Power analyzer

CVM-C11

INSTRUCTION MANUAL

(M361B01-03-25A)

CE


22
PAP

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

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

CONTENTS

REVISION LOG

Table 1: Revision log.

Date	Revision	Description
09/22	M361B01-03-22A	Initial Version
01/23	M361B01-03-23A	Changes in the following sections: 3.4.7. - 4.1. - 5.1. - 5.1.3. - 6.9. - 7.3.6. - 7.3.8.5. - 8. - Annex A
04/23	M361B01-03-23B	Changes in the following sections: 2. - 3.3. - 3.4. - 3.5. - 4.3. - 6. - 6.3. - 6.4. - 6.5. - 6.6. - 6.7. - 6.27.1. - 6.31. - 6.37. - 6.38. - 6.39. - 7. - 8.2. - 8.3.8. - 8.3.9.1. - 8.3.9.2. - 8.3.9.17. - 8.3.9.19. - 9. - Annex A - Annex B.
01/24	M361B01-03-24A	Changes in the following sections: 3.5.1. - 3.5.4. - 3.5.7. - 3.5.10. - 3.5.13. - 3.5.16. - 3.5.19. - 8.3.9.17. - 6.1. - 9.
05/24	M361B01-03-24B	Changes in the following sections: 8.3.1. - 9.
01/25	M361B01-03-25A	Changes in the following sections: 6.3.1. - 7.9. - 8.3.2. - 8.3.9.19. - Annex B

SYMBOLS

Table 2: Symbols.

Symbol	Description
CE	In accordance with the relevant European directive.
	Device covered by European Directive 2012/19/EC. At the end of its useful life, do not leave the device in a household refuse bin. Follow local regulations on electronic equipment recycling.
⎓	Direct current.
~	Alternating 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 **CVM-C11** device measures, calculates and displays the main electrical parameters of the following networks: single-phase, two-phase, with and without neutral, balanced three-phase, with ARON measurements or unbalanced. The measurement will be taken in RMS with the three AC voltage inputs and four current inputs.

There are 4 versions of the device, depending on the type of current input:

✓ **CVM-C11-ITF-IN-485-ICT2** and **CVM-C11-ITF-IN-ETH-ICT2** model measures current through /5A or /1A transformers.
✓**CVM-C11-FLEX-IN-485-ICT2** current measurement through Rogowski sensors.
✓**CVM-C11-MC-IN-485-ICT2** indirect current measurement with efficient transformers of the MC1 and MC3 series.

The device features:

- **3 keys** that allow you to browse between the various screens and program the device.
- **2** indicator **LEDs**.
- **LCD display**, displays all parameters.
- **2 digital inputs**, used to select the tariff, detect the logic state of external signals or to generate a synchronism pulse to calculate the maximum demand.
- **2 digital outputs**, fully programmable.
- **2 alarm relays**, fully programmable.
- **RS-485** Communications, with two serial protocols: **MODBUS RTU**© and **BACnet**.
- **Ethernet** Communications (**CVM-C11-ITF-IN-ETH-ICT2** Model), with two serial protocols: **MODBUS TCP** and **BACnet IP**.

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 **CVM-C11** 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 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.

Inspect the work area before taking any measurements. Do not take measurements in dangerous areas or where there is a risk of explosion.

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

The device will be installed on a panel ($92^{+0.8}$ x $92^{+0.8}$ mm panel drill hole, in compliance with IEC 61554). All connections are located inside the electric panel.

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 must be connected to a power circuit that is protected with type gL (IEC 60269) or class M fuses with a rating of 0.5 to 2 A. It must be fitted with a circuit breaker or equivalent device, in order to be able to disconnect the device from the power supply network.

3.3.- CVM-C11-FLEX-IN-485-ICT2: ROGOWSKI SENSORS

The **CVM-C11-FLEX-IN-485-ICT2** model measures currents using flexible sensors, based on the Rogowski coil principle.
The flexibility of the sensor allows it to measure an alternating current irrespective of the position of the conductor.

CIRCUTOR has 1 Rogowski sensor model that can be used with the **CVM-C11-FLEX-IN-485-ICT2**: **MFC-FLEX**.

Note: *For more information, consult the corresponding sensor guide.*

Table 3: Probe cable terminal connections.

Terminals
MFC-FLEX
 **White** (OUT+): Measuring channel (L1, L2, L3, N) **Blue** (OUT-): Common (C) **Grey:** Shield (SHLD)

3.4.- DEVICE TERMINALS

3.4.1.- CVM-C11-ITF-IN-485-ICT2 AND CVM-C11-MC-IN-485-ICT2 MODELS

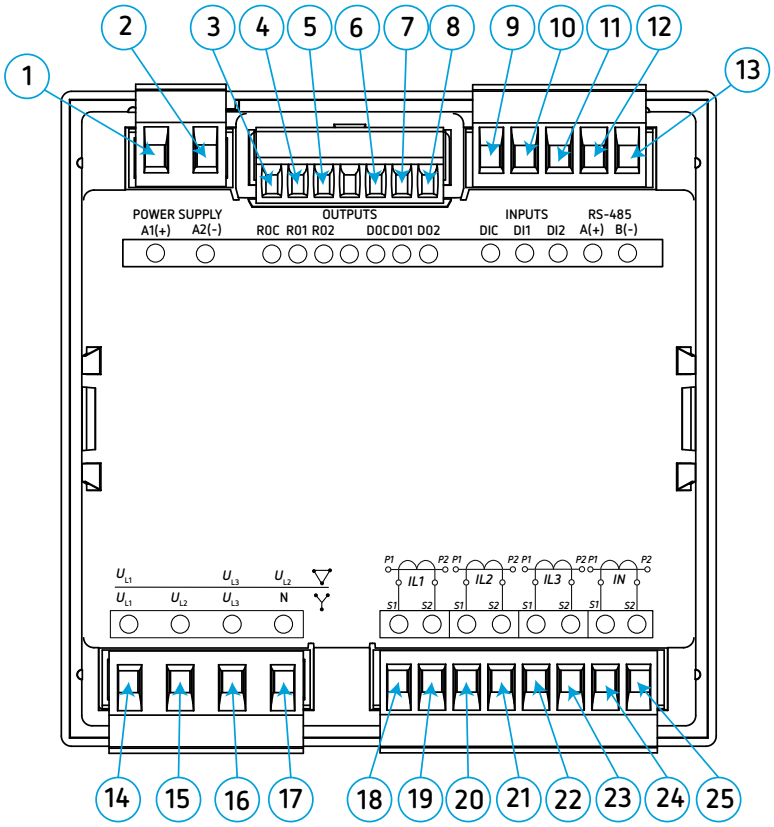


Figure 1: CVM-C11-ITF-IN-485-ICT2 and CVM-C11-MC-IN-485-ICT2 terminals.

Table 4: List of terminals of the CVM-C11-ITF-IN-485-ICT2 and CVM-C11-MC-IN-485-ICT2.

Device terminals	
1 : **A1(+),** Power supply	14 : $U_{L1,}$ Voltage input L1
2 : **A2(-),** Power supply	15 : $U_{L2,}$ Voltage input L2
3 : **ROC**, Common relay output	16 : $U_{L3,}$ Voltage input L3
4 : **RO1**, Relay output 1	17 : **N,** Neutral / $U_{L2,}$ Voltage input L2
5 : **RO2**, Relay output 2	18 : **S1 IL1,** Current input L1
6 : **DOC**, Common digital outputs	19 : **S2 IL1,** Current input L1
7 : **DO1**, Digital output 1	20 : **S1 IL2,** Current input L2
8 : **DO2**, Digital output 2	21 : **S2 IL2,** Current input L2
9 : **DIC**, Common digital inputs	22 : **S1 IL3,** Current input L3
10 : **DI1**, Digital input 1	23 : **S2 IL3,** Current input L3
11 : **DI2**, Digital input 2	24 : **S1 IN,** Current input N
12 : **A(+)**, RS-485	25 : **S2 IN,** Current input N
13 : **B(-)**, RS-485	

3.4.2.- CVM-C11-ITF-IN-ETH-ICT2 MODEL

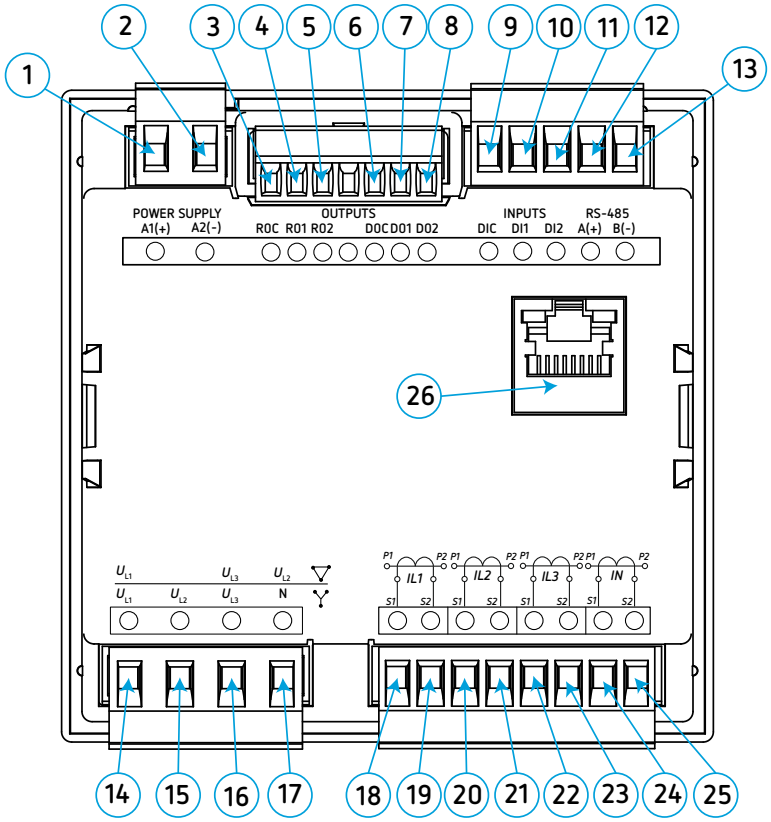


Figure 2: CVM-C11-ITF-IN-ETH-ICT2 terminals.

Table 5: List of terminals of the CVM-C11-ITF-ETH-485-ICT2.

Device terminals	
1 : **A1(+),** Power supply	14 : $U_{L1,}$ Voltage input L1
2 : **A2(-),** Power supply	15 : $U_{L2,}$ Voltage input L2
3 : **ROC**, Common relay output	16 : $U_{L3,}$ Voltage input L3
4 : **RO1**, Relay output 1	17 : **N,** Neutral / $U_{L2,}$ Voltage input L2
5 : **RO2**, Relay output 2	18 : **S1 IL1,** Current input L1
6 : **DOC**, Common digital outputs	19 : **S2 IL1,** Current input L1
7 : **DO1**, Digital output 1	20 : **S1 IL2,** Current input L2
8 : **DO2**, Digital output 2	21 : **S2 IL2,** Current input L2
9 : **DIC**, Common digital inputs	22 : **S1 IL3,** Current input L3
10 : **DI1**, Digital input 1	23 : **S2 IL3,** Current input L3
11 : **DI2**, Digital input 2	24 : **S1 IN,** Current input N
12 : **A(+)**, RS-485	25 : **S2 IN,** Current input N
13 : **B(-)**, RS-485	26 : Ethernet connector.

3.4.3.- CVM-C11-FLEX-IN-485-ICT2 MODEL

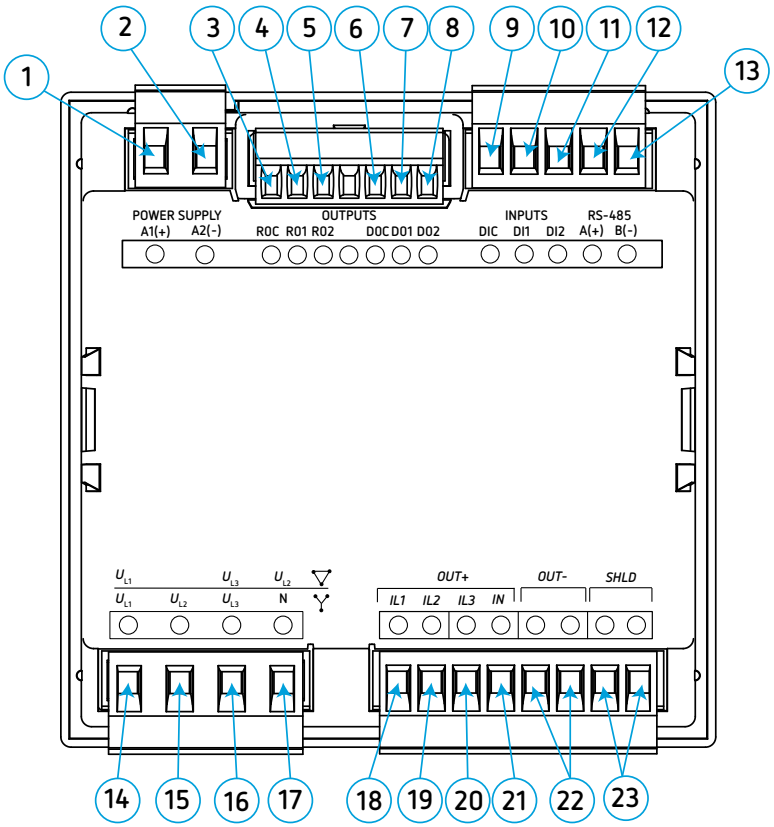


Figure 3: CVM-C11-FLEX-IN-485-ICT2 terminals.

Table 6: List of terminals of the CVM-C11-FLEX-IN-485-ICT2.

Device terminals	
1 : **A1(+),** Power supply	13 : **B(-)**, RS-485
2 : **A2(-),** Power supply	14 : $U_{L1,}$ Voltage input L1
3 : **ROC**, Common relay output	15 : $U_{L2,}$ Voltage input L2
4 : **RO1**, Relay output 1	16 : $U_{L3,}$ Voltage input L3
5 : **RO2**, Relay output 2	17 : **N,** Neutral / $U_{L2,}$ Voltage input L2
6 : **DOC**, Common digital outputs	18 : **IL1 (OUT+),** Current input L1
7 : **DO1**, Digital output 1	19 : **IL2 (OUT+),** Current input L2
8 : **DO2**, Digital output 2	20 : **IL3 (OUT+),** Current input L3
9 : **DIC**, Common digital inputs	21 : **IN (OUT+),** Current input N
10 : **DI1**, Digital input 1	22 : **OUT-,** common of current inputs
11 : **DI2**, Digital input 2	23 : **SHLD,** GND of current inputs
12 : **A(+)**, RS-485	

3.5.- CONNECTION DIAGRAM

3.5.1.- MEASURING THREE-PHASE NETWORKS WITH A 4-WIRE CONNECTION, CVM-C11-ITF-IN-xxx-ICT2 MODEL

Measurement system: 4- 3Ph

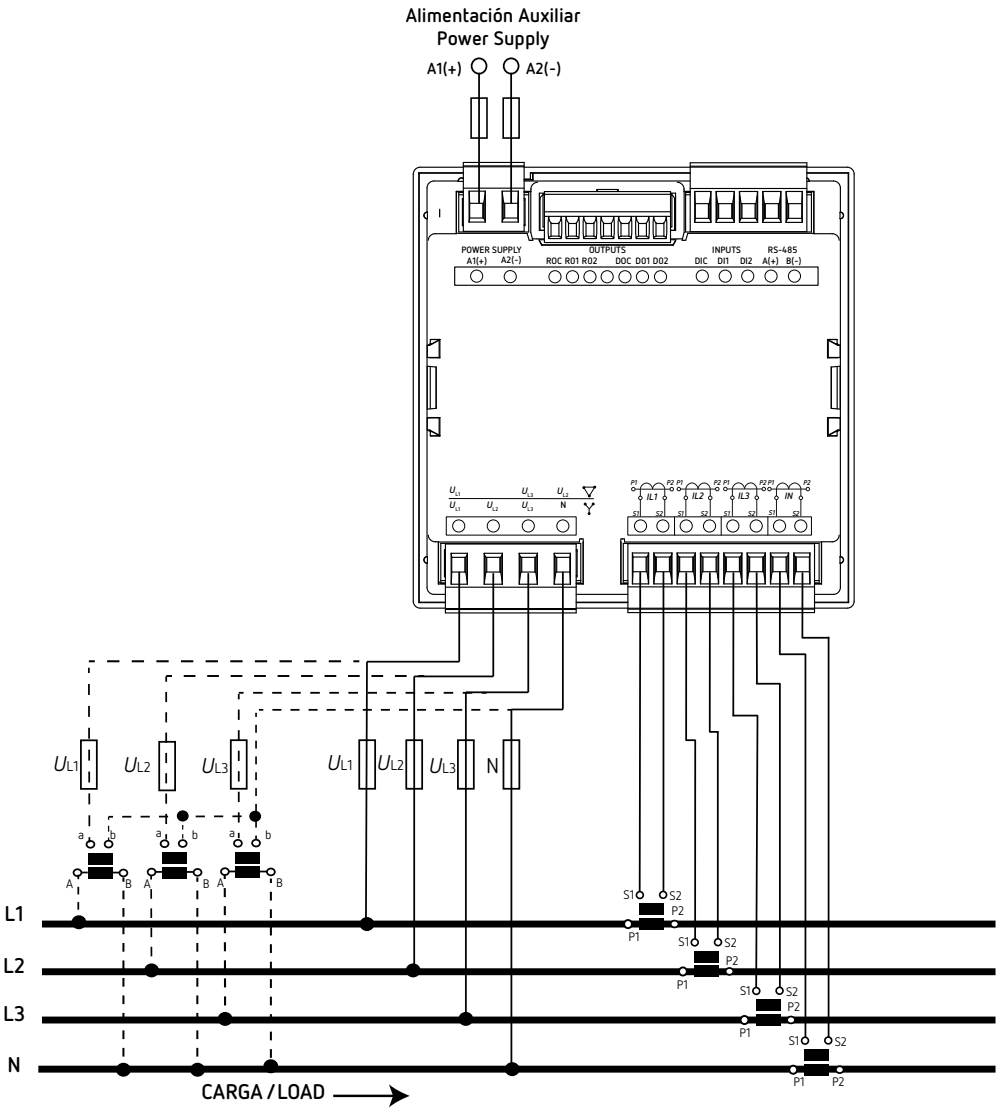


Figure 4: Three-Phase measuring with a 4-wire connection (CVM-C11-ITF-IN-xxx-ICT2).

3.5.2.- MEASURING THREE-PHASE NETWORKS WITH A 4-WIRE CONNECTION, CVM-C11-MC-IN-485-ICT2 MODEL

Measurement system: 4-3Ph

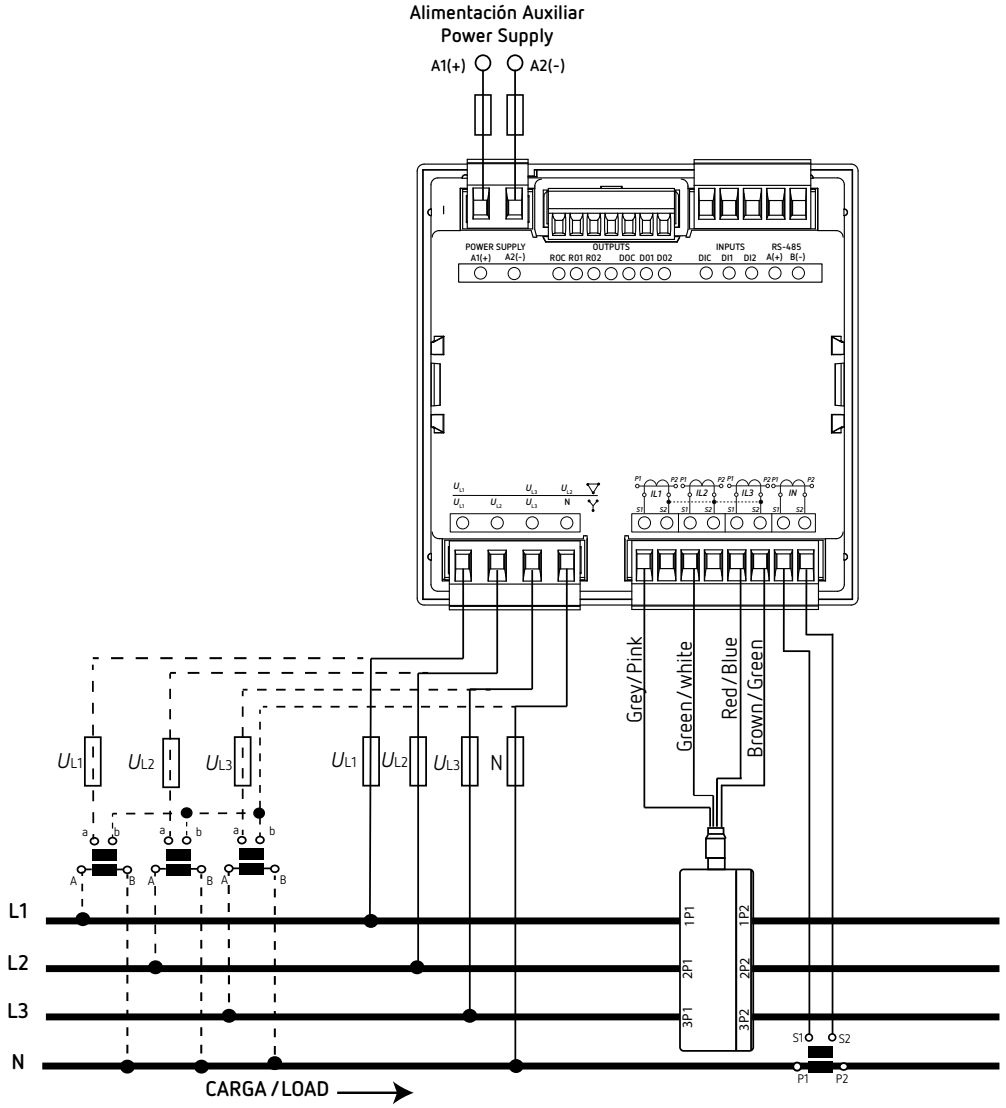


Figure 5: Three-Phase measuring with a 4-wire connection (CVM-C11-MC-IN-485-ICT2).

Note: *Do not connect MC current transformers to ground.*

The MC transformer secondary value is set to 0.250 A (fixed value).

3.5.3.- MEASURING THREE-PHASE NETWORKS WITH A 4-WIRE CONNECTION, CVM-C11-FLEX-IN-485-ICT2 MODEL

Measurement system: 4-3Ph

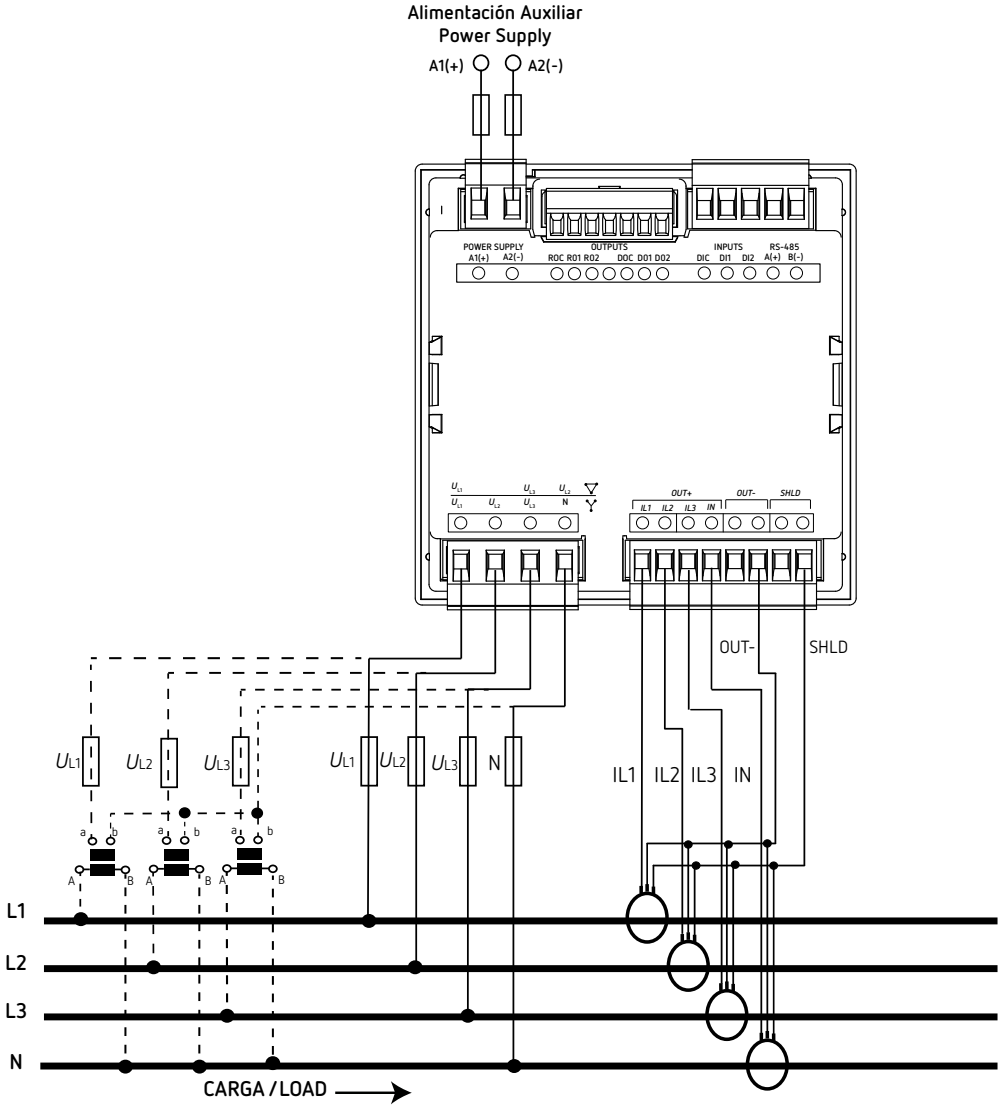


Figure 6: Three-Phase measuring with a 4-wire connection (CVM-C11-FLEX-IN-485-ICT2).

It is mandatory connect the **SHLD** terminal of the probe.

3.5.4.- MEASURING THREE-PHASE NETWORKS WITH A 3-WIRE CONNECTION, CVM-C11-ITF-IN-xxx-ICT2 MODEL

Measurement system: 3- 3Ph

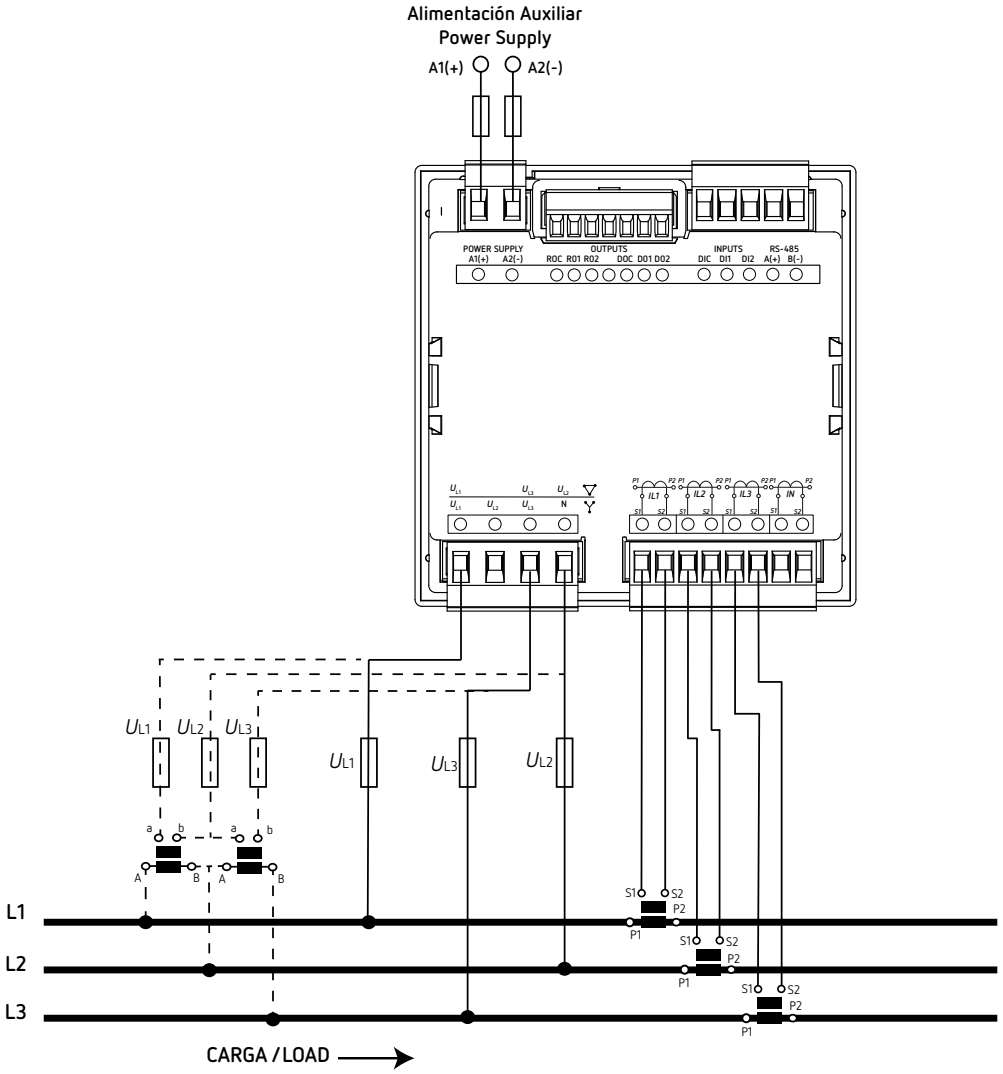


Figure 7: Three-Phase measuring with a 3-wire connection (CVM-C11-ITF-IN-xxx-ICT2).

3.5.5.- MEASURING THREE-PHASE NETWORKS WITH A 3-WIRE CONNECTION, CVM-C11-MC-IN-485-ICT2 MODEL

Measurement system: 3- 3Ph

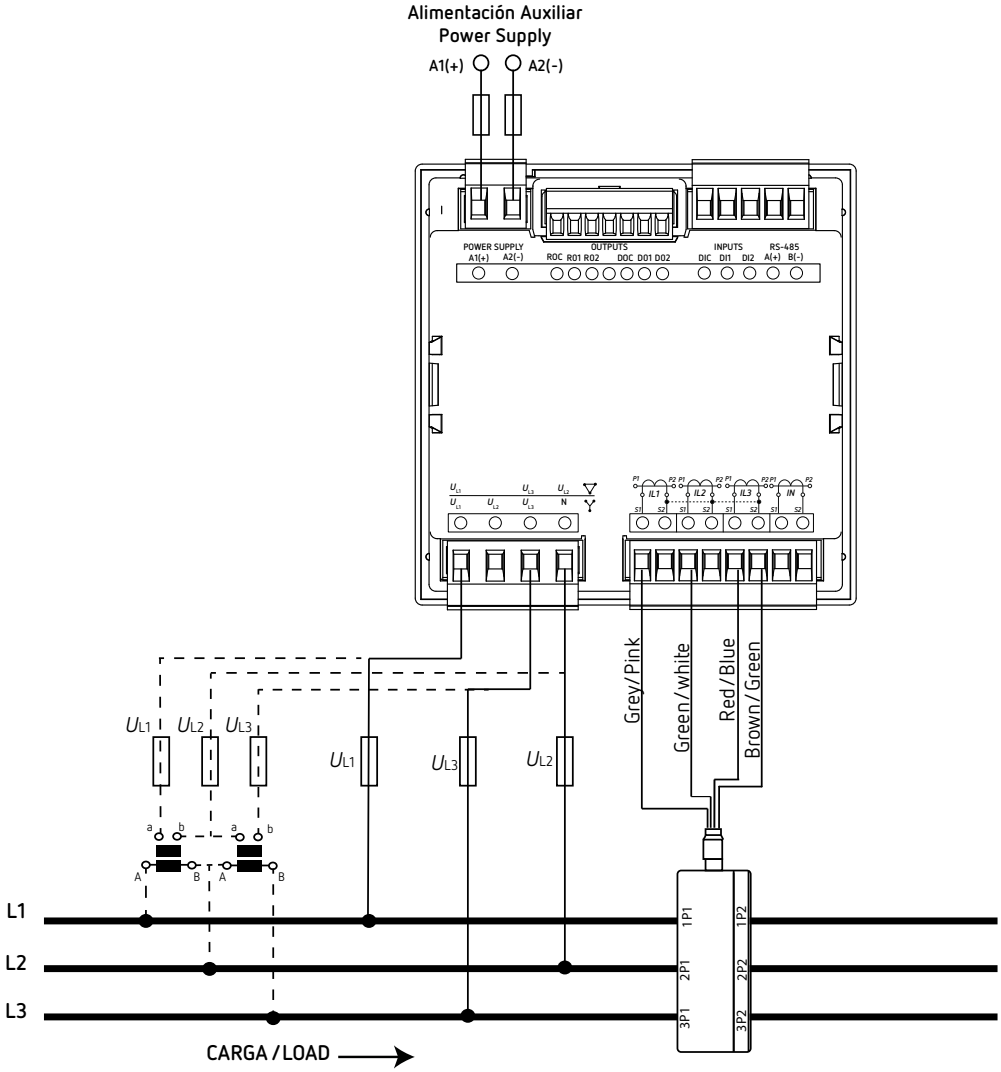


Figure 8: Three-Phase measuring with a 3-wire connection (CVM-C11-MC-IN-485-ICT2).

Note: *Do not connect MC current transformers to ground.*

The MC transformer secondary value is set to 0.250 A (fixed value).

3.5.6.- MEASURING THREE-PHASE NETWORKS WITH A 3-WIRE CONNECTION, CVM-C11-FLEX-IN-485-ICT2 MODEL

Measurement system: 3- 3Ph

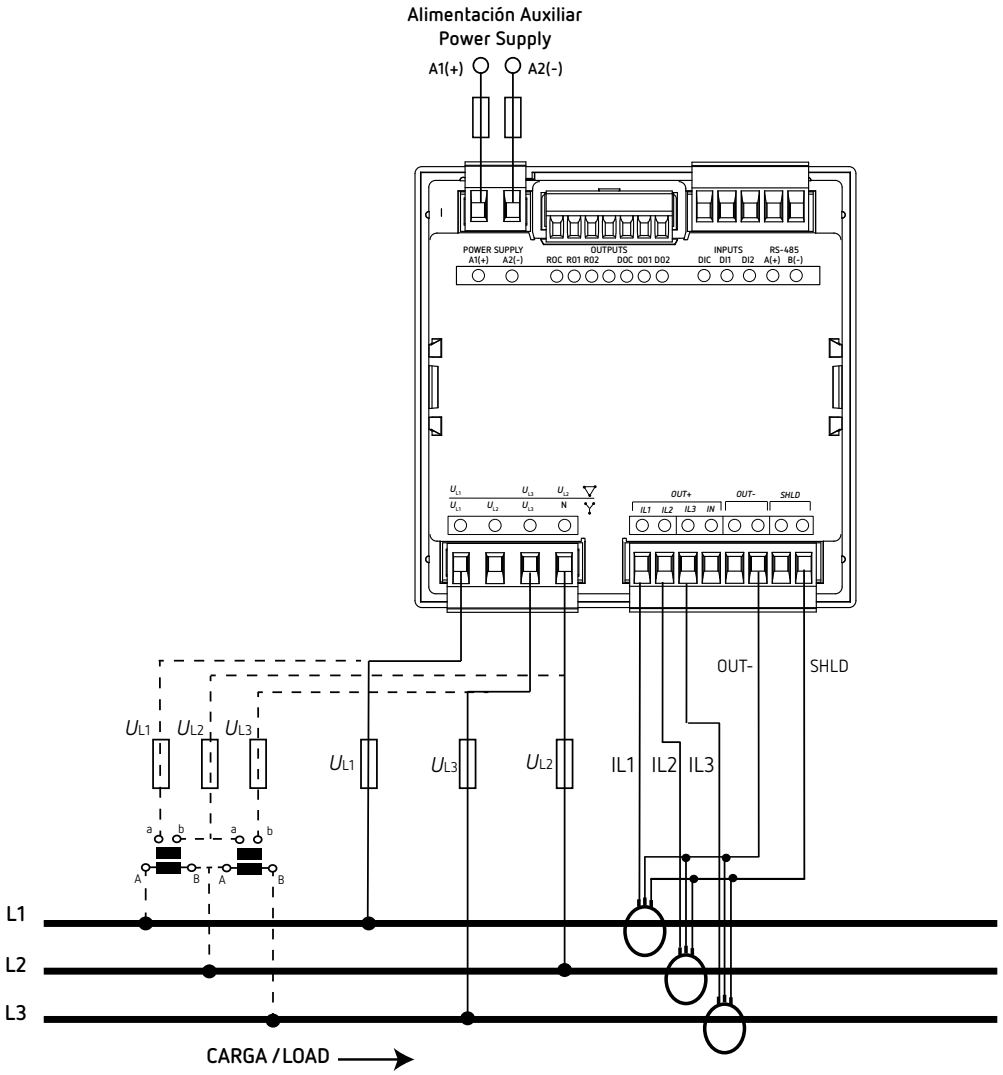


Figure 9: Three-Phase measuring with a 3-wire connection (CVM-C11-FLEX-IN-485-ICT2).

