



**CONTROL DEVICE FOR ELECTRONIC EARTH
LEAKAGE PROTECTION RELAYS**

CBS-4 SERIES

INSTRUCTION MANUAL

M98228301-03-17B

CIRCUTOR, SA

Verifications upon receipt

This manual provides installation tips and a guide for use of the control device for **CBS-4** earth leakage relays with the purpose of achieving its optimum performance. Upon receiving the device, check the following points:

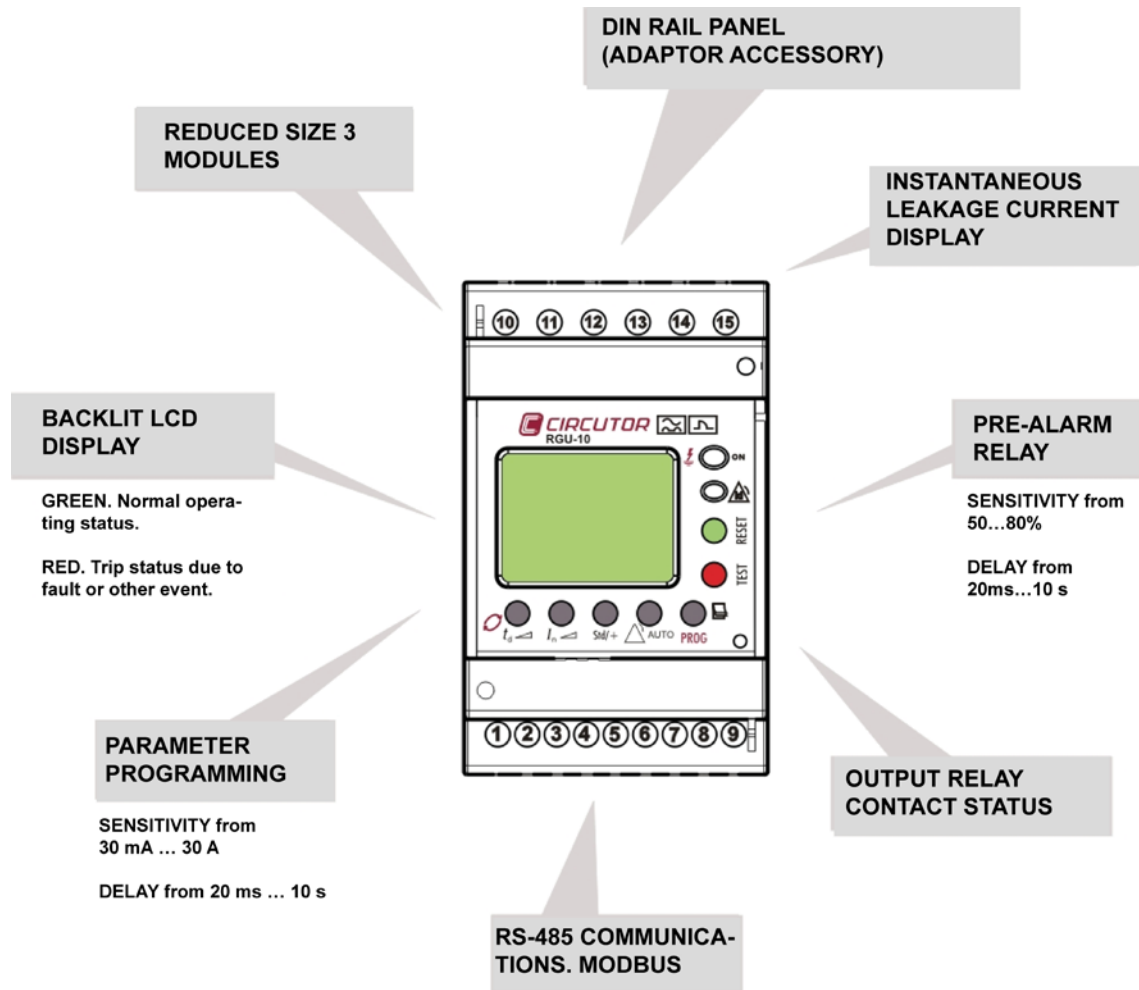
- That the device meets the specifications of your order.
- That it has not been damaged during shipping.
- Check that it is supplied with the corresponding Instruction Manual.



The safe use of the **CBS-4/CBS-4C** requires that the persons installing or using it follow the customary safety measures, as well as the different warnings indicated in the Instructions Manual.
This analyzer should only be installed and maintained by qualified staff.

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ASSOCIATED CIRCUIT BREAKER

CONTACTOR. Undervoltage coil connection.



CIRCUIT BREAKER WITH TRIGGER COIL.



TRIGGER COIL.

- Minimum voltage
- Current emission.

ASSOCIATED MEASUREMENT ELEMENT

EARTH LEAKAGE TOROIDAL TRANSFORMER.



