlight of the display
Minimum value	0 s.
Maximum value	9999 s.



**Note:** If set to 0, the display backlight does not turn off.

To validate the data, press the  key.  
 Use the  and  keys to browse the configuration screens of the menu.

### 5.6.4.- LIGHT ALARM

If the voltage value measured by the device 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.






Use the , key to modify the value of the flashing digit  
 When the desired value is shown on the screen, press the  key to skip the digit.

✓ **Configuration values**

Table 33: Configuration values: Light Alarm.

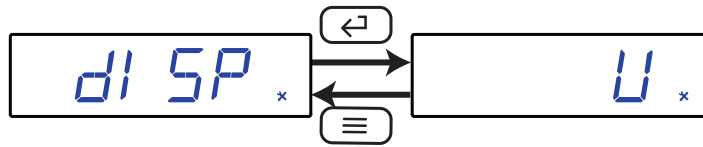
	Light Alarm
Minimum value	30.0 %
Maximum value	120.0 %

**Note:** If set to 0, the light alarm is deactivated.

To validate the data, press the  key.  
 Use the  and  keys to browse the configuration screens of the menu.

### 5.6.5.-DISPLAY HOME SCREEN

In this section the initial display screen is configured.



Use the key to browse the different options.

#### ✓ Configuration values

Table 34: Configuration values: Display home screen.

Display home screen		
Possible values	$U$	voltage screen.
	$I$	current screen
	$P$	power screen
	$EPP$	positive energy screen.
	$EPn$	negative energy screen
	$AHP$	positive Ah screen.
	$AHn$	negative Ah screen.

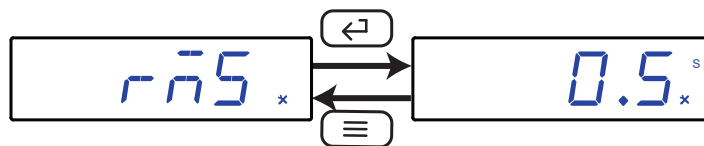
To validate the data, press the key.

Use the and keys to browse the configuration screens of the menu.

### 5.6.6.- REFRESH TIME

**Note:** Screen available from version **1009** of the device software.

In this section, the refresh time of the device is configured.



Use the key to browse the different options.

Table 35: Configuration values: Refresh time.

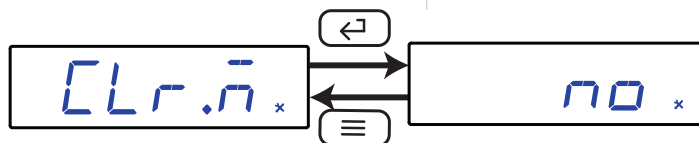
Refresh time		
Possible values	$0.5$	0.5 s refresh time
	$0.3$	0.3 s refresh time

To validate the data, press the key.

Use the and keys to browse the configuration screens of the menu.

### 5.6.7.- DELETING THE MAXIMUM & MINIMUM VALUES

This screen determines whether the maximum and minimum values are deleted or not.



Use the key to browse the different options.

#### ✓ Configuration values

Table 36: Configuration values: Deleting the maximum & minimum values.

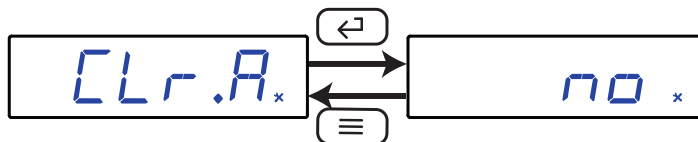
	Deleting the maximum & minimum values	
Possible values	no	the maximum and minimum values are not deleted.
	YES	the maximum and minimum values are deleted.

To validate the data, press the key.

Use the and keys to browse the configuration screens of the menu.

### 5.6.8.- DELETING THE ELECTRICAL CHARGE TOTALISERS

On this screen, the user selects whether or not to clear the electric charge totalisers.



Use the key to browse the different options.

#### ✓ Configuration values

Table 37: Configuration values: Deleting the electrical charge totaliser.

	Deleting the electrical charge totalisers	
Possible values	no	the totalisers are not cleared.
	YES	the totalisers are cleared.

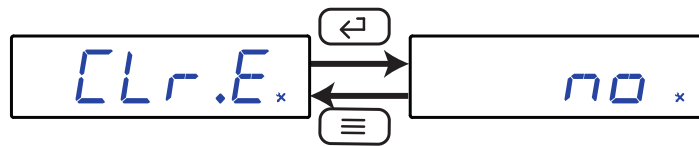
To validate the data, press the key.

Use the and keys to browse the configuration screens of the menu.



### 5.6.9.- DELETING THE ENERGY TOTALISERS

On this screen, the user selects whether or not to clear the energy totalisers.






Use the  key to browse the different options.

#### ✓ Configuration values

Table 38: Configuration values: Deleting the energy totaliser.

Deleting the energy totalisers	
Possible values	no the totalisers are not cleared.
	YES the totalisers are cleared.

To validate the data, press the  key.

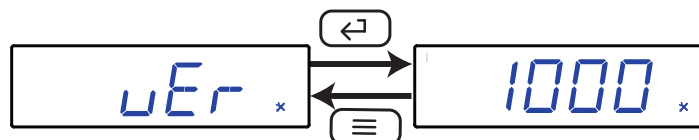
Use the  and  keys to browse the configuration screens of the menu.

### 5.6.10.- SAVE CONFIGURATION

To save the configuration of the device, see "5.1.7.- SAVE CONFIGURATION".