It is mandatory connect the **SHLD** terminal of the probe.

3.5.7.- MEASURING THREE-PHASE NETWORKS WITH A 3-WIRE CONNECTION AND TRANSFORMERS WITH AN ARON CONNECTION, CVM-C11-ITF-IN-xxx-ICT2 MODELS

Measurement system: 3-Ar On

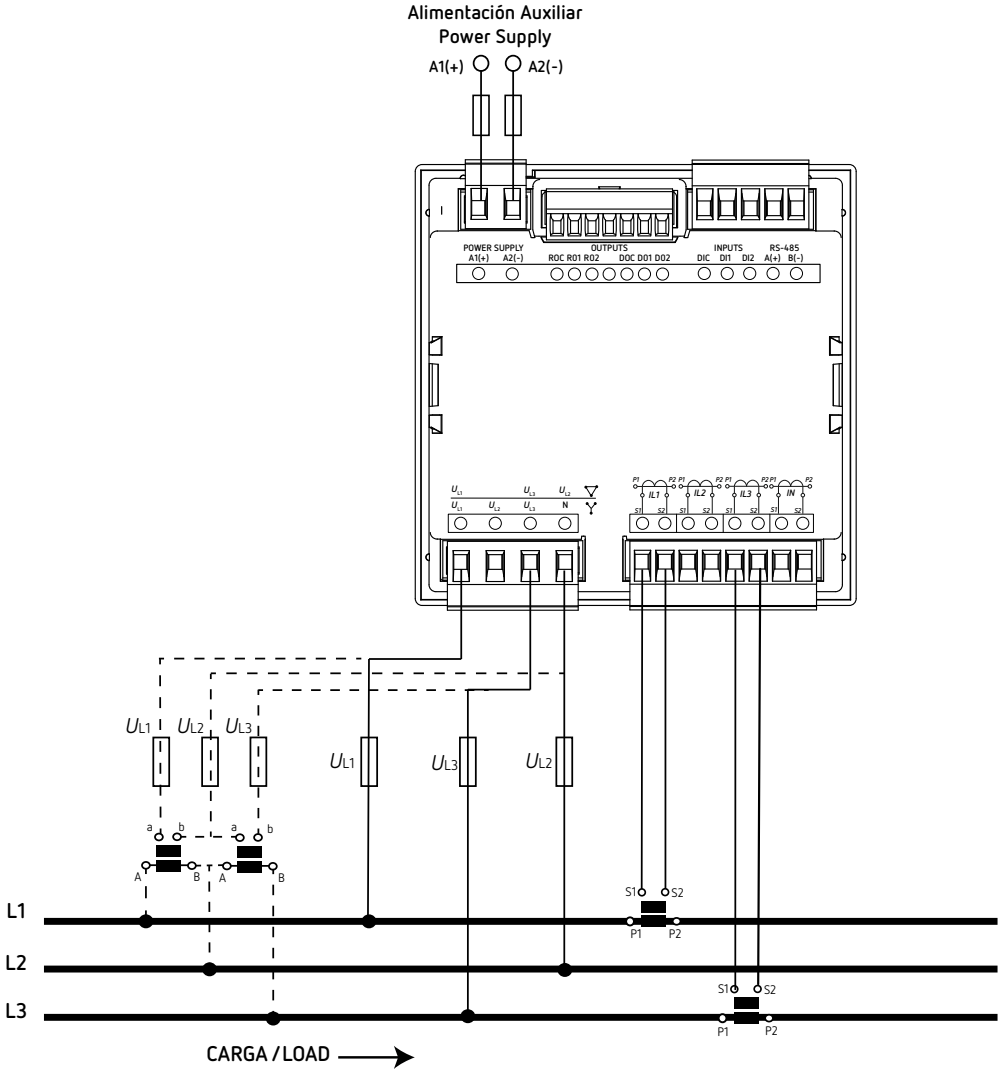


Figure 10: Three-Phase measuring with a 3-wire connection and transformers with an ARON connection (CVM-C11-ITF-IN-xxx-ICT2).

3.5.8.- MEASURING THREE-PHASE NETWORKS WITH A 3-WIRE CONNECTION AND TRANSFORMERS WITH AN ARON CONNECTION, CVM-C11-MC-IN-485-ICT2 MODEL

Measurement system: 3-ArOn

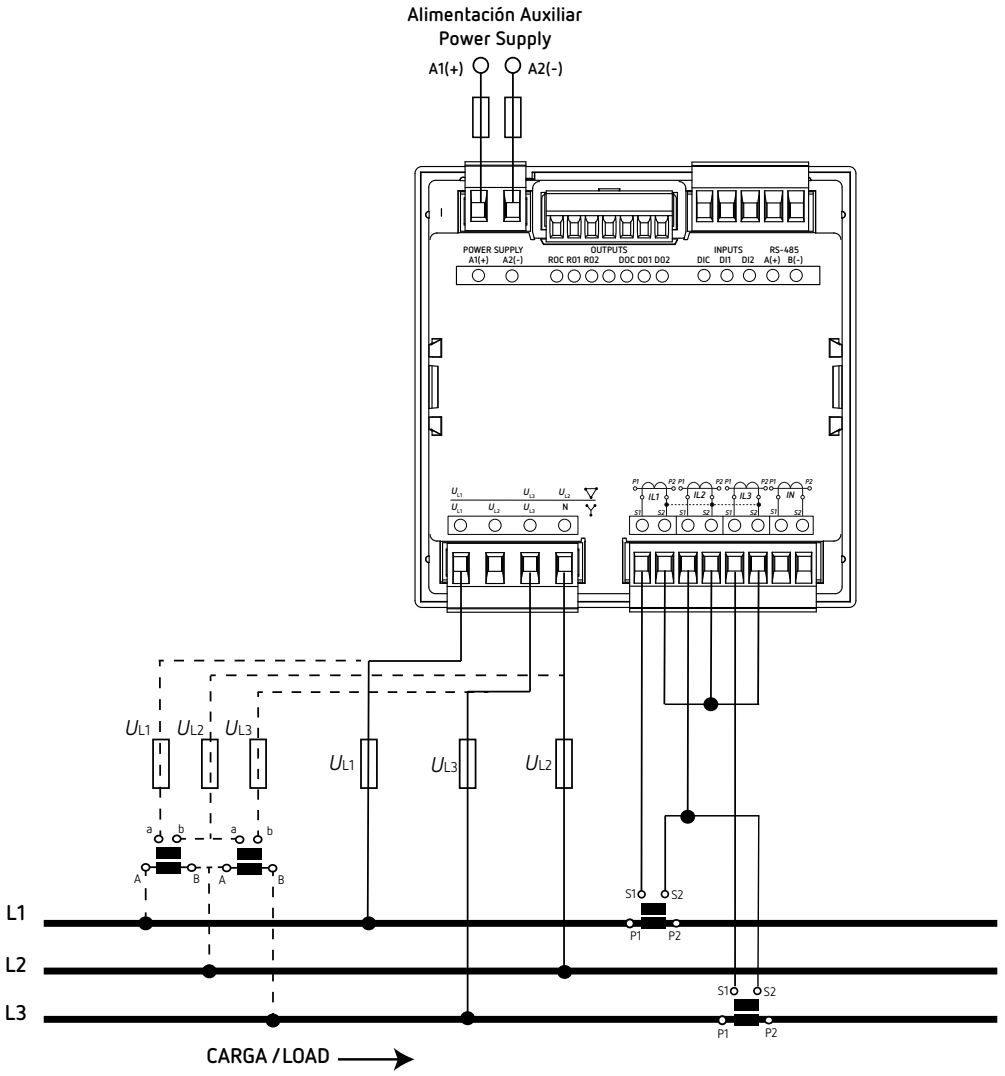


Figure 11: Three-Phase measuring with a 3-wire connection and transformers with an ARON connection (CVM-C11-MC-IN-485-ICT2).

Note: *Do not connect MC current transformers to ground.*

The MC transformer secondary value is set to 0.250 A (fixed value).

3.5.9.- MEASURING THREE-PHASE NETWORKS WITH A 3-WIRE CONNECTION AND TRANSFORMERS WITH AN ARON CONNECTION, CVM-C11-FLEX-IN-485-ICT2 MODEL

Measurement system: 3-ArOn

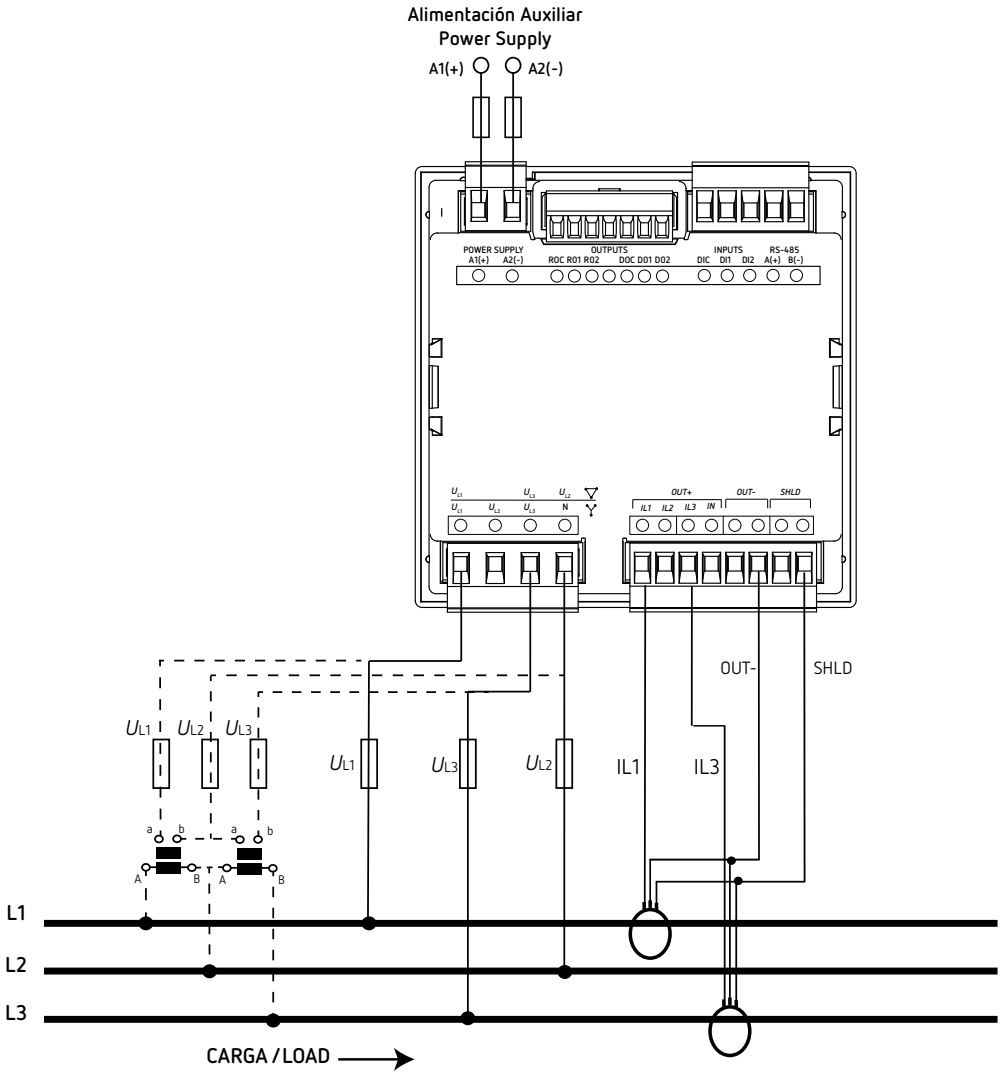


Figure 12: Three-Phase measuring with a 3-wire connection and transformers with an ARON connection (CVM-C11-FLEX-IN-485-ICT2).

It is mandatory connect the **SHLD** terminal of the probe.

3.5.10.- MEASURING TWO-PHASE NETWORKS WITH A 3-WIRE CONNECTION, CVM-C11-ITF-IN-xxx-ICT2 MODELS

Measurement system: 3-2Ph

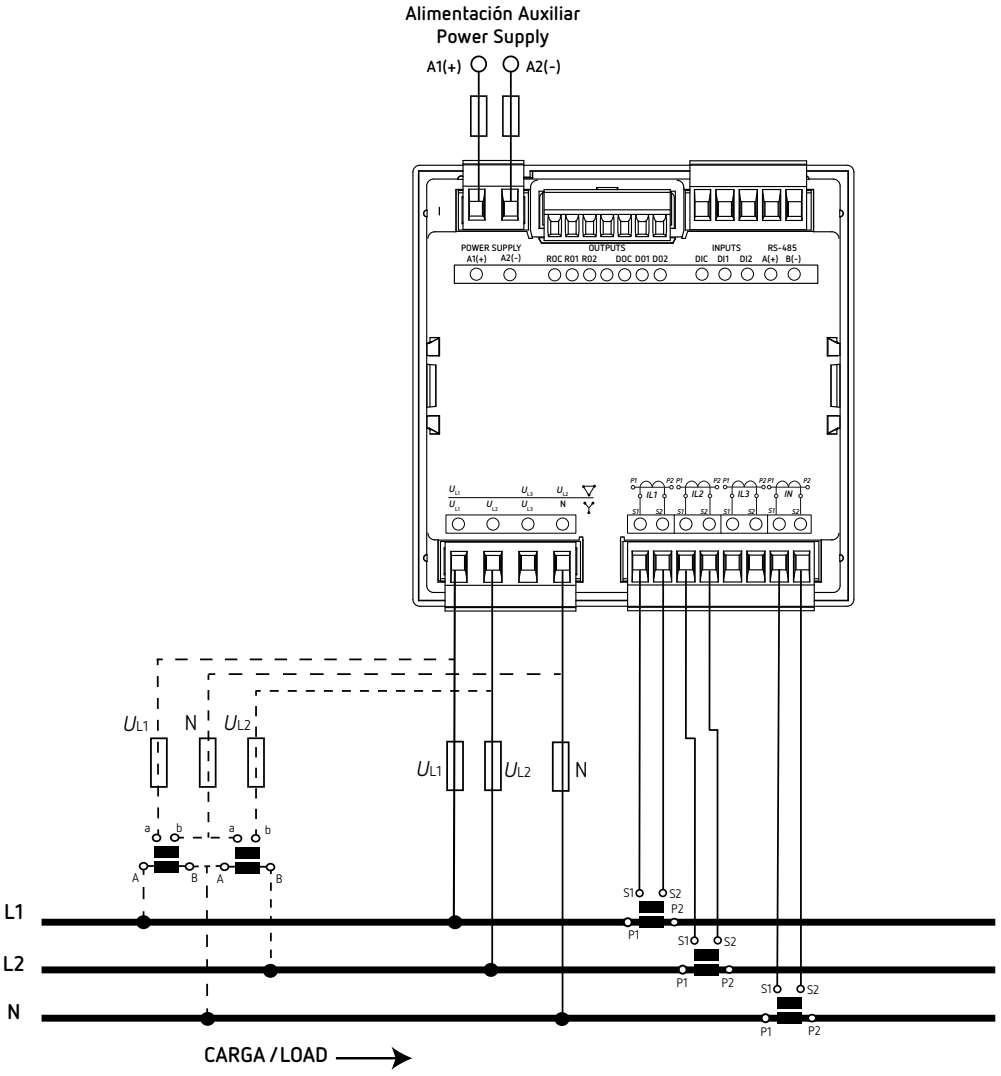


Figure 13: Measuring Two-Phase Networks with a 3-wire connection (CVM-C11-ITF-IN-xxx-ICT2).

3.5.11.- MEASURING TWO-PHASE NETWORKS WITH A 3-WIRE CONNECTION, CVM-C11-MC-IN-485-ICT2 MODEL

Measurement system: 3-2Ph

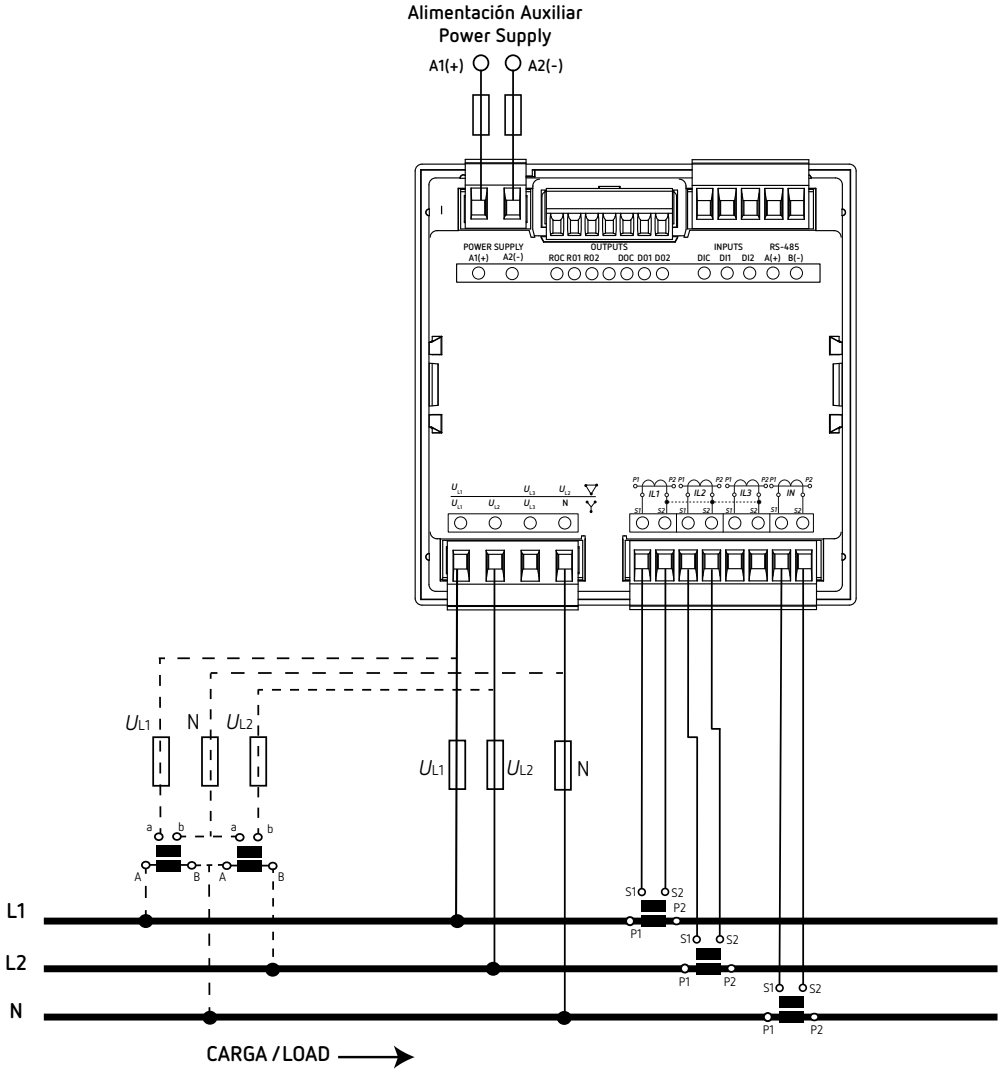


Figure 14: Measuring Two-Phase Networks with a 3-wire connection (CVM-C11-MC-IN-485-ICT2).

Note: *Do not connect MC current transformers to ground.*

The MC transformer secondary value is set to 0.250 A (fixed value).

3.5.12.- MEASURING TWO-PHASE NETWORKS WITH A 3-WIRE CONNECTION, CVM-C11-FLEX-IN-485-ICT2 MODEL

Measurement system: 3-2Ph

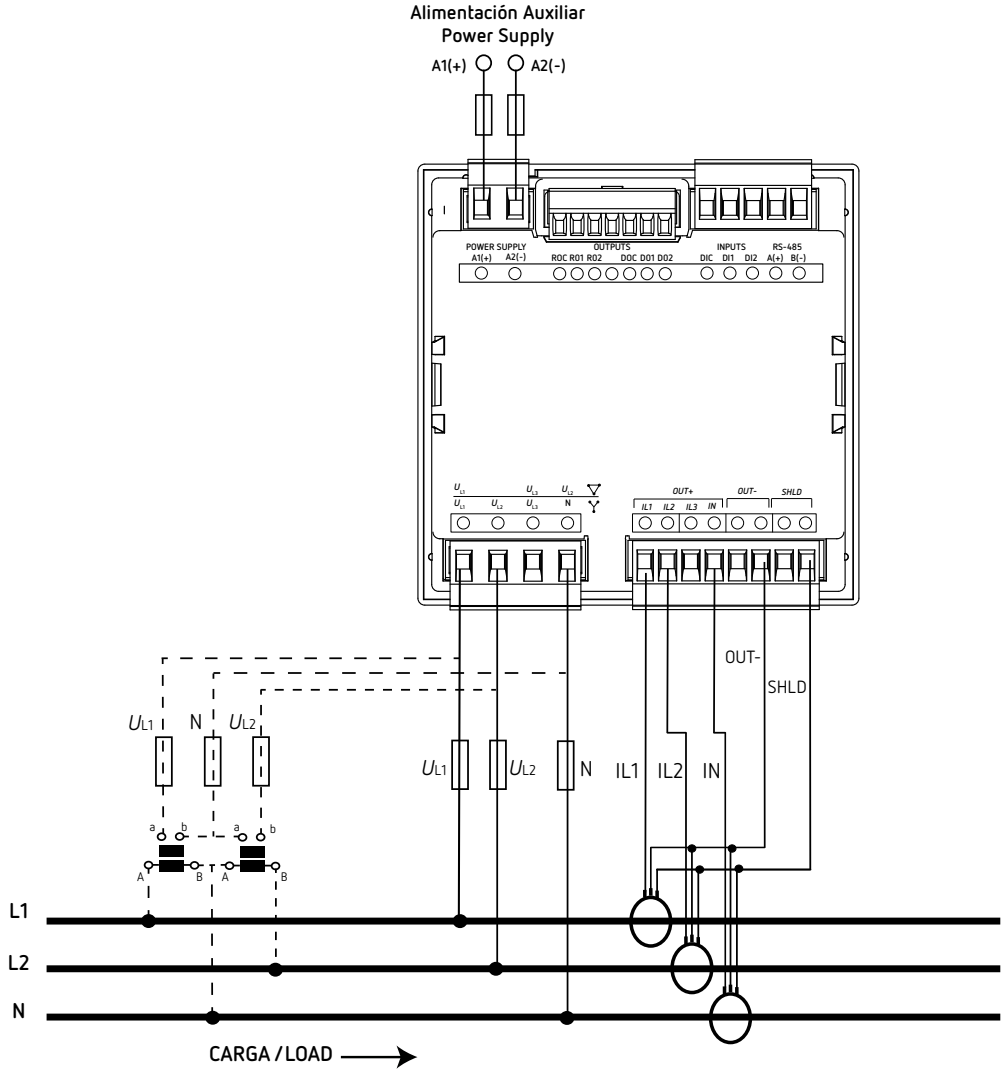


Figure 15: Measuring Two-Phase Networks with a 3-wire connection (CVM-C11-FLEX-IN-485-ICT2).

It is mandatory connect the **SHLD** terminal of the probe.

3.5.13.- MEASURING SINGLE-PHASE NETWORKS, PHASE TO PHASE, WITH A 2-WIRE CONNECTION, CVM-C11-ITF-IN-xxx-ICT2 MODELS

Measurement system: 2- 2Ph

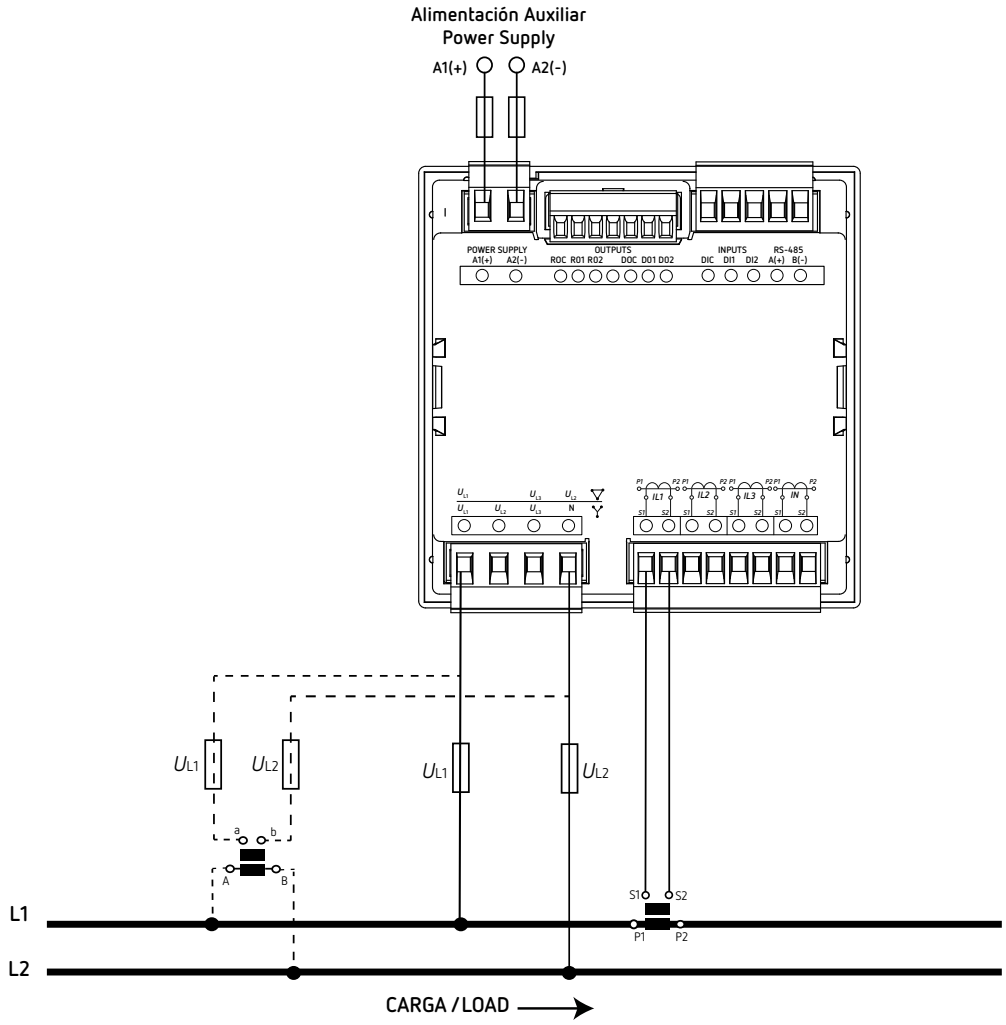


Figure 16: Measuring Single-Phase Networks, phase to phase, with a 2-wire connection (CVM-C11-ITF-IN-xxx-ICT2).

3.5.14.- MEASURING SINGLE-PHASE NETWORKS, PHASE TO PHASE, WITH A 2-WIRE CONNECTION, CVM-C11-MC-IN-485-ICT2 MODEL

Measurement system: 2-2Ph

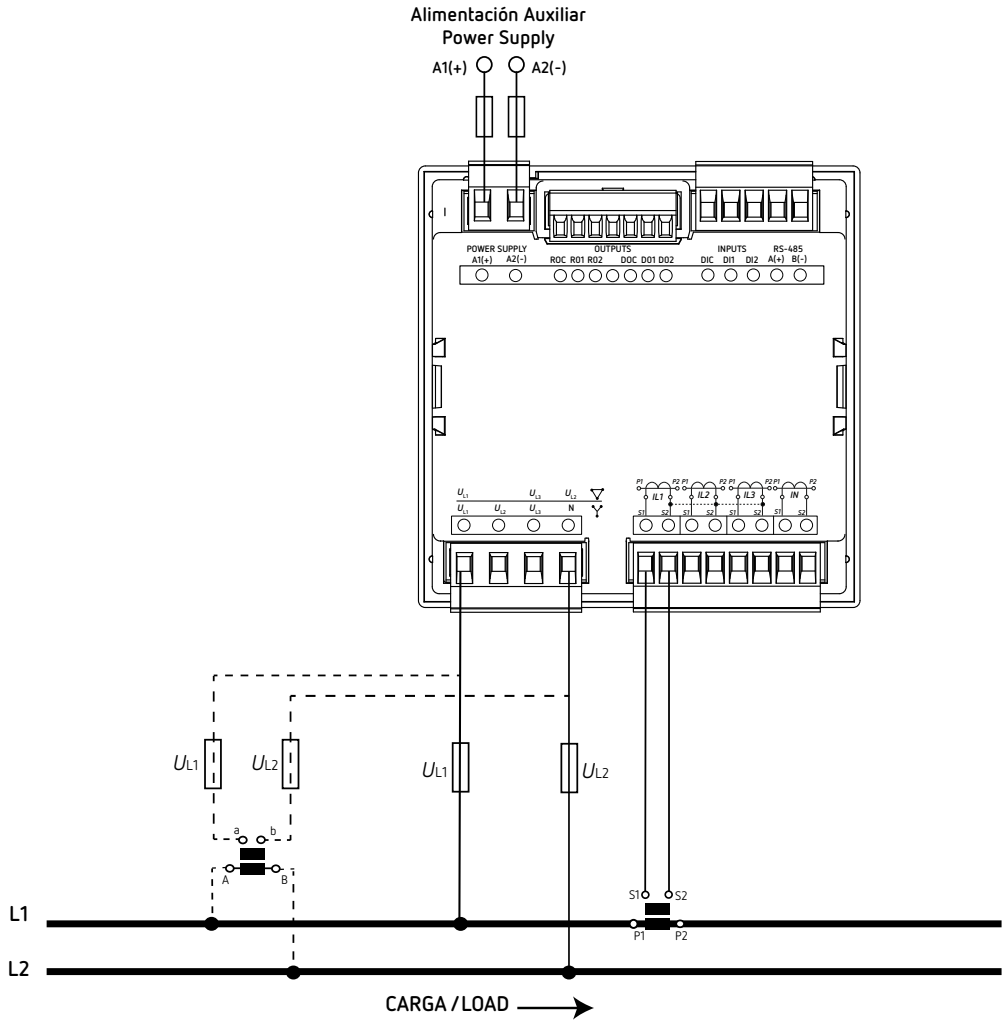


Figure 17: Measuring Single-Phase Networks, phase to phase, with a 2-wire connection (CVM-C11-MC-IN-485-ICT2).

Note: *Do not connect MC current transformers to ground.*

The MC transformer secondary value is set to 0.250 A (fixed value).

3.5.15.- MEASURING SINGLE-PHASE NETWORKS, PHASE TO PHASE, WITH A 2-WIRE CONNECTION, CVM-C11-FLEX-IN-485-ICT2 MODEL

Measurement system: 2-2Ph

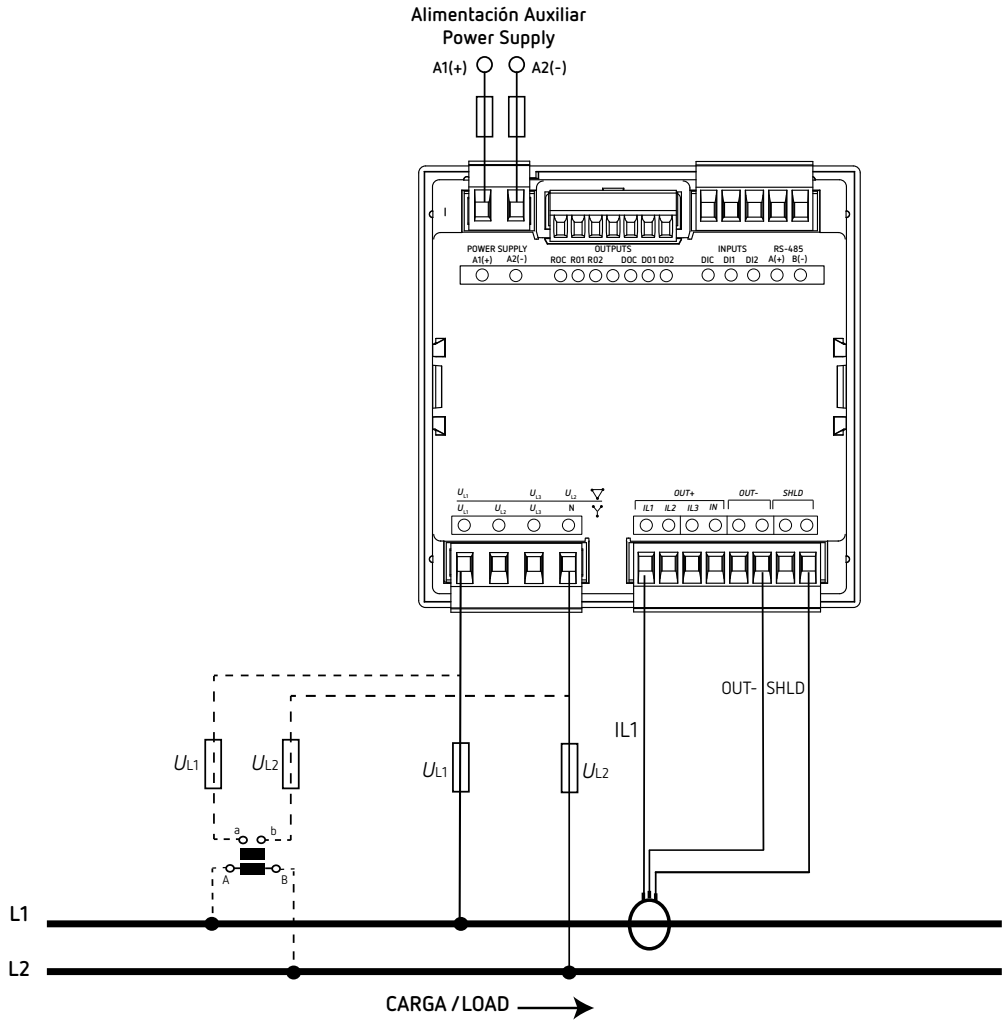


Figure 18: Measuring Single-Phase Networks, phase to phase, with a 2-wire connection (CVM-C11-FLEX-IN-485-ICT2).

It is mandatory connect the **SHLD** terminal of the probe.

3.5.16.- MEASURING SINGLE-PHASE NETWORKS, PHASE TO NEUTRAL, WITH A 2-WIRE CONNECTION, CVM-C11-ITF-IN-xxx-ICT2 MODELS

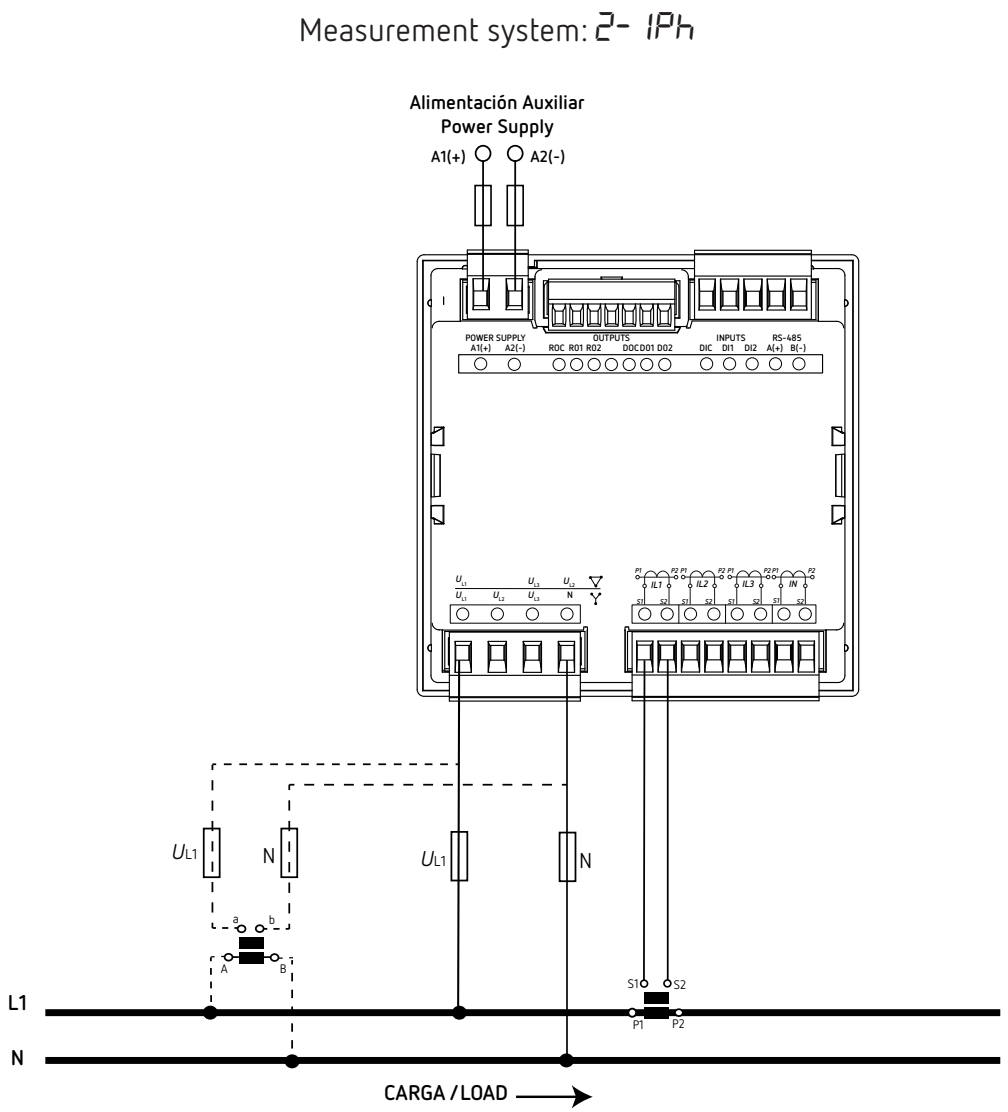


Figure 19: Measuring Single-Phase Networks, phase to neutral, with a 2-wire connection (CVM-C11-ITF-IN-xxx-ICT2).