GENERAL FEATURES

The **CBS-4** earth leakage device is a type A programmable electronic earth leakage protection device with 5 independent relays: 4 relays for controlling the circuit breaker elements of the four channels and performing the protection and pre-alarm function, which has prevention and maintenance functions in the installation.

It enables programming and adjustment of all the required parameters to obtain full maintenance protection and control of the installation. A set of parameters can be configured via direct adjustments using the keypad (buttons) and setup menus in the device.

Before starting up the earth leakage device, please read carefully the sections on power supply, connection and programming.



The **CBS-4** measures, calculates and displays the earth leakage current of balanced or unbalanced three-phase industrial networks.

The measurement is made in RMS, via an earth leakage current input, from the **WG/WGS** series exterior toroidal measuring transformer.

In normal operating conditions, the main values that determine the earth leakage protection of the installation, such as the sensitivity, delay and instantaneous leakage current, are shown on the display.

We are aware of the high levels of prevention and maintenance required for installations, and so have provided the device with a display and indicator LEDs for any events that might arise.

Data displayed or indications of prealarms, trips, leakage readings, etc. help provide us with enough information for good maintenance.

The backlit display is in green under normal operating conditions, but in the case of any event causing a trip of the main relay, the display is backlit, indicating the reason.



The version with RS - 485 communications and the adequate *software* enable configuration, data and information centralisation to obtain effective monitoring and control of the maintenance status of our power lines.

Measurement of the earth leakage current from which the **CBS-4/CBS-4C** acts by indicating the instantaneous leakage current, pre-alarm or trip is determined by the earth leakage transformers of the **WG** series. The interior diameter of the transformer is defined by the dimensions of the installation wiring.

EARTH LEAKAGE TRANSFORMERS, WG SERIES

Weight (g)	Effective section (mm)	Type	Code
76	20 ø	WGS-20	P10131
95	30 ø	WGS-30	P10132
161	35 ø	WG-35	P10111
274	70 ø	WG-70	P10112
545	105 ø	WG-105	P10113
1.222	140 ø	WG-140	P10114
2.040	210 ø	WG-210	P10115
2.400	70x175	WG-70 x 175	P10116
5.450	115x305	WG-115 x 305	P10117
7.400	150x350	WG-150 x 350	P10118
13.400	200x500	WG-200 x 500	P10119



Main Features

- True RMS measurement.
- Type A earth leakage protection. IEC 61008.1
- Immunity to transients. IEC 61008.1
- Filtering of high frequencies IEC 61008.1
- Trip adjustment between 80 and 100% $I_{\Delta n}$
- Inverse curve. IEC 61008.1
- Associated standards IEC 61008.1, IEC755

Other features

- 3 modules. DIN rail. In panel, via front panel accessory **Code M5ZZF1**
- Display of instantaneous leakage values.
- Backlit LCD display.
- Built-in RS - 485 (Modbus RTU®) communications system. Only **CBS-4C**

Available types

RGU-10 SERIES	Code
CBS-4	P12711
CBS-4C	P12712

INSTALLATION AND START-UP

This manual contains information and warnings that the user must adhere to in order to guarantee the safe operation of the **CBS-4/CBS-4C**, keeping it in a generally safe condition. The device should not be switched on until it has been mounted in its final location in the electric panel.

IF THE DEVICE IS USED IN A MANNER OTHER THAN THAT SPECIFIED BY THE MANUFACTURER, ITS PROTECTION ELEMENTS MAY BE COMPROMISED.

When it is likely that the device has lost its safety protection (signs of visible damage), it should be disconnected from the auxiliary power supply. In this case, contact a qualified technical service representative.

Installing the device

The following points must be checked before the device is powered:

- Power supply voltage.
- Operating conditions.
- Safety.

A. Power supply voltage:

▪ Standard Version:

- Power supply: 230 Vac ($\pm 20\%$)
- Frequency: 50/60 Hz
- Terminals 10-11: A1-A2
- Device consumption: 6 VA

▪ Special Version:

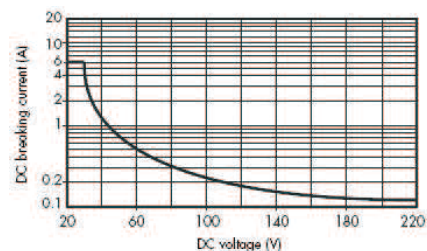
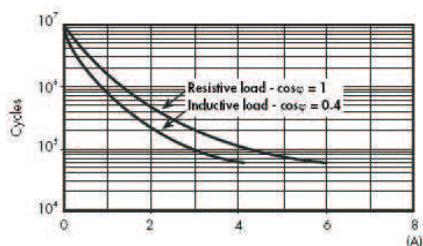
- Power supply: 24...230Vac // 400 Vac // 12...230Vdc
- Frequency: 50/60 Hz
- Terminals 10-1: A1-A2

B. Changeover contacts of main/pre-alarm relay output:

- Trip contact terminals : 13-14-15
- NO output terminal channel 1 : 13
- Common output terminal : 14
- NO output terminal channel 2 : 15
- Trip contact terminals : 7-8-9
- NO output terminal channel 3 : 7
- Common output terminal : 8
- NO output terminal channel 4 : 9
- Material : AgCdO
- Instantaneous nominal/maximum current : 6 / 10 A_{AC}
- Rated/maximum switching voltage : 230 Vac
- Nominal load in AC. : 2500 VA
- Contacts protected by varistor : 275 Vac
- Useful mechanical life : $10 \cdot 10^6$
- Ambient temperature range : - 40...+85°C

- Useful electrical life for AC loads.