## 5.7.- SOFTWARE VERSION

The software version of the device is shown in the **display mode**.



**6.- RS-485 COMMUNICATIONS**

The **DHC-96** devices have one **RS-485** communications port, with communications protocols: **MODBUS RTU** ®.

**6.1.- CONNECTIONS**

The **RS-485** cable must be wired with twisted pair cable with mesh shield, with a maximum distance between the **DHC-96** and the master device of 1200 metres.  
A maximum of 32 **DHC-96** devices can be connected to this bus.

Use an intelligent **RS-232 to RS-485** network protocol converter to establish the communications with the master device.

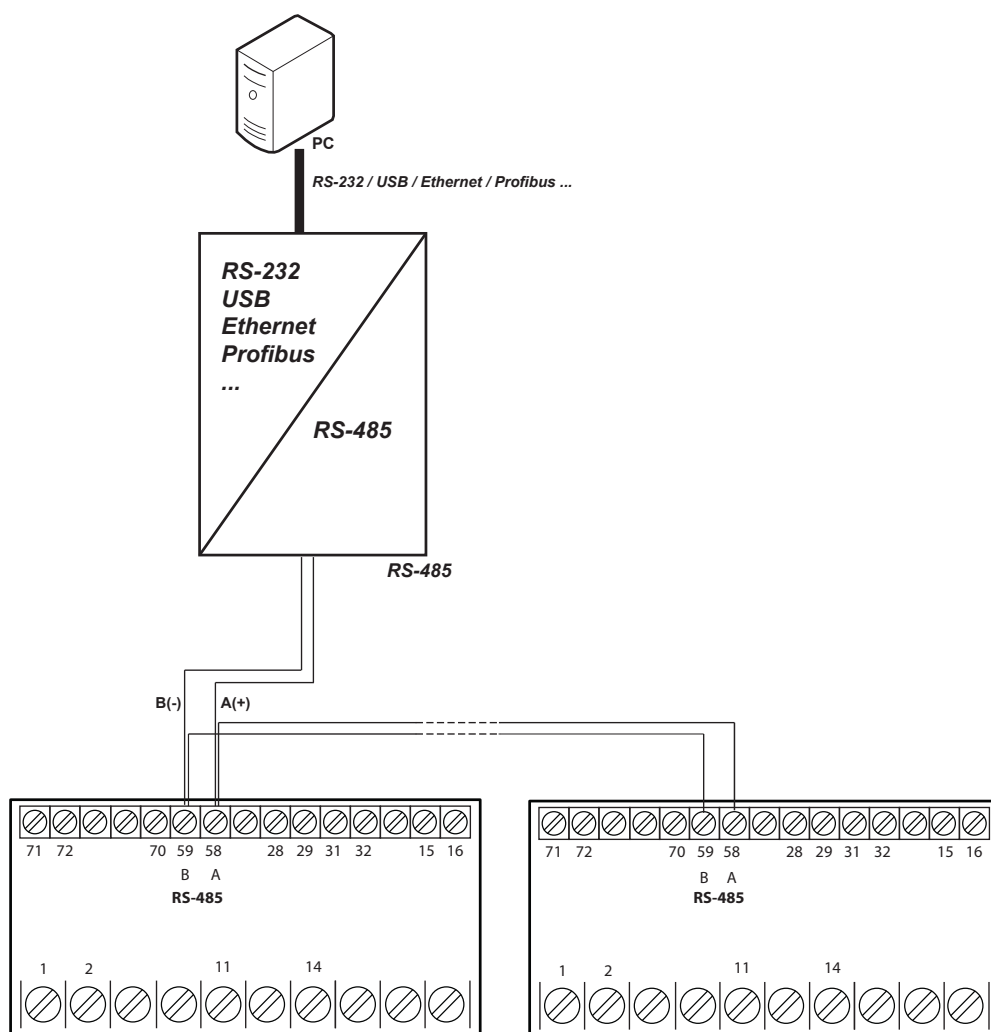


Figure 23: RS-485 Connection diagram.

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

## 6.2.- MODBUS PROTOCOL

In the Modbus protocol, the **DHC-96** 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 multiples relays

**Function 0x10:** Writing multiples registers.

### 6.2.1. 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,** on which the reading will start.

**No. of Registers: 0002,** number of registers 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.

**Registre: 03,** in binary it is: 0000 0011, output relays 1 and 2 closed.

**CRC:1189,** CRC.Character.

### 6.2.2. 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

### 6.3.- MODBUS COMMANDS

#### 6.3.1.- MEASUREMENT VARIABLES AND DEVICE STATUS

All the addresses of Modbus memory are in Hexadecimal.  
For these variables is implemented the **Function 0x03** and **0x04**.