3.5.17.- MEASURING SINGLE-PHASE NETWORKS, PHASE TO NEUTRAL, WITH A 2-WIRE CONNECTION, CVM-C11-MC-IN-485-ICT2 MODEL

Measurement system: 2- 1Ph

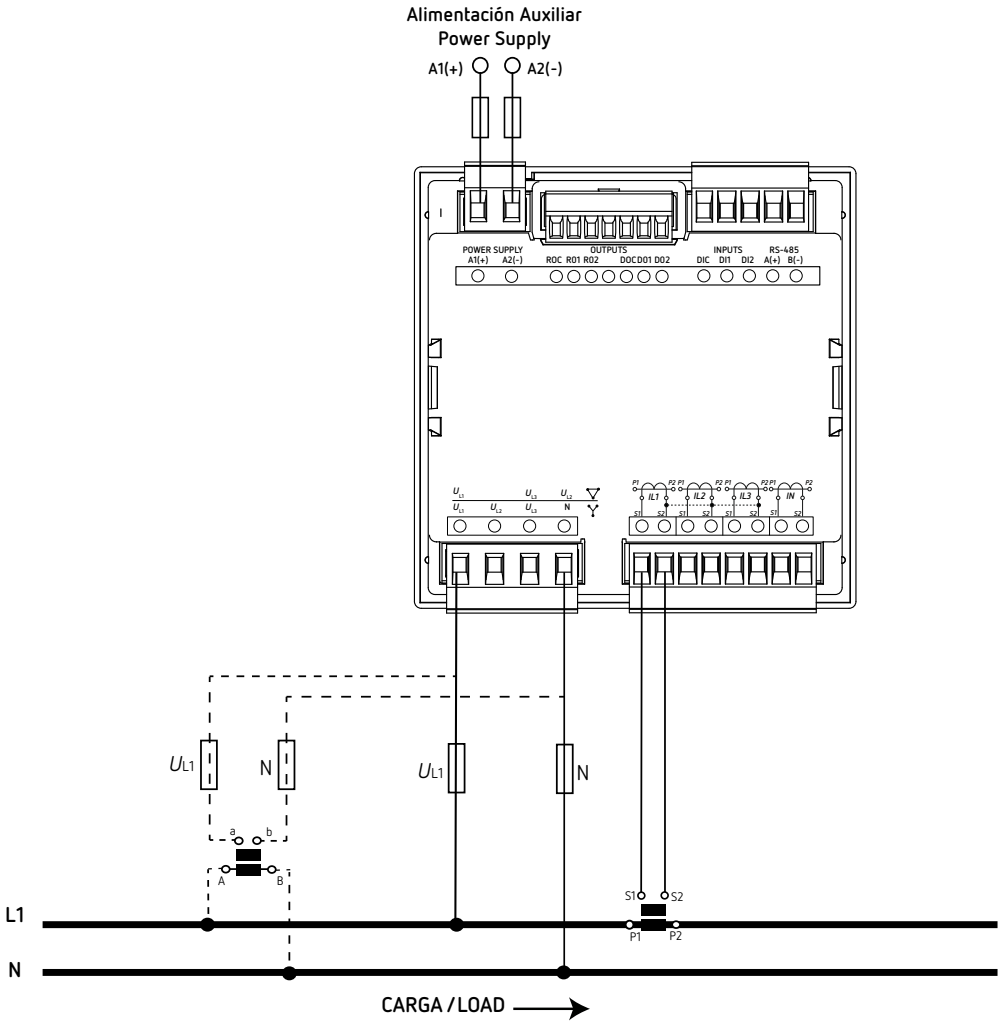


Figure 20: Measuring Single-Phase Networks, phase to neutral, with a 2-wire connection (CVM-C11-MC-IN-485-ICT2).

Note: *Do not connect MC current transformers to ground.*

The MC transformer secondary value is set to 0.250 A (fixed value).

3.5.18.- MEASURING SINGLE-PHASE NETWORKS, PHASE TO NEUTRAL, WITH A 2-WIRE CONNECTION, CVM-C11-FLEX-IN-485-ICT2 MODEL

Measurement system: 2- 1Ph

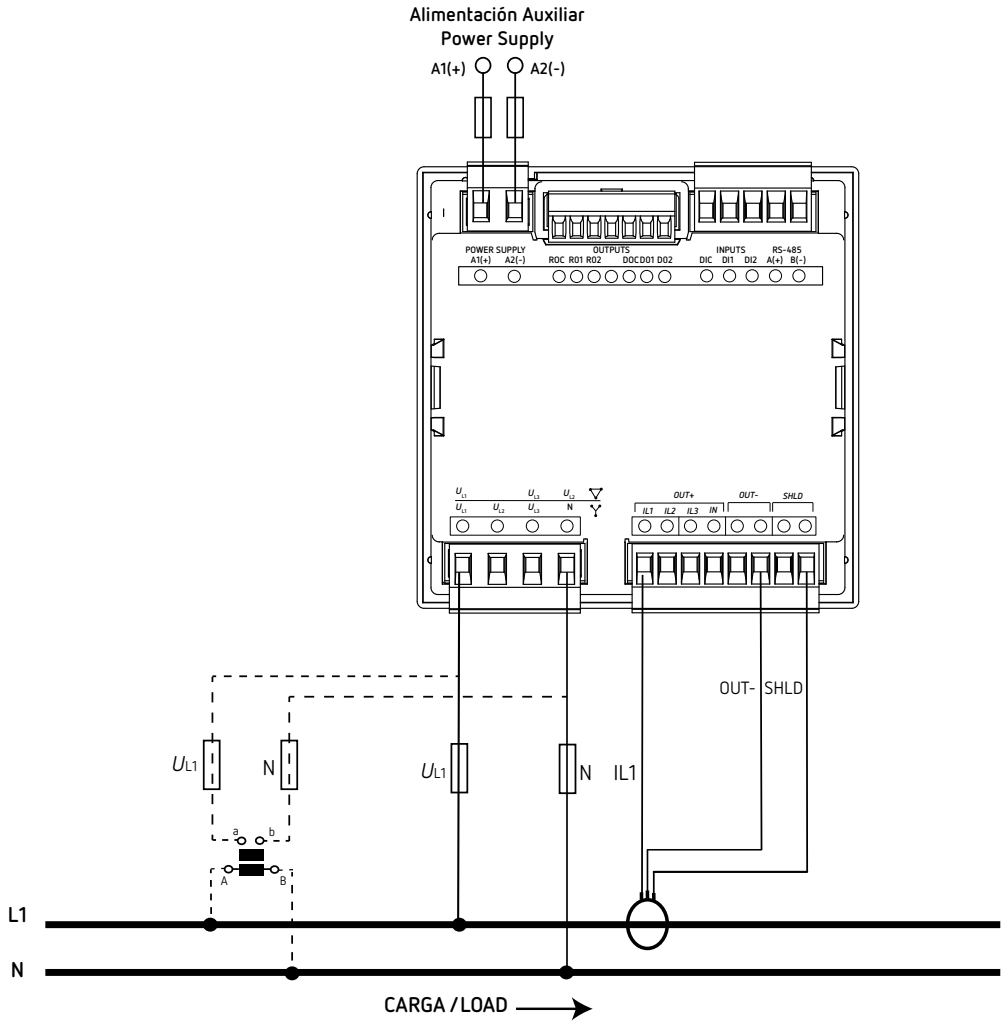


Figure 21: Measuring Single-Phase Networks, phase to neutral, with a 2-wire connection (CVM-C11-FLEX-IN-485-ICT2).

It is mandatory connect the **SHLD** terminal of the probe.

3.5.19.- MEASURING THREE-PHASE NETWORKS WITH A 3-WIRE AND EARTH CONNECTION, CVM-C11-ITF-IN-xxx-ICT2 MODELS

Note: *Installation available from version C11.1005.230119 of the device.*

Measurement system: 3-3I T

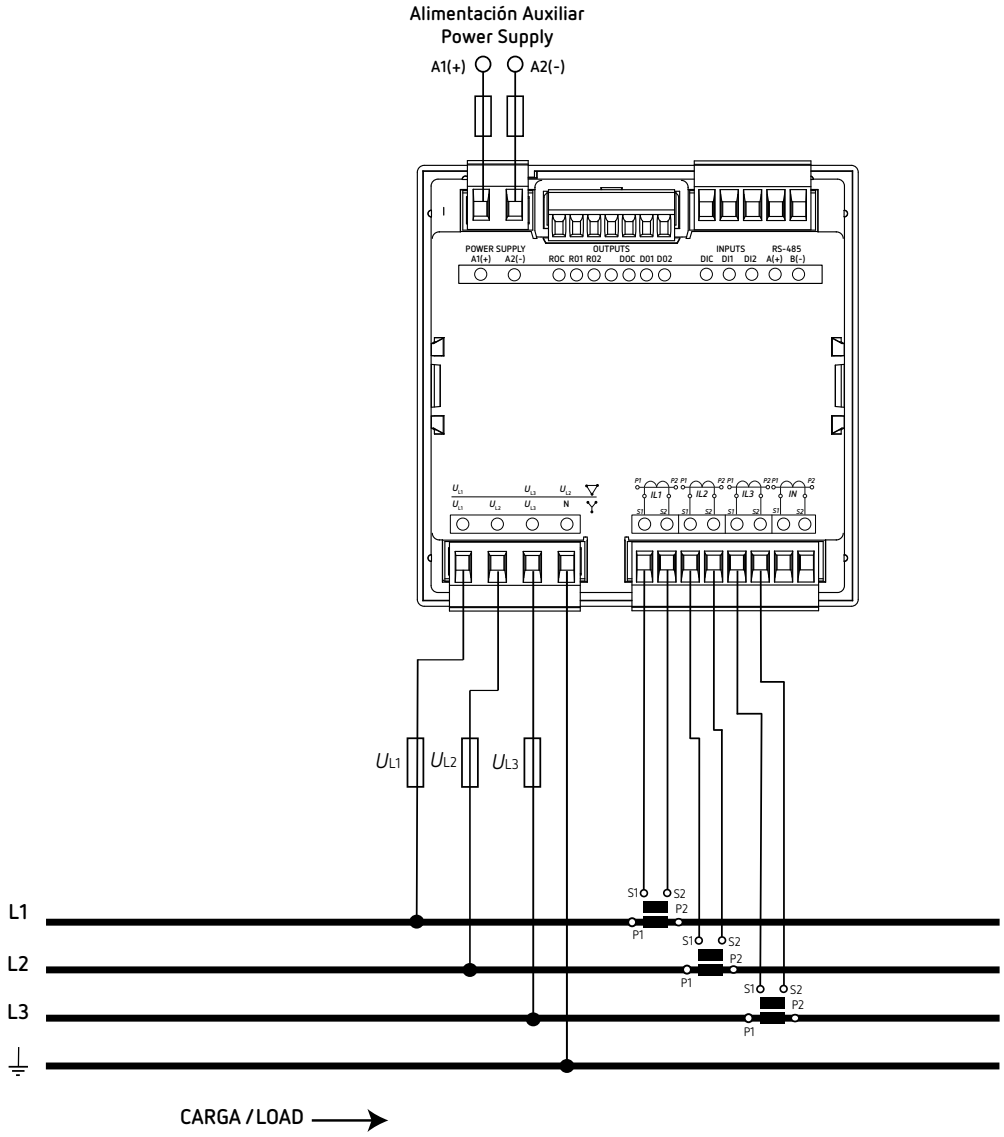


Figure 22: Measuring three-phase networks with a 3-wire and earth connection (CVM-C11-ITF-IN-xxx-ICT2).

3.5.20.- MEASURING THREE-PHASE NETWORKS WITH A 3-WIRE AND EARTH CONNECTION, CVM-C11-MC-IN-485-ICT2 MODEL

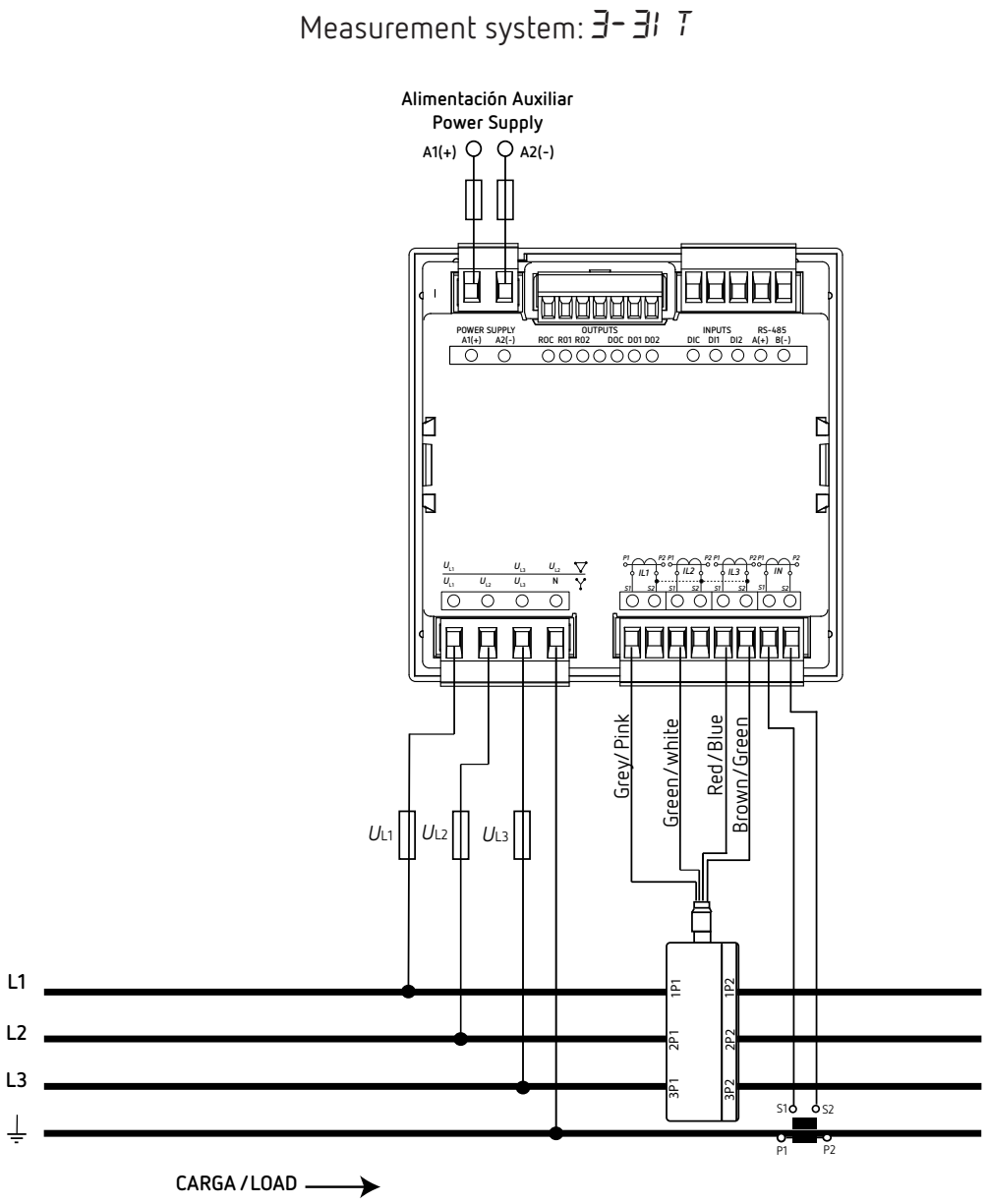


Figure 23: Measuring three-phase networks with a 3-wire and earth connection (CVM-C11-MC-IN-485-ICT2).

Note: *Do not connect MC current transformers to ground.*

The MC transformer secondary value is set to 0.250 A (fixed value).

3.5.21.- MEASURING THREE-PHASE NETWORKS WITH A 3-WIRE AND EARTH CONNECTION, CVM-C11-FLEX-IN-485-ICT2 MODEL

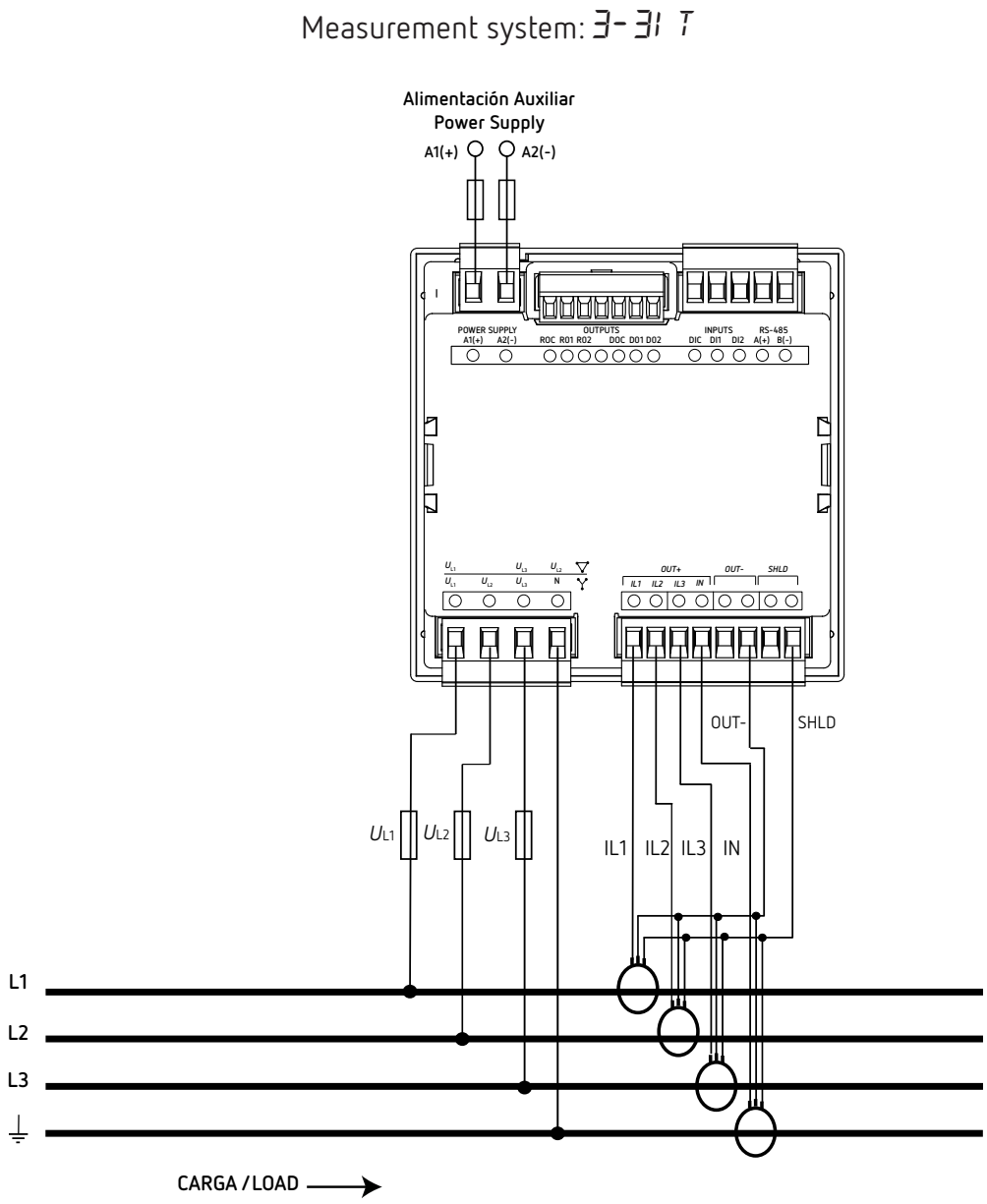


Figure 24: Measuring three-phase networks with a 3-wire and earth connection (CVM-C11-FLEX-IN-485-ICT2).

It is mandatory connect the **SHLD** terminal of the probe.

4.- OPERATION

The **CVM-C11** is a four-quadrant power analyzer (consumption and generation).
The device can operate according to three different measurement conventions:

- ✓ **CIRCUTOR** measurement convention.
- ✓ **IEC 61557-12** measurement convention.
- ✓ **IEEE 1459** measurement convention.

The measurement convention is configured in the setup menu, see ***"6.8.- MEASUREMENT CONVENTION"***.

✓ **CIRCUTOR** measurement convention:

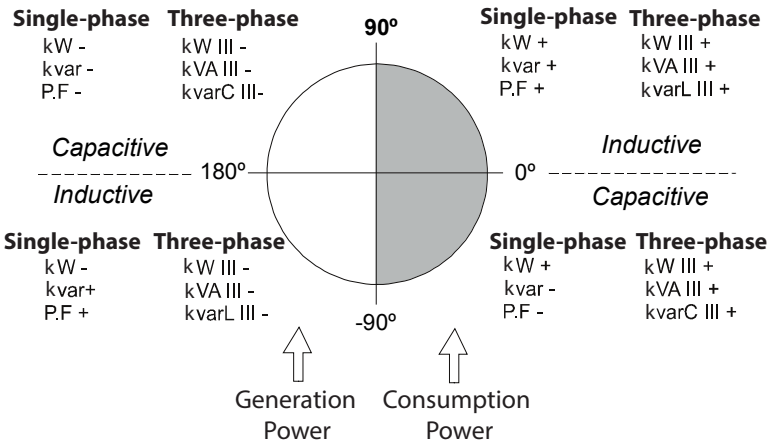


Figure 25: CIRCUTOR measurement convention.

✓ **IEC 61557-12** measurement convention:

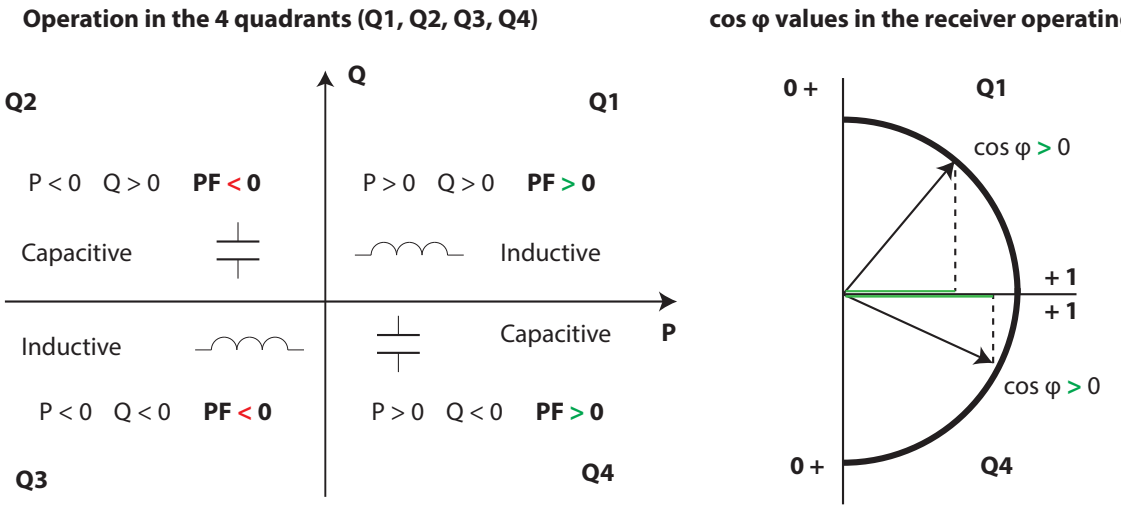


Figure 26: Convenio de medida IEC 61557-12.

✓ **IEEE 1459** measurement convention:

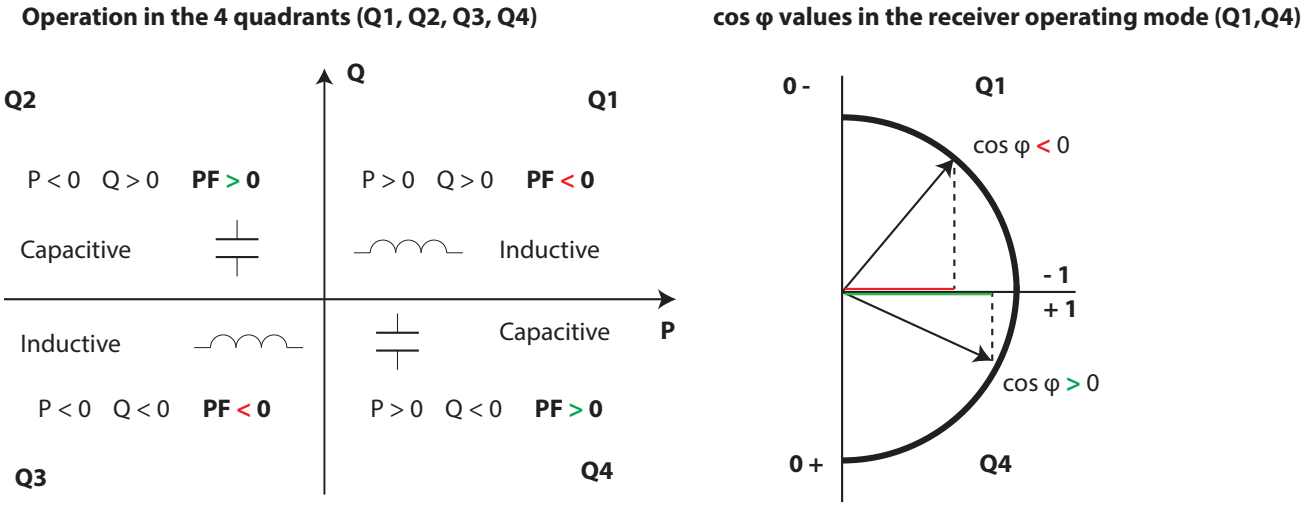


Figure 27: Convenio de medida IEEE 1459.

4.1.- MEASURING PARAMETERS

The device displays the electrical parameters shown in the following tables.

Where: **III** = Three-phase, **∑=** Total, **MAX =** Maximum value, **MIN =** Minimum value, **M =** Measured value, **C=** Calculated value, **M/C** = Measured value (**M**) if the Neutral transformer has been connected, if not the value is calculated (**C**).

Table 7: Measuring parameters of the CVM-C11 (4-3Ph installation).

Parameter	4-3Ph										
	L1	L2	L3	N	L12	L23	L31	III	∑	MAX	MIN
Voltage	M	M	M	-	C	C	C	C	-	M	M
THD Voltage	C	C	C	-	-	-	-	-	-	C	C
Voltage harmonics	C	C	C	-	-	-	-	-	-	-	-
Current	M	M	M	M/C	-	-	-	M	-	M	M
THD Current	C	C	C	-	-	-	-	-	-	C	C
Current harmonics	C	C	C	-	-	-	-	-	-	-	-
Frequency	M	-	-	-	-	-	-	-	-	M	M
Active power	C	C	C	-	-	-	-	-	C	C	C
Apparent power	C	C	C	-	-	-	-	-	C	C	C
Inductive Reactive Power - Consumption	C	C	C	-	-	-	-	-	C	C	C
Inductive Reactive Power - Generation	C	C	C	-	-	-	-	-	C	C	C
Capacitive Reactive Power -Consumption	C	C	C	-	-	-	-	-	C	C	C
Capacitive Reactive Power - Generation	C	C	C	-	-	-	-	-	C	C	C
Cos φ	C	C	C	-	-	-	-	C	-	C	C
Power factor	C	C	C	-	-	-	-	C	-	C	C
Maximum Current Demand	C	C	C	-	-	-	-	C	-	C	-
Maximum Demand of Active power	-	-	-	-	-	-	-	-	C	C	-
Maximum Demand of Apparent Power	-	-	-	-	-	-	-	-	C	C	-

Table 7 (Continuation): Measuring parameters of the CVM-C11 (4-3Ph installation).

Parameter	4-3Ph										
	L1	L2	L3	N	L12	L23	L31	III	∑	MAX	MIN
Maximum Demand of inductive Reactive Power	-	-	-	-	-	-	-	-	C	C	-
Maximum Demand of capacitive Reactive Power	-	-	-	-	-	-	-	-	C	C	-

Table 8: Measuring parameters of the CVM-C11 (3-3Ph installation).

Parameter	3-3Ph										
	L1	L2	L3	N	L12	L23	L31	III	∑	MAX	MIN
Voltage	-	-	-	-	M	M	C	C	-	M	M
THD Voltage	M	-	M	-	-	-	-	-	-	-	-
Voltage harmonics	M	-	M	-	-	-	-	-	-	-	-
Current	M	M	M	-	-	-	-	M	-	M	M
THD Current	M	M	M	-	-	-	-	-	-	-	-
Current harmonics	M	M	M	-	-	-	-	-	-	-	-
Frequency	M	-	-	-	-	-	-	-	-	M	M
Active power	-	-	-	-	-	-	-	-	C	C	C
Apparent power	-	-	-	-	-	-	-	-	C	C	C
Inductive Reactive Power - Consumption	-	-	-	-	-	-	-	-	C	C	C
Inductive Reactive Power - Generation	-	-	-	-	-	-	-	-	C	C	C
Capacitive Reactive Power -Consumption	-	-	-	-	-	-	-	-	C	C	C
Capacitive Reactive Power - Generation	-	-	-	-	-	-	-	-	C	C	C
Cos φ	-	-	-	-	-	-	-	C	-	C	C
Power factor	-	-	-	-	-	-	-	C	-	C	C
Maximum Current Demand	C	C	C	-	-	-	-	C	-	C	-
Maximum Demand of Active power	-	-	-	-	-	-	-	-	C	C	-
Maximum Demand of Apparent Power	-	-	-	-	-	-	-	-	C	C	-
Maximum Demand of inductive Reactive Power	-	-	-	-	-	-	-	-	C	C	-
Maximum Demand of capacitive Reactive Power	-	-	-	-	-	-	-	-	C	C	-

Table 9: Measuring parameters of the CVM-C11 (3-Aron installation).

Parameter	3-Aron										
	L1	L2	L3	N	L12	L23	L31	III	∑	MAX	MIN
Voltage	-	-	-	-	M	M	C	C	-	M	M
THD Voltage	M	-	M	-	-	-	-	-	-	-	-
Voltage harmonics	M	-	M	-	-	-	-	-	-	-	-
Current	M	C	M	-	-	-	-	M	-	M	M
THD Current	M	-	M	-	-	-	-	-	-	-	-
Current harmonics	M	-	M	-	-	-	-	-	-	-	-
Frequency	M	-	-	-	-	-	-	-	-	M	M

Table 9 (Continuation): Measuring parameters of the CVM-C11 (3-Aron installation).

Parameter	3-Aron										
	L1	L2	L3	N	L12	L23	L31	III	∑	MAX	MIN
Active power	-	-	-	-	-	-	-	-	C	C	C
Apparent power	-	-	-	-	-	-	-	-	C	C	C
Inductive Reactive Power - Consumption	-	-	-	-	-	-	-	-	C	C	C
Inductive Reactive Power - Generation	-	-	-	-	-	-	-	-	C	C	C
Capacitive Reactive Power -Consumption	-	-	-	-	-	-	-	-	C	C	C
Capacitive Reactive Power - Generation	-	-	-	-	-	-	-	-	C	C	C
Cos φ	-	-	-	-	-	-	-	C	-	C	C
Power factor	-	-	-	-	-	-	-	C	-	C	C
Maximum Current Demand	C	C	C	-	-	-	-	C	-	C	-
Maximum Demand of Active power	-	-	-	-	-	-	-	-	C	C	-
Maximum Demand of Apparent Power	-	-	-	-	-	-	-	-	C	C	-
Maximum Demand of inductive Reactive Power	-	-	-	-	-	-	-	-	C	C	-
Maximum Demand of capacitive Reactive Power	-	-	-	-	-	-	-	-	C	C	-

Table 10: Measuring parameters of the CVM-C11 (3-2Ph installation).

Parameter	3-2Ph							
	L1	L2	N	L12	III	∑	MAX	MIN
Voltage	M	M	-	C	M	-	M	M
THD Voltage	M	M	-	-	-	-	-	-
Voltage harmonics	M	M	-	-	-	-	-	-
Current	M	M	M	-	M	-	M	M
THD Current	M	M	-	-	-	-	-	-
Current harmonics	M	M	-	-	-	-	-	-
Frequency	M	-	-	-	-	-	M	M
Active power	C	C	-	-	-	C	C	C
Apparent power	C	C	-	-	-	C	C	C
Inductive Reactive Power - Consumption	C	C	-	-	-	C	C	C
Inductive Reactive Power - Generation	C	C	-	-	-	C	C	C
Capacitive Reactive Power -Consumption	C	C	-	-	-	C	C	C
Capacitive Reactive Power - Generation	C	C	-	-	-	C	C	C
Cos φ	C	C	-	-	C	-	C	C
Power factor	C	C	-	-	C	-	C	C
Maximum Current Demand	C	C	-	-	C	-	C	-
Maximum Demand of Active power	-	-	-	-	-	C	C	-
Maximum Demand of Apparent Power	-	-	-	-	-	C	C	-
Maximum Demand of inductive Reactive Power	-	-	-	-	-	C	C	-
Maximum Demand of capacitive Reactive Power	-	-	-	-	-	C	C	-

Table 11: Measuring parameters of the CVM-C11 (2-2Ph installation).

Parameter	2-2Ph						
	L1	N	L12	III	∑	MAX	MIN
Voltage	-	-	M	-	-	M	M
THD Voltage	M	-	-	-	-	-	-
Voltage harmonics	M	-	-	-	-	-	-
Current	M	-	-	-	-	M	M
THD Current	M	-	-	-	-	-	-
Current harmonics	M	-	-	-	-	-	-
Frequency	M	-	-	-	-	M	M
Active power	C	-	-	-	C	C	C
Apparent power	C	-	-	-	C	C	C
Inductive Reactive Power - Consumption	C	-	-	-	C	C	C
Inductive Reactive Power - Generation	C	-	-	-	C	C	C
Capacitive Reactive Power -Consumption	C	-	-	-	C	C	C
Capacitive Reactive Power - Generation	C	-	-	-	C	C	C
Cos φ	C	-	-	C	-	C	C
Power factor	C	-	-	C	-	C	C
Maximum Current Demand	C	-	-	C	-	C	-
Maximum Demand of Active power	-	-	-	-	C	C	-
Maximum Demand of Apparent Power	-	-	-	-	C	C	-
Maximum Demand of inductive Reactive Power	-	-	-	-	C	C	-
Maximum Demand of capacitive Reactive Power	-	-	-	-	C	C	-

Table 12: Measuring parameters of the CVM-C11 (2-1Ph installation).

Parameter	2-1Ph					
	L1	N	III	∑	MAX	MIN
Voltage	M	-	-	-	M	M
THD Voltage	M	-	-	-	-	-
Voltage harmonics	M	-	-	-	-	-
Current	M	-	-	-	M	M
THD Current	M	-	-	-	-	-
Current harmonics	M	-	-	-	-	-
Frequency	M	-	-	-	M	M
Active power	C	-	-	C	C	C
Apparent power	C	-	-	C	C	C
Inductive Reactive Power - Consumption	C	-	-	C	C	C
Inductive Reactive Power - Generation	C	-	-	C	C	C
Capacitive Reactive Power -Consumption	C	-	-	C	C	C
Capacitive Reactive Power - Generation	C	-	-	C	C	C
Cos φ	C	-	C	-	C	C
Power factor	C	-	C	-	C	C
Maximum Current Demand	C	-	C	-	C	-
Maximum Demand of Active power	-	-	-	C	C	-

Table 12 (Continuation): Measuring parameters of the CVM-C11 (2-1Ph installation).

Parameter	2-1Ph					
	L1	N	III	∑	MAX	MIN
Maximum Demand of Apparent Power	-	-	-	C	C	-
Maximum Demand of inductive Reactive Power	-	-	-	C	C	-
Maximum Demand of capacitive Reactive Power	-	-	-	C	C	-

Table 13: Measuring parameters of the CVM-C11 (3-3IT installation).