Cut off power for DC loads.



C. External input for Trip/Rearm:

- Terminals : 10 – 12
- Type of input. : Optocoupled
- Maximum voltage / Maximum power : 110 – 230 Vac ($\pm 20\%$) / 0.7 W

D. Earth leakage current measurement circuit

Scale range	Scale background:	Display resolution
30 mA	75 mA	± 1 mA
300 mA	750 mA	± 1 mA
3 A	7.5 A	± 0.1 A
30 A	75 A	± 1 A

E. Operating conditions

- Operating temperature : $-10^{\circ}\text{C} \dots +50^{\circ}\text{C}$
- Relative humidity : 5 ... 95 RH (without condensation)
- Altitude : up to 2000 m

F. Safety:

- Designed for category III 300 Vac installations. (EN 61010).
- Double-insulated electric shock protection class II.

INSTALLATION AND ASSEMBLY

The device is installed on DIN rail or panel (panel drill $67^{+1} \times 67^{+1}$ mm, in accordance with DIN 43 700 with accessory M5ZZF1). All the connections are located inside the electric panel.

Take into account that when the device is connected, the terminals may be hazardous to the touch, and opening the covers or removing elements may provide access to parts that are dangerous. Do not use the device until it is fully installed.

To install the device on a panel, use a 72x72 mm frontal adapter. All the connections remain inside the electric panel.



The frontal adapter accessory has a base, a frame, two tabs and three screws.

1. Place the base on the drill hole made on the panel.
2. Locate the unit behind the base.
3. Screw the base onto the unit using the holes in the top right and bottom left hand corners of the front panel.
4. Fit on the front panel to cover the fixing holes.
5. Fit the green pressure tabs on the side rails of the base.
6. Move the tabs towards the panel to fix it.



Example. How to connect the different parts of the front panel accessory to the unit.

Connection features

Device connection using cable with cross-section from 0.5 a 2 mm²
 Recommended torque 0.5-0.6 Nm
 Length of stripped cable 5-7 mm

To connect the earth leakage transformer over long distances, the use of braided cable is recommended..