Table 39: Modbus memory map (Table 1)

Parameter	Format	Address	V. Maximum	V. Minimum	Units
Voltage	float	06	08	0A	V
Current	float	12	14	16	A
Power	float	18	1A	1C	kW
Positive electric charge	float	1E	-	-	Ah
Negative electric charge	float	20	-	-	Ah
Positive energy	float	22	-	-	kWh
Negative energy	float	24	-	-	kWh

Table 40: Modbus memory map (Table 2)

Parameter	Format	Address	Units
Voltage	int	106	V or kV
Decimal point of voltage	int	107	0: xxxx - 1: xxx.x - 2: xx.xx - 3: x.xxx
Voltage units	int	108	0: V - 1: kV
Current	int	109	A or kA
Decimal point of current	int	10A	0: xxxx - 1: xxx.x - 2: xx.xx - 3: x.xxx
Current units	int	10B	0: A - 1: kA
Power	int	10C	W, kW, MW
Decimal point of power	int	10D	0: xxxx - 1: xxx.x - 2: xx.xx - 3: x.xxx
Power units	int	10E	0: W - 1: kW - 2: MW
Positive electric charge	Long[2]	110... 113	Long [1]x2 <sup>32</sup> + Long[0] mAh
Negative electric charge	Long[2]	114... 117	Long [1]x2 <sup>32</sup> + Long[0] mAh
Positive energy	Long[2]	118... 11B	Long [1]x2 <sup>32</sup> + Long[0] Wh
Negative energy	Long[2]	11C ... 11F	Long [1]x2 <sup>32</sup> + Long[0] Wh

Table 41: Modbus memory map (Table 3)

Parameter	Format	Address
Device status	bit [16]	105

The format of the parameter **Device status** is shown in **Table 42**:

Table 42:Format of the parameter: Device status.

Bits		
Bit 0	Device status	0: Device measuring
Bit 1		1:Device in configuration mode
Bit 2	Malfunction	0: Voltage
Bit 3	Light alarm	1: Current
Bit 4	Relay output	2: Power
Bit 8 - 15	Initial display screen	3: Positive energy
		4: Negative energy
		5: Positive electric charge
		6: Negative electric charge

Table 43: Modbus memory map (Table 4)

Parameter	Format	Address
Status of relay outputs	bit [16]	100
Status of digital inputs	bit [16]	102

The format of the parameters **Status of relay outputs and digital inputs** is shown in Table 44:

Table 44:Format of the parameter: 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

### 6.3.2.- RELAY OUTPUTS

All the addresses of Modbus memory are in Hexadecimal.

For these variables is implemented the **Function 0x01 and 0x0F**.

Table 45: Modbus memory map (Table 5)

Parameter	Format	Address
Relay outputs	bit	0000

The format of the parameter is shown in Table 46

Table 46:Format of the parameter: Relay outputs.

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

### 6.3.3.- DIGITAL INPUTS

All the addresses of Modbus memory are in Hexadecimal.

For these variables is implemented the **Function 0x02**.

Table 47: Modbus memory map (Table 6)

Parameter	Format	Address
Digital inputs	bit	0000

The format of the parameter is shown in Table 48:

Table 48:Format of the parameter: 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

### 6.3.4.- REMOTE CONTROL OUTPUT (Relay output)

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

Table 49: Modbus memory map (Table 5)

Parameter	Format	Address	Value
Remote control, Output relay 1	bit	0000	0: Open 1: Closed
Remote control, Output relay 2	bit	0001	0: Open 1: Closed

**Función 0x0F**, multiple relay control:

Table 50: Modbus memory map (Table 6)

Parameter	Format	Address
Remote control	bit	0000

The format of the parameter is shown in **Table 51**

Table 51:Format of the parameter: 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

### 6.3.5.- DELETING VALUES

All the addresses of Modbus memory are in Hexadecimal.  
The **Function 0x0E** is available to delete the maximum, minimum and totaliser values.

Address	Function	Initial relay address	Password	ID reset	ID value	CRC
Peripheral No.	0E	AACC	<sup>(3)</sup>	ID reset	FF	xxxx

<sup>(3)</sup> The password is the one used to log into the device (see "5.6.1.- LOGIN PASSWORD").

The **ID reset** value determines which values will be deleted:

Table 52: ID reset.

Parameter	ID reset
Maximum and minimum values	0x03
Electric charge totalisers	0x02
Energy totalisers	are used

*Example: Clearing the energy totalisers:*

Address	Function	Initial relay address	Password	ID reset	ID value	CRC
01	0E	AACC	0001	01	FF	760D

### 6.3.6.- DEVICE CONFIGURATION VARIABLES

All the addresses of Modbus memory are in Hexadecimal.  
For these variables is implemented the **Function 0x10**.

#### 6.3.6.1. Configuration of the input

Table 53: Modbus memory map: Configuration of the input.

Configuration of the input			
Parameter	Format	Address	Valid data margin
Voltage display value	int	807	1000... 9999 V
Decimal point of the voltage display value	int	808	0: xxxx - 1: xxx.x - 2: xx.xx - 3: x.xxx
Voltage measurement range	int	80B	0: 150.0 V - 1: 300.0 V - 2: 600.0 V
Current display value	int	809	1000... 9999 A
Decimal point of the current display value	int	80A	0: xxxx - 1: xxx.x - 2: xx.xx - 3: x.xxx
Current input	int	80C	Model <b>DHC-96 CPM-HS</b> : 0: 4 V - x: 5 V <sup>(4)</sup> Model <b>DHC-96 CPM</b> : 0: 50.00 mV - 1: 60.00 mV - 2: 75.00 mV 3: 100.0 mV - 4: 150.0 mV - 5: 200.0 mV 6: 250.0 mV - 7: 300.0 mV - 8: 400.0 mV 9: 600.0 mV
Decimal point for voltage display <sup>(5)</sup>	int	82C	0: xxxx - 1: xxx.x - 2: xx.xx
Shunt position <sup>(6)</sup>	int	82E	0: Negative Pole - 1: Positive Pole

<sup>(4)</sup> Parameter available for the **DHC-96 CPM-HS** models from version **100A** of the device.

<sup>(5)</sup> Parameter available from version **1008** of the device.

<sup>(6)</sup> Parameter available for the **DHC-96 CPM** models from version **1009** of the device.