Parameter	3-3IT										
	L1	L2	L3	N	L12	L23	L31	III	∑	MAX	MIN
Voltage	M	M	M	-	C	C	C	C	-	M	M
THD Voltage	C	C	C	-	-	-	-	-	-	-	-
Voltage harmonics	C	C	C	-	-	-	-	-	-	-	-
Current	M	M	M	-	-	-	-	M	-	M	M
THD Current	C	C	C	-	-	-	-	-	-	-	-
Current harmonics	C	C	C	-	-	-	-	-	-	-	-
Frequency	M	-	-	-	-	-	-	-	-	M	M
Active power	-	-	-	-	-	-	-	-	C	C	C
Apparent power	-	-	-	-	-	-	-	-	C	C	C
Inductive Reactive Power - Consumption	-	-	-	-	-	-	-	-	C	C	C
Inductive Reactive Power - Generation	-	-	-	-	-	-	-	-	C	C	C
Capacitive Reactive Power -Consumption	-	-	-	-	-	-	-	-	C	C	C
Capacitive Reactive Power - Generation	-	-	-	-	-	-	-	-	C	C	C
Cos φ	-	-	-	-	-	-	-	C	-	C	C
Power factor	-	-	-	-	-	-	-	C	-	C	C
Maximum Current Demand	C	C	C	-	-	-	-	C	-	C	-
Maximum Demand of Active power	-	-	-	-	-	-	-	-	C	C	-
Maximum Demand of Apparent Power	-	-	-	-	-	-	-	-	C	C	-
Maximum Demand of inductive Reactive Power	-	-	-	-	-	-	-	-	C	C	-
Maximum Demand of capacitive Reactive Power	-	-	-	-	-	-	-	-	C	C	-

Table 14: Measuring parameters of the CVM-C11 (Global).

Parameter	T1	T2	T3	∑
Active Energy - Consumption	C	C	C	C
Active Energy - Generation	C	C	C	C
Apparent Energy - Consumption	C	C	C	C
Apparent Energy - Generation	C	C	C	C
Inductive Reactive Energy - Consumption	C	C	C	C
Inductive Reactive Energy - Generation	C	C	C	C
Capacitive Reactive Energy - Consumption	C	C	C	C
Capacitive Reactive Energy - Generation	C	C	C	C
Cost - Consumption	C	C	C	C

Table 14 (Continuation): Measuring parameters of the CVM-C11 (Global).

Parameter	T1	T2	T3	∑
Cost - Generation	C	C	C	C
CO_2 Emissions - Consumption	C	C	C	C
CO_2 Emissions - Generation	C	C	C	C
No. of hours	C	C	C	C

4.1.1.- THD CALCULATION

The device can calculate the Total Harmonic Distortion (THD) using the fundamental component of the signal (**THD**) or the effective component (RMS) (**thd**).

For example, the equations for the calculation of the Total Harmonic Distortion of Voltage are:

$$THD = \sqrt{\sum_{n=2}^{32}\left(\frac{V_n}{V_1}\right)^2}$$

Where $\mathbf{V_1}$ **=** Is the fundamental component.

$$thd = \sqrt{\sum_{n=2}^{32}\left(\frac{V_n}{V_{RMS}}\right)^2}$$

Where $\mathbf{V_{RMS}}$ **=** is the effective component (RMS).

The calculation method to be used by the device is selected in the configuration menu, see ***"6.13.- THD CALCULATION"***.

4.1.2.- MAXIMUM DEMAND

The maximum demand is the average instantaneous measurement over a specific time interval, usually 15 minutes. There are several ways to calculate this parameter:

Fixed Window (by block)

This is the calculation of maximum demand in a specific interval (normally the integration period = 15 minutes). Once the number is calculated, the value is saved and a new calculation for the next 15 minutes begins. The result would be 4 values per hour.

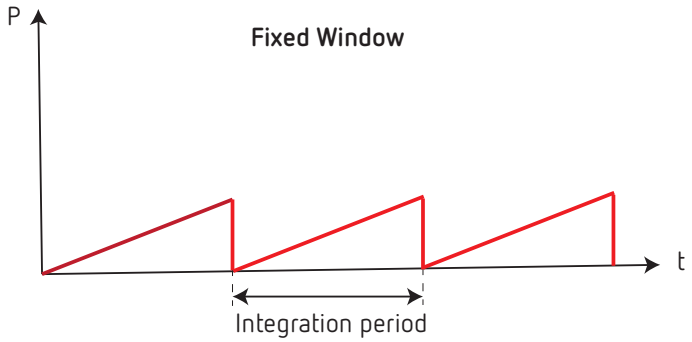


Figure 28:Fixed window.

Sliding window

This is the calculation of maximum demand in a specific interval (usually the integration period = 15 minutes). Once the number is calculated, it is refreshed every minute with the values from the last 15 minutes. In other words, every minute (this time can be variable) we will have a maximum demand number for the last 15 minutes. The result would be 60 values per hour.

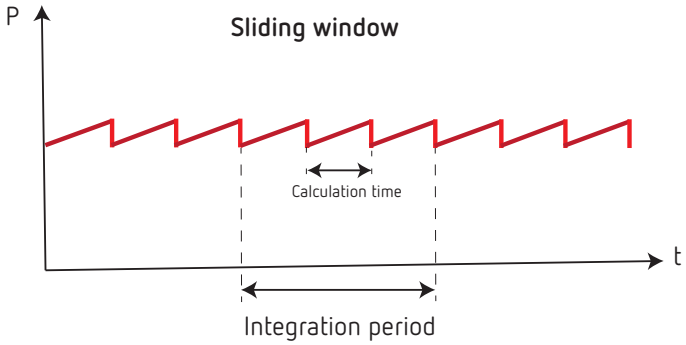


Figure 29: Sliding window.

The **CVM-C11** calculates the maximum demand of the following:

- ✓ Current of the L1, L2, L3 and three-phase.
- ✓ Three-Phase Active Power.
- ✓ Three-Phase Apparent Power.
- ✓ Three-Phase Inductive Reactive Power.
- ✓ Three-Phase Capacitive Reactive Power.

In the configuration menu, the type of integration is selected, ***"6.10.- TYPE OF INTEGRATION OF THE MAXIMUM DEMAND"*** and the integration period of the maximum demand ***"6.11.- MAXIMUM DEMAND INTEGRATION PERIOD"***.

4.2.- DISPLAY

The device has a backlit LCD display showing all the parameters listed in **Table 7** ... **Table 14.**

The display is divided into two areas (**Figure 30**):

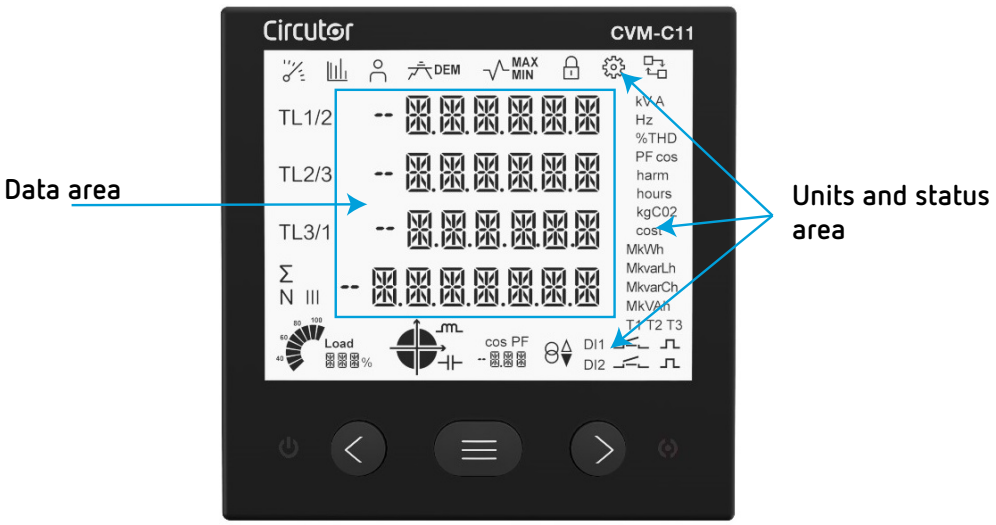
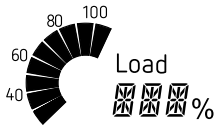
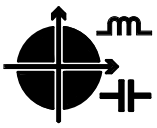


Figure 30: CVM-C11 Display areas.

✓ The **data** area, which displays all the values measured by the device.
✓ The **units and status** area, which displays the different statuses, units and device information (**Table 15**).

Table 15:Display icons.

Icon	Description	Icon	Description
	Analyzer profile.		Analog bar, where the % of the current power of the installation is shown.
	Electrical energy efficiency profile, **e³**.		Quadrant in which the device is working.
	User profile.	cos PF --	cos φ or the power factor of the installation.
DEM	Maximum demand.		Consumption.
MAX	Maximum value.		Generation.
MIN	Minimum value.	**DI1** **DI2**	Digital input connected.
	Configuration menu protected by password.		Relay disconnected or connected.
	Screen in edit mode in the configuration menu.		Digital output connected.
	Active RS-485 communications.	**T1, T2, T3**	Active tariff.

4.2.1.- cos φ - PF (POWER FACTOR)

Figure 31: Cos φ - PF.

This bar displays the value of the installation's **cos φ** or **Power Factor (PF)** in real time. The parameter that will be displayed is selected on the programming menu. (***"6.16.- DISPLAY SELECTING Cos φ - PF"***).

4.2.2.- ANALOGUE BAR

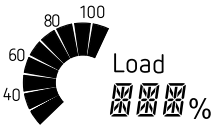


Figure 32: Analogue Bar

The **current power of the installation in %** is displayed on the analog bar. When the value exceeds 110% the analog bar flashes. And if the value exceeds 999% *-HI* is displayed.

The device calculates the current power of the installation using the formula:

$$P = V*I*\cos(\varphi)$$

Where the **voltage** and the **cos(φ)** are the installation's current values.

The current is referenced in its full scale. (100% is the full scale of the device and a value above 100% indicates that it is out of range).

4.3.- KEYBOARD FUNCTIONS

The **CVM-C11** has 3 keys that allow you to browse between the various screens and program the device.

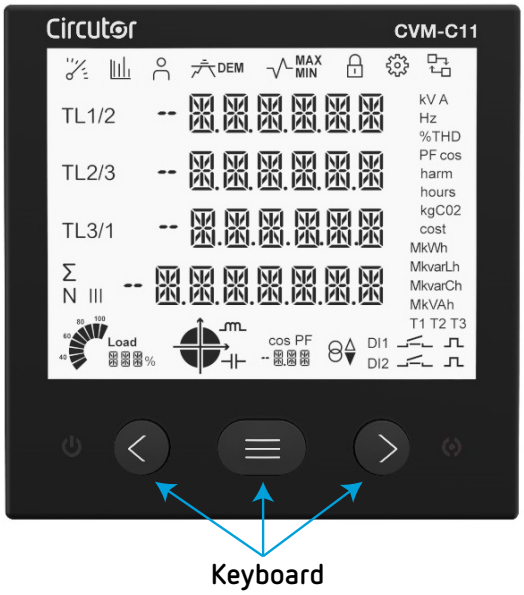


Figure 33: CVM-C11 keyboard.

Key functions on measuring screens (**Table 16**):

Table 16: Key functions on measuring screens.

Key	Short keystroke	Long keystroke (3 s)
<	Previous screen.	Display of minimum value.
>	Next screen.	Display of maximum value.
≡	Browsing the different profiles.	Accessing the programming menu.
≡ + >	-	Display of the Maximum Demand.
< + >	-	Unlocks the active alarm.
< + ≡	-	Access to the Ethernet communications configuration menu.(1)

(1) Available in model **CVM-C11-ITF-IN-ETH-ICT2**.

Key functions on harmonics screens (**Table 17**):

Table 17: Key functions on harmonics screens.

Key	Short keystroke	Long keystroke (3 s)
	Output of the harmonics screens.	-
	Next screen.	-
	Browsing the different types of harmonics.	Accessing the programming menu.

Key functions on the programming menu, query mode (**Table 18**):

Table 18: Key functions on the programming menu, query mode.

Key	Short keystroke	Long keystroke (3 s)
	Previous screen.	Programming output.
	Next screen.	Programming output.
	-	Opening the programming menu in the edit mode.

Key functions on the programming menu, edit mode (**Table 19**):

Table 19: Key functions on the programming menu, edit mode.

Key	Keystroke
	Line jump and move an editable digit.
	Increases the digits (0-9) or rotates between the different options.
	Moves an editable digit (flashing)

4.4.- LED INDICATORS

The **CVM-C11** device has 2 LEDs:

- **ON**, white color, indicates that the device is on, flashing each second.
- **ALARM**, red color, indicates that an alarm has been activated if it is on.

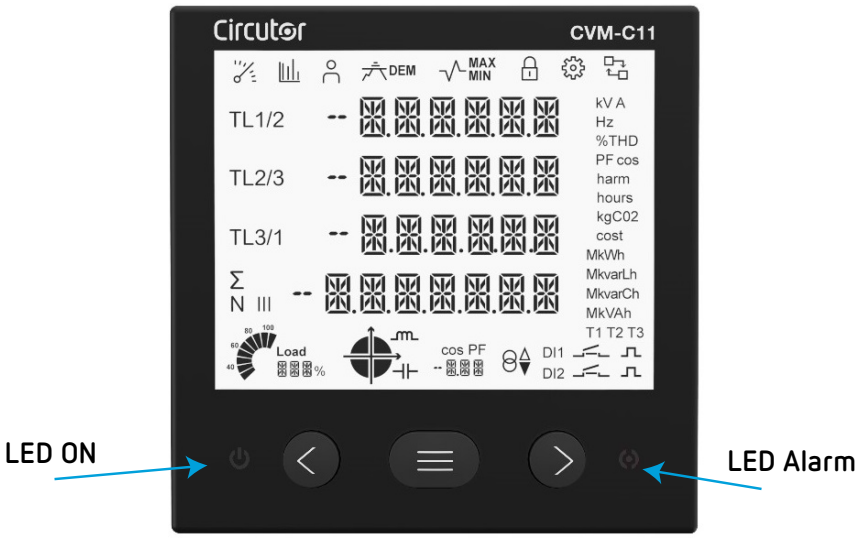


Figure 34: LED Indicators of the CVM-C11.

4.5.- RELAYS

El **CVM-C11** has 2 alarm relays (terminals 3, 4 and 5 on **Figure 1**) fully programmable, see ***"6.25.- PROGRAMMING THE ALARM RELAY 1"*** and ***"6.26.- PROGRAMMING THE ALARM RELAY 2"*** **(Figure 35).**

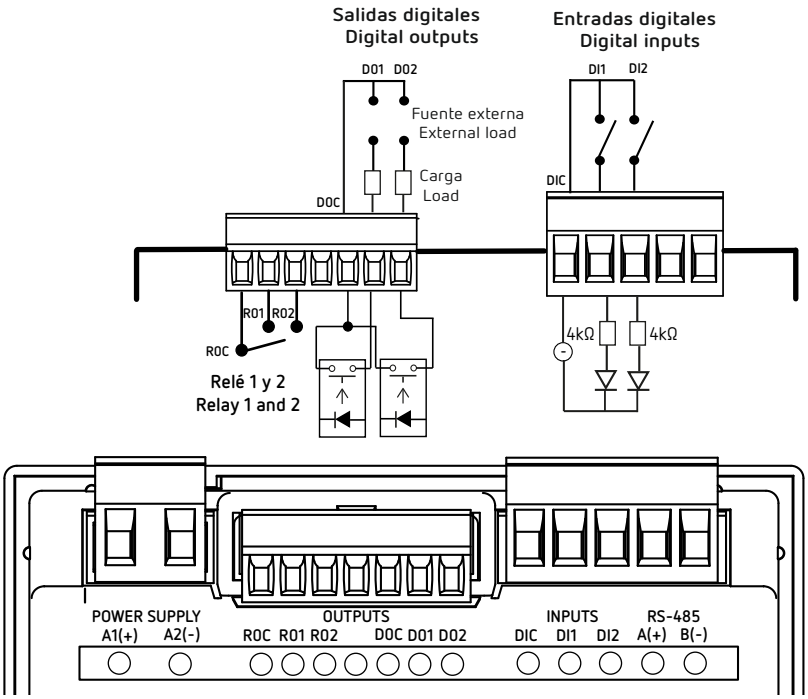


Figure 35:Relays, Digital outputs and Digital inputs.

4.6.- DIGITAL INPUTS

The **CVM-C11** has two digital inputs (terminals 9, 10 and 11 on **Figure 1**) programmable to function as logic input, tariff selection (**Figure 35**) or to generate a synchronism pulse to calculate the maximum demand.

If configured as a logic input, the device displays the status of that input. See ***"6.29.- OPERATING MODE OF DIGITAL INPUT 1"*** and ***"6.30.- OPERATING MODE OF DIGITAL INPUT 2"***.

The selected tariff can be determined in accordance with the status of the inputs, as shown in **Table 20**.

Table 20: Selecting the tariff in accordance with the input status.

IN1, Input 1			IN2, Input 2		Tariff
Synchronism pulse	Logic input	Tariff selection	Logic input	Tariff selection	
x			x		T1
	x		x		T1
x				0	T1
	x			0	T1
x				1	T3
	x			1	T3
		0	x		T1
		1	x		T2
		0		0	T1
		0		1	T3
		1		0	T2
		1		1	T1

4.7.- DIGITAL OUTPUTS

The **CVM-C11** has two NPN transistors outputs (terminals 6, 7 and 8 on **Figure 1**), fully programmable, see ***"6.27.- PROGRAMMING ALARM 3 (DIGITAL OUTPUT T1)"*** and ***"6.28.- PROGRAMMING ALARM 4 (DIGITAL OUTPUT T2)"***.

5.- DISPLAY

The **CVM-C11** has 3 operation profiles. The display screens will be opened for the corresponding profile:

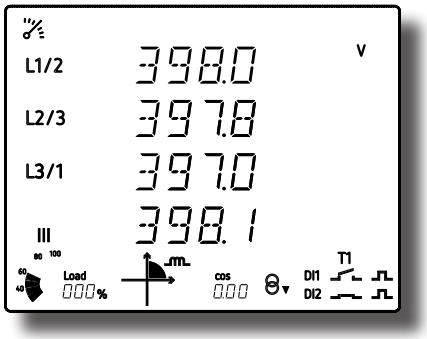
- ✓ **Analyzer** profile.
- ✓ Electrical energy efficiency profile, **e**³.
- ✓ **User** profile.

Use the key to jump between the different profiles.

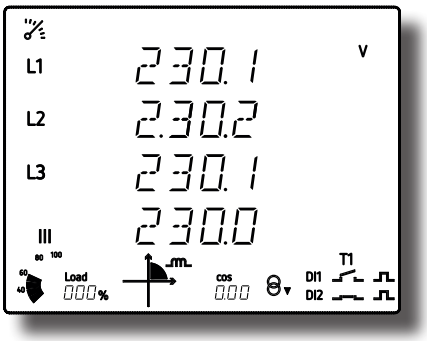
5.1.- ANALYZER PROFILE

This profile is identified by the symbol at the top of the screen.
The device displays 12 different screens for the **analyzer** profile and the voltage and current harmonics, up to the 31st order harmonic, for each one of the lines, L1, L2 and L3. (*"5.4.- HARMONICS"*).

Use keys and to browse the different screens.



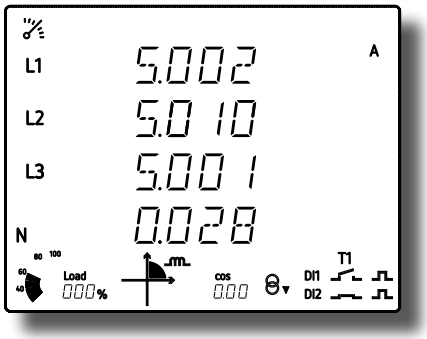
Phase-phase Voltage L1-L2
Phase-phase Voltage L2-L3
Phase-phase Voltage L3-L1
Phase-phase Voltage III



Phase-neutral Voltage L1
Phase-neutral Voltage L2
Phase-neutral Voltage L3
Phase-neutral Voltage III

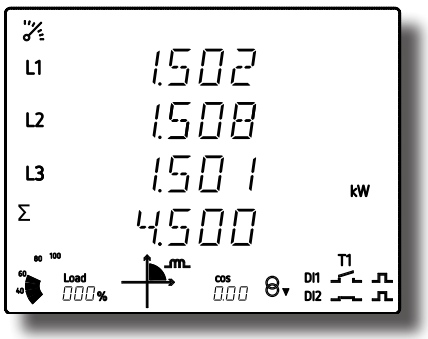
Note: *Screen not visible for installation types* 3-3Ph 3-ArOn *and* 2-2Ph.

Note: *For the* 3-31 T *installation, the phase-earth voltage is displayed.*



Current L1
Current L2
Current L3
Neutral Current (2)

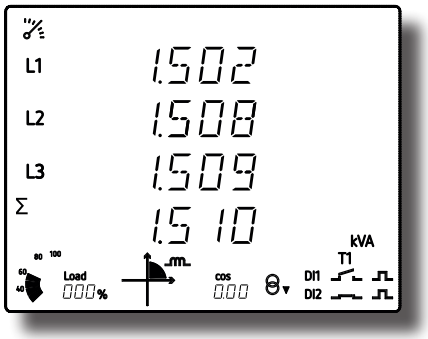
(2) *Not available for the* 3-3Ph, 3-ArOn *and* 3-31 T *installation types.*



Active Power L1 (3)
Active Power L2 (3)
Active Power L3 (3)
Active Power Total, ∑

The generation values are not measured when the 2 quadrant option is selected.

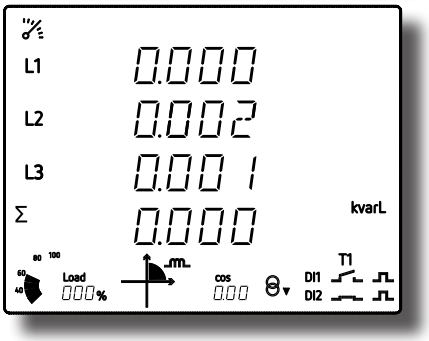
(3) *Not available for installation types 3-3I T.*



Apparent Power L1 (4)
Apparent Power L2 (4)
Apparent Power L3 (4)
Apparent Power Total, ∑

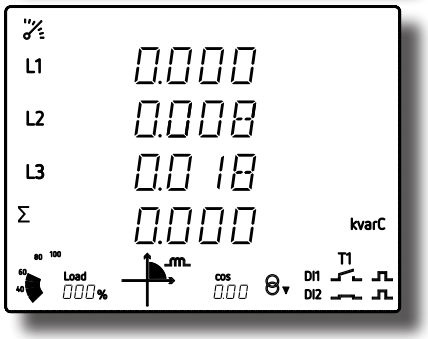
The generation values are not measured when the 2 quadrant option is selected.

(4) *Not available for installation types 3-3I T.*



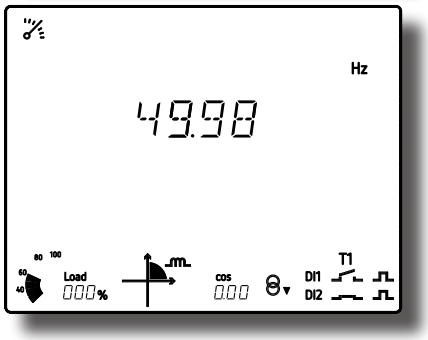
Inductive Reactive Power L1 (5)
Inductive Reactive Power L2 (5)
Inductive Reactive Power L3 (5)
Inductive Reactive Power Total, ∑

(5) *Not available for installation types 3-3I T.*

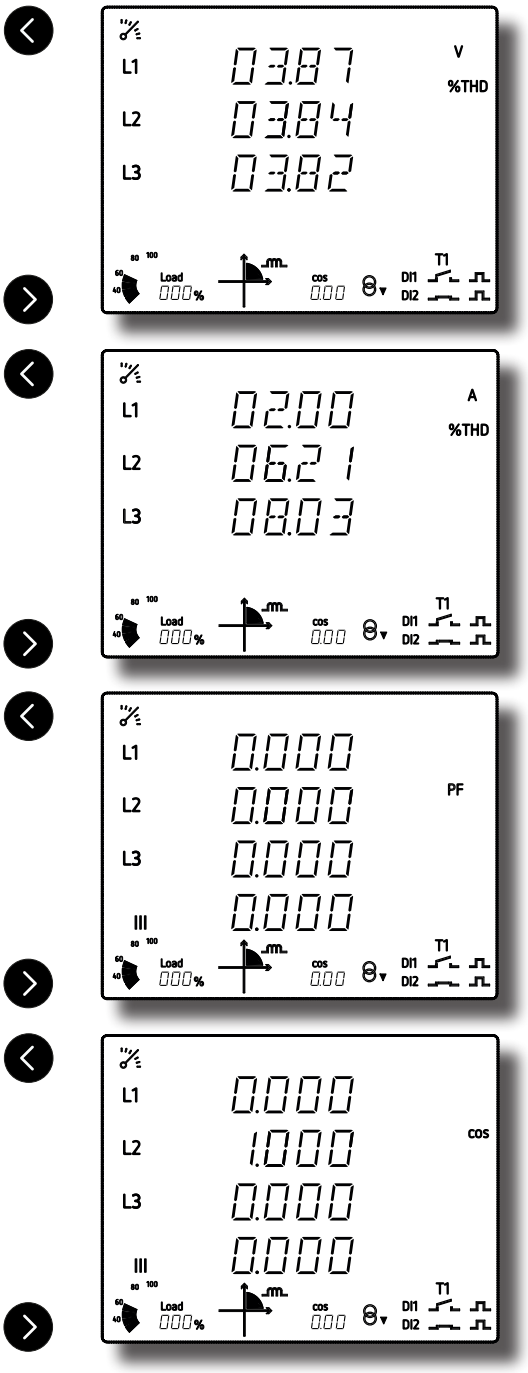


Capacitive Reactive Power L1 (6)
Capacitive Reactive Power L2 (6)
Capacitive Reactive Power L3 (6)
Capacitive Reactive Power Total, ∑

(6) *Not available for installation types 3-3I T.*



Frequency



THD Voltage L1
THD Voltage L2
THD Voltage L3

THD Current L1
THD Current L2
THD Current L3

Power factor L1
Power factor L2
Power factor L3
Power factor III

COS φ L1
COS φ L2
COS φ L3
COS φ III

5.1.1.- MAXIMUM AND MINIMUM VALUES

To see the maximum values of the screen being displayed, press the key for 3 seconds. These are displayed for 30 seconds. The MAX symbol is shown on the display (**Figure 36**).

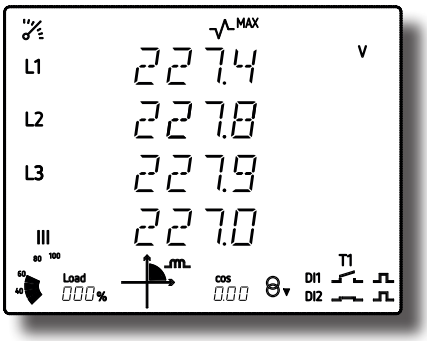


Figure 36: Analyzer profile screen displaying the maximum values.

To see the minimum values of the screen being displayed, press the key for 3 seconds. These are displayed for 30 seconds. The MIN symbol will be displayed.
The maximum and minimum values are reset on the programming menu. (*"6.17.- DELETING MAXIMUM AND MINIMUM VALUES"*).

5.1.2.- MAXIMUM DEMAND

The device calculates the maximum demand of the following:

- ✓ Current L1, L2 y L3.
- ✓ The three-phase current.
- ✓ Three-Phase Active Power.
- ✓ Three-Phase Apparent Power.
- ✓ Three-Phase Inductive Reactive Power
- ✓ Three-Phase Capacitive Reactive Power

This value can be displayed on the display screen of the parameter by pressing the and keys at the same time.

The DEM symbol appears on the display (**Figure 37**).

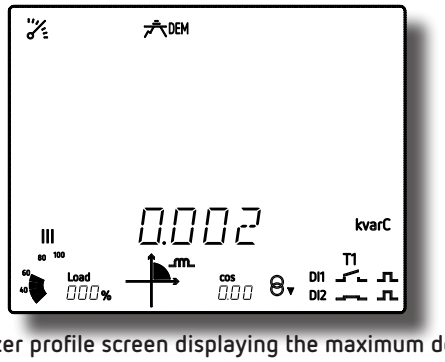


Figure 37: Analyzer profile screen displaying the maximum demand values.

Press keys or to stop displaying the maximum demand values.

The maximum demand is programmed in the configuration menu from parameters *"6.10.- TYPE OF INTEGRATION OF THE MAXIMUM DEMAND"* y *"6.11.- MAXIMUM DEMAND INTEGRATION PERIOD"*.

The maximum demand values are reset on the programming menu: *"6.12. DELETING MAXIMUM DEMAND"*.

5.1.3.- DETECTION OF INCORRECT DIRECTION OF ROTATION

The device has a system for detecting the incorrect direction of rotation of the voltages. In other words, if each of the voltages has been correctly connected to the appropriate terminal, L1 to terminal **UL1**, L2 to terminal **UL2** and L3 to terminal **UL3**.
If there is an error in the direction of rotation, the icons **L1**, **L2** and **L3** flash on the display.

The device has a RS-485 communications parameter, which indicates whether an incorrect direction of rotation has been detected ("***8.3.7. DETECTION OF INCORRECT DIRECTION OF ROTATION.***")

Table 21: **Detection of incorrect direction of rotation.**

Measurement system	Detection of direction of rotation	Description
4-3Ph	✓	The phase angle between **UL1** and **UL2** is < 110° or > 130°. The phase angle between **UL2** and **UL3** is < 110° or > 130°. ***Note:*** *The phase angle is 120° when the voltages are balanced.*
3-3Ph	✓	The phase angle between **UL12** and **UL32** is < 290° or > 310°. ***Note:*** *The phase angle is 300° when the voltages are balanced.*
3-ArOn	✓	The phase angle between **UL12** and **UL32** is < 290° or > 310°. ***Note:*** *The phase angle is 300° when the voltages are balanced.*
3-3l T	-	-
3-2Ph	✓	The phase angle between **ULxx** is < 170° or > 190°. ***Note:*** *The phase angle is 180° when the voltages are balanced.*
2-2Ph	-	-
2-1Ph	-	-

5.2.- e³ PROFILE

This profile is identified with the  symbol at the top of the screen.
The installation's consumed and generated energy are displayed on the **e³** profile of the device.
The installation status is also displayed:

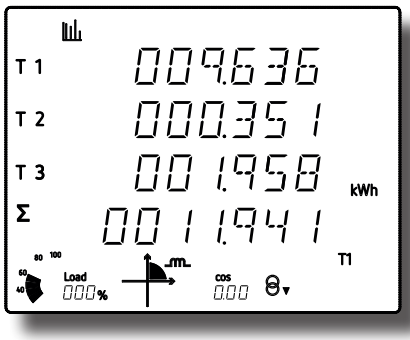
 Installation is consuming energy.

 Installation is generating energy.

A long keystroke, ≥ 3 sec, of key  will display the generation values. The generation values are identified with the negative sign on the screen, which appears in front of each parameter.

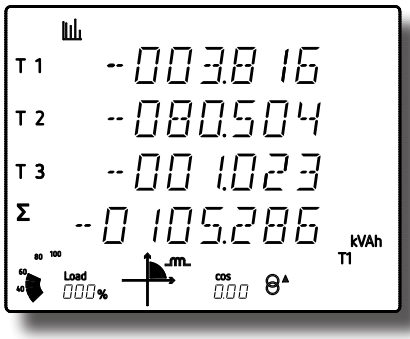
A long keystroke, ≥ 3 sec, of key  will display the consumption values.

Use keys  and  to browse the different screens.



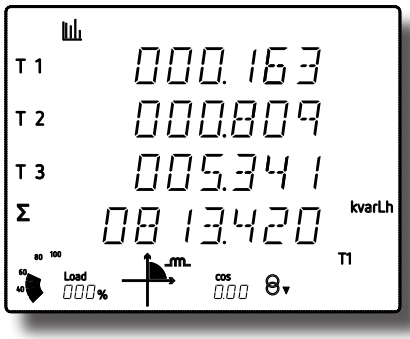
Active Energy Tariff 1
Active Energy Tariff 2
Active Energy Tariff 3
Total Active Energy, ∑

Consumption and generation values only available for the 4 quadrant option.



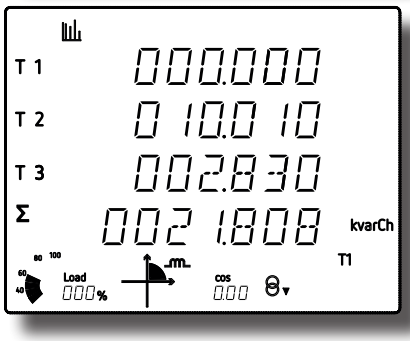
Apparent Energy Tariff 1
Apparent Energy Tariff 2
Apparent Energy Tariff 3
Total Apparent Energy, ∑

Consumption and generation values only available for the 4 quadrant option.



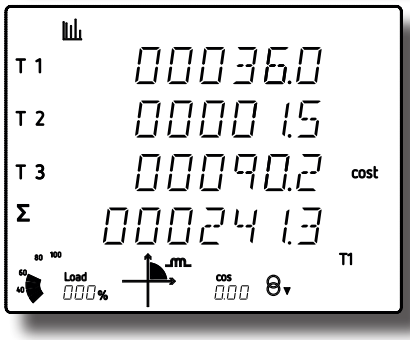
Inductive Reactive Energy Tariff 1
Inductive Reactive Energy Tariff 2
Inductive Reactive Energy Tariff 3
Total Inductive Reactive Energy, ∑

Consumption and generation values only available for the 4 quadrant option.



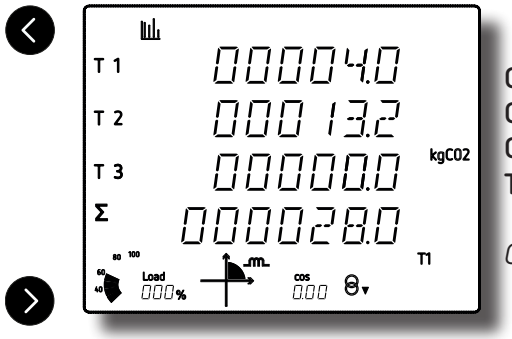
Capacitive Reactive Energy Tariff 1
Capacitive Reactive Energy Tariff 2
Capacitive Reactive Energy Tariff 3
Total Capacitive Reactive Energy, ∑

Consumption and generation values only available for the 4 quadrant option.



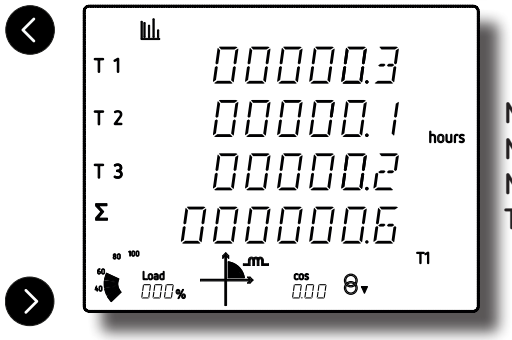
Cost Tariff 1
Cost Tariff 2
Cost Tariff 3
Total Cost, ∑

Consumption and generation values



CO_2 Emissions Tariff 1
CO_2 Emissions Tariff 2
CO_2 Emissions Tariff 3
Total CO_2 Emissions, ∑

Consumption and generation values



No. of hours Tariff 1
No. of hours Tariff 2
No. of hours Tariff 3
Total No. of hours, ∑

Symbols **T1**, **T2** and **T3** on the display indicate the three tariffs available on the device.
The selected tariff is indicated at the bottom right of the display.

5.3.- USER PROFILE

This profile is identified with the symbol at the top of the screen (**Figure 38**).

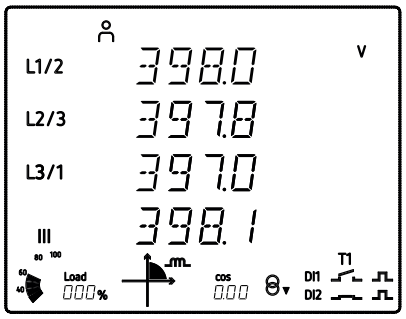


Figure 38: Screen of the CVM-C11 with the user profile.

This profile displays the screens selected in the programming menu (***"6.14.- SELECTING THE OPERATION PROFILE"***).
Note: *If you have not selected the display of any screen, the device will restart and display the* ***Phase-Neutral Voltage*** *screen by default.*

The voltage and current harmonics are also displayed, up to the 31st order harmonic, for each of the lines, L1, L2 and L3 ("***5.4.- HARMONICS***.").

5.4.- HARMONICS

The device can display the voltage and current harmonics, up to the 31st order harmonic, for each one of the lines, L1, L2 and L3.

The display of these can be deactivated using the programming menu (*"6.20.- ACTIVATING THE HARMONICS DISPLAY SCREEN."*).