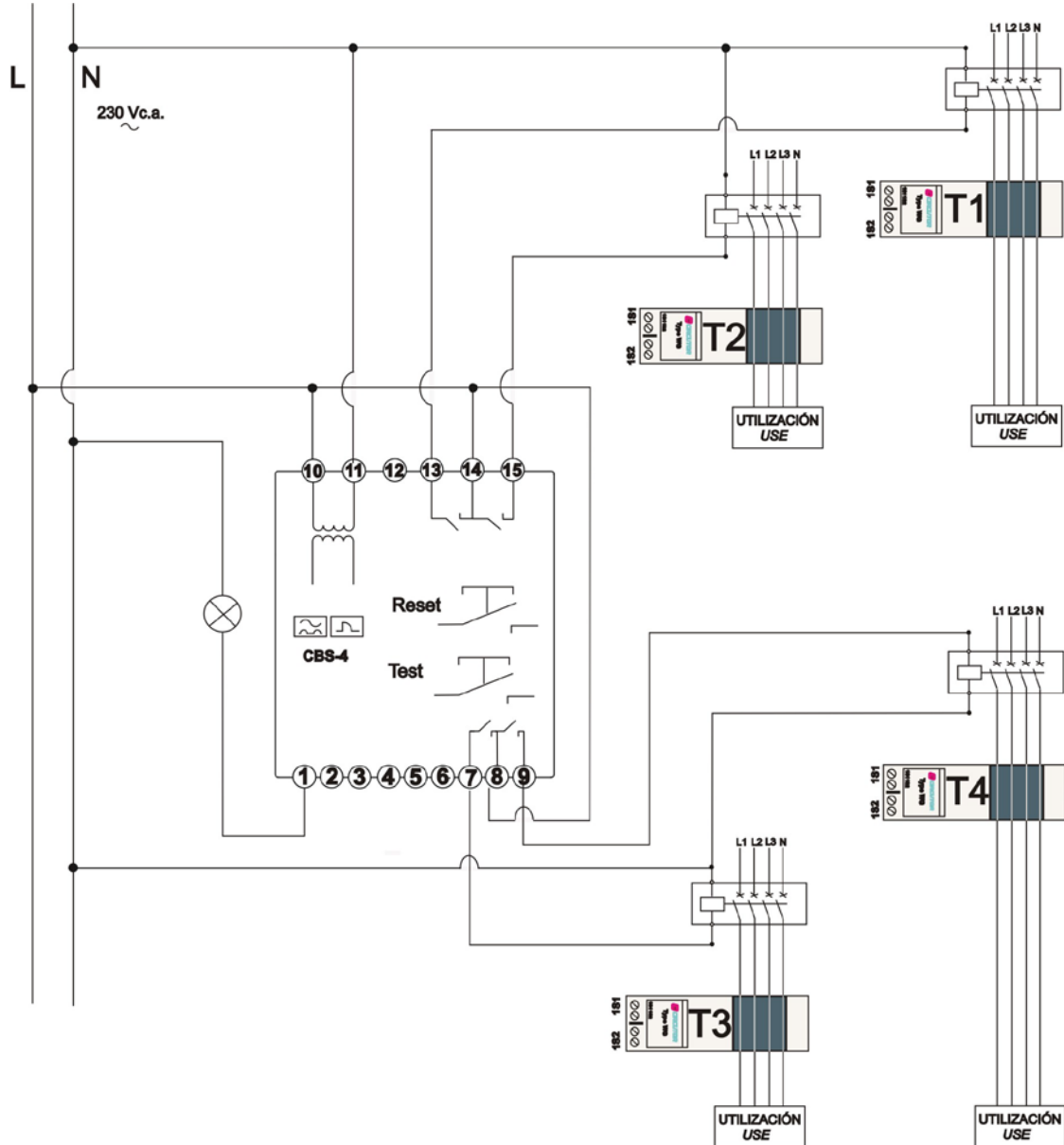
List of terminals

No.	Description of terminals
1	Pre-alarm signalling contact
2	Common 1S2 input
3	1S1-T4 input
4	1S1-T3 input
5	1S1-T2 input
6	1S1-T1 input
7	Channel 3 NO trip contact
8	Common output contact
9	Channel 9 NO trip contact
10	A1 power supply voltage input / trip-rearm
11	A2 power supply voltage input
12	Trip-rearm input
13	Channel 1 NO trip contact
14	Common output contact
15	Channel 2 NO trip contact

CONNECTION DIAGRAMS

Connection of **CBS-4/CBS-4C** circuit breaker elements with current shunt coil. In the event of an earth leakage relay trip due to a fault, test or error of the earth leakage current transformer.

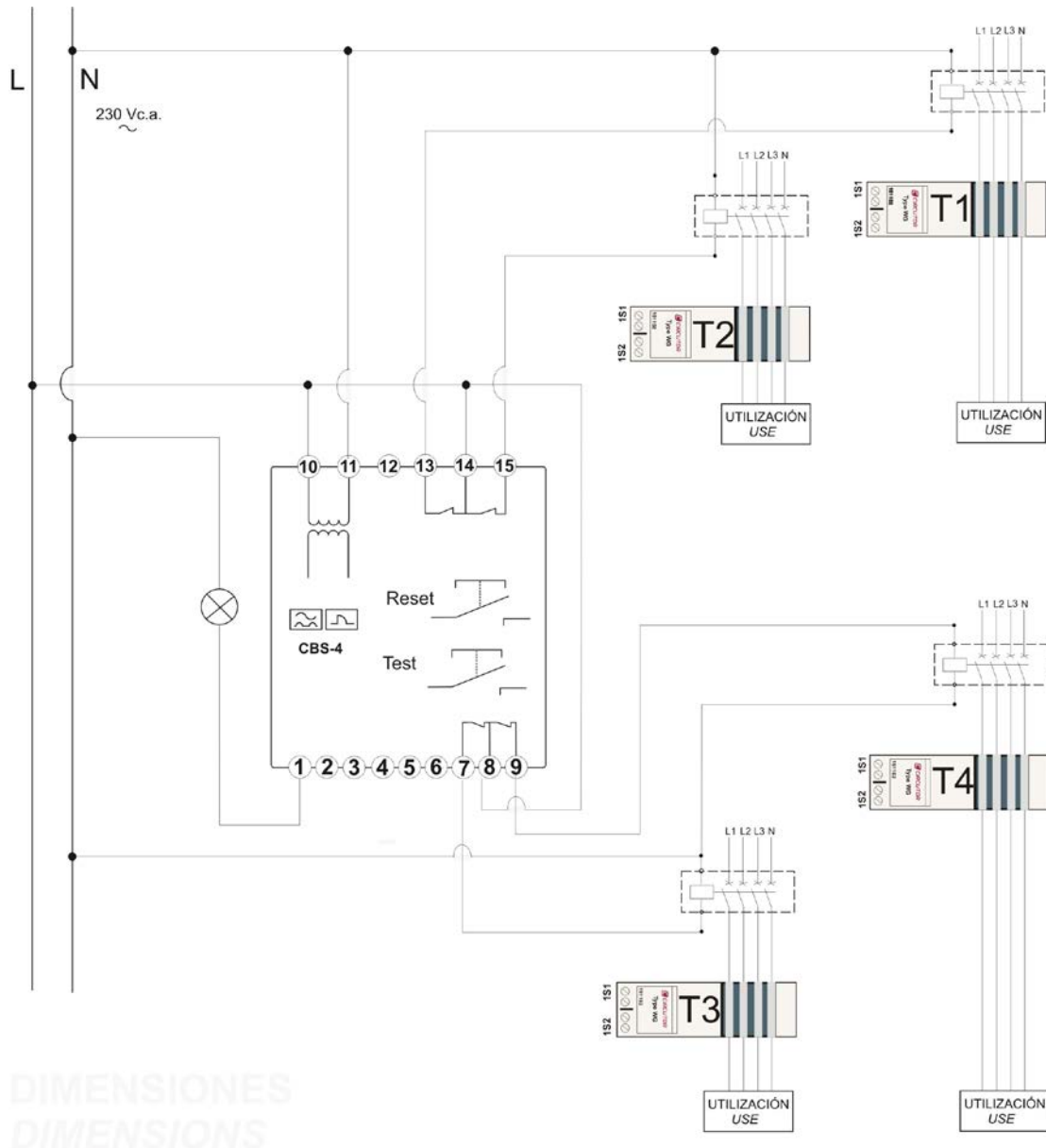
1. See cause of the tripped channel on the red display.
2. Rearm the circuit breaker element.
3. Press the RESET button of the device for the tripped channel.