#### 6.3.6.2. RS-485 communications

Table 54: Modbus memory map: RS-485 communications.

RS-485 communications			
Parameter	Format	Address	Valid data margin
Modbus address	int	802	1... 247
Baud rate	int	803	0: 2400 bps - 1: 4800 bps - 2: 9600 bps - 3: 19200 bps
Data format	int	804	0: n,8,1 : no parity, 8 data bits, 1 stop bit 1: o,8,1 : odd parity, 8 data bits, 1 stop bit 2: e,8,1 : even parity, 8 data bits, 1 stop bit 3: n,8,2 : no parity, 8 data bits, 2 stop bit

### 6.3.6.3. Analog output

Table 55: Modbus memory map: Analog output

Analog output			
Parameter	Format	Address	Valid data margin
Type of output	int	817	<b>Current output model:</b> 0: 4... 20 mA - 1: 0... 20 mA - 2: 4... 12... 20 mA <b>Voltage output model:</b> 7: 0... 10 V - 8: 2... 10 V
Analog output parameter	int	814	0: Voltage 3: Current 6: Power
Reading for the end of the analog output (fs)	int	815	Table 23
Reading for the start of the analog output (ds)	int	816	Table 21

### 6.3.6.4. Relay outputs

Table 56: Modbus memory map: Relay outputs

Relay outputs			
Parameter	Format	Address	Valid data margin
Relay 1: mode	int	820	2: Output disabled 1: Alarm output 0: Remote control output
Relay 2: mode	int	826	
Relay 1: pulse duration	int	821	000.0 ... 999.9 s
Relay 2: pulse duration	int	827	
Relay 1: Alarm parameter	int	822	0: High voltage alarm ( <i>U--H</i> ) 3: High current alarm ( <i>I--H</i> ) 8: High power alarm ( <i>P--H</i> ) 12: Alarm when digital input 1 is connected ( <i>dI 1H</i> ) 13: Alarm when digital input 2 is connected ( <i>dI 2H</i> ) 16: Low voltage alarm ( <i>U--L</i> ) 19: Low current alarm ( <i>I--L</i> ) 24: Low power alarm ( <i>P--L</i> ) 28: Alarm when digital input 1 is disconnected ( <i>dI 1L</i> ) 29: Alarm when digital input 2 is disconnected ( <i>dI 2L</i> )
Relay 2: Alarm parameter	int	828	
Relay 1: connection delay	int	823	000.0 ... 999.9 s
Relay 2: connection delay	int	829	
Relay 1: alarm value	int	824	Table 28
Relay 2: alarm value	int	82A	
Relay 1: hysteresis	int	825	Table 29
Relay 2: hysteresis	int	82B	



## 6.3.6.5. Configuration of the display

Table 57: Modbus memory map: Configuration of the display

Configuration of the display			
Parameter	Format	Address	Valid data margin
Login password	int	800	0000... 9999
Cyclic display	int	80D	0... 60 s <sup>(10)</sup>
Backlight	int	801	0... 9999 s <sup>(11)</sup>
Light alarm	int	805	300... 1200 (x 0.1%) <sup>(12)</sup>
Display home screen	int	806	<b>0:</b> Voltage - <b>1:</b> Current - <b>2:</b> Power, <b>3:</b> Positive energy - <b>4:</b> Negative energy, <b>5:</b> Positive electric charge, <b>6:</b> Negative electric charge
Refresh time <sup>(10)</sup>	int	82D	<b>0:</b> 0.5 s - <b>1:</b> 0.3 s

<sup>(7)</sup> If set to **0**, the display screens do not cycle automatically.

<sup>(8)</sup> If set to **0**, the display backlight does not turn off.

<sup>(9)</sup> If set to **0**, the light alarm is deactivated.

<sup>(10)</sup> Parameter available from version **1009** of the device.

## 7.- TECHNICAL FEATURES

AC Power supply <sup>(13)</sup>	
Rated voltage	100... 270 V ~
Frequency	50 / 60 Hz
Consumption	6... 18 VA
Installation category	CAT III 300V

DC Power supply <sup>(13)</sup>		
Rated voltage	100... 270 V ===	20... 60 V ===
Consumption	1,3... 2.0 W	2,5... 4.5 W
Installation category	CAT III 300V	

Voltage measurement circuit	
Rated voltage (Un)	$\pm 150.0 \text{ V} / \pm 300.0 \text{ V} / \pm 600.0 \text{ V}^{(11)} \text{ ===}$
Overvoltage	1.2 Un continuous
Consumption	< 0.1 VA
Impedance	> 1 M $\Omega$
Installation category	CAT III 600V

<sup>(11)</sup> Depending on model, see Table 3.

Current measurement circuit		
Rated current (In)	DHC-96 CPM	Shunt: 50 mV / 60 mV / 75 mV / 100 mV / 150 mV / 200 mV / 250 mV / 300 mV / 400 mV / 600 mV
	DHC-96 CPM-HS	Hall sensor $\pm 4\text{V}$
Overcurrent	1.2 In continuous	
Consumption	< 1 VA	
Impedance	< 20 m $\Omega$	
Installation category	CAT III 600V	

Measurement accuracy	
Voltage measurement	Clase 0.5
Current measurement	Clase 0.5
Power measurement	Class 1
Energy measurement	Class 1
Resolution	1 s

Relay outputs	
Quantity	2
Contact capacity (resistive)	AC: 2.5 A / 250 V~, CC: 2.5 A / 30 V ===
Maximum current	2.5 A
Maximum switching power	625 VA
Electrical life (250 V~ / 5A)	1x10 <sup>5</sup>
Mechanical life	5x10 <sup>6</sup>