The harmonics display screens are displayed in the **Analyzer** and **User** operating profiles, by pressing the key after the last screen of the profile.

Harmonics are displayed as shown on **Figure 39**.

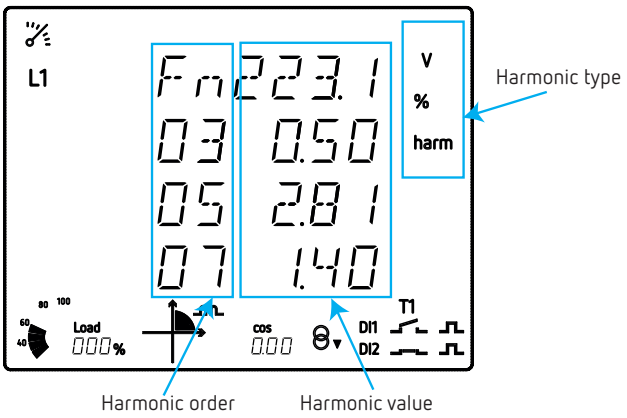


Figure 39: CVM-C11 harmonics screen.

The key jumps to the next harmonic screen.

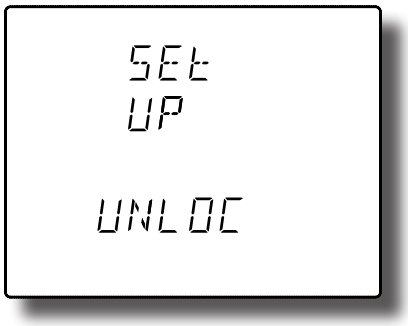
Press key to display the different types of harmonics:

- Voltage harmonics L1- L2 - L3
- Current harmonics L1- L2 -L3

To exit the harmonic display screens, press the key.

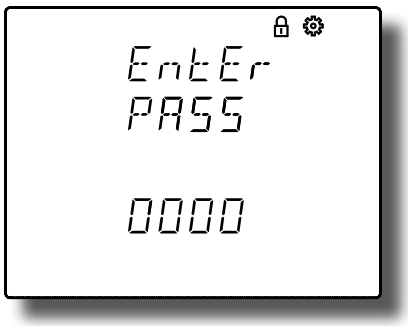
6.- CONFIGURATION

To enter the configuration menu press the key for 3 seconds.
The home screen of the menu indicates whether the menu is locked or not:



✓UnLOC (**unlocked**): When you enter the programming menu you can view and modify the programming.
✓LOC (**locked**): When you enter the programming you can view the programming but not modify it. Icon ,at the top of the display, indicates the locking status.

Press key to access the first programming step.
The following screen will be displayed if the programming menu is **locked**, LOC:



Enter the password in this screen to modify the programming parameters.

Press key for 3 seconds to edit the password. The icon appears at the top of the screen.
To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.
When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.
To validate the data, press for 3 seconds and the icon will disappear from the display.

If the password is correct the icon disappears.
If you do not enter the password or it is incorrect, you can open the programming menu but it cannot be modified.

The programming menu is unlocked for a short period of time and it will be locked again when you exit the device's menu.
To permanently unlock the device, select the programming parameter ***"6.40.- LOCKING THE PROGRAMMING"***.

To access the first programming step, press the key.

The programming parameters are validated as follows:

- ✓ When on reaching the last point on the programming menu ("*6.40.- LOCKING THE PROGRAMMING*") the key is pressed .
- ✓ At any point in the programming, by pressing the key for 3 seconds.

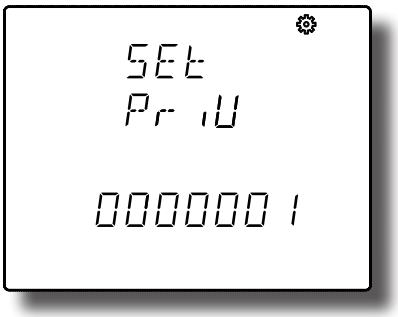
If the device is reset before validation or no key is pressed for 30 seconds, the configuration will not be stored in the memory.

To exit the configuration menu, press the key for 3 seconds.

Note: *In the annex "**ANNEX A.- CONFIGURATION MENUS**" you can see the configuration tree.*

6.1.- PRIMARY VOLTAGE

On this screen the voltage transformer primary is programmed.



Press key for 3 seconds to edit the transformer primary value. The icon appears at the top of the screen.

To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

To validate the data, press for 3 seconds and the icon will disappear from the display.
The programmed value will be deleted if the entered value is higher than the maximum programming value.

✓Configuration values

Table 22:Configuration values: Primary voltage.

Primary voltage	
Minimum value	1
Maximum value	599999

For models **CVM-C11-ITF-IN-xxx** and **CVM-C11-MC-IN-485:**
Voltage ratio x Primary Current < 600000

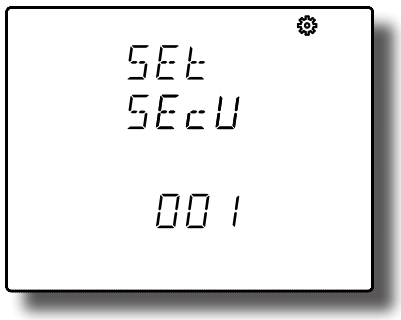
For model **CVM-C11-FLEX-IN-485:**
Primary voltage / Secondary voltage < 600.

Note: *The ratio is the relation between the primary and the secondary.*

Press key to access the next programming step.

6.2.- SECONDARY VOLTAGE

On this screen the voltage transformer secondary is programmed.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

To validate the data, press for 3 seconds and the icon will disappear from the display.
The programmed value will be deleted if the entered value is higher than the maximum programming value.

✓**Configuration values**

Table 23:Configuration values: Secondary voltage.

Secondary voltage	
Minimum value	1
Maximum value	999

Press key to access the next programming step.

6.3.- PRIMARY CURRENT

Note: *Parameter not available in model **CVM-C11-FLEX-IN-485-ICT2**.*
The current transformer primary is programmed on this screen.

Press key ☰ for 3 seconds to edit the value. The ⚙ icon appears at the top of the screen.
To enter or modify the value, press the ☰ key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key › to modify the other values.

To validate the data, press ☰ for 3 seconds and the ⚙ icon will disappear from the display.
The programmed value will be deleted if the entered value is higher than the maximum programming value.

✓**Configuration values**

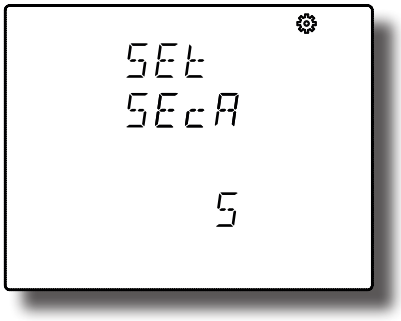
Table 24:Configuration values: Primary current.

Primary current	
Minimum value	1
Maximum value	10000

Voltage ratio x Current ratio < 600000
***Note:** The ratio is the relation between the primary and the secondary.*
Press key › to access the next programming step.

6.4.- SECONDARY CURRENT (CVM-C11-ITF-IN-xxx-ICT2 Model)

On this screen the current transformer secondary is selected.



Press key ☰ for 3 seconds to edit the value. The ⚙ icon appears at the top of the screen.
The key ☰ jumps between the possible options.
To validate the data, press ☰ for 3 seconds and the ⚙ icon will disappear from the display.

✓**Configuration values**

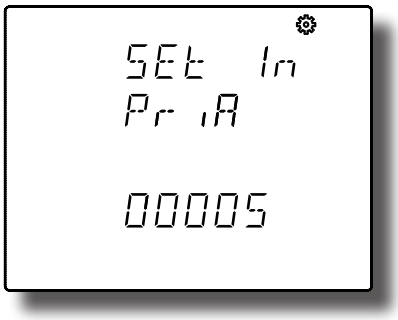
Table 25:Configuration values: Secondary current.

Secondary current	
Possible values	1 A
	5 A

Press key › to access the next programming step.

6.5.- PRIMARY NEUTRAL CURRENT

Note: *Parameter not available in model **CVM-C11-FLEX-IN-485-ICT2**.*
The neutral current transformer primary is programmed on this screen.



Press key ☰ for 3 seconds to edit the value. The ⚙ icon appears at the top of the screen.
To enter or modify the value, press the ☰ key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key › to modify the other values.

To validate the data, press ☰ for 3 seconds and the ⚙ icon will disappear from the display.
The programmed value will be deleted if the entered value is higher than the maximum programming value.

✓**Configuration values**

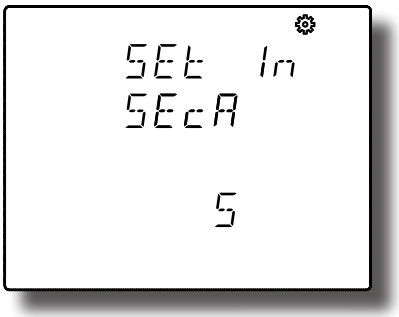
Table 26:Configuration values: Primary neutral current.

Primary neutral current	
Minimum value	1
Maximum value	10000

Press key › to access the next programming step.

6.6.- SECONDARY NEUTRAL CURRENT (CVM-C11-ITF-IN-xxx-ICT2 Model)

The neutral current transformer secondary is programmed on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

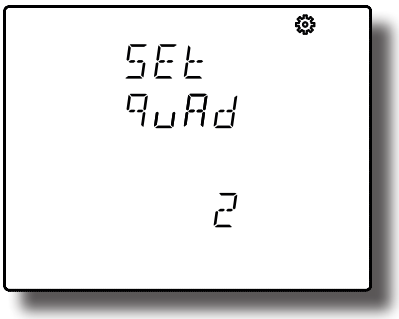
Table 27:Configuration values: Secondary neutral current.

Secondary neutral current	
Possible values	1 A
	5 A

Press key to access the next programming step.

6.7.- NUMBER OF QUADRANTS

The quadrant number on which the device takes the measurement is selected on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓Configuration values

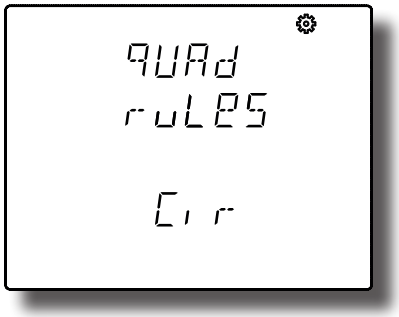
Table 28:Configuration values: Number of quadrants.

Number of quadrants	
Possible values	2, Consumption
	4, Consumption and Generation

Press key to access the next programming step.

6.8.- MEASUREMENT CONVENTION

You can select the measurement convention of the device from this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓Configuration values

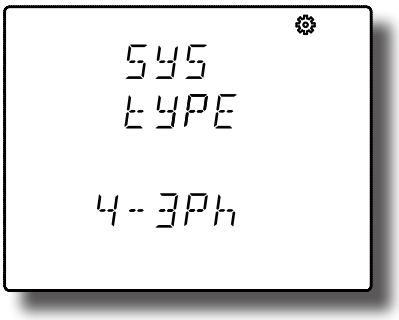
Table 29:Configuration values: Measurement convention.

Measurement convention	
Possible values	Cir **Circutor** measurement convention.
	IEC IEC 61557-12 measurement convention.
	IEEE IEEE 1459 measurement convention.

Press key to access the next programming step.

6.9.- TYPE OF INSTALLATION

The type of installation is selected on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 30:Configuration values: Type of installation.

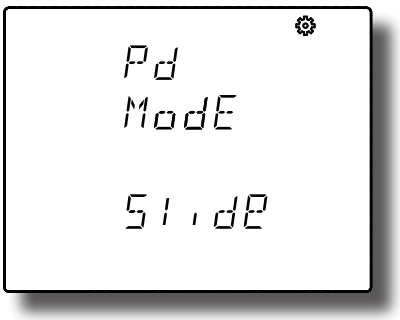
Type of installation	
Possible values	4-3Ph Three-phase network measurement with a 4-wire connection.
	3-3Ph Three-phase network measurement with a 3-wire connection.
	3-Aron Three-phase network measurement with a 3-wire connection and transformers with an ARON connection.
	3-2Ph Two-phase network measurement with a 3-wire connection.
	2-2Ph Single-phase network measurement, phase to phase, with a 2-wire connection.
	2-1Ph Single-phase network measurement, phase to neutral, with a 2-wire connection.
	3-3I T Measuring Three-Phase Networks with a 3-wire and earth connection(7)

(7) *Installation available from version C11.1005.230119 of the device.*

Press key to access the next programming step.

6.10.- TYPE OF INTEGRATION OF THE MAXIMUM DEMAND

In this screen, the type of integration to be used for the calculation of the maximum demand is selected. See ***"4.1.2.- MAXIMUM DEMAND"***.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

The key jumps between the possible options.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 31:Configuration values: Type of integration of the maximum demand.

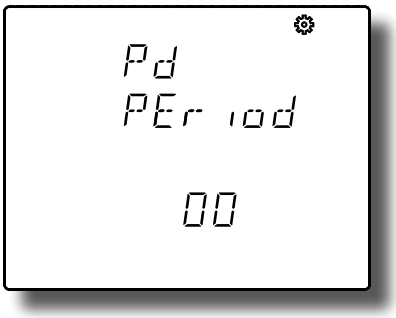
Type of integration of the maximum demand	
Possible values	SLIdE Sliding window
	FIxEd Fixed window

Note: *When modifying the type of integration, the device restarts the calculation of the maximum demand.*

Press key to access the next programming step.

6.11.- MAXIMUM DEMAND INTEGRATION PERIOD

The maximum demand integration period is programmed in minutes on this screen. See ***"4.1.2.- MAXIMUM DEMAND".***



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

To validate the data, press for 3 seconds and the icon will disappear from the display.
The programmed value will be deleted if the entered value is higher than the maximum programming value.

✓**Configuration values**

Table 32:Configuration values: Maximum demand integration period.

Maximum demand integration period	
Minimum value	0
Maximum value	60

Note: *Programming the value* ***0*** *disables the calculation of the maximum demand.*
Note: *When modifying the integration period, the device restarts the calculation of the maximum demand.*

Press key to access the next programming step.

6.12.- DELETING MAXIMUM DEMAND

On this screen you select whether or not to delete the maximum demand.

Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 33:Configuration values: Deleting maximum demand.

Deleting maximum demand	
Possible values	Yes
	No

Press key to access the next programming step.

6.13.- THD CALCULATION

In this screen the calculation method of the Total Harmonic Distortion (THD) is selected. See ***"4.1.1.- THD CALCULATION"***.

Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

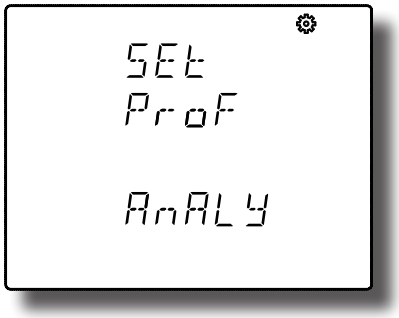
Table 34:Configuration values: THD calculation.

THD calculation	
Possible values	tHd Calculation using the effective value (RMS).
	THd Calculation using the fundamental value.

Press key to access the next programming step.

6.14.- SELECTING THE OPERATION PROFILE

The device's operation profile is selected on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 35:Configuration values: Operation profile.

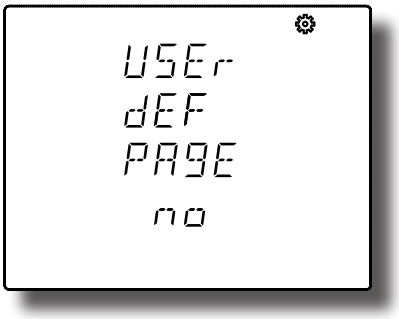
Operation profile	
Possible values	AnALY Analyzer profile.
	E3 Electrical energy efficiency profile, **e**^{3},
	USEr User profile

Press key to access the next programming step.

6.14.1.- SELECTING THE SCREENS THAT WILL BE DISPLAYED

Note: *The following screen is displayed if you have selected the USEr profile.*

This screen is used to select whether the device's display screens are defined by the user or not.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 36:Configuration values: Selecting the screens that will be displayed.

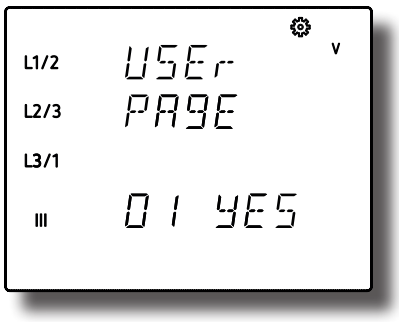
Selecting the screens that will be displayed	
Possible values	**Yes**, the display screens are those that were stored in previous programming settings of the device. (In the case of new devices, these will be the same as those of the **analyzer** profile)
	No, the display screens are selected.

Press key to access the next programming step.

6.14.2.- SELECTING THE SCREENS

Note: *The following screen is displayed if you have selected the USEr profile. And* ***No*** *has been selected in,* ***"6.14.1.- SELECTING THE SCREENS THAT WILL BE DISPLAYED"****.*

This screen displays the first screen of the **analyzer** profile, *Phase-phase Voltage* and the **user** profile viewing option can be selected.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 37:Configuration values: Selecting the screens.

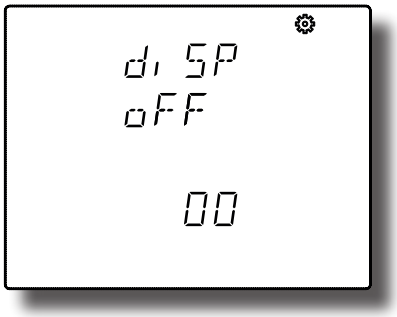
Selecting the screens	
Possible values	**Yes,** to display the screen in the user menu.
	No, to stop displaying the screen.

Press key to access the next programming step.

This programming step is repeated for each one of the 19 screens of the device.

6.15.- BACKLIGHT, TURNING ON THE BACKLIT DISPLAY

The time that the Backlight will stay lit (in seconds) is programmed on this screen after the last keystroke on the device.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

To validate the data, press for 3 seconds and the icon will disappear from the display.
The programmed value will be deleted if the entered value is higher than the maximum programming value.

✓**Configuration values**

Table 38:Configuration values: Backlight.

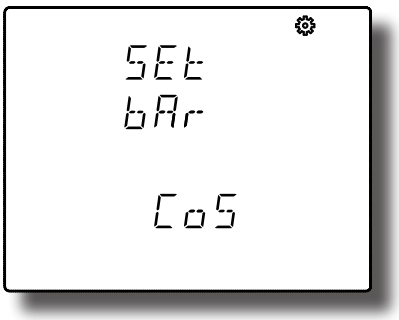
Backlight	
Minimum value	0 seconds.
Maximum value	99 seconds.

Note: *The value **00** indicates that the backlight will stay permanently lit.*

Press key to access the next programming step.

6.16.- DISPLAY SELECTION cos φ - PF

In this screen it is selected what is going to be visualized in the icon, cos PF , the **Cos** φ or the **PF**, power factor.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

The key jumps between the possible options.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 39:Configuration values: Display selection cos φ - PF.

Display selection cos φ - PF	
Possible values	CoS, Displaying the cos φ.
	PF, Displaying the Power Factor

Press key to access the next programming step.

6.17.- DELETING MAXIMUM AND MINIMUM VALUES

On this screen you select whether or not to delete the maximum and minimum values.

Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

The key jumps between the possible options.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓Configuration values

Table 40:Configuration values: Deleting maximum and minimum values.

Deleting maximum and minimum values	
Possible values	Yes
	No

Press key to access the next programming step.

6.18.- DELETING ENERGY VALUES

On this screen you select whether or not to delete the energy values.

Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

The key jumps between the possible options.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓Configuration values

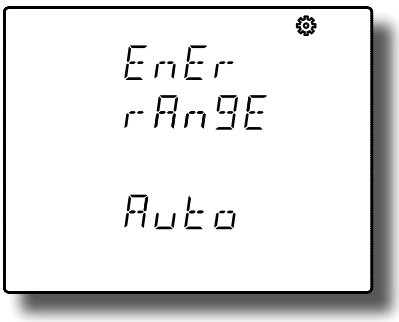
Table 41:Configuration values: Deleting energy values.

Deleting energy values	
Possible values	Yes
	No

Press key to access the next programming step.

6.19.- SELECTING THE RANGE OF ENERGIES

The operation of the range of energy is selected on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 42:Configuration values: Selecting the range of energies.

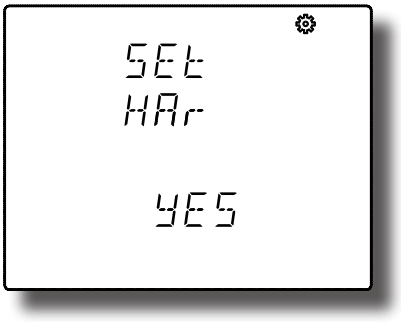
Selecting the range of energies	
Possible values	AUtO The device displays the kWh and MWh. When the energy value reaches 999999kWh, the device automatically selects the MWh range.
	Short The device only displays the KWh. When the energy value reaches 999999kWh, the device resets the measurement to 0kWh.

Press key to access the next programming step.

To validate the change in the energy range, it is necessary to delete the energy values ("6.18.-DELETING ENERGY VALUES").

6.20.- ACTIVATING THE HARMONICS DISPLAY SCREEN

This screen is used to select whether harmonics are displayed or not.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

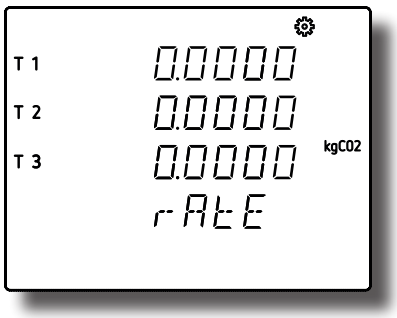
Table 43:Configuration values: Harmonics display.

Harmonics display	
Possible values	Yes
	No

Press key to access the next programming step.

6.21.- $kgCO_2$ CARBON EMISSION RATIO OF CONSUMED ENERGY

The carbon emissions ratio is the amount of emissions released into the atmosphere to produce a unit of electricity (1 kWh). The ratio for the European mix is approximately 0.65 $kgCO_2$ per kWh.
The emission ratio of the 3 tariffs of the device, T1, T2 and T3, is programmed on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.
Press key to browse the different tariffs.
To validate the data, press for 3 seconds and the icon will disappear from the display.
The programmed value will be deleted if the entered value is higher than the maximum programming value.

✓**Configuration values**

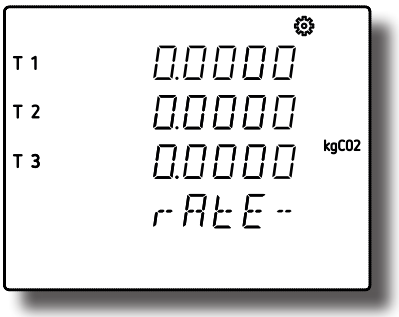
Table 44:Configuration values: emission ratio, consumed energy.

Emission ratio, consumed energy	
Minimum value	0
Maximum value	1.9999

Press key to access the next programming step.

6.22.- $kgCO_2$ CARBON EMISSION RATIO OF GENERATED ENERGY

The carbon emissions ratio is the amount of emissions released into the atmosphere to produce a unit of electricity (1 kWh). The ratio for the European mix is approximately 0.65 $kgCO_2$ per kWh.
The emission ratio of the 3 tariffs of the device, T1, T2 and T3, is programmed on this screen.



Press key ☰ for 3 seconds to edit the value. The ⚙ icon appears at the top of the screen.
To enter or modify the value, press the ☰ key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key › to modify the other values.
Press key ‹ to browse the different tariffs.
To validate the data, press ☰ for 3 seconds and the ⚙ icon will disappear from the display.
The programmed value will be deleted if the entered value is higher than the maximum programming value.

✓**Configuration values**

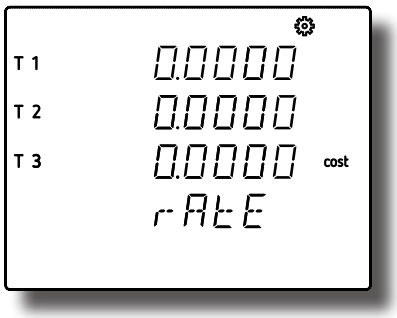
Table 45:Configuration values: emission ratio, generated energy.

Emission ratio, generated energy	
Minimum value	0
Maximum value	1.9999

Press key › to access the next programming step.

6.23.- COST RATIO OF CONSUMED ENERGY

The cost per kWh of electricity of the three tariffs of the device is calculated on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.
Press key to browse the different tariffs.
To validate the data, press for 3 seconds and the icon will disappear from the display.
The programmed value will be deleted if the entered value is higher than the maximum programming value.

✓**Configuration values**

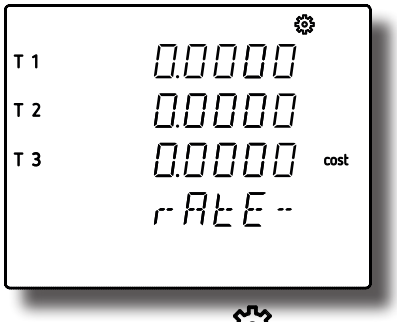
Table 46:Configuration values: cost ratio, consumed energy.

Cost ratio, consumed energy	
Minimum value	0
Maximum value	1.9999

Press key to access the next programming step.

6.24.- COST RATIO OF GENERATED ENERGY

The cost per kWh of electricity of the three tariffs of the device is calculated on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

Press key to browse the different tariffs.

To validate the data, press for 3 seconds and the icon will disappear from the display.
The programmed value will be deleted if the entered value is higher than the maximum programming value.

✓**Configuration values**

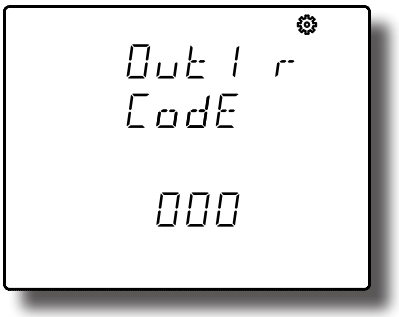
Table 47:Configuration values: cost ratio, generated energy.

Cost ratio, generated energy	
Minimum value	0
Maximum value	1.9999

Press key to access the next programming step.

6.25.- PROGRAMMING THE ALARM RELAY 1

In this step, all the values corresponding to alarm relay 1 are programmed.
The variable code is selected on this screen, depending on **Table 48** and **Table 49,** which will control alarm relay 1.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

When you enter the code of a variable on the display, the symbols for that variable will be activated.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Note: *Set the value to* ***000*** *if you do not wish to program a variable.*

Table 48: Parameter codes used to program the outputs.

Parameter	Phase	Code	Phase	Code	Phase	Code	Phase	Code
Phase-Neutral Voltage	L1	01	L2	09	L3	17	-	-
Current	L1	02	L2	10	L3	18	-	-
Active power	L1	03	L2	11	L3	19	III	25
Inductive Reactive Power	L1	04	L2	12	L3	20	III	26
Capacitive Reactive Power	L1	05	L2	13	L3	21	III	27
Apparent power	L1	06	L2	14	L3	22	III	28
Power factor	L1	07	L2	15	L3	23	III	29
Cosine φ	L1	08	L2	16	L3	24	III	30
% THD V	L1	36	L2	37	L3	38	-	-
% THD A	L1	39	L2	40	L3	41	-	-
Phase-Phase Voltage	L1/2	32	L2/3	33	L3/1	34	-	-
Frequency	-	31	-	-	-	-	-	-
Neutral current	-	35	-	-	-	-	-	-
Maximum current demand	L1	45	L2	46	L3	47	III	44
Active Power Maximum Demand	-	-	-	-	-	-	III	42
Apparent Power Maximum Demand	-	-	-	-	-	-	III	43
Inductive Reactive Power Maximum Demand	-	-	-	-	-	-	III	132
Capacitive Reactive Power Maximum Demand	-	-	-	-	-	-	III	133

In addition, there are some parameters (**Table 49**) that refer to the three phases at the same time (OR function). If you have selected one of these variables, the alarm will be activated when any of the three phases meets the programmed conditions.

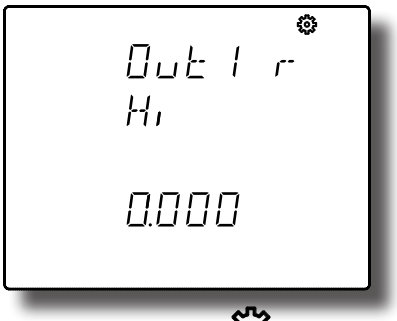
Table 49: Multiple parameter codes for alarm programming.

Types of parameters	Code
Phase-Neutral Voltage	200
Current	201
Active power	202
Inductive Reactive Power	203
Capacitive Reactive Power	204
Power factor	205
Phase-Phase Voltage	206
% THD V	207
% THD A	208
Apparent Power	209

Press key  to access the next programming step.

6.25.1.- MAXIMUM VALUE

On this screen, the value above which the alarm is activated is programmed.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

In the case of some parameters (**Table 50**), you can modify the position of the decimal point. To do so, press key after modifying the last digit and the decimal point will start flashing.

Press key repeatedly to modify the position of the decimal point.

When the decimal point is in the desired position, press the key to end the programming, pressing now the key we can set a positive or negative value.

Note: *Pay special attention when programming the Generation Power (displayed with negative values).*
Example: *If you wish to enter a generation power alarm with limits between 2 kW and 1 kW, program the following as the* ***maximum value*** *: - 1 kW and the following as the* ***minimum value*** *: - 2 kW.*

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

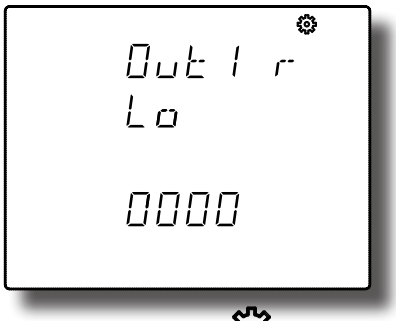
Table 50: Decimal point and units of the alarm parameters.

Types of parameters	Units	Decimal point
Voltage	2000 kV 200.0 kV 20.00 kV 2.000 kV	Programmable
Current	A	Programmable
Frequency	Hz	Fixed
Power	kW	Programmable
Power factor	PF	Fixed
Cosine φ	φ	Fixed
Maximum current demand	A	Programmable
Maximum power demand	kW	Programmable
THD	%	Fixed

Press key to access the next programming step.

6.25.2.- MINIMUM VALUE

On this screen, the value below which the alarm is activated is programmed.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.
When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.
In the case of some parameters (**Table 48**), you can modify the position of the decimal point. To do so, press key after modifying the last digit and the decimal point will start flashing.

Press key repeatedly to modify the position of the decimal point.

When the decimal point is in the desired position, press the key to end the programming, pressing now the key we can set a positive or negative value.

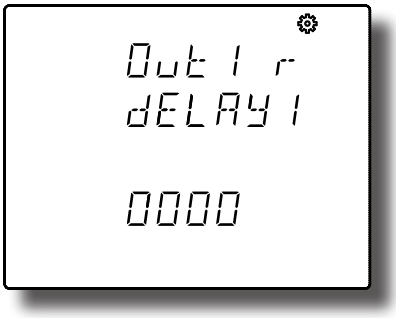
Note: *Pay special attention when programming the Generation Power (displayed with negative values).*
Example: *If you wish to enter a generation power alarm with limits between 2 kW and 1 kW, program the following as the* ***maximum value*** *: - 1 kW and the following as the* ***minimum value*** *: - 2 kW.*

To validate the data, press for 3 seconds and the icon will disappear from the display.

Press key to access the next programming step.

6.25.3.- CONNECTION TIME DELAY

The alarm connection delay is programmed on this screen in seconds.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

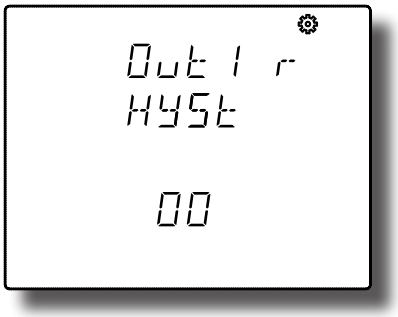
Table 51:Configuration values: Connection time delay.

Connection time delay	
Minimum value	0 seconds
Maximum value	9999 seconds

Press key to access the next programming step.

6.25.4.- HYSTERESIS VALUE

The hysteresis value, i.e., difference between the alarm connection and disconnection value, in %, is programmed on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

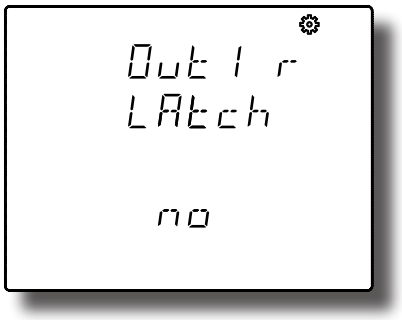
Table 52:Configuration values: Hysteresis value.

Hysteresis value	
Minimum value	0 %
Maximum value	99 %

Press key to access the next programming step.

6.25.5.- LATCH

The latch is selected on this screen, i.e., if the alarm is interlocked after it has been tripped, even when the condition that triggered it has disappeared.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

The key jumps between the possible options.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 53:Configuration values: Latch.

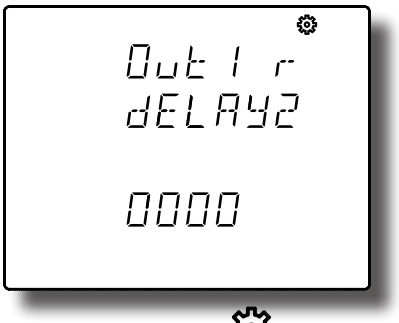
Latch	
Possible values	Yes
	No

Note: *If the device is reset, the status of alarms is deleted and all alarms will return to the programmed standby status, provided that the condition that triggered them has been resolved.*

Press key to access the next programming step.

6.25.6.- DISCONNECTION DELAY

The alarm disconnection delay is programmed on this screen in seconds.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓Configuration values

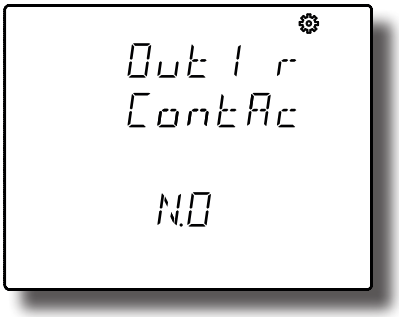
Table 54:Configuration values: Disconnection delay.

Disconnection delay	
Minimum value	0 seconds
Maximum value	9999 seconds

Press key to access the next programming step.

6.25.7.- CONTACT STATUS

The status of relay contacts is selected on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓Configuration values

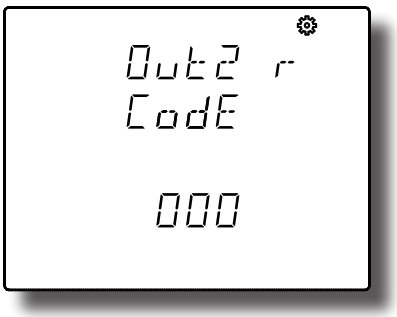
Table 55:Configuration values: Contact status.

Contact status	
Possible values	nO Normally open contact.
	nC Normally closed contact.

Press key to access the next programming step.

6.26.- PROGRAMMING THE ALARM RELAY 2

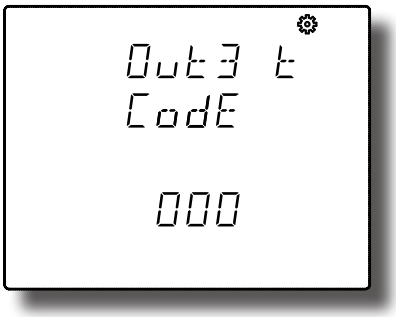
In this step, all the values corresponding to alarm relay 2 are programmed.



They are programmed as in the case of alarm relay 1, see *"6.25.- PROGRAMMING THE ALARM RELAY 1"*.

6.27.- PROGRAMMING ALARM 3 (DIGITAL OUTPUT T1)

All values for digital output T1 are programmed on this screen.
The variable code is selected on this screen, depending on **Table 48, Table 49** and **Table 56,** which will control digital output T1.



Press key ☰ for 3 seconds to edit the value. The ⚙ icon appears at the top of the screen.
To enter or modify the value, press the ☰ key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key › to modify the other values.

When you enter the code of a variable on the display, the symbols for that variable will be activated.
To validate the data, press ☰ for 3 seconds and the ⚙ icon will disappear from the display.

✓**Configuration values**

Note: *Set the value to* ***000*** *if you do not wish to program a variable.*

Table 56: Parameter codes used to program digital outputs.