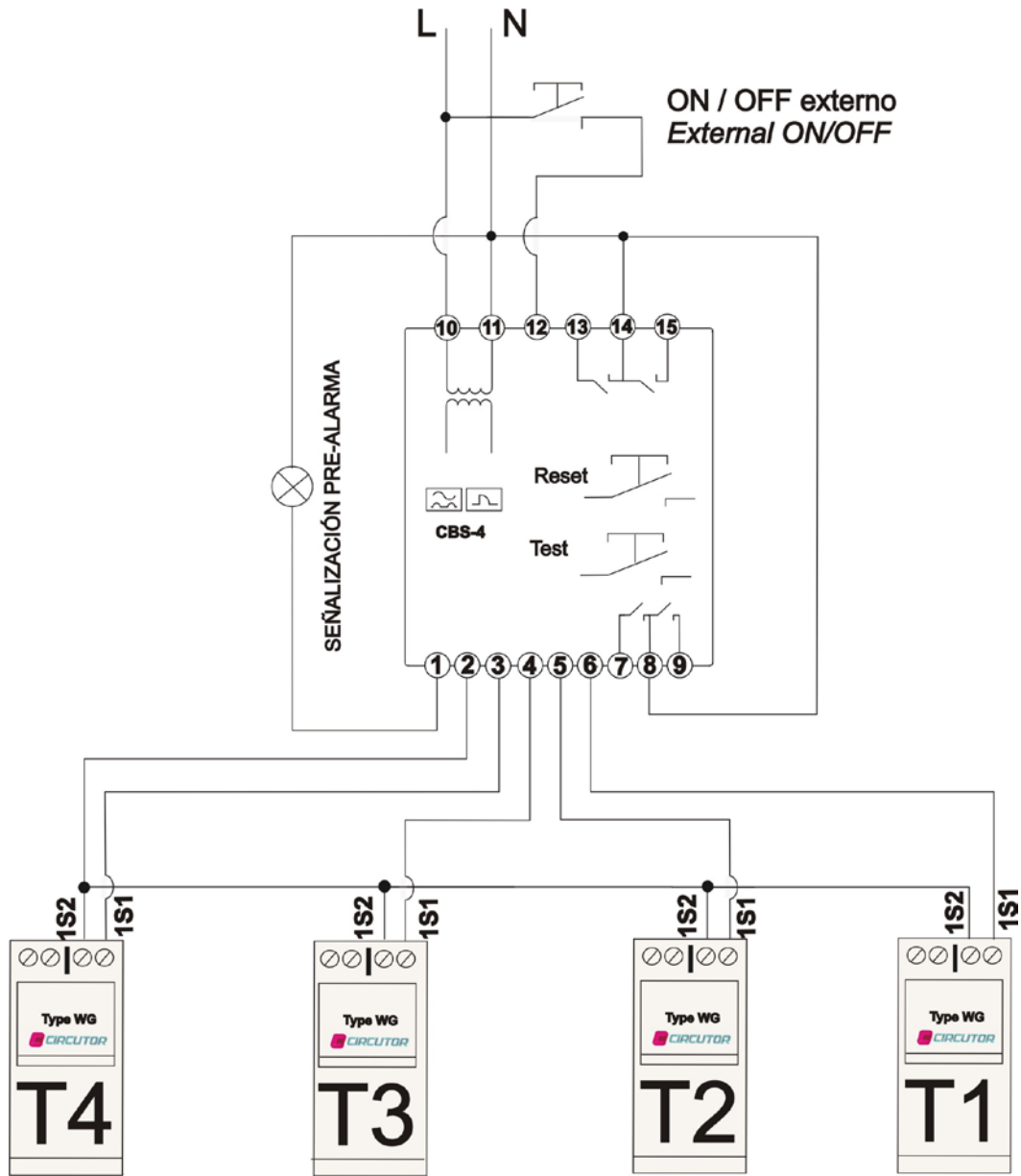
Connection of the **CBS-4/CBS-4C** circuit breaker elements with the current undervoltage coil. In the event of an earth leakage relay trip due to a fault, test or error of the earth leakage current transformer.