Digital inputs	
Quantity	2
Type	Potential free contact
Insulation	2000 V~
Maximum short-circuit current	3.3 mA ===
Maximum voltage in open circuit	17 V ===

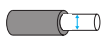


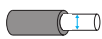


Analog output	
Quantity	1
Maximum internal voltage	17 V $\approx$
Linearity	0,5%
Nominal output range <sup>(12)</sup>	Current output model: 0-20 mA, 4-20 mA, 4-12-20 mA (programmable) Voltage output model: 0-10 V, 2-10 V (programmable)
Maximum load resistor	350 $\Omega$

<sup>(12)</sup> Depending on model, see Table 6

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	LED 5 digits
Keyboard	4 keys

Environmental features	
Operating temperature	-25°C ... +55°C
Storage temperature	-25°C ... +70 °C
Relative humidity	$\leq$ 93%
Maximum altitude	2000 m
Protection degree	Front: IP54, Rear case: IP20
Pollution degree	2
Isolation	Power supply - Output : $\geq$ 2kV ~ Input - Output : $\geq$ 1kV ~

Mechanical features			
Power supply and Measurement			
Terminals: 1, 2, 4, 5, 11	$\leq$ 1 mm <sup>2</sup>	$\leq$ 0.5 Nm	PZ1
Analog output, Relay outputs, RS-485, Digital inputs			
Terminals: 15, 16, 28, 29, 31, 32, 58, 59, 70, 71, 72	$\leq$ 2.5 mm <sup>2</sup>	0,5... 0.6 Nm	PZ0
Dimensions	Figure 24 (mm)		
Weight	240 g.		
Surround	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

(Continued) Standards	
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
Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	IEC 61000-4-11

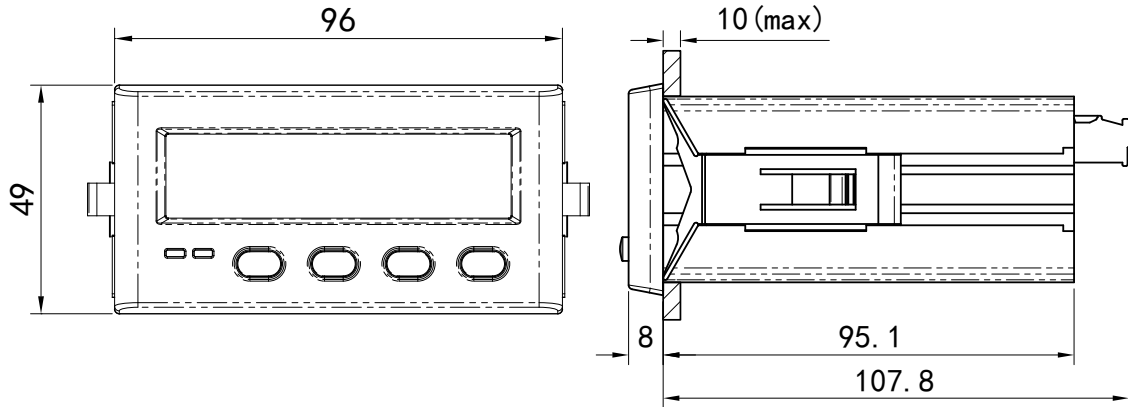


Figure 24: Dimensions of the DHC-96 CPM.

## 8.- MAINTENANCE AND TECHNICAL SERVICE

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

### Technical Assistance Service

Vial Sant Jordi, s/n, 08232 - Viladecavalls (Barcelona)

Tel: 902 449 459 (Spain) / +34 937 452 919 (outside of Spain)

email: sat@circutor.com

## 9.- GUARANTEE

**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.

## 10.- EU DECLARATION OF CONFORMITY



CIRCUITOR, S.A.U. – Vial Sant Jordi, s/n  
08232 Viladecavalls (Barcelona) Spain  
(+34) 937 452 900 – info@circuitor.com



### DECLARACIÓN UE DE CONFORMIDAD

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

Producto:

Instrumentación digital

Serie:

DHC-96 CPM

Marca:

CIRCUITOR

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/EU: Low Voltage Directive 2014/30/EU: EMC Directive 2011/65/EU: RoHS2 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 61326-1:2012 Ed 2.0

Año de marcado "CE":

2022



### EU DECLARATION OF CONFORMITY

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

Product:

Digital multimeter

Series:

DHC-96 CPM

Brand:

CIRCUITOR

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/EU: Low Voltage Directive 2014/30/EU: EMC Directive 2011/65/EU: RoHS2 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 61326-1:2012 Ed 2.0

Year of CE mark:

2022



### DECLARATION UE DE CONFORMITÉ

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

Produit:

Instrumentation numérique

Série:

DHC-96 CPM

Marque:

CIRCUITOR

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/EU: Low Voltage Directive 2014/30/EU: EMC Directive 2011/65/EU: RoHS2 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 61326-1:2012 Ed 2.0

Année de marquage « CE »:

2022



Viladecavalls (Spain), 5/10/2022  
Chief Executive Officer: Joan Comellas Cabeza




**KONFORMITÄTSERKLÄRUNG UE**

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

Produkt:

**Digitale Messgeräte**

Série:

**DHC-96 CPM**

Marke:

**CIRCUITOR**

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

2014/35/EU: Low Voltage Directive 2014/30/EU: EMC Directive  
 2011/65/EU: RoHS2 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 61326-1:2012 Ed 2.0