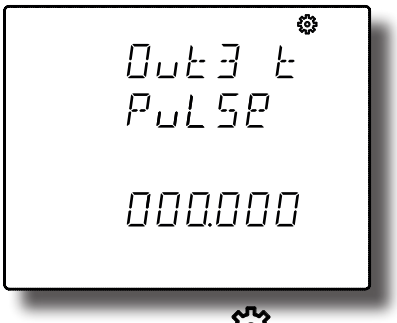
Parameter	Tariff	Code	Tariff	Code	Tariff	Code	Tariff	Code
Consumed Active Energy	T1	49	T2	70	T3	91	total	112
Generated Active Energy	T1	59	T2	80	T3	101	total	122
Consumed Inductive Reactive Energy	T1	51	T2	72	T3	93	total	114
Generated Inductive Reactive Energy	T1	61	T2	82	T3	103	total	124
Consumed Capacitive Reactive Energy	T1	53	T2	74	T3	95	total	116
Generated Capacitive Reactive Energy	T1	63	T2	84	T3	105	total	126
Consumed Apparent Energy	T1	55	T2	76	T3	97	total	118
Generated Apparent Energy	T1	65	T2	86	T3	107	total	128
Consumed CO_2 Emissions	T1	56	T2	77	T3	98	total	119
Generated CO_2 Emissions	T1	66	T2	87	T3	108	total	129
Consumption Cost	T1	57	T2	78	T3	99	total	120
Generation Cost	T1	67	T2	88	T3	109	total	130
No. of hours	T1	68	T2	89	T3	110	total	131

If you have selected a parameter from **Table 48** or **Table 49** the subsequent programming steps are the same as for alarm relay 1, see (***"6.25.- PROGRAMMING THE ALARM RELAY 1"***).

If you have selected a parameter from **Table 56,** the subsequent programming steps are:

6.27.1.- KILOWATTS PER PULSE

In this section, the kilowatts per pulse of digital output T1 are programmed.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

The programmed value will be deleted if the entered value is higher than the maximum programming value.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 57:Configuration values: Kilowatts per pulse.

	Energy	CO_2 Emissions	Cost	No. of hours
Minimum value	000.000 kWh	00000.0 kWh	00000.0 kWh	00000.0 kWh
Maximum value	999.999 kWh	99999.9 kWh	99999.9 kWh	99999.9 kWh

Example: *To program 500 Wh per pulse: 000.500*
To program 1.5 kWh per pulse: 00 1.500

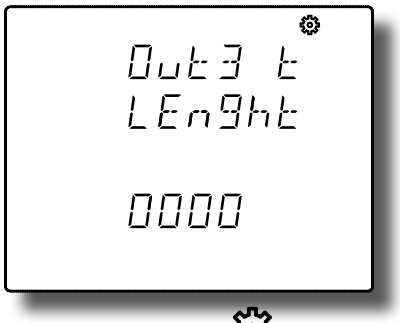
Press key to access the next programming step.

Note: *The device generates a pulse following the following formula:*

$$\text{Pulse: } \left(\frac{\text{Parameter (W)}}{3600}\right) \times \left(\frac{\text{Pulse width} + 30}{1000}\right)$$

6.27.2.- PULSE WIDTH

The width of the pulse is selected on this screen in ms.



Press key ☰ for 3 seconds to edit the value. The ⚙ icon appears at the top of the screen.

To enter or modify the value, press the ☰ key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key › to modify the other values.

The programmed value will be deleted if the entered value is higher than the maximum programming value.

To validate the data, press ☰ for 3 seconds and the ⚙ icon will disappear from the display.

✓**Configuration values**

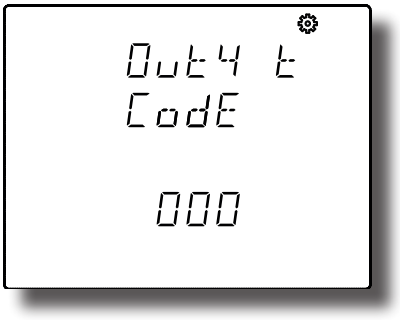
Table 58:Configuration values: Pulse width.

Pulse width	
Minimum value	30 ms
Maximum value	400 ms

Press key › to access the next programming step.

6.28.- PROGRAMMING ALARM 4 (DIGITAL OUTPUT T2)

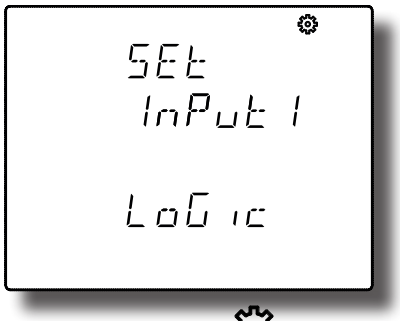
All values for digital output T2 are programmed on this screen.



The programming is the same as for digital output T1, see *"6.27.- PROGRAMMING ALARM 3 (DIGITAL OUTPUT T1)"*.

6.29.- OPERATING MODE OF DIGITAL INPUT 1

The function of digital input 1 is selected on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

The key jumps between the possible options.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 59:Configuration values: Operating mode of digital input 1.

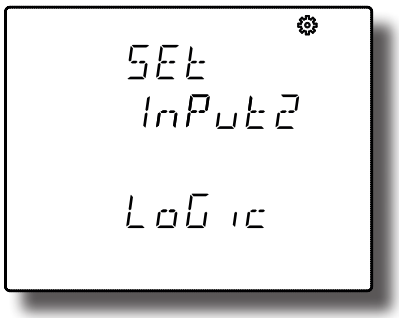
Operating mode of digital input 1	
Possible values	LoG ic Logic input
	tAr iFF Tariff selection.
	PuLSE Maximum Demand Synchronism Pulse

Note: *When generating the synchronism pulse of the Maximum Demand, the device restarts the calculation of the maximum demand.*

Press key to access the next programming step.

6.30.- OPERATING MODE OF DIGITAL INPUT 2

The function of digital input 2 is selected on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

The key jumps between the possible options.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓Configuration values

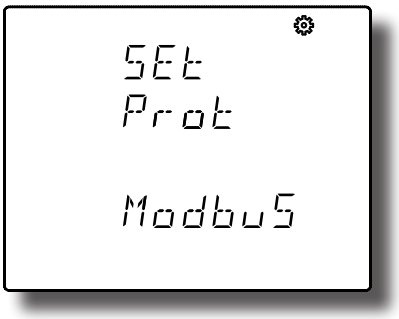
Table 60:Configuration values: Operating mode of digital input 2.

Operatinf mode of digital input 2	
Possible values	Lo9 ic Logic input
	tAr iFF Tariff selection.

Press key to access the next programming step.

6.31.- RS-485 COMMUNICATIONS: PROTOCOL

The RS-485 communications protocol is selected on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓Configuration values

Table 61:Configuration values: RS-485: Protocol.

RS-485: Protocol	
Possible values	Modbus
	BACnet [8]

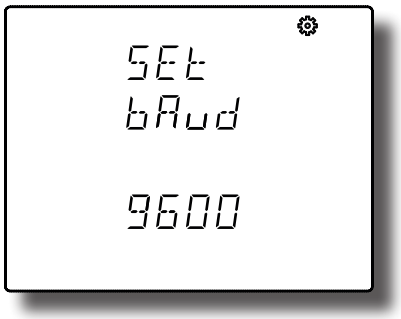
[8] Not available for model **CVM-C11-ITF-IN-ETH-ICT2.** This model has Ethernet communications with Modbus TCP or BACnet protocol, see ***"7.- CONFIGURATION OF ETHERNET COMMUNICATIONS".***

Note: *The device will restart after exiting the setup menu if the RS-485 communications parameters have been modified.*

Press key to access the next programming step.

6.32.- MODBUS PROTOCOL: BAUD RATE

Note: *Screen visible if the Modbus protocol has been programmed,* ***"6.31.- RS-485 COMMUNICATIONS: PROTOCOL".***
The baud rate of Modbus communications is programmed on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

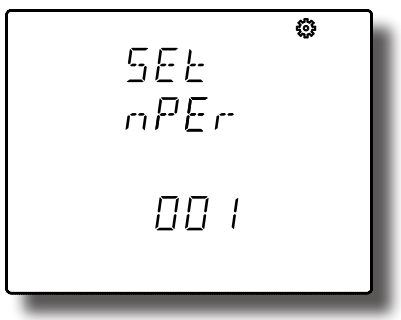
Table 62:Configuration values: Modbus, Baud rate.

Modbus: Baud rate	
Possible values	9600 bauds
	19200 bauds
	38400 bauds

Press key to access the next programming step.

6.33.- MODBUS PROTOCOL: PERIPHERAL NUMBER

Note: *Screen visible if the Modbus protocol has been programmed,* ***"6.31.- RS-485 COMMUNICATIONS: PROTOCOL".***
The peripheral number is programmed on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

The programmed value will be deleted if the entered value is higher than the maximum programming value.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 63:Configuration values: Peripheral number.

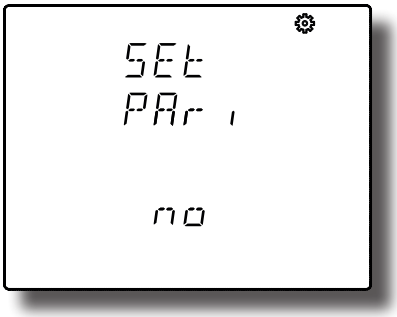
Peripheral number	
Minimum value	1
Maximum value	255

Press key to access the next programming step.

6.34.- MODBUS PROTOCOL: PARITY

Note: *Screen visible if the Modbus protocol has been programmed,* ***"6.31.- RS-485 COMMUNICATIONS: PROTOCOL".***

The type of parity of Modbus communications is selected on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

The key jumps between the possible options.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

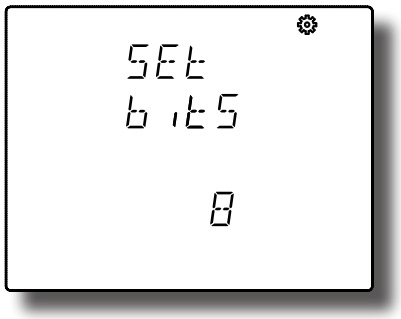
Table 64:Configuration values: Modbus, Parity.

Modbus: Parity	
Possible values	no no parity
	EuEn even parity.
	odd odd parity.

Press key to access the next programming step.

6.35.- MODBUS PROTOCOL: NUMBER OF DATA BITS

Note: *Screen visible if the Modbus protocol has been programmed,* ***"6.31.- RS-485 COMMUNICATIONS: PROTOCOL".***
The number of data bits of Modbus communications are programmed on this screen.

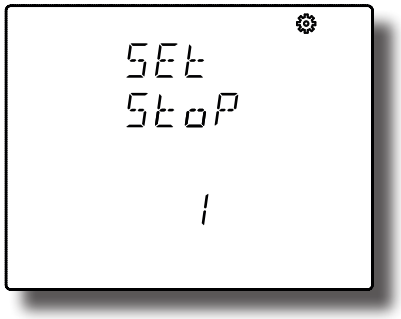


Note: *This parameter cannot be modified.*

Press key to access the next programming step.

6.36.- MODBUS PROTOCOL: NUMBER OF STOP BITS

Note: *Screen visible if the Modbus protocol has been programmed,* ***"6.31.- RS-485 COMMUNICATIONS: PROTOCOL".***
The number of Stop bits of Modbus communications are programmed on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

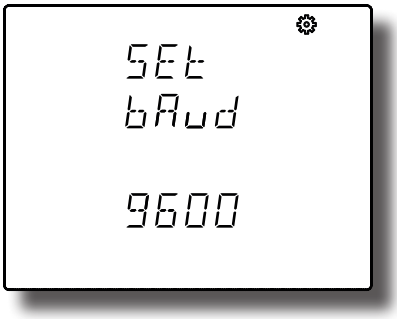
Table 65:Configuration values: No of stop bits.

Modbus: No of stop bits	
Possible values	1 bits
	2 bits

Press key to access the next programming step.

6.37.- BACnet PROTOCOL: BAUD RATE

Note: *Not available for model* ***CVM-C11-ITF-IN-ETH-ICT2.***
Note: *Screen visible if the BACnet protocol has been programmed,* ***"6.31.- RS-485 COMMUNICATIONS: PROTOCOL".***
The baud rate of BACnet communications is programmed on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

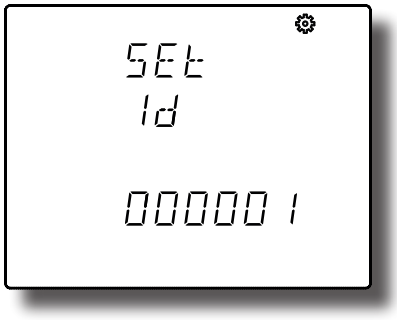
Table 66:Configuration values: BACnet, baud rate.

BACnet: Baud rate	
Possible values	9600 bauds
	19200 bauds
	38400 bauds

Press key to access the next programming step.

6.38.- BACnet PROTOCOL: DEVICE ID

Note: *Not available for model* ***CVM-C11-ITF-IN-ETH-ICT2.***
Note: *Screen visible if the BACnet protocol has been programmed,* ***"6.31.- RS-485 COMMUNICATIONS: PROTOCOL".***
The device ID is programmed on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

The programmed value will be deleted if the entered value is higher than the maximum programming value.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

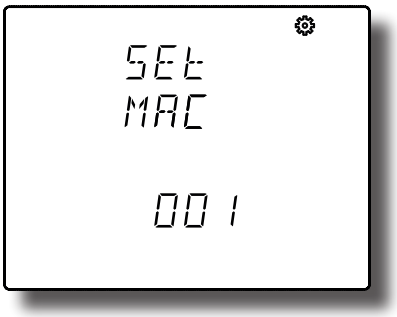
Table 67:Configuration values: BACnet, device ID.

BACnet: Device ID	
Minimum value	0
Maximum value	999999

Press key to access the next programming step.

6.39.- BACnet PROTOCOL: MAC ADDRESS

Note: *Not available for model* ***CVM-C11-ITF-IN-ETH-ICT2.***
Note: *Screen visible if the BACnet protocol has been programmed,* ***"6.31.- RS-485 COMMUNICATIONS: PROTOCOL".***
The MAC address is programmed on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

The programmed value will be deleted if the entered value is higher than the maximum programming value.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓Configuration values

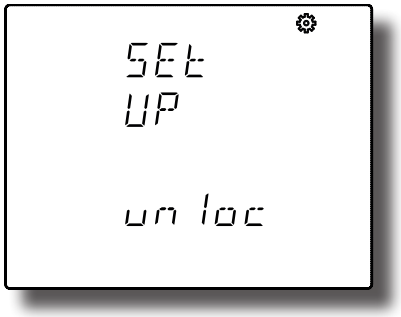
Table 68:Configuration values: BACnet, MAC address.

BACnet: MAC address	
Minimum value	0
Maximum value	255

Press key to access the next programming step.

6.40.- LOCKING THE PROGRAMMING

This screen is for protecting the data configured in the programming menu.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓Configuration values

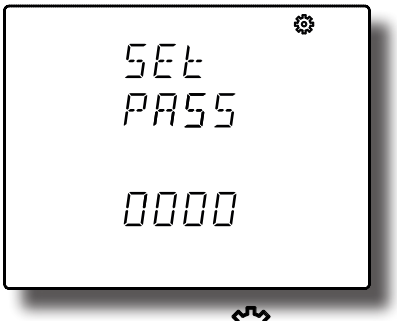
Table 69:Configuration values: Locking the programming.

Locking the programming	
Possible values	Unl oc When you enter the programming menu you can view and modify the programming.
	l oc When you enter the programming you can view the programming but not modify it. Icon indicates the locking status.

Press key to access the next programming step.

6.40.1.- PASSWORD

Note: *Screen visible if the programming lock has been activated,* l oc, ***"6.40.- LOCKING THE PROGRAMMING".***
On this screen you enter the password for locking and unlocking the programming.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values.

The programmed value will be deleted if the entered value is higher than the maximum programming value.

To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 70:Configuration values: Password.

Password	
Default value	1234

This value may only be modified through communications. See "***8.3.9.18. Password configuration.***"

Press the key to exit the setup menu.

Note: *The device will restart after exiting the setup menu if the RS-485 communications parameters have been modified.*

7.- CONFIGURATION OF ETHERNET COMMUNICATIONS

Note: *Ethernet communications are available on model* ***CVM-C11-ITF-IN-ETH-ICT2****.*

To enter the configuration menu you must press the keys for 3 seconds.

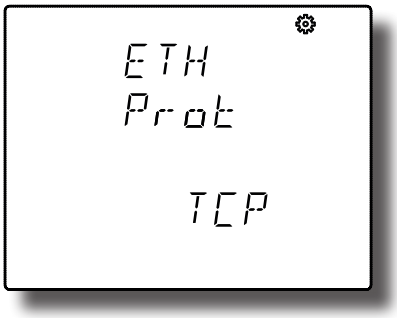
To exit the configuration menu, press the key for 3 seconds.

If a reset is performed before validation or no key is pressed for 30 seconds, the configuration made is not stored in memory.

Note: *In the annex* ***"ANNEX B.- ETHERNET CONFIGURATION MENUS"*** *you can view the configuration tree.*

7.1.- PROTOCOL

On this screen the Ethernet communications protocol is selected.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 71:Configuration values: Protocol.

Protocolo	
Possible values	TCP, Modbus TCP
	bAC, BACnet

Press key to access the next programming step.

7.2.- MODBUS TCP PROTOCOL: DHCP

Note: *Screen visible if the* ***Modbus TCP*** *protocol has been programmed,* ***"7.1.- PROTOCOL".***

On this screen you select whether or not to enable DHCP. If DHCP enable is selected (default setting), the IP address is assigned dynamically through a central server and no further parameters need to be configured.

Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
The key jumps between the possible options.
To validate the data, press for 3 seconds and the icon will disappear from the display.

✓**Configuration values**

Table 72:Configuration values: Modbus TCP, DHCP.

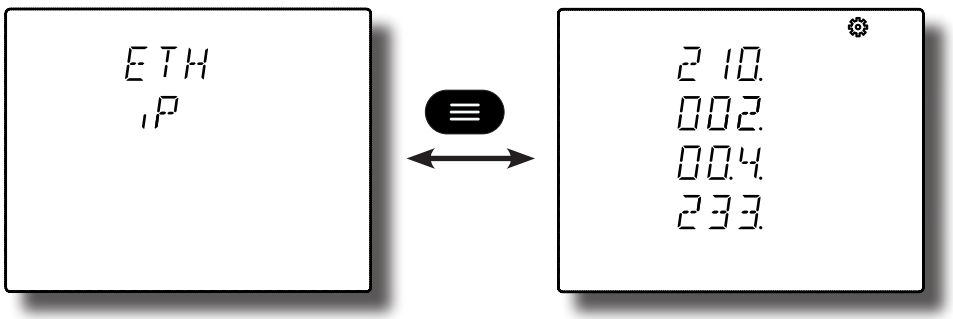
Modbus TCP: DHCP	
Possible values	YES, DHCP enabled
	no, DHCP not enabled

Press key to access the next programming step.

7.3.- MODBUS TCP PROTOCOL: IP ADRESS

Note: *Screen visible if the* ***Modbus TCP*** *protocol has been programmed,* ***"7.1.- PROTOCOL".***

This screen configures (DHCP not enabled) or displays the IP address.



Press the key to display the value.

Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values. The key jumps to the previous digit.

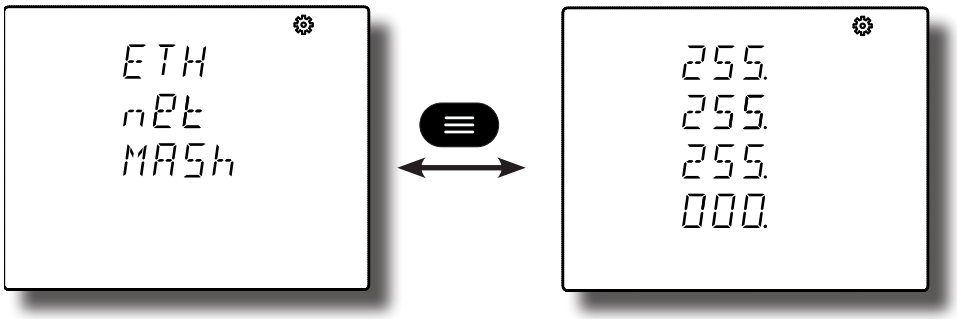
To validate the data, press for 3 seconds and the icon will disappear from the display.

Press key to access the next programming step.

7.4.- MODBUS TCP PROTOCOL: MASK

Note: *Screen visible if the* ***Modbus TCP*** *protocol has been programmed,* ***"7.1.- PROTOCOL".***

On this screen the IP mask is configured (DHCP not enabled) or displayed.



Press the key to display the value.
Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

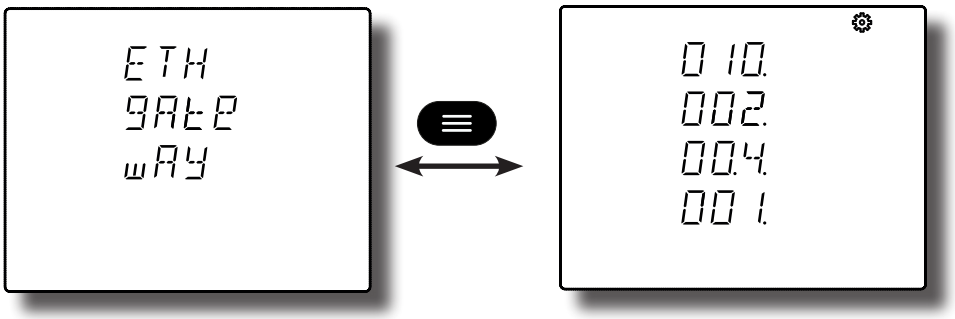
When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values. The key jumps to the previous digit.
To validate the data, press for 3 seconds and the icon will disappear from the display.

Press key to access the next programming step.

7.5.- MODBUS TCP PROTOCOL: GATEWAY

Note: *Screen visible if the* ***Modbus TCP*** *protocol has been programmed,* ***"7.1.- PROTOCOL".***

This screen configures (DHCP not enabled) or displays the gateway for Ethernet communications.



Press the key to display the value.

Press key for 3 seconds to edit the value. The icon appears at the top of the screen.

To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values. The key jumps to the previous digit.

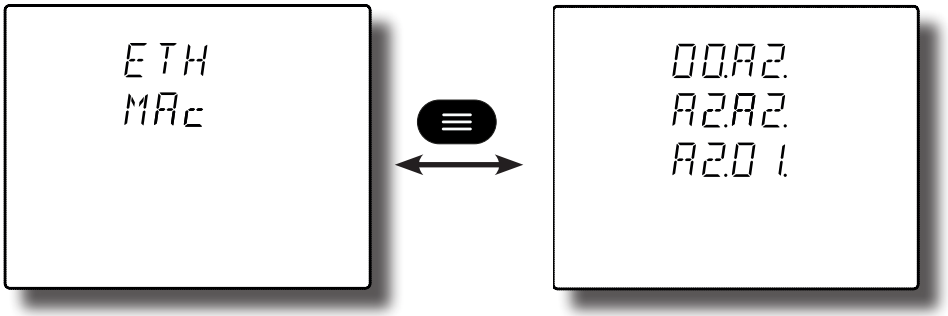
To validate the data, press for 3 seconds and the icon will disappear from the display.

Press key to access the next programming step.

7.6.- MODBUS TCP PROTOCOL: MAC ADRESS

Note: *Screen visible if the* ***Modbus TCP*** *protocol has been programmed,* ***"7.1.- PROTOCOL".***

This screen displays the MAC address of the device.



Press the key to display the value.

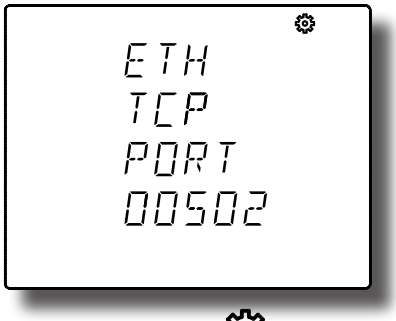
Note: *This parameter cannot be modified.*

Press key to access the next programming step.

7.7.- MODBUS TCP PROTOCOL: PORT

Note: *Screen visible if the* ***Modbus TCP*** *protocol has been programmed,* ***"7.1.- PROTOCOL".***

The Ethernet communications port is configured on this screen.



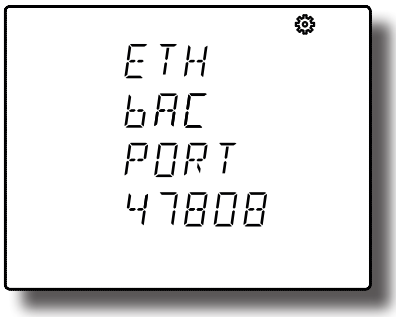
Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values. The key jumps to the previous digit.
To validate the data, press for 3 seconds and the icon will disappear from the display.
Press key to access the next programming step.

7.8.- BACNET PROTOCOL: PORT

Note: *Screen visible if the* ***BAcnet*** *protocol has been programmed,* ***"7.1.- PROTOCOL".***

The Ethernet communications port is configured on this screen.



Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values. The key jumps to the previous digit.
To validate the data, press for 3 seconds and the icon will disappear from the display.
Press key to access the next programming step.

7.9.- BACNET PROTOCOL: DEVICE ID

Note: *Screen visible if the* ***BAcnet*** *protocol has been programmed,* ***"7.1.- PROTOCOL".***

The device ID is programmed on this screen.

Press key for 3 seconds to edit the value. The icon appears at the top of the screen.
To enter or modify the value, press the key repeatedly, increasing the value of the flashing digit.

When the desired value is shown on the screen, move onto the next digit by pressing the key to modify the other values. The key jumps to the previous digit.
To validate the data, press for 3 seconds and the icon will disappear from the display.
Press key to access the next programming step.

8.- RS-485 COMMUNICATIONS

The **CVM-C11** devices have one RS-485 communications port.
The device has as standard two communications protocols: **MODBUS RTU** ® and **BACnet**.

The protocol and configuration parameters are selected in the setup menu. ("*6.31. RS-485 COMMUNICATIONS: PROTOCOL*").

8.1.- CONNECTIONS

The RS -485 cable must be wired with twisted pair cable with mesh shield, with a maximum distance between the **CVM-C11** and the master device of 1200 metres. A maximum of 32 **CVM-C11** 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.

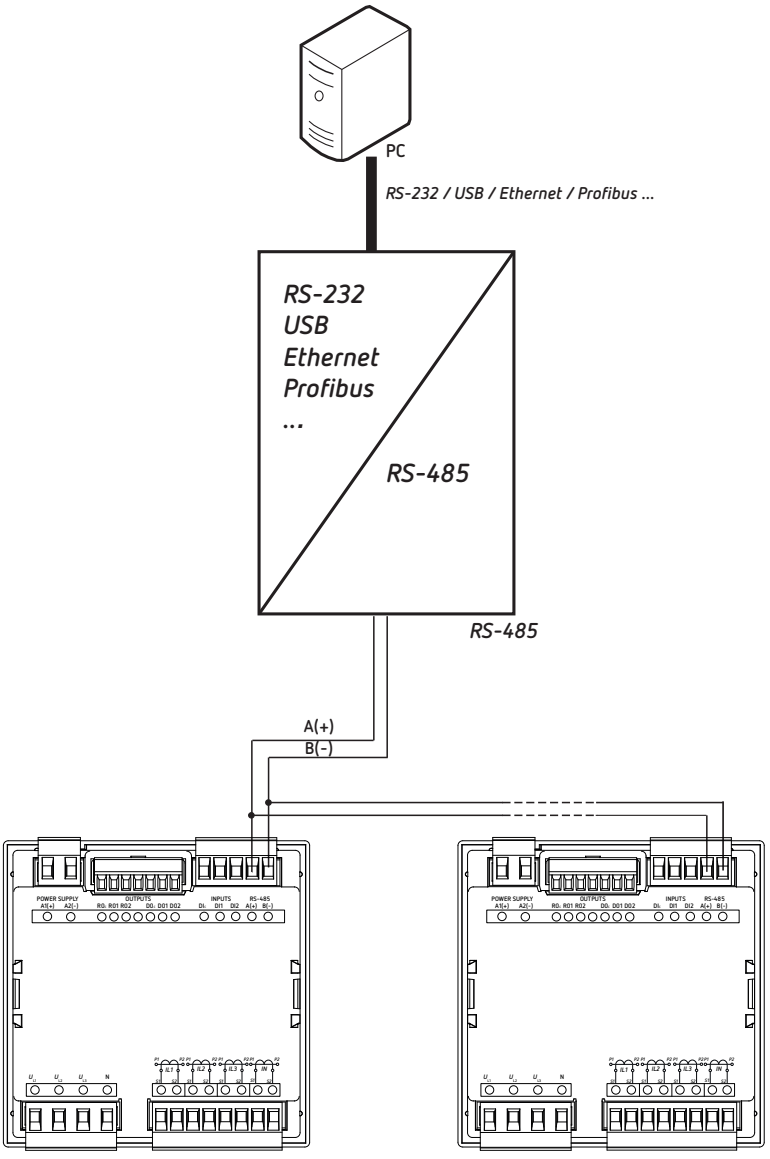


Figure 40: RS-485 Connection diagram.

8.2.- MODBUS PROTOCOL

In the Modbus protocol, the **CVM-C11** 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 a digital input.
Function 0x03 and 0x04: Reading integer logs.
Function 0x05: Writing a relay.
Function 0x10: Writing multiple logs.

8.2.1.- READING EXAMPLE: FUNCTION 0x04.

Question: Instantaneous value of the phase voltage of L1

Address	Function	Initial Register	No. of Registers	CRC
0A	04	0000	0002	70B0

Address: 0A, Peripheral number: 10 in decimals.
Function: 04, Read function.
Initial Register: 0000, on which the reading will start.
No. of Registers: 0002, number of registers read.
CRC: 70B0, CRC Character.

Response:

Address	Function	No. of Bytes	Register No. 1	Register No. 2	CRC
0A	04	04	0000	084D	8621

Address: 0A, Responding peripheral number: 10 in decimals.
Function: 04, Read function.
No. of bytes: 04, No. of bytes received.
Registers: 0000084D, value of the phase voltage of L1: VL1 x 10 : 212.5V
CRC: 8621, CRC Character.

Note: *Every Modbus frame has a maximum limit of 20 variables (40 logs).*

8.2.2.- WRITING EXAMPLE: FUNCTION 0x05.

Question: Deleting maximum and minimum values.

Address	Function	Initial Register	Value	CRC
0A	05	0834	FF00	CEEF

Address: 0A, Peripheral number: 10 in decimal.
Function: 05, Read function.
Initial Register: 0834, Register of the parameter for deleting maximum and minimum values.
Value: FF00, we indicate that we want to delete the maximum and minimum values.

CRC: CEEF, CRC character.

Response:

Address	Function	Initial Register	Value	CRC
0A	05	0834	FF00	CEEF

8.3.- MODBUS COMMANDS

All the addresses of Modbus memory are in Hexadecimal.

8.3.1.- MEASUREMENT VARIABLES

For these variables is implemented the **Function 0x03** and **0x04.**

Table 73: Modbus memory map (Table 1)

Parameter	Symbol	Instantaneous	Maximum	Minimum	Units
L1 Phase voltage	V 1	00-01	106-107	164-165	V x 10
L1 Current	A 1	02-03	108-109	166-167	mA
L1 Active Power	kW 1	04-05	10A-10B	168-169	W
L1 Inductive Power	kvarL 1	06-07	10C-10D	16A-16B	var
L1 Capacitive Power	kvarC 1	08-09	10E-10F	16C-16D	var
L1 Apparent Power	kVA 1	0A-0B	110-111	16E-16F	VA
L1 Power Factor	PF 1	0C-0D	112-113	170-171	x 100
Cos φ L1	Cos φ 1	0E-0F	114-115	172-173	x 100
L2 Phase voltage	V 2	10-11	116-117	174-175	V x 10
L2 Current	A 2	12-13	118-119	176-177	mA
L2 Active Power	kW 2	14-15	11A-11B	178-179	W
L2 Inductive Power	kvarL 2	16-17	11C-11D	17A-17B	var
L2 Capacitive Power	kvarC 2	18-19	11E-11F	17C-17D	var
L2 Apparent Power	kVA 2	1A-1B	120-121	17E-17F	VA
L2 Power Factor	PF 2	1C-1D	122-123	180-181	x 100
Cos φ L2	Cos φ 2	1E-1F	124-125	182-183	x 100
L3 Phase voltage	V 3	20-21	126-127	184-185	V x 10
L3 Current	A 3	22-23	128-129	186-187	mA
L3 Active Power	kW 3	24-25	12A-12B	188-189	W
L3 Inductive Power	kvarL 3	26-27	12C-12D	18A-18B	var
L3 Capacitive Power	kvarC 3	28-29	12E-12F	18C-18D	var
L3 Apparent Power	kVA 3	2A-2B	130-131	18E-18F	VA
L3 Power Factor	PF 3	2C-2D	132-133	190-191	x 100
Cos φ L3	Cos φ 3	2E-2F	134-135	192-193	x 100
Active Three-phase Power	kW III	30-31	136-137	194-195	W
Inductive Three-phase power	kvarL III	32-33	138-139	196-197	var
Capacitive Three-phase Power	kvarC III	34-35	13A-13B	198-199	var
Apparent three-phase power	kVA III	36-37	13C-13D	19A-19B	VA
Three-phase Power Factor	PF III	38-39	13E-13F	19C-19D	x100

Table 73 (Continuation): Modbus memory map (Table 1)

Parameter	Symbol	Instantaneous	Maximum	Minimum	Units
Three-phase Cos φ	Cos φ III	3A-3B	140-141	19E-19F	x100
L1 Frequency	Hz	3C-3D	142-143	1A0-1A1	Hz x100
L1-L2 Voltage	V12	3E-3F	144-145	1A2-1A3	V x 10
L2-L3 Voltage	V23	40-41	146-147	1A4-1A5	V x 10
L3-L1 Voltage	V31	42-43	148-149	1A6-1A7	V x 10
Neutral Current N	A N	44-45	14A-14B	1A8-1A9	mA
L1 voltage % THD	%THDV1	46-47	14C-14D	1AA-1AB	% x 100
L2 voltage % THD	%THDV2	48-49	14E-14F	1AC-1AD	% x 100
L3 voltage % THD	%THDV3	4A-4B	150-151	1AE-1AF	% x 100
L1 current % THD	%THDI1	4C-4D	152-153	1B0-1B1	% x 100
L2 current % THD	%THDI2	4E-4F	154-155	1B2-1B3	% x 100
L3 current % THD	%THDI3	50-51	156-157	1B4-1B5	% x 100
Maximum demand kW III	Md (Pd)	52-53	158-159	-	W
Maximum demand kVA III	Md (Pd)	54-55	15A-15B	-	VA
Maximum demand I AVG	Md (Pd)	56-57	15C-15D	-	mA
Maximum demand I L1	Md (Pd)	58-59	15E-15F	-	mA
Maximum demand I L2	Md (Pd)	5A-5B	160-161	-	mA
Maximum demand I L3	Md (Pd)	5C-5D	162-163	-	mA
Maximum demand kvarL III	kvarL	200-201	204-205	-	kvarL
Maximum demand kvarC III	kvarC	202-203	206-207	-	kvarC

8.3.2.- ENERGY VARIABLES

For these variables is implemented the **Function 0x03** and **0x04.**

Table 74: Modbus memory map (Table 2)

Parameter	Symbol	Tariff 1	Tariff 2	Tariff 3	Total	Units
Consumed active energy kW)	kWh III	5E-5F	88-89	B2-B3	DC-DD	kWh
Consumed active energy (W)	kWh III	60-61	8A-8B	B4-B5	DE-DF	Wh
Consumed inductive reactive energy (kvarhL)	kvarhL III	62-63	8C-8D	B6-B7	E0-E1	kvarh
Consumed inductive reactive energy (varhL)	kvarhL III	64-65	8E-8F	B8-B9	E2-E3	varh
Consumed capacitive reactive energy (kvarhC)	kvarhC III	66-67	90-91	BA-BB	E4-E5	kvarh
Consumed capacitive reactive energy (varhC)	kvarhC III	68-69	92-93	BC-BD	E6-E7	varh
Consumed apparent energy (kVAh)	kVAh III	6A-6B	94-95	BE-BF	E8-E9	kVAh
Consumed apparent energy (VAh)	kVAh III	6C-6D	96-97	C0-C1	EA-EB	VAh
Consumed CO_2 emissions	$KgCO_2$	6E-6F	98-99	C2-C3	EC-ED	x10
Consumption cost	$	70-71	9A-9B	C4-C5	EE-EF	x10
Generated active energy (kW)	kWh III	72-73	9C-9D	C6-C7	F0-F1	kWh
Generated active energy (W)	kWh III	74-75	9E-9F	C8-C9	F2-F3	Wh
Generated inductive reactive energy (kvarhL)	kvarhL III	76-77	A0-A1	CA-CB	F4-F5	kvarh
Generated inductive reactive energy (varhL)	kvarhL III	78-79	A2-A3	CC-CD	F6-F7	varh
Generated capacitive reactive energy (kvarhC)	kvarhC III	7A-7B	A4-A5	CE-CF	F8-F9	kvarh
Generated capacitive reactive energy (varhC)	kvarhC III	7C-7D	A6-A7	D0-D1	FA-FB	varh
Generated apparent energy (kVAh)	kVAh III	7E-7F	A8-A9	D2-D3	FC-FD	kVAh
Generated apparent energy (VAh)	kVAh III	80-81	AA-AB	D4-D5	FE-EF	VAh

Table 74 (Continuation): Modbus memory map (Table 2)

Parameter	Symbol	Tariff 1	Tariff 2	Tariff 3	Total	Units
Generated CO_2 emissions	$KgCO_2$	82-83	AC-AD	D6-D7	100-101	x10
Generation Cost	$	84-85	AE-AF	D8-D9	102-103	x10
Hours per tariff	Hours	86-87	B0-B1	DA-DB	104-105	sec

Table 75: Modbus memory map (Table 3)

Parameter	Tariff 1	Tariff 2	Tariff 3	Total
Number of overflows of the consumed active energy counter	2842	284A	2852	285A
Number of overflows of the consumed inductive reactive energy	2843	284B	2853	285B
Number of overflows of the consumed capacitive reactive energy	2844	284C	2854	285C
Number of overflows of the consumed apparent energy	2845	284D	2855	285D
Number of overflows of the generated active energy	2846	284E	2856	285E
Number of overflows of the generated inductive reactive energy	2847	284F	2857	285F
Number of overflows of the generated capacitive reactive energy	2848	2850	2858	2860
Number of overflows of the generated apparent energy	2849	2851	2859	2861
Number of overflows of the consumed CO_2 emissions	2862	2867	286C	2871
Number of overflows of the consumption cost	2863	2868	286D	2872
Number of overflows of the generated CO_2 emissions	2864	2869	286E	2873
Number of overflows of the generation Cost	2865	286A	286F	2874
Number of overflows of the Hours per tariff	2866	286B	2870	2875

8.3.3.- VOLTAGE AND CURRENT HARMONICS

For these variables is implemented the **Function 0x03** and **0x04.**

Table 76: Modbus memory map (Table 4).