For connections via the current undervoltage coil, you need to activate the positive safety. More information about this on page 12.

1. See cause of the tripped channel on the red display.
2. Rearm the circuit breaker element.
3. Press the RESET button of the device for the tripped channel.



Connection of the earth leakage transformers of the **WG** series to the **CBS-4/CBS-4C** devices, which are associated with each channel to control, as follows:



CBS-4/CBS-4C connection with the voltage undervoltage coil is the same as the current shunt coil, with the main difference being the activation of the positive safety.

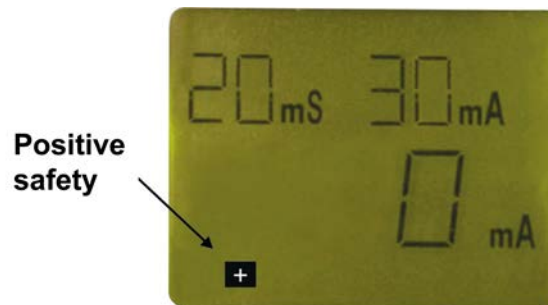
In this way, by using a CONTACTOR you can rearm the protection by pressing RESET; however, if using a CIRCUIT BREAKER, you must rearm the circuit breaker element first.

Connection of the device in positive safety mode

This installation mode provides the most conservative protection from the point of view of the safety of people and materials in electrical installations.

With this type of connection and configuration of the device, you can be confident that people and materials are protected against faults in situations in which the earth leakage relay loses its protective capability. Whether due to power supply problems in the device itself or an absence of voltage in the installation (neutral or phase failure), the last order of the relay is to open the installation.

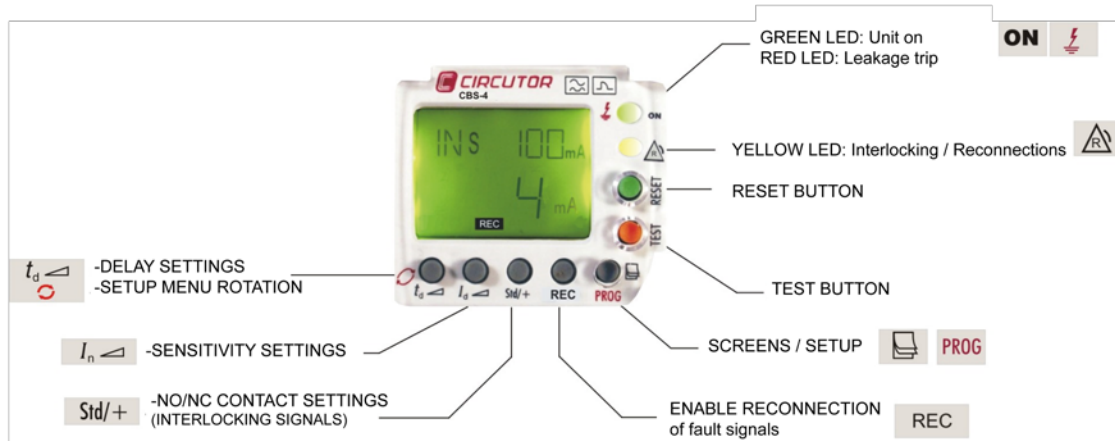
1. The circuit breaker element must be able to trip by means of the undervoltage coil, whether internal (CONTACTOR) or external (CIRCUIT BREAKER).
2. Program the device to set it by pressing the Std/+ button in positive safety mode. The symbol "+" appears on the display.
3. The device's power supply must be from the same installation or part that it protects.



DESCRIPTION

The device's front panel, which is made up of the display, buttons and LEDs, is protected by a sealable plastic cover, conveniently perforated for access to the RESET, TEST and PROGRAMMING buttons.

Generic functions of the LEDs and buttons on the front panel:



The device has two light indicators.



Dual-colour Green / Red LE

- Off, the device is not operating or is not receiving power supply voltage.
- Green, the device is operating. It is receiving power supply voltage
- Red, the device has tripped.

Yellow LED. Pre-alarm indication.



- Off, there is no prealarm trip.
- Permanently lit, prealarm trip.

The device has 7 buttons, described in order of accessibility.

Accessible with presealed cover and tool.

RESET button



- Initialisation of device after trip.