Jahr der CE-Kennzeichnung: 2022


**DECLARAÇÃO DA UE DE CONFORMIDADE**

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

Produto:

**Instrumentação digitais**

Série:

**DHC-96 CPM**

Marca:

**CIRCUITOR**

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/EU: Low Voltage Directive 2014/30/EU: EMC Directive  
 2011/65/EU: RoHS2 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 61326-1:2012 Ed 2.0

Ano de marcação "CE": 2022

Viladecavalls (Spain), 5/10/2022  
 Chief Executive Officer: Joan Comellas Cabeza


**DICHIARAZIONE DI CONFORMITÀ UE**

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

prodotto:

**Strumentazione digitale**

Serie:

**DHC-96 CPM**

MARCHIO:

**CIRCUITOR**

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/EU: Low Voltage Directive 2014/30/EU: EMC Directive  
 2011/65/EU: RoHS2 Directive

È conforme alle seguenti normative o altri documenti normativi:

IEC 61010-1:2010+AMD1:2016 Ed 3.0 IEC 61326-1:2012 Ed 2.0

Anno di marcatura "CE": 2022





**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

produkt:

**Przyrządy cyfrowe**

Seria:

**DHC-96 CPM**

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/EU: Low Voltage Directive 2014/30/EU: EMC Directive  
2011/65/EU: RoHS2 Directive

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

IEC 61010-1:2010+AMD1:2016 Ed.3.0 IEC 61326-1:2012 Ed. 2.0

Rok oznakowania "CE":