Parameter	L1 Voltage	L2 Voltage	L3 Voltage	Units
Fundamental Harm.	A28-A29	A48-A49	A68-A69	V x 10
2nd Order harmonic	A2A	A4A	A6A	% x 10
3rd Order harmonic	A2B	A4B	A6B	% x 10
4th Order harmonic	A2C	A4C	A6C	% x 10
5th Order harmonic	A2D	A4D	A6D	% x 10
6th Order harmonic	A2E	A4E	A6E	% x 10
7th Order harmonic	A2F	A4F	A6F	% x 10
8th Order harmonic	A30	A50	A70	% x 10
9th Order harmonic	A31	A51	A71	% x 10
10th Order harmonic	A32	A52	A72	% x 10
11th Order harmonic	A33	A53	A73	% x 10
12th Order harmonic	A34	A54	A74	% x 10
13th Order harmonic	A35	A55	A75	% x 10
14th Order harmonic	A36	A56	A76	% x 10
15th Order harmonic	A37	A57	A77	% x 10
16th Order harmonic	A38	A58	A78	% x 10
17th Order harmonic	A39	A59	A79	% x 10
18th Order harmonic	A3A	A5A	A7A	% x 10
19th Order harmonic	A3B	A5B	A7B	% x 10

Table 76 (Continuation) : Modbus memory map (Table 4).

Parameter	L1 Voltage	L2 Voltage	L3 Voltage	Units
20th Order harmonic	A3C	A5C	A7C	% x 10
21st Order harmonic	A3D	A5D	A7D	% x 10
22nd Order harmonic	A3E	A5E	A7E	% x 10
23rd Order harmonic	A3F	A5F	A7F	% x 10
24th Order harmonic	A40	A60	A80	% x 10
25th Order harmonic	A41	A61	A81	% x 10
26th Order harmonic	A42	A62	A82	% x 10
27th Order harmonic	A43	A63	A83	% x 10
28th Order harmonic	A44	A64	A84	% x 10
29th Order harmonic	A45	A65	A85	% x 10
30th Order harmonic	A46	A66	A86	% x 10
31st Order harmonic	A47	A67	A87	% x 10

Table 77: Modbus memory map (Table 5).

Parameter	L1 Current	L2 Current	L3 Current	Units
Fundamental Harm.	A88-A89	AA8-AA9	AC8-AC9	mA
2nd Order harmonic	A8A	AAA	AAC	% x 10
3rd Order harmonic	A8B	AAB	ACB	% x 10
4th Order harmonic	A8C	AAC	ADC	% x 10
5th Order harmonic	A8D	AAD	ACD	% x 10
6th Order harmonic	A8E	AAE	ACE	% x 10
7th Order harmonic	A8F	AAF	ACF	% x 10
8th Order harmonic	A90	AB0	AD0	% x 10
9th Order harmonic	A91	AB1	AD1	% x 10
10th Order harmonic	A92	AB2	AD2	% x 10
11th Order harmonic	A93	AB3	AD3	% x 10
12th Order harmonic	A94	AB4	AD4	% x 10
13th Order harmonic	A95	AB5	AD5	% x 10
14th Order harmonic	A96	AB6	AD6	% x 10
15th Order harmonic	A97	AB7	AD7	% x 10
16th Order harmonic	A98	AB8	AD8	% x 10
17th Order harmonic	A99	AB9	AD9	% x 10
18th Order harmonic	A9A	ABA	ADA	% x 10
19th Order harmonic	A9B	ABB	ADB	% x 10
20th Order harmonic	A9C	ABC	ADC	% x 10
21st Order harmonic	A9D	ABD	ADD	% x 10
22nd Order harmonic	A9E	ABE	ADE	% x 10
23rd Order harmonic	A9F	ABF	ADF	% x 10
24th Order harmonic	AA0	AC0	AE0	% x 10
25th Order harmonic	AA1	AC1	AE1	% x 10
26th Order harmonic	AA2	AC2	AE2	% x 10
27th Order harmonic	AA3	AC3	AE3	% x 10
28th Order harmonic	AA4	AC4	AE4	% x 10
29th Order harmonic	AA5	AC5	AE4	% x 10

Table 77 (Continuation) : Modbus memory map (Table 5).

Parameter	L1 Current	L2 Current	L3 Current	Units
30th Order harmonic	AA6	AC6	AE6	% x 10
31st Order harmonic	AA7	AC7	AE7	% x 10

8.3.4.- DELETING PARAMETERS

The **Function 0x05** is implemented for these variables.

Table 78: Modbus memory map: Deleting parameters.

Parameters	Address	Valid data margin
Deleting energies	834	**FF00**
Deleting maximum and minimum values	838	**FF00**
Starting maximum demand	839	**FF00**
Deleting the hour counters (All tariffs)	83D	**FF00**
Deleting the maximum value of the maximum demand	83F	**FF00**
Deleting energies, maximum demand and maximum and minimum values	848	**FF00**

8.3.5.- POWER STATUS

The **Function 0x04** is implemented for this variable.
This variable indicates the quadrant in which the device is operating.

Table 79: Modbus memory map: Power status

Power status		
Variable	Address	Default value
Power status	7D1	-

The variable format is shown in **Table 80:**

Table 80: Variable format: Power status.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	**1:** Capacitive	**1:** Inductive	**1:** Generated	**1:** Consumed

8.3.6.- THE DEVICE'S SERIAL NUMBER

The **Function 0x04** is implemented for this variable.

Table 81: Modbus memory map: Serial number.

The device's serial number		
Variable	Address	Default value
Serial number	578 - 579	-
Modbus ID identifier	640	870

8.3.7.- DETECTION OF INCORRECT DIRECTION OF ROTATION

The **Function 0x04** is implemented for this variable.
This variable indicates whether an incorrect direction of rotation has been detected in the voltages.

Table 82: Modbus memory map: Detection of incorrect direction of rotation.

Detection of incorrect direction of rotation		
Variable	Address	Value
Detection of incorrect direction of rotation	7D5	**0:** No fault has been detected **1:** Fault detected

8.3.8.- STATUS OF INPUTS AND OUTPUTS

The **Function 0x01** is implemented for this variable.

Table 83: Modbus memory map: Status of the outputs.

Status of the outputs [9]		
Variable	Address	Value
Alarm relay 1	0F	**0:** Disabled - **1:** Enabled
Alarm relay 2	10	**0:** Disabled - **1:** Enabled
Digital output 1	11	**0:** Disabled - **1:** Enabled
Digital output 2	12	**0:** Disabled - **1:** Enabled

The **Function 0x02** is implemented for this variable.

Table 84: Modbus memory map: Status of digital inputs.

Status of digital inputs [9]		
Variable	Address	Value
Digital input 1	0	**0:** Disabled - **1:** Enabled
Digital input 2	1	**0:** Disabled - **1:** Enabled

[9] Variables available from version C11.1006.230203.

8.3.9.- DEVICE CONFIGURATION VARIABLES

The **Functions 0x04** and **0x10** are implemented for this variable.

The device's Modbus function does not check whether the variables recorded are within the correct margins, they are only checked when they are read from the EEPROM. So if any parameter is recorded with an incorrect value the device will be configured with its default value.
The Modbus configuration will not take effect until the device is reset.

8.3.9.1.- Transformation ratios.

Table 85: Modbus memory map: Transformation ratios.

Transformation ratios			
Configuration variable [10] [11]	Address	Valid data margin	Default value
Voltage primary	2710 - 2711	**1 - 599999**	1
Voltage secondary	2712	**1 - 999**	1
Current primary [12]	2713	**1 - 10000**	5
Current secondary [13]	2714	**1:** .../1A **5:** ../5 A	5

[10] All variables must be programmed at the same time.
[11] Voltage ratio x Current ratio < 600000.

(12) Parameter not available in model **CVM-C11-FLEX-IN-485-ICT2**.
(13) Only available for models **CVM-C11-ITF-IN-xxx-ICT2.**
Note: *The ratio is between the primary and the secondary.*

8.3.9.2.- Neutral current transformation ratios

Table 86: Modbus memory map: Neutral current transformation ratios.

Transformation ratios			
Configuration variable (14)	Address	Valid data margin	Default value
Neutral current primary (15)	271A	1 - 10000	5
Neutral current secondary (16)	271B	**1:** .../1A **5:** ../5 A	5

(14) All variables must be programmed at the same time.
(15) Parameter not available in model **CVM-C11-FLEX-IN-485-ICT2**.
(16) Only available for models **CVM-C11-ITF-IN-xxx-ICT2.**

8.3.9.3.- Number of quadrants

Table 87: Modbus memory map: Number of quadrants

Maximum demand			
Configuration variable	Address	Valid data margin	Default value
Number of quadrants	2B64	**0:** 4 quadrants **1:** 2 quadrants	0

8.3.9.4. Measurement convention

Table 88: Modbus memory map: Measurement convention.

Measurement convention			
Configuration variable	Address	Valid data margin	Default value
Measurement convention	2B86	**0:** Circutor **1:** IEC 61557-12 **2:** IEEE 1459	0

8.3.9.5.- Type of installation

Table 89: Modbus memory map: Type of installation

Type of installation			
Configuration variable	Address	Valid data margin	Default value
Type of installation	2B5C	**0:** 4-3Ph Three-phase network with 4 wires. **1:** 3-3Ph Three-phase network with 3 wires. **2:** 3-ArOn Three-phase network with 3 wires, Aron. **3:** 3-2Ph Two-phase network with 3 wires. **4:** 2-2Ph Single-phase network with 2 wires, phase-to-phase. **5:** 2-1Ph Single-phase network with 2 wires, phase-to-neutral. **6:** 3-3I T Three-phase network 3 wires and earth.(17)	0

(17) Installation available from version C11.1005.230119 of the device.

8.3.9.6.- Maximum demand

Table 90: Modbus memory map: Maximum demand

Maximum demand			
Configuration variable	Address	Valid data margin	Default value
Integration period	274C	**0**[18] **- 60** minutes	15
Type of integration	274D	**0:** Sliding window **1:** Fixed window	**0**

[18] *Programming the value **0** disables the calculation of the maximum demand.*

***Note:** When modifying the maximum demand configuration variables, the device restarts the calculation of the maximum demand.*

8.3.9.7.- THD calculation

Table 91:Modbus memory map: THD calculation.

THD calculation			
Configuration variable	Address	Valid data margin	Default value
THD calculation	2774	**0:** thd, Calculation using the effective value (RMS). **1:** THD, Calculation using the fundamental value.	0

8.3.9.8.- Operating profile

Table 92: Modbus memory map: Operating profile

Operating profile			
Configuration variable	Address	Valid data margin	Default value
Operating profile	2B60	**0:** Analyzer **1:** User **2:** Electrical energy efficiency, **e**^{3}	0

8.3.9.9.- Display backlight

Table 93: Modbus memory map: Backlight

Backlight			
Configuration variable	Address	Valid data margin	Default value
Backlight	2B5E	**0:** Always lit **0 - 99** seconds	0

8.3.9.10.- Activating the harmonics display screen

Table 94: Modbus memory map: Display of harmonics

Display of harmonics			
Configuration variable	Address	Valid data margin	Default value
Display of harmonics	2B62	**0:** No **1:** Yes	1

8.3.9.11. - CO_2 consumption and generation emissions.

Table 95: Modbus memory map: CO_2 consumption and generation emissions.

CO_2 emissions			
Configuration variable [19][20]	Address	Valid data margin	Default value
Tariff 1 consumption emissions ratio	2724	**0 - 1.9999**	0
Tariff 2 consumption emissions ratio	2725	**0 - 1.9999**	0
Tariff 3 consumption emissions ratio	2726	**0 - 1.9999**	0
Tariff 1 generation emissions ratio	2728	**0 - 1.9999**	0
Tariff 2 generation emissions ratio	2729	**0 - 1.9999**	0
Tariff 3 generation emissions ratio	272A	**0 - 1.9999**	0

[19] All variables must be programmed at the same time.

[20] They have 4 decimal place.

8.3.9.12.- Cost of energy consumption and generation.

Table 96: Modbus memory map: Cost of energy consumption and generation.

Cost per kWh			
Configuration variable [21][22]	Address	Valid data margin	Default value
Cost per kWh of tariff 1 consumption	272C	**0 - 1.9999**	0
Cost per kWh of tariff 2 consumption	272D	**0 - 1.9999**	0
Cost per kWh of tariff 3 consumption	272E	**0 - 1.9999**	0
Cost per kWh of tariff 1 generation	2730	**0 - 1.9999**	0
Cost per kWh of tariff 2 generation	2731	**0 - 1.9999**	0
Cost per kWh of tariff 3 generation	2732	**0 - 1.9999**	0

[21] All variables must be programmed at the same time.

[22] They have 4 decimal place.

8.3.9.13.- Programming alarms 1 and 2 (Relays 1 and 2)

Table 97: Modbus memory map: Programming alarms 1 and 2.

Programming alarms 1 and 2				
Configuration variable	Address		Valid data margin	Default value
	Relay 1	Relay 2		
Maximum value	2AF8-2AF9	2B02-2B03	depending on the variable	0
Minimum value	2AFA-2AFB	2B04-2B05	depending on the variable	0
Variable code	2AFC	2B06	**Table 48** and **Table 49**	0
Connection delay	2AFD	2B07	**0 - 9999** seconds	0
Hysteresis	2AFE	2B08	**0 - 99** %	0
latch	2AFF	2B09	**0** : No **1:** Yes	0
Disconnection delay	2B00	2B0A	**0 - 9999** seconds	0
Contacts status	2B01	2B0B	**0** : Normally open **1:** Normally closed	0

8.3.9.14.- Programming alarms 3 and 4 (Digital outputs T1 and T2)

Table 98: Modbus memory map: Programming alarms 3 and 4.

Programming alarms 3 and 4				
Configuration variable	Address		Valid data margin	Default value
	Relay 1	Relay 2		
Kilowatts per impulse	2B0C-2B0D	2B16-2B17	**Table 57**	0
Variable code	2B10	2B1A	**Table 48, Table 49** and **Table 56**	0
Pulse width	2B11	2B1B	**30 - 400** ms	100 ms

8.3.9.15.- Digital inputs

Table 99: Modbus memory map: Configuration of digital inputs.

Configuration variable	Address		Valid data margin	Default value
	Input 1	Input 2		
Operating mode [23]	2B66	2B67	**0**: Tariff **1**: Logic state **2:** Maximum demand synchronism pulse[24]	0

[23] If Input 1 is configured as a tariff and Input 2 is configured as a logic state (or vice versa) we will only have 2 tariffs.
[24] Option available on digital input 1.

We can also read the status of the digital inputs when they are in logic mode:

The **Function 0x04** is implemented for this variable.

Table 100: Modbus memory map: Status of the digital inputs (Logic state mode)

Status of digital inputs		
Variable	Address	Default value
Status of digital inputs	4E20	-

The variable format is shown in **Table 101:**

Table 101: Variable format: Status of digital inputs.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	0	0	Input 2 **0:** OFF **1:** ON	Input 1 **0:** OFF **1:** ON

8.3.9.16.- Digital outputs

Reading the status of the digital outputs. The **Function 0x04** is implemented for this variable.

Table 102: Modbus memory map: Status of the digital outputs

Status of the digital outputs		
Variable	Address	Default value
Status of the digital outputs	4E21	-

The variable format is shown in **Table 103:**

Table 103: Variable format: Status of the digital outputs.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	**Output 4** **0:** OFF **1:** ON	**Output 3** **0:** OFF **1:** ON	**Output 2** **0:** OFF **1:** ON	**Output 1** **0:** OFF **1:** ON

8.3.9.17.- Communications

Table 104: Modbus memory map: Communications

Communications			
Configuration variable	Address	Valid data margin	Default value
Protocol	2742	**0 :** Modbus **1:** Bacnet [25]	0
Modbus and BACnet: Peripheral number	2743	**1 - 255**	1
Modbus: Transmission speed	2744	**0:** 9600 - **1:**19200 - **2:** 38400	1
BACnet: Transmission speed	2744		1
Modbus: Parity	2745	**0:** No parity **1:** Odd parity **2:** Even parity	0
Modbus: Data bits	2746	**0 :** 8 bits[26]	0
Modbus: Stop bits	2747	**0 :** 1 stop bit **1:** 2 stop bits	0
BACnet: Device ID	2EE0- 2EE1	**0- 999999**	-
BAcnet: MAC	2EE2	**0- 255**	2

[25] Not available for model **CVM-C11-ITF-IN-ETH-ICT2**.

[26] This parameter cannot be modified.

8.3.9.18.- Password configuration

These variables allow you to lock or unlock access to the programming menu, and also allow you to change the password code. The password code may only be changed through this command.
The device does not need you to enter the old password in order for it to record the new one; it records the new one directly without any verification.

Table 105: Modbus memory map: Password configuration

Password			
Configuration variable[27]	Address	Valid data margin	Default value
Password value[28]	2B70	**0 - 9999**	1234
Lock-Unlock	2B71	**0**: Unlock **1**: Lock	0

[27] You must program all the variables at the same time.

[28] The password value is read and written in hexadecimal.

8.3.9.19.- Ethernet Communications

Note: *Ethernet communications are available on model* ***CVM-C11-ITF-IN-ETH-ICT2.***

Table 106: Modbus memory map: Ethernet communications.

Ethernet communications			
Configuration variable	Address	Valid data margin	Default value
Ethernet protocol	2800	**0:** Modbus TCP **1:** BACnet IP	0
Modbus TCP: DHCP	2801	**0:** No, DHCP not enabled **1:** Yes, DHCP enabled	1
Modbus TCP: IP adress	2802 - 2803 - 2804 - 2805	**0.0.0.0. - 255.255.255.255**	010.002.004.233
Modbus TCP: Mask	2806 - 2807 - 2808 - 2809	**0.0.0.0. - 255.255.255.255**	255.255.255.000
Modbus TCP: Gateway	280A - 280B - 280C - 280D	**0.0.0.0. - 255.255.255.255**	010.002.004.001
Modbus TCP: MAC adress[29]	280E - 280F - 2810 - 2811 - 2812 - 2813 -	-	00A2A2A2A201
Modbus TCP: Port	2814	**1 - 65535**	502
BACnet: Port	2815	**1 - 65535**	47808
BACnet: Device ID	2EE0- 2EE1	**0- 999999**	-

[29] This parameter cannot be modified.

8.4.- BACnet PROTOCOL

BACnet is a communications protocol for Building Automation and Control NETworks. This protocol replaces the proprietary communications of each device, making it a set of common communication rules that enables the complete integration of the building automation and control devices of different manufacturers.

The device features **BACNet** MS/TP communications, following the specifications of ANSI/ASHRAE 135 (ISO 16484-5).
Using a RS485 connection, the device can connect to a BACnet and include all of the objects and services defined in the attached PICS map (Protocol Implementation Conformance Statement). ("***7.4.1. PICS MAP***")

The default speed is 9600 bps and the MAC is 2 (node number), and can be changed on the configuration screen or by entering the BaudRate and MAC_Address variables. The identifier (Device_ ID) can be changed on the configuration screen using the writing property over the variable or through the Device_ID variable.

Another option is to overwrite the Object_Name in the Device object:
a) #Baud x – where x can be: 9600, 19200
b) #MAC x – where x can be: 0 ... 127
c) #ID x – where x can be: 0 ... 999999

For further information on the protocol: www.bacnet.org.

8.4.1.- MAPA PICS

PICS
Vendor Name: CIRCUTOR
Product Name: CVM-C11
Product Model Number: 0870
Application Software Version: 1.1
Firmware Revision: 0.8.4.
BACnet Protocol Revision: 12

Product Description:

Electrical energy meter

BACnet Standardized Device Profile (Annex L)

x	BACnet Application Specific Controller (B-ASC)

List all BACnet Interoperability Building supported (see Annex K in BACnet Addendum 135d):

DS-RP-B Read Property DS-WP-B Write Propery DS-RPM-B Read Property Multiple DM-DDB-B Dynamic Device Binding DM-DOB-B Dynamic Object Binding DM-DCC-B Device Communication Control DM-RD-B Reinitialize Device

Which of the following device binding methods does the product support? (check one or more)

x	Recive Who-Is, send I-Am (BIBB DM-DDB-B)
x	Recive Who-Has, send I-Have (BIBB DM-DOB-B)

Standard Object Types Supported:

Analog Input Object Type

1. Dynamically creatable using BACnet's CreateObject service?	No	
2. Dynamically deleatable using BACnet's DeleteObject service?	No	
3. List of optional properties supported:	max_pres_value	min_pres_value
4. List of all properties that are writable where not otherw is a required by this standard		
5. List of proprietary properties:		
6. List of any property value range restrictions:		

Properly Identifier

Object_Name	max 32 characters

DESCRIPTION		SYMBOL	ID OBJECTS	OBJECT NAME	UNITS
Tensión fase-neutro	Voltage phase to neutral	V 1	AI0	Ph2NU1	V
Corriente	Current	A 1	AI1	Ph1Current	A
Potencia activa	Active power	kW 1	AI2	ActPwrPh1	kW
Potencia reactiva	Reactive power	kvar 1	AI3	ReactPwrPh1	kvar
Factor de potencia	Power factor	PF 1	AI4	PwrFactPh1	PF
Tensión fase-neutro	Voltage phase to neutral	V 2	AI5	Ph2NU2	V
Corriente	Current	A 2	AI6	Ph2Current	A
Potencia activa	Active power	kW 2	AI7	ActPwrPh2	kW

DESCRIPTION		SYMBOL	ID OBJECTS	OBJECT NAME	UNITS
Potencia reactiva	Reactive power	kvar 2	AI8	ReactPwrPh2	kvar
Factor de potencia	Power factor	PF 2	AI9	PwrFactPh2	PF
Tensión fase-neutro	Voltage phase to neutral	V 3	AI10	Ph2NU3	V
Corriente	Current	A 3	AI11	Ph3Current	A
Potencia activa	Active power	kW 3	AI12	ActPwrPh3	kW
Potencia reactiva	Reactive power	kvar 3	AI13	ReactPwrPh3	kvar
Factor de potencia	Power factor	PF 3	AI14	PwrFactPh3	PF
Potencia activa trifásica	Three phase active power	kW III	AI15	ActPwOn3Ph	kW
Potencia inductiva trifásica	Three phase reactive inductive power	kvarL III	AI16	InductPwOn3Ph	kvarL
Potencia capacitiva trifásica	Three phase capacitive inductive power	kvarC III	AI17	CapPwOn3Ph	kvarC
Cos φ trifásico	Three phase cos φ	Cos φ III	AI18	Cosphi	Cos φ
Factor de potencia trifásico	Three phase power factor	PFIII	AI19	PwFactOn3Ph	PF
Frecuencia (L2)	Frequency	Hz	AI20	Frequency	Hz
Tensión fase-fase	Voltage phase to phase	V12	AI21	Ph2PhU12	V
Tensión fase-fase	Voltage phase to phase	V23	AI22	Ph2PhU23	V
Tensión fase-fase	Voltage phase to phase	V31	AI23	Ph2PhU31	V
%THD V	%THD V	%THD V1	AI24	THDVal_U1	%THD
%THD V	%THD V	%THD V2	AI25	THDVal_U2	%THD
%THD V	%THD V	%THD V3	AI26	THDVal_U3	%THD
%THD A	%THD A	%THD A1	AI27	THDVal_I1	%THD
%THD A	%THD A	%THD A2	AI28	THDVal_I2	%THD
%THD A	%THD A	%THD A3	AI29	THDVal_I3	%THD
Energía activa	Active energy	kW•h III	AI30	ActEnergy	kW•h
Energía reactiva inductiva	Reactive inductive energy	kvarL•h III	AI31	InductEnergy	kvarL•h
Energía reactiva capacitiva	Reactive capacitive energy	kvarC•h III	AI32	CapEnergy	kvarC•h
Energía Aparente trifásica	Three phase aparent energy	kVA•h III	AI33	AppEnergy	kVA•h
Energía activa generada	Three phase generated active energy	kW•h III (-)	AI34	ActEnergy_exp	kW•h
Energía inductiva generada	Three phase generated reactive inductive energy	kvarL•h III (-)	AI35	IndEnergy_exp	kvarL•h
Energía capacitiva generada	Three phase generated reactive capacitive energy	kvarC•h III(-)	AI36	CapEnergy_exp	kvarC•h
Energía aparente generada	Three phase generated aparent energy	kVA•h III (-)	AI37	AppEnergy_exp	kVA•h
Corriente trifásica (media)	Three phase average current	I_AVG	AI38	AvgValCurr3Ph	I_AVG
Corriente de neutro	Neutral current	In	AI39	NeutralCurrent	In
Potencia aparente L1	Aparent power L1	kVA	AI40	AppPwrPh1	kVA
Potencia aparente L2	Aparent power L2	kVA	AI41	AppPwrPh2	kVA
Potencia aparente L3	Aparent power L3	kVA	AI42	AppPwrPh3	kVA

DESCRIPTION		SYMBOL	ID OBJECTS	OBJECT NAME	UNITS
Potencia aparente trifásica	Three phase aparent power	kVAIII	AI43	AppPw3Ph	kVA
Máxima demanda I1	Maximum demand I1	Md (A1)	AI44	MaxDemand_A1	A
Máxima demanda I2	Maximum demand I2	Md(A2)	AI45	MaxDemand_A2	A
Máxima demanda I3	Maximum demand I3	Md(A3)	AI46	MaxDemand_A3	A
Máxima demanda A	Maximum demand A	A III	AI47	MaxDemand_A	A
Máxima demanda kW	Maximum demand kW	kW III	AI48	MaxDemand_kW	kW
Máxima demanda kVA	Maximum demand kVA	kVA III	AI49	MaxDemand_ kVA	kVA

Analog Value Object Type

1. Dynamically creatable using BACnet's CreateObject service?		No
2. Dynamically deleatable using BACnet's DeleteObject service?		No
3. List of optional properties supported:		
4. List of all properties that are writable where not otherwise required by this standard		
5. List of propietary properties:		
Property Identifier	**Property Datatype**	**Meaning**
5. List of object identifiers and their meaning in this device		
Object ID	**Object Name**	**Description**
AV1	MAC_Address	MAC
AV2	BaudRate	BAUD RATE
AV3	Device_ID	DEVICE ID

Device Object Type

1. Dynamically creatable using BACnet's CreateObject service?	No
2. Dynamically deleatable using BACnet's DeleteObject service?	No
3. List of optional properties supported:	Description, Protocolo_Conformance_Class
4. List of all properties that are writable where not otherwise required by this standard	
Object_Name Max_Master Max_Info_Frames Object_Identifier	
5. List of propietary properties:	
5. List of any property value range restrictions	
Property Identifier	**Restrictions**
Object_Name	< 32 bytes
Object_Identifier	Device Type only
Number_Of_APDU_Retries	0-255
APDU_Timeout	0-65535 miliseconds
Vendor_Identifier	0-65535

Data Link Layer Options (check all that supported):

X	MS/TP master (Clause 9), baud rate(s): 9.6, 19.2kB/s

Character Sets Supported (check all that apply):

Indicating support for multiple character set does not imply that they can all be supported simultaneously.

X	ANSI X3.4

9.- TECHNICAL FEATURES

AC Power supply				
Rated voltage	100 ... 270 V ~ ± 10%			
Frequency	50 ... 60 Hz			
Consumption	CVM-C11-ITF-IN-485	CVM-C11-ITF-IN-ETH	CVM-C11-FLEX-IN-485	CVM-C11-MC-IN-485
	2 ... 5 VA	2 ... 7 VA	2.5 ... 5.5 VA	2.5 ... 5.5 VA
Installation category	CAT III 300 V			

DC Power supply				
Rated voltage	100 ... 270 V ⎓ ± 10%			
Consumption	CVM-C11-ITF-IN-485	CVM-C11-ITF-IN-ETH	CVM-C11-FLEX-IN-485	CVM-C11-MC-IN-485
	1.2 ... 2 W	2.4 ... 2.6 W	1.2 ... 2 W	1.2 ... 2 W
Installation category	CAT III 300 V			

Voltage measurement circuit	
Rated voltage (Un)	230 V Ph-N, 380 V Ph-Ph
Max. voltage measurement	300 V Ph-N, 520 V Ph-Ph
Min. voltage measurement (Vstart)	10 V Ph-N
Frequency measurement margin	45 ... 65Hz
Input impedance	> 1.7 MΩ
Consumption	< 0.2 VA (per phase)
Installation category	CAT III 300 V

Current measurement circuit			
CVM-C11-FLEX-IN-485-ICT2	Measurement using Rogowski sensors.		
Nominal current (In)	CVM-C11-ITF-IN-xxx	CVM-C11-MC-IN-485	CVM-C11-FLEX-IN-485[30]
	5 A	.../250 mA	.../100 mV
Scales	.../1A o .../5A	-	-
Max. current measurement	6 A	400 mA	400 mV
Min. current measurement (Istart)	10 mA	1 mA	0.2 mV
Consumption	< 0.2 VA (per phase)	< 1 VA	< 1 VA
Input Impedance	< 20 mΩ	< 20 mΩ	< 20 mΩ
Installation category	CAT III 300 V	CAT III 300 V	CAT III 300 V

[30] without sensors **MFC-FLEX.**

Measurement accuracy (UNE-EN 61557-12)[31]	
CVM-C11-ITF-IN-xxx	
Voltage measurement	0.2% (5 ... 120% Un)
Current measurement	0.2% (1 ... 120% In)
Frequency measurement	0.025 Hz
Active power measurement	0.5% ± 2 digits
Reactive power measurement	1 % ± 2 digits
Active energy measurement	Class 0.5s (According to EN IEC 62053-22)
Reactive energy measurement	Class 1 (According to IEC 62053-24)
cos φ	0.5
Power factor	0.5
THD Voltage measurement	Class 1

Measurement accuracy (UNE-EN 61557-12)[31]	
CVM-C11-ITF-IN-xxx	
Voltage harmonics	Class 1
THD Current measurement	Class 1
Current harmonics	Class 1
CVM-C11-FLEX-IN-485 (without sensors MFC-FLEX)	
Voltage measurement	0.2 % (5 ... 120% Un)
Current measurement	0.5 % (10 ... 300% In)
Frequency measurement	0.025 Hz
Active power measurement	1 %
Reactive power measurement	2 %
Apparent power measurement	1 %
Active energy measurement	Class 1 (According to EN IEC 62053-21)
Reactive energy measurement	Class 2 (According to IEC 62053-23)
cos φ	0.5 %
Power factor	0.5 %
THD Voltage measurement	Class 1
Voltage harmonics	Class 1
THD Current measurement	Class 1
Current harmonics	Class 1
CVM-C11-MC-IN-485 (without MC Transformers)	
Voltage measurement	0.2 % (5 ... 120% Un)
Current measurement	0.2 % (10 ... 120 % In)
Frequency measurement	0.025 Hz
Active power measurement	0.5 % ± 1 digit
Reactive power measurement	1 % ± 1 digit
Apparent power measurement	0.5 % ± 1 digit
Active energy measurement	Class 0.5s (According to EN IEC 62053-22)
Reactive energy measurement	Class 1 (According to IEC 62053-24)
cos φ	0.5 %
Power factor	0.5 %
THD Voltage measurement	Class 1
Voltage harmonics	Class 1
THD Current measurement	Class 1
Current harmonics	Class 1

[31] Accuracy for the type of installation: 4-3Ph

Refreshment time	
Measurement of voltage, current, frequency, active and reactive power	500 ms
Active and reactive energy measurement	1 s
Measurement of maximum demand, maximums, minimums and harmonics	1 s

Relay outputs	
Quantity	2
Max. voltage open contacts	250 V ~ / 30 V ⎓
Maximum current	2.5 A

(Continuation) Relay outputs	
Maximum switching power	625 VA / 75 W (AC1)
Electrical life (250V AC / 5A)	$60x10^3$ cycles
Mechanical life	$10x10^6$ cycles

Digital inputs	
Quantity	2
Type	NPN
Insulation	2000 V
Max. current in short circuit	4 mA ⎓
Max. voltage in open circuit	17 V ⎓

Digital outputs	
Quantity	2
Type	NPN
Maximum voltage	24 V ⎓
Maximum current	50 mA
Maximum frequency	16 impulses / sec
Pulse width	300 ms - 400 ms

Communications		
	Modbus RTU	BACnet [32]
Bus	RS-485	MS/TP
Protocol	Modbus RTU	BACnet
Baud rate	9600 - 19200 - 38400 bps	
Stop bits	1 - 2	1
Parity	without - even - odd	without

[32] Not available for model **CVM-C11-ITF-IN-ETH-ICT2**.

Ethernet communication (CVM-C11-ITF-IN-ETH-ICT2)	
Type	Ethernet 10BaseT - 100BaseTX self-detectable
Connector	RJ45
Protocol	Modbus TCP - BACnet IP
Connection mode to Network	DHCP ON/OFF (ON by default)

User interface	
Display	LCD Custom COG
Keyboard	3 keys
LED	2 LED

Environmental features	
Operating temperature	-25°C ... +70°C
Storage temperature	-25°C ... +75°C
Relative humidity (non-condensing)	5 ... 95%
Maximum altitude	2000 m
Protection degree IP	IP20, Front panel: IP54
Protection degree IK	IK08
Pollution degree	2
Use	Indoor

Mechanical features			
Terminals			
1, 2, 14 ... 17, 9 ... 13, 18 ... 25	0.2 ... 2.5 mm^2	0.5 ... 0.6 Nm	M3.5
3 ... 8	0.2 ... 1.5 mm^2	0.2 ... 0.25 Nm	M2.5
Dimensions (Figure 41)	96 x 96 x 67.2 mm		
Weight	**CVM-C11-ITF-IN-485**	**CVM-C11-ITF-IN-ETH**	**CVM-C11-FLEX-IN-485** **CVM-C11-MC-IN-485**
	356 g.	363 g.	319 g.
Surround	Self-extinguishing UL 94 V0 plastic		
Attachment	Panel		

Standards	
Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements	EN IEC 61326-1:2021
Electromagnetic compatibility (EMC) -- Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2
Electromagnetic compatibility (EMC) - Part 4-3 : Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	EN 61000-4-3
Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4
Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5
Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6
Electromagnetic compatibility (EMC) -- Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	EN 61000-4-8
Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	EN 61000-4-11
Safety requirements for electrical equipment for measurement, control and laboratory use -- Part 2-030: Particular requirements for testing and measuring circuits	EN 61010-2-030
Safety requirements for electrical equipment for measurement, control and laboratory use -- Part 1: General requirements	EN 61010-1
Electrical safety in low voltage distribution systems up to 1 000 V AC and 1 500 V DC - Equipment for testing, measuring or monitoring of protective measures - Part 12: Power metering and monitoring devices (PMD)	EN IEC 61557-12
Environmental testing -- Part 2-2: Tests - Tests B: Dry heat.	UNE-EN 60068-2-2
Environmental testing -- Part 2-1: Tests - Test A: Cold	UNE-EN 60068-2-1
Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	UNE-EN 60068-2-78
Standard for Safety of Flammability of Plastic Materials for Parts in Devices and Appliances testing	UL 94

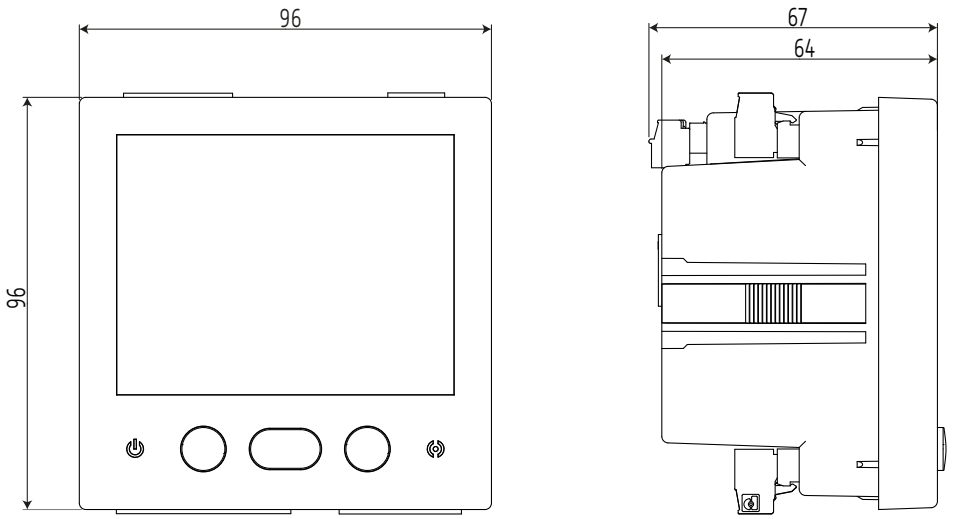


Figure 41: Dimensions of the CVM-C11.