TEST button



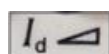
- Causes a trip to test if relay is operating correctly.

PROG/PAG button



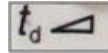
- Dual-function button.
- Short press to alternate between the different channels.
- Press and hold to enter device programming by SETUP.

Accessible with raised cover. Dual-function buttons. Press and hold to enter and configure values and tap to select the option in a series of values defined in the device.



SENSITIVITY $I_{\Delta n}$ button

- Allows to choose from values of 30, 100, 300, 500 mA , 1 and 3 A
- Use extended scale in SETUP programming to add 5, 10 and 30 A to the above values list.

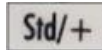
DELAY, t_d button

- Allows you to choose from values of 20, 100, 200, 300 , 400, 500, 750 ms 1 s
- Use extended scale in SETUP programming to add 3, 5 and 10 s to the above list of values.

- This button also allows you to browse the *SETUP MENU*.



Accessible with raised cover and tool. Flush buttons.

NORMAL OR POSITIVE SAFETY button

- This allows you to configure the polarity of the output contacts.
- With normal safety, (Std) the relay activates with a fault, status is NO.
- With positive safety (+), the relay activates when there is voltage in the device and deactivates when there is a fault, status is NC.

REC button

- This allows you to activate the automatic re-establishment option and use the device for **signalling faults**. It must not be used as an earth leakage protection function.
- When activating the REC, the device automatically resets the trip relay, when the leakage current drops below the programmed threshold once again.

The device enables all the parameters to be displayed and configured by direct adjustment or by programming the *SETUP* via a display.

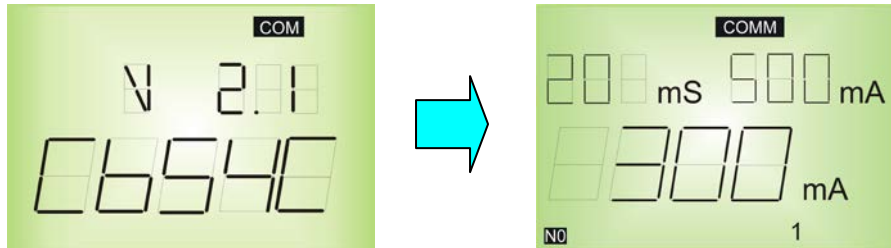
Backlight LCD display

- The screen background is green in normal status. The required parameters of the earth leakage protection are displayed along with the sensitivity and delay of its associated devices. The actual leakage current and channel being viewed are also displayed.
- For any event that causes a trip in the device, the screen background changes to red and the display shows the reason for the trip.



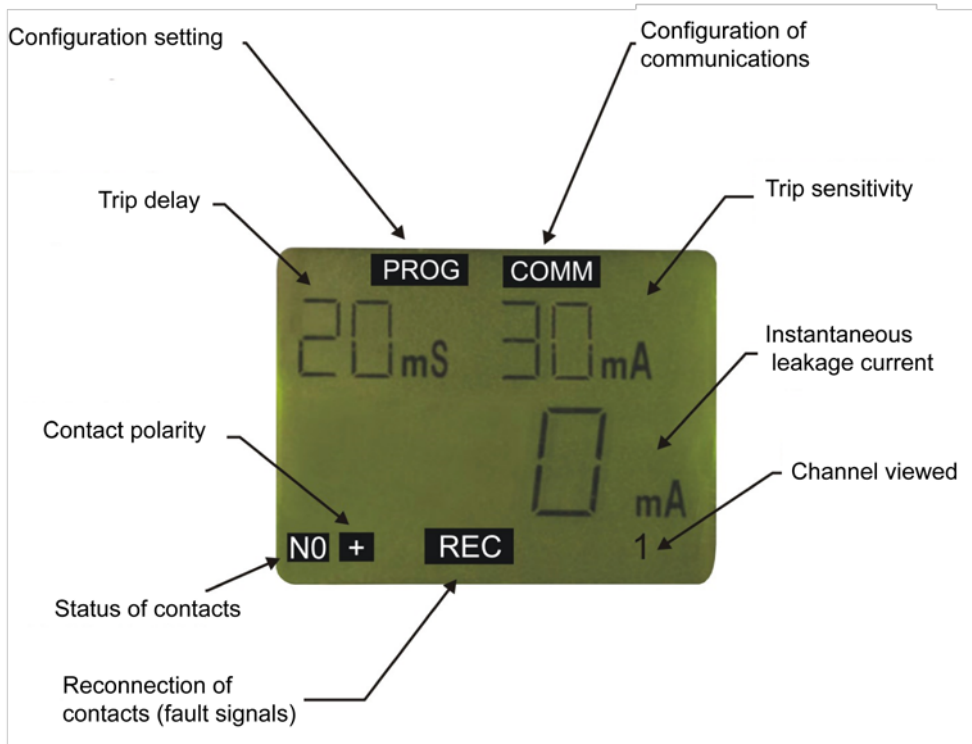
OPERATION

When the device is powered at its rated voltage, the LED on the front panel is ON, the backlit LCD is lit in green to indicate the version of the *software* and *hardware*. After a short period, the version disappears and the default display values are displayed.