2022

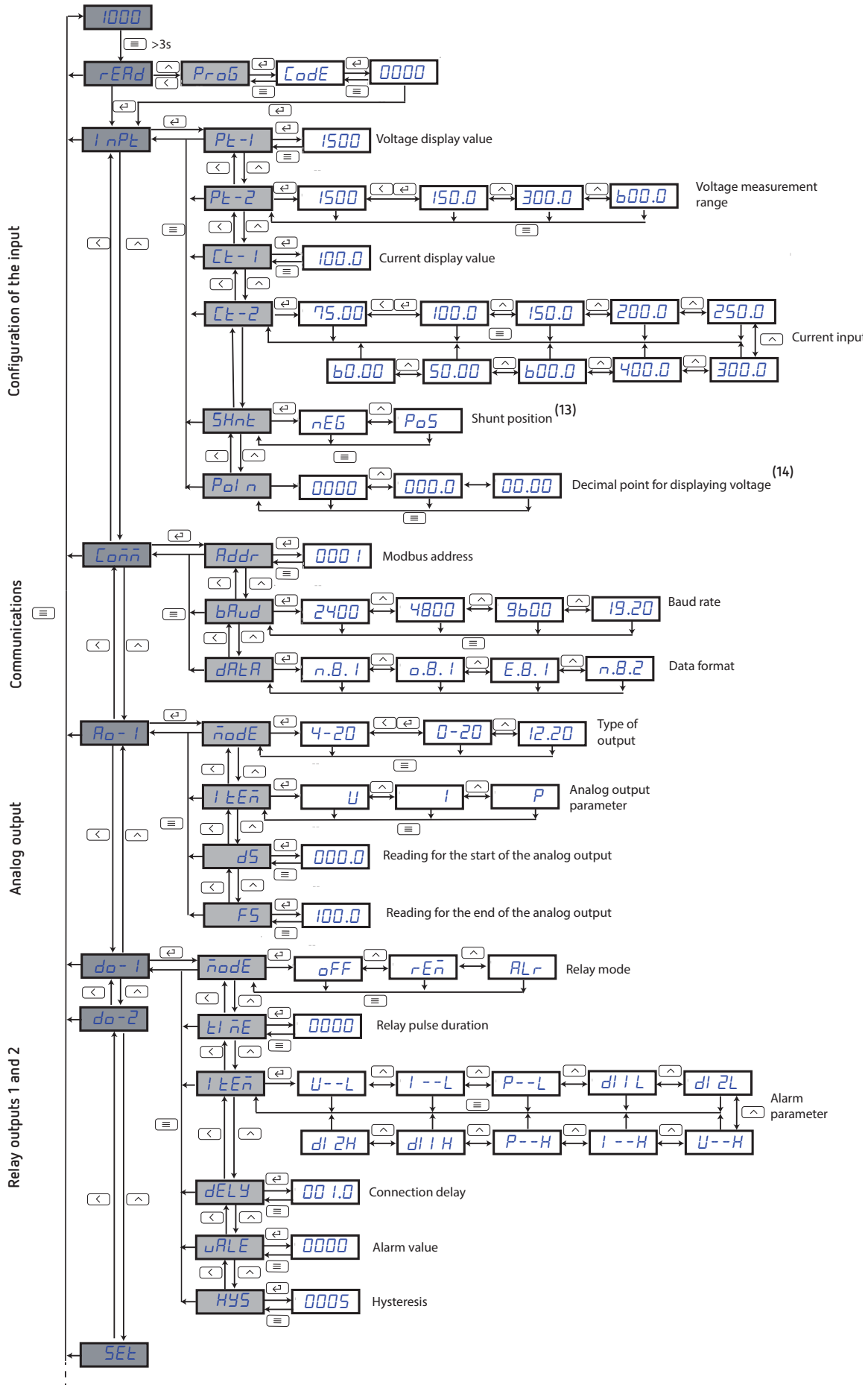


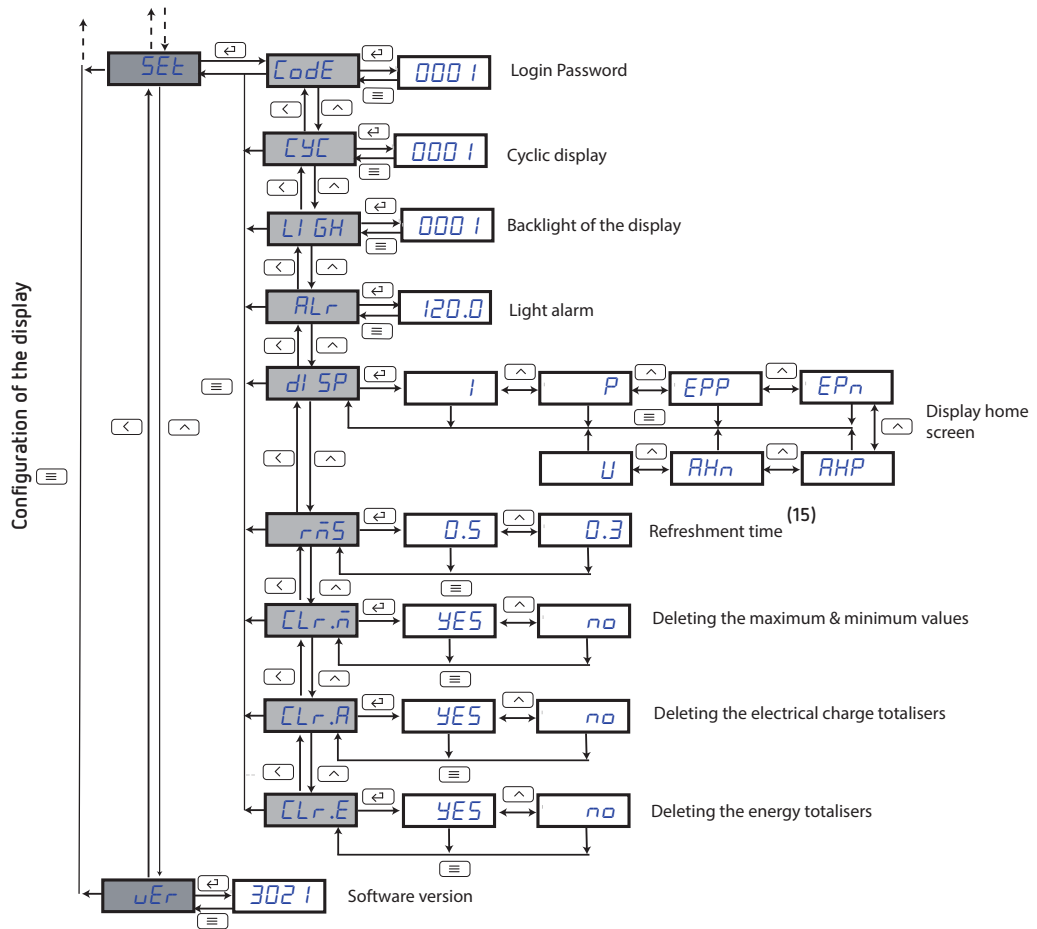
Viladecavalls (Spain), 5/10/2022  
Chief Executive Officer: Joan Comellas Cabeza