10.- 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

11.- 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.

CIRCUTOR, S.A. – 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

Serie:

CVM-C11

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/EU: Low Voltage Directive	2014/30/EU: EMC Directive
2011/65/EU: RoHS2 Directive	2015/863/EU: 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 61010-2-030:2017 Ed 2.0
IEC 61326-1:2020 Ed 3.0	IEC 63000:2016 Ed 1.0

Año de marcado "CE":

2022

(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

Series:

CVM-C11

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/EU: Low Voltage Directive	2014/30/EU: EMC Directive
2011/65/EU: RoHS2 Directive	2015/863/EU: 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 61010-2-030:2017 Ed 2.0
IEC 61326-1:2020 Ed 3.0	IEC 63000:2016 Ed 1.0

Year of CE mark:

2022

(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

Série:

CVM-C11

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/EU: Low Voltage Directive	2014/30/EU: EMC Directive
2011/65/EU: RoHS2 Directive	2015/863/EU: 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 61010-2-030:2017 Ed 2.0
IEC 61326-1:2020 Ed 3.0	IEC 63000:2016 Ed 1.0

Année de marquage « CE »:

2022

Viladecavalls (Spain), 27/9/2022
Chief Executive Officer: Joan Comellas Cabeza

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

CIRCUTOR, S.A.U. – 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

Serie:

CVM-C11

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/EU: Low Voltage Directive	2014/30/EU: EMC Directive
2011/65/EU: RoHS2 Directive	2015/863/EU: 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 61010-2-030:2017 Ed 2.0
IEC 61326-1:2020 Ed 3.0	IEC 63000:2016 Ed 1.0

Jahr der CE-Kennzeichnung:

2022

(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

Série:

CVM-C11

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/EU: Low Voltage Directive	2014/30/EU: EMC Directive
2011/65/EU: RoHS2 Directive	2015/863/EU: 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 61010-2-030:2017 Ed 2.0
IEC 61326-1:2020 Ed 3.0	IEC 63000:2016 Ed 1.0

Ano de marcação "CE":

2022

(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

Serie:

CVM-C11

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

È conforme alle seguenti normative o altri documenti normativi:

IEC 61010-1:2010+AMD1:2016 Ed 3.0	IEC 61010-2-030:2017 Ed 2.0
IEC 61326-1:2020 Ed 3.0	IEC 63000:2016 Ed 1.0

Anno di marcatura "CE":

2022

Viladecavalls (Spain), 27/9/2022
Chief Executive Officer: Joan Comellas Cabeza

CIRCUTOR, S.A.U. – 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

Seria:

CVM-C11

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 instrukciami producenta

2014/35/EU: Low Voltage Directive	2014/30/EU: EMC Directive
2011/65/EU: RoHS2 Directive	2015/863/EU: 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 61010-2-030:2017 Ed 2.0
IEC 61326-1:2020 Ed 3.0	IEC 63000:2016 Ed 1.0

Rok oznakowania "CE":

2022

Viladecavalls (Spain), 27/9/2022
Chief Executive Officer: Joan Comellas Cabeza

Circutor
NIF A-08513178
Vial Sant Jordi s/n.
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Barcelona (Spain)
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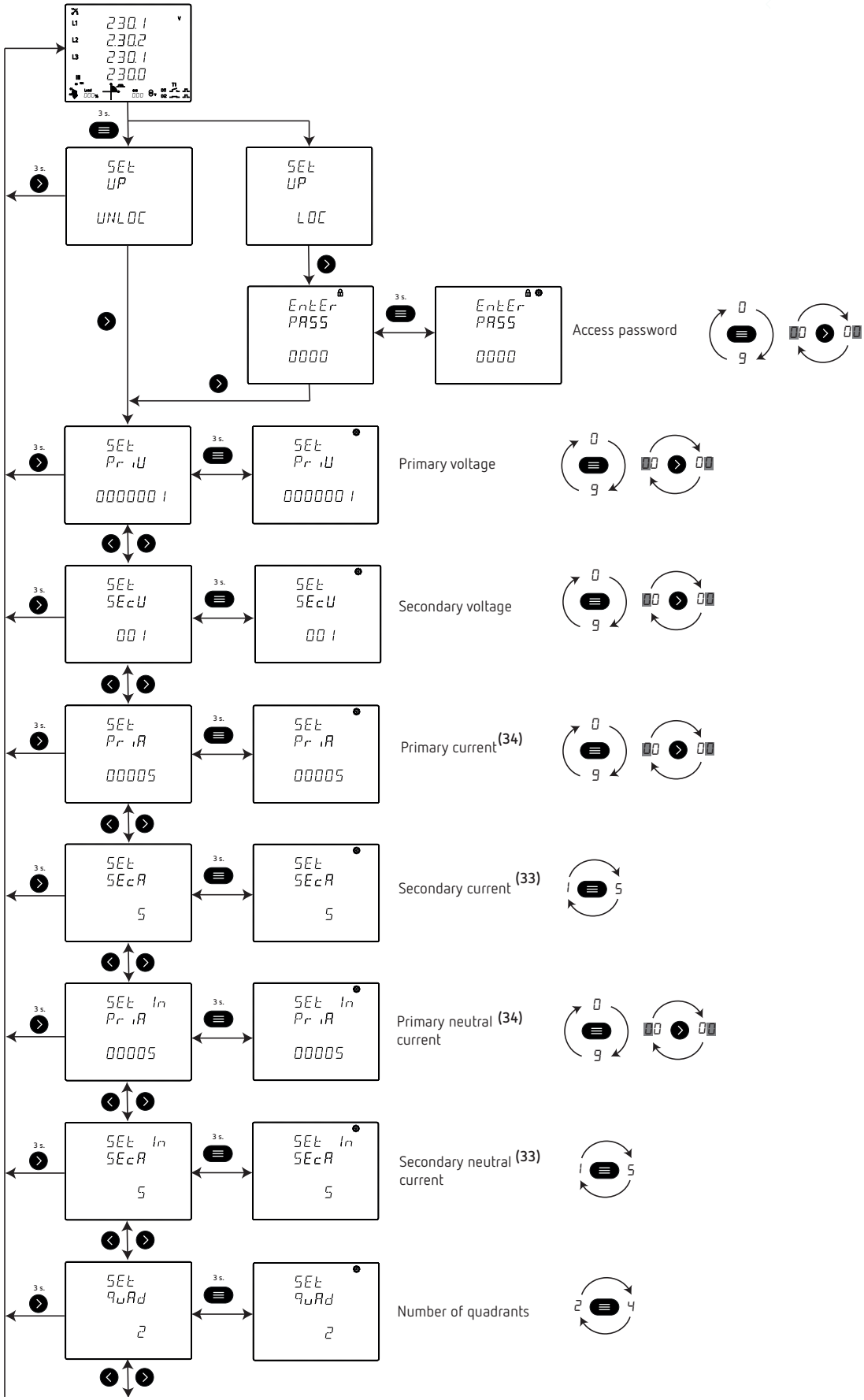
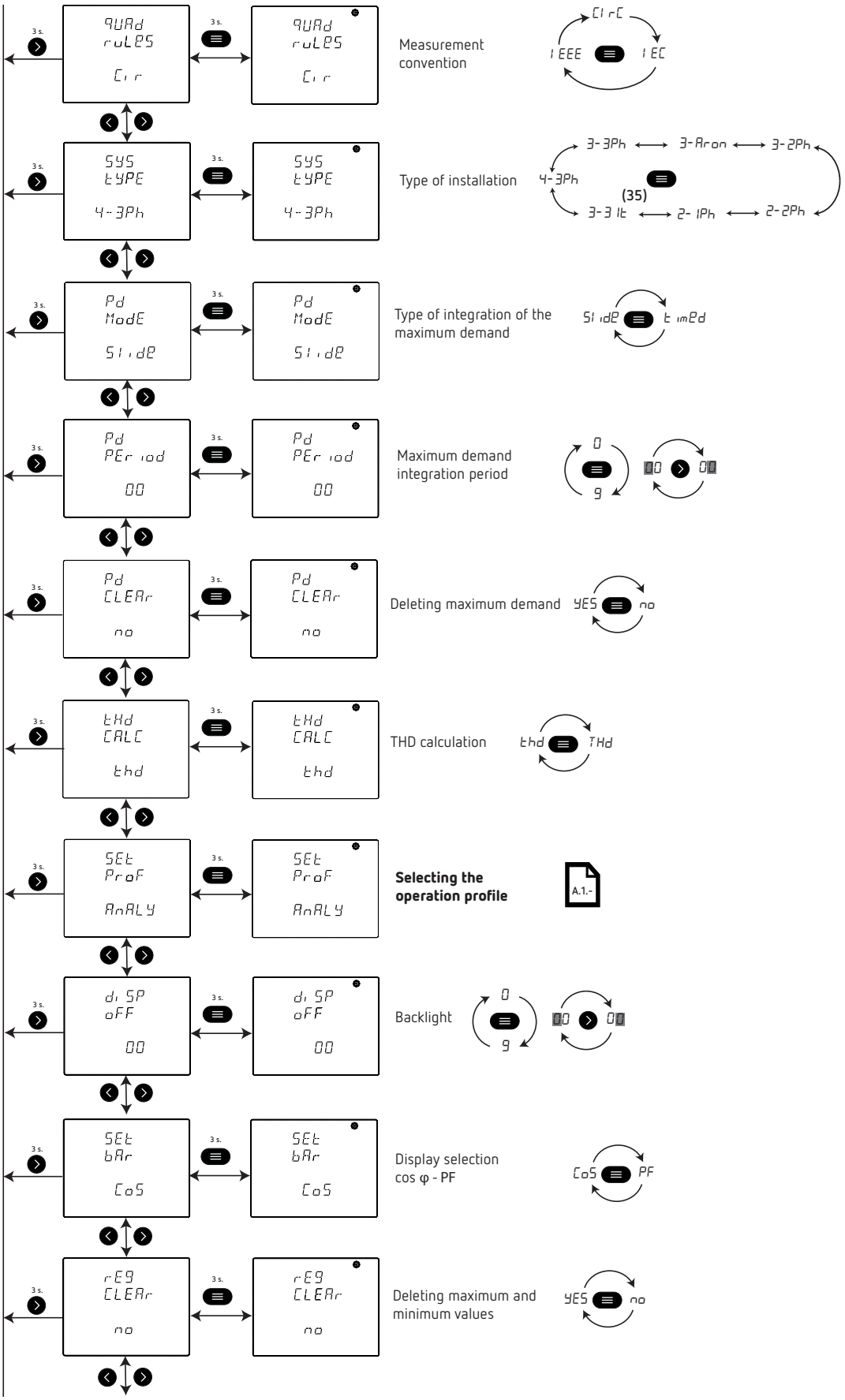
ANNEX A.- CONFIGURATION MENUS

Configuration menu

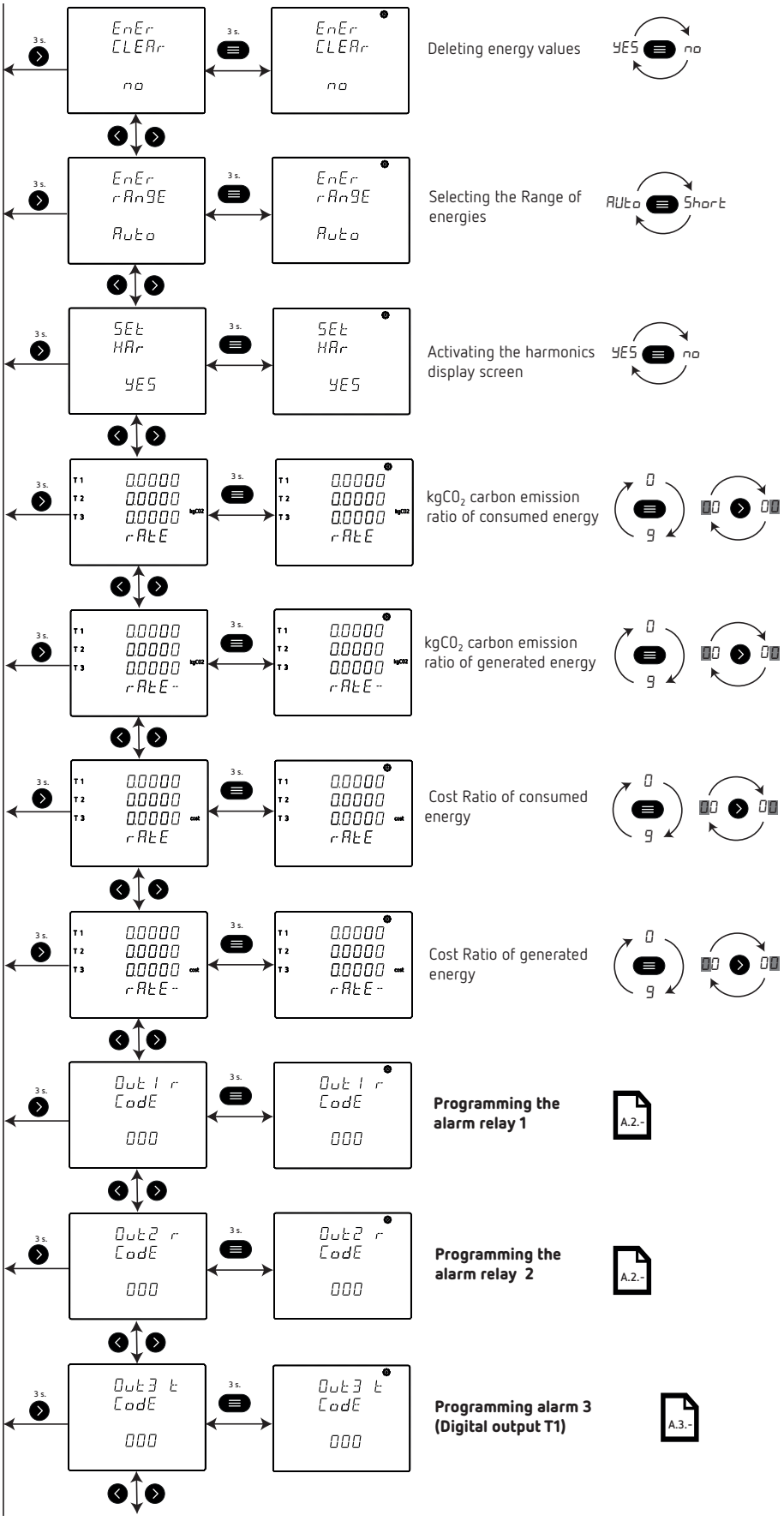


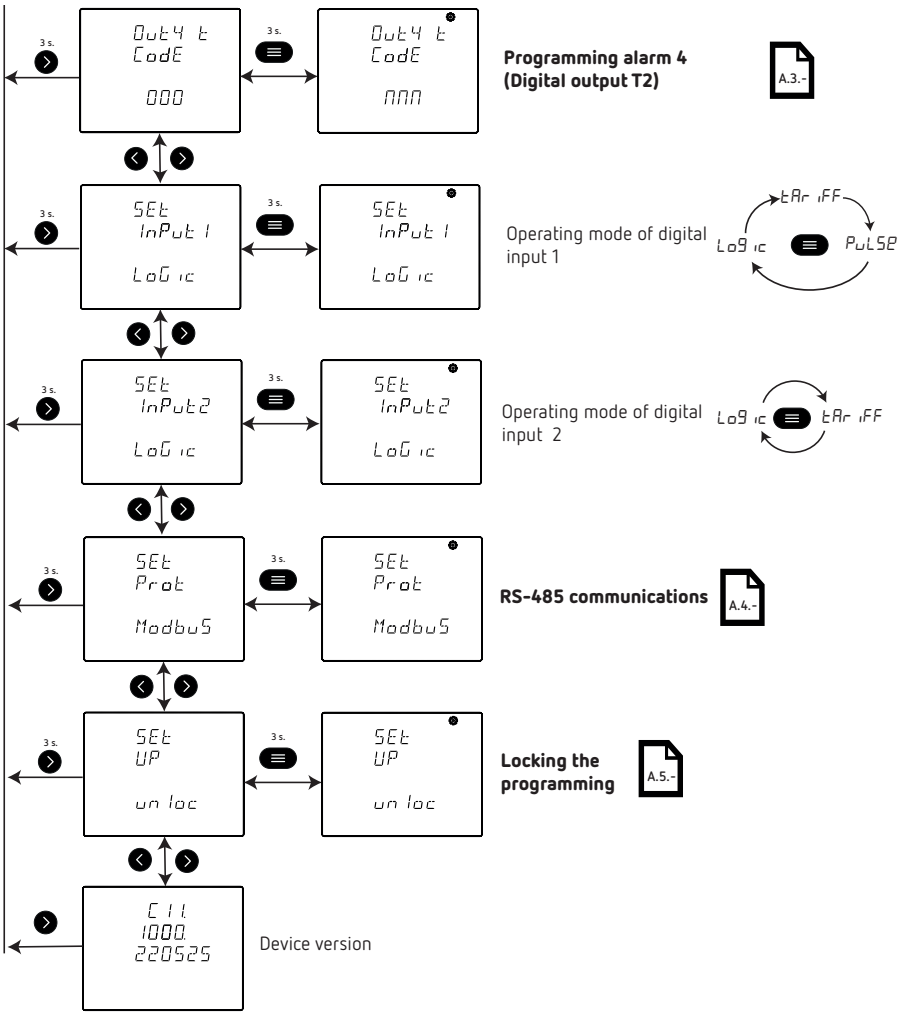
(33) *Only available on **CVM-C11-ITF-IN-xxx-ICT2** models.*

(34) *Parameter not available in model. **CVM-C11-FLEX-IN-485-ICT2**.*



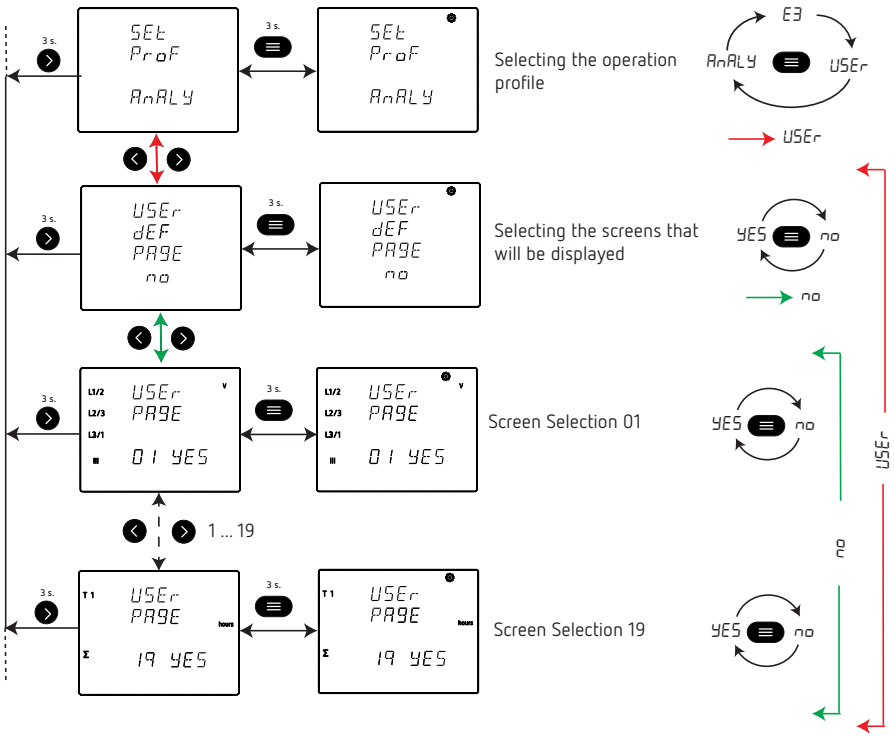
(35) *Installation available from version C11.1005.230119 of the device.*


3 s.
EnEr
CLEAr
no
Deleting energy values
YES
no
EnEr
rAn9E
Auto
Selecting the Range of energies
Auto
Short
SEt
HAr
YES
Activating the harmonics display screen
YES
no
T1
T2
T3
rAtE
kgCO2 carbon emission ratio of consumed energy
kgCO2 carbon emission ratio of generated energy
Cost Ratio of consumed energy
Cost Ratio of generated energy
Out1 r
CodE
000
Programming the alarm relay 1
A.2.-
Out2 r
Programming the alarm relay 2
Out3 t
Programming alarm 3 (Digital output T1)
A.3.-


3 s.
Out4 t
CodE
000
Out4 t
CodE
nnn
Programming alarm 4
(Digital output T2)
A.3.-
SEt
InPut 1
LoG ic
Operating mode of digital
input 1
tAr iFF
LoG ic
PuLSE
SEt
InPut2
Operating mode of digital
input 2
RS-485 communications
A.4.-
SEt
Prot
Modbus
SEt
UP
un loc
Locking the
programming
A.5.-
C11
1000.
220525
Device version

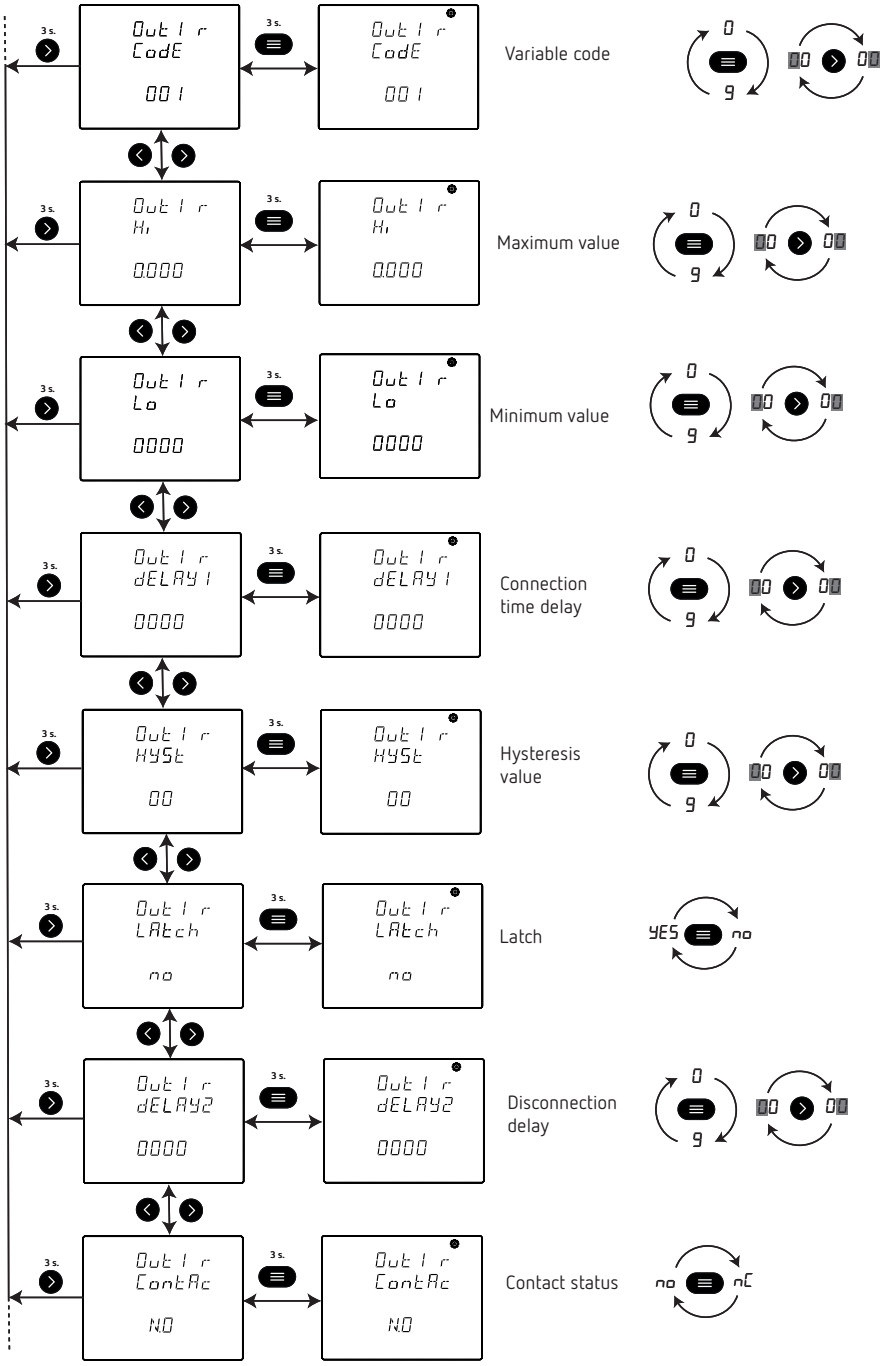
ANNEX A.1.- SELECTING THE OPERATION PROFILE

Selecting the operation profile



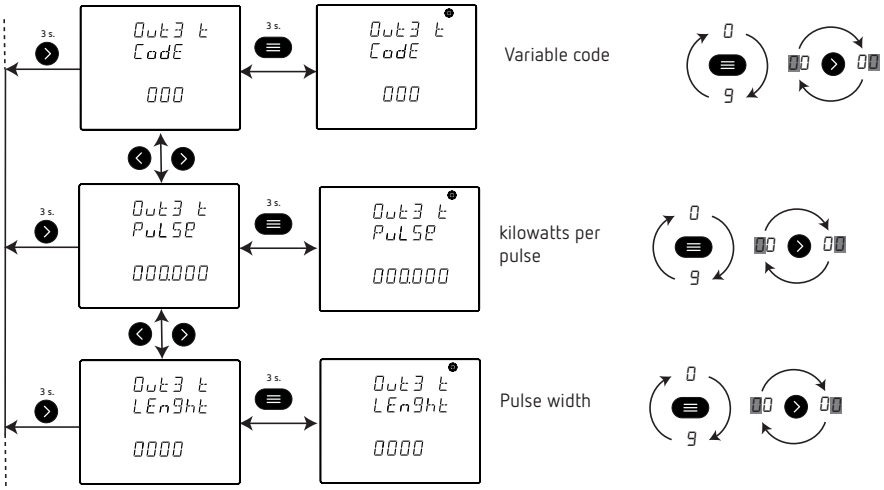
ANNEX A.2.- PROGRAMMING THE ALARM RELAY 1 AMD 2

Programming the alarm relay 1 and 2



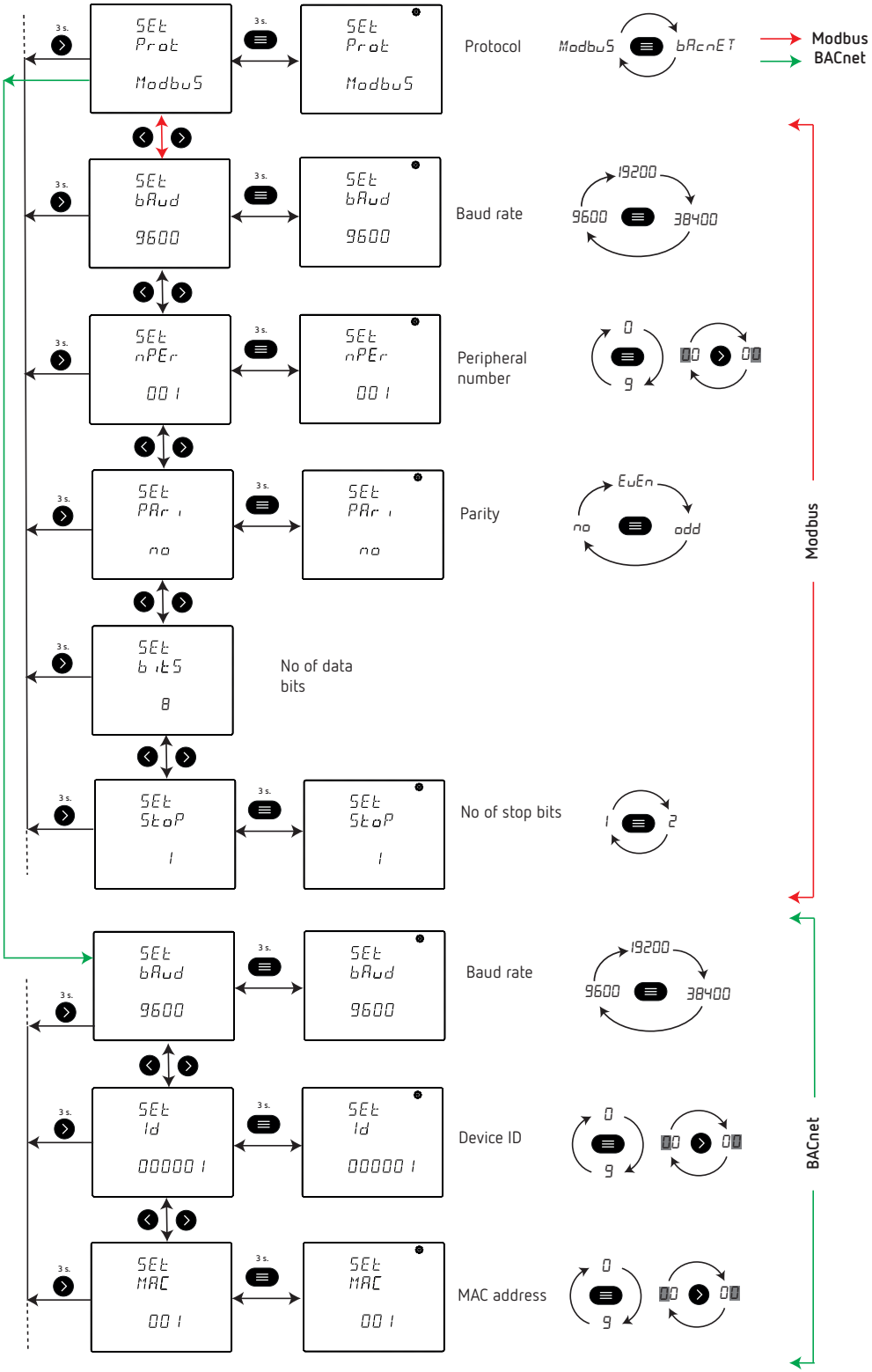
ANNEX A.3.- PROGRAMMING ALARM 3 AND 4

Programming Alarm 3 (Digital output T1) and Alarm 4 (Digital output T2)



ANNEX A.4.- RS-485 COMMUNICATIONS PROGRAMMING

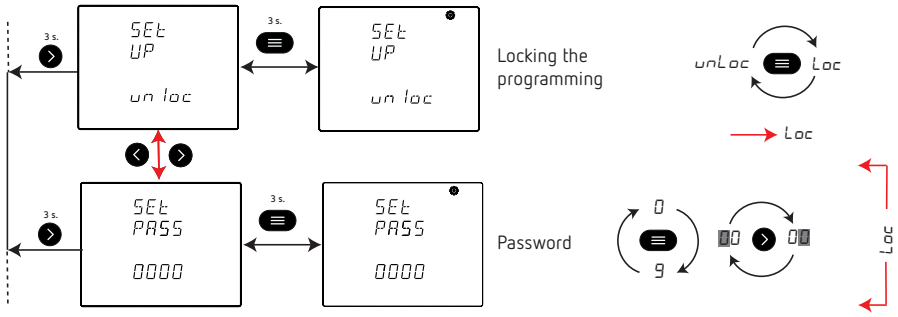
RS-485 Communications Programming



Note: *RS-485 BACNet communications are not available for the* ***CVM-C11-ITF-IN-ETH-ICT2*** *model.*

ANNEX A.5.- LOCKING THE PROGRAMMING

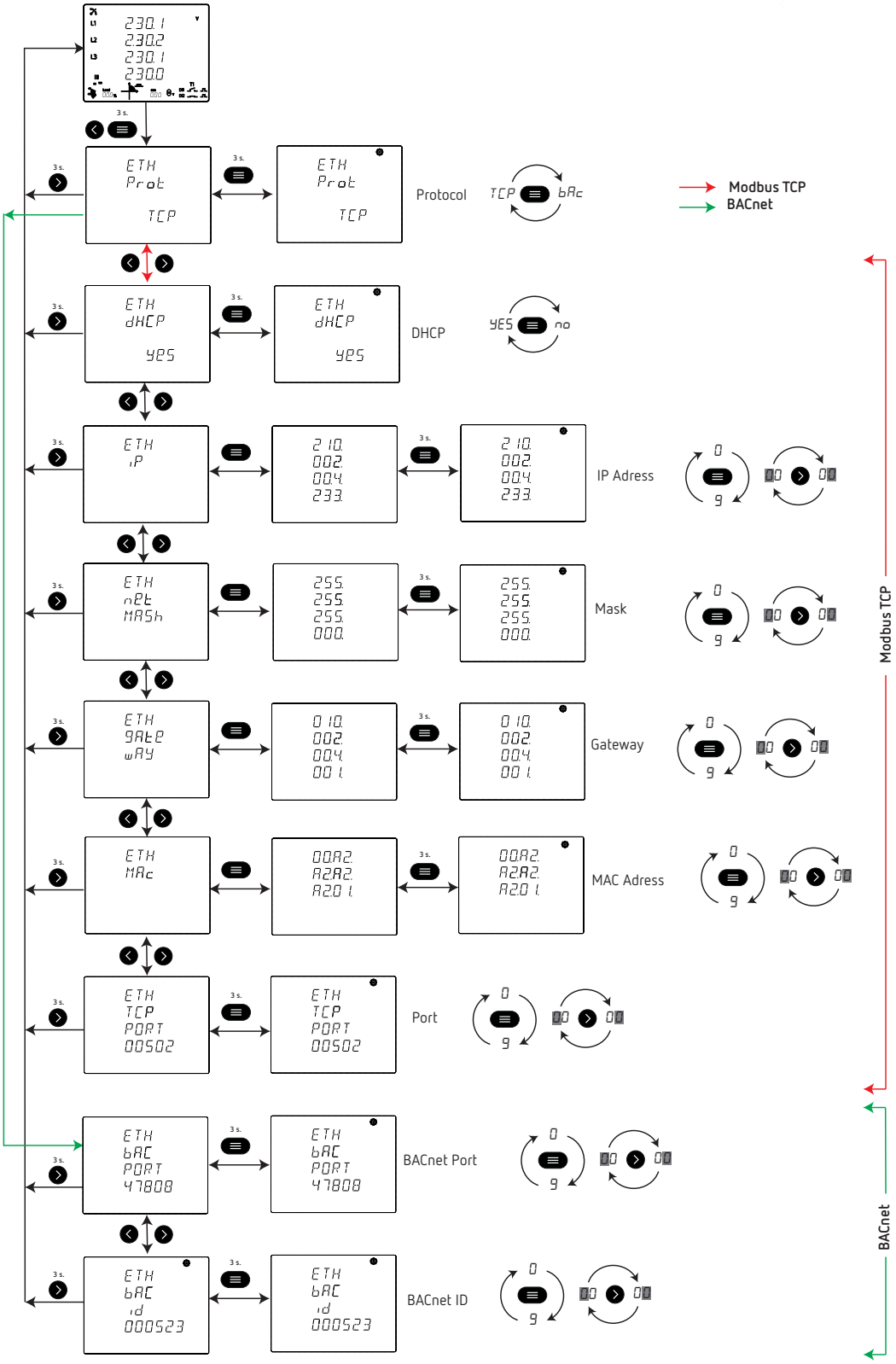
Locking the programming



ANNEX B.- ETHERNET CONFIGURATION MENUS

Note: *Ethernet communications are available on model* ***CVM-C11-ITF-IN-ETH-ICT2****.*

Ethernet configuration menu



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