**ANNEX A.- CONFIGURATION MENU**

**ANNEX A.1.- DHC-96 CPM**



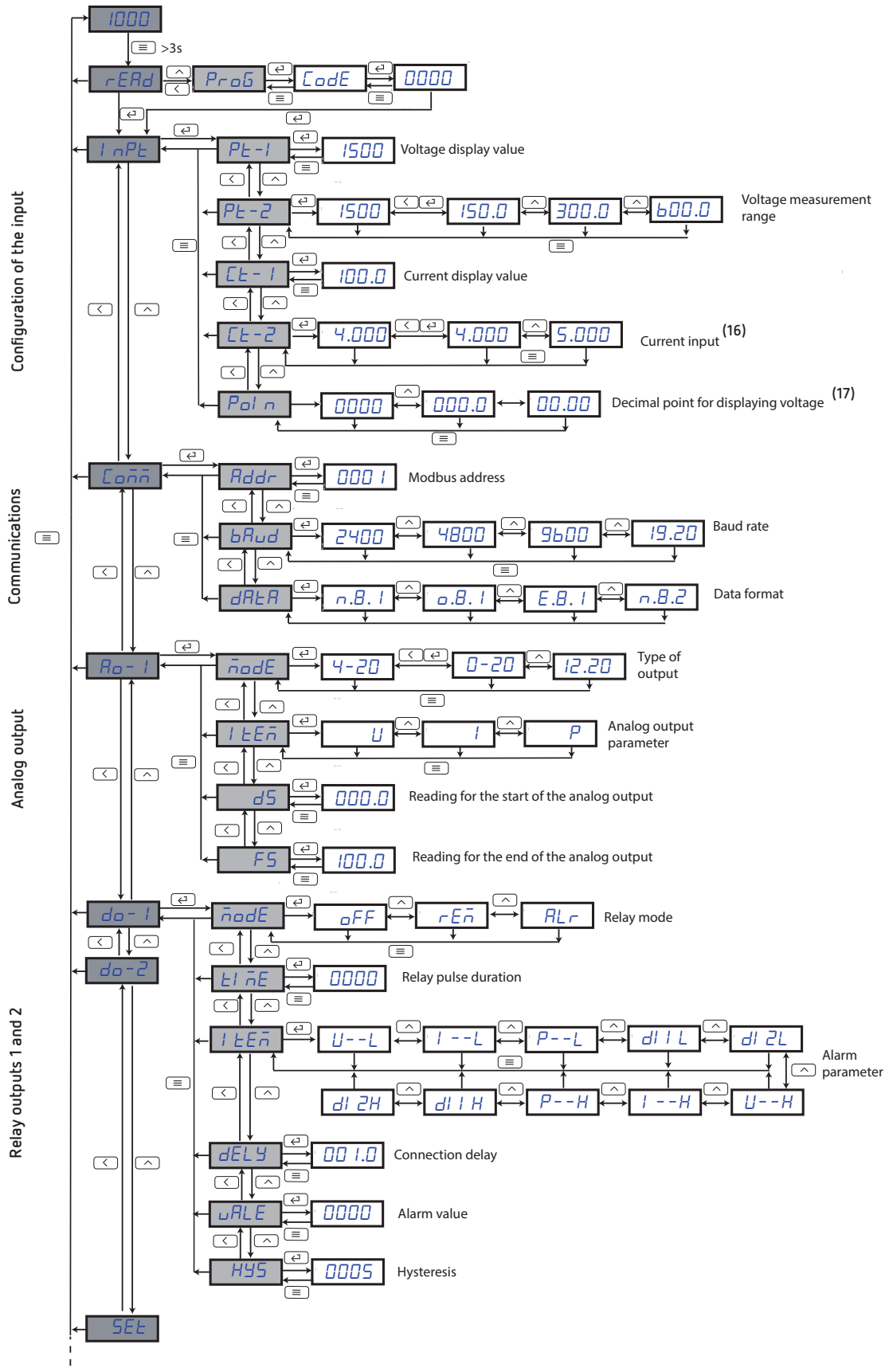


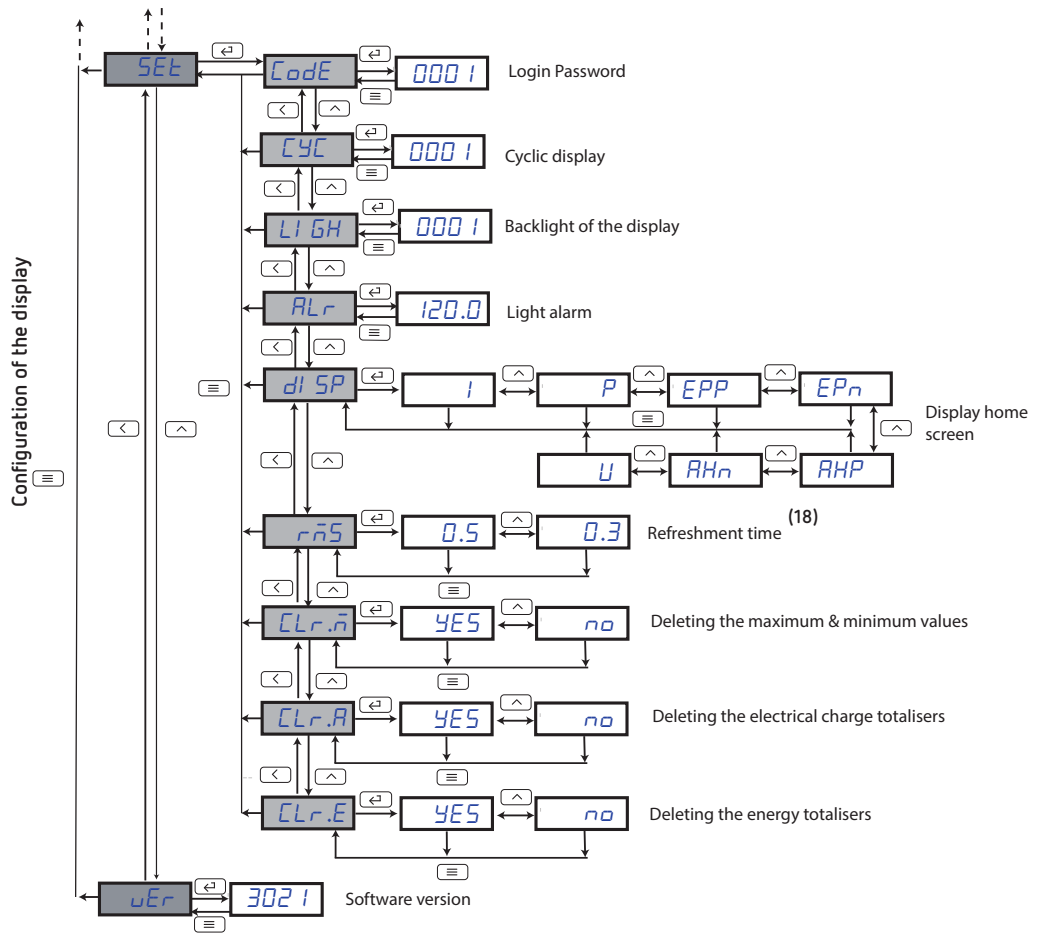
(13) Parameter available for **DHC-96 CPM** models from version **1009** of the device.

(14) Parameter available from version **1008** of the device.

(15) Parameter available from version **1009** of the device.

ANNEX A.2.- DHC-96 CPM-HS





(16) Parameter available for DHC-96 CPM-HS models from version 100A of the device.

(17) Parameter available from version 1008 of the device.

(18) Parameter available from version 1009 of the device.



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