The display indicates the programmed delay and sensitivity setting values, as well as a reading of the instantaneous leakage current.

During operation, the device display shows the following symbols while configuring and programming the device.



The following magnitudes associated with the earth leakage protection are shown in the display in normal operating status.

MAGNITUDE	UNIT
Instantaneous leakage current	mA / A
Delay of programmed trip, t_d	ms / s
Sensitivity of programmed trip, $I_d = I_{\Delta N}$	mA / A
State of main relay contacts	+ (contact 13-14 NC) / none (contact 13 - 14 NO) + (contact 15-14 NC) / none (contact 15 - 14 NO) + (contact 7-8 NC) / none (contact 7 - 8 NO) + (contact 9 -8 NC) / none (contact 9 - 8 NO)

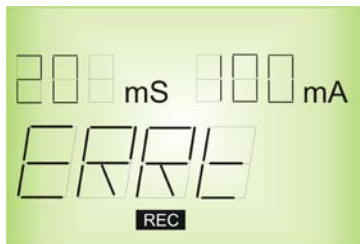
The **CBS-4/CBS-4C** allows for the display and programming of all the parameters required to complete the setting of the earth leakage protection with pre-alarm and communications.

MAGNITUDE	UNIT
Pre-alarm sensitivity in % $I_{\Delta N}$	%
Working frequency (*)	Hz
No. of peripherals (*)	-
Communication speed (*)	Bauds
Type of parity (*)	-

(*) Only for **CBS-4C**

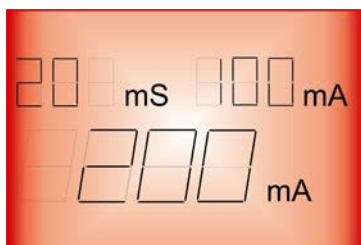
INCIDENTS OR CAUSES OF DEVICE TRIPPING

BAD CONNECTION OF TRANSFORMER. The device carries out a check from time to time to detect the presence of the sensor or associated earth leakage transformer. In addition, the LCD will indicate an error message constantly: "ERRt". If the transformer secondary short circuits, it also detects it as an error. When this error is detected, to re-establish correct operations, make sure there is a good connection with the earth leakage transformer and perform the RESET. If it detects the transformer again, it recovers normal status and the error message disappears.

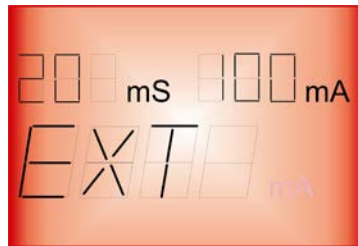


PREALARM TRIP. If the fault current exceeds the programmed prealarm threshold, the yellow LED is lit, the LCD backlit in green indicates the level of leakage and the prealarm output relay is enabled. When the pre-alarm situation disappears, it reverts to normal status (indication relay and LED).

TRIP DUE TO FAILURE. When it trips due to the fault current, the red and yellow LEDs are lit and the LCD backlit in red. The display of the current of the last cycle that tripped the relay is maintained. To reconnect, press RESET to return to the initial status.

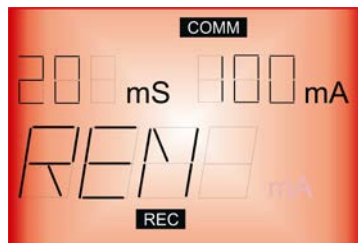


REMOTE TRIP. When a trip is forced (input terminals 10-12, applying a 230 Vac voltage) the device trips all the channels and is disabled, reporting this incident through the “**EXT**” message on the display lit up in red and the ON LED. It has to stay permanently lit in this situation until there is a change in status. Manual or communications-based rearming is not possible.



When it is remotely rearmed (remote input terminals 10-12, cutting voltage of 230 Vac) the device is reconnected with the backlight display in green, the ON LED in green as in the normal status.

For the CBS-4C, a remote trip/rearm can be completed via RS - 485 communications, the device stays tripped and the incident is indicated via the “**REM**” message on the display lit in red and the ON LED as well. It has to stay permanently lit in this situation until there is a change in status.



It rearms when it is rearmed remotely via RS - 485 communications, applying a voltage of 230 Vac between the remote input terminals 10-12 or by means of the reset button. The device is reconnected with the backlight display in green, ON LED in green as in normal status.

DEVICE TRIP DISPLAY MESSAGES

CAUSE OF TRIP	DISPLAY MESSAGE
TEST	TEST
Bad connection with the toroidal transformer	ERRt
On/off remote signal	EXT
RS485 communications	REM
Current leakage	Instantaneous value

OTHER DISPLAY MESSAGES

MESSAGE	
SAVE	Validates configuration values
EXIT	Exits programming mode
OVR	Reading of leakage current out of scale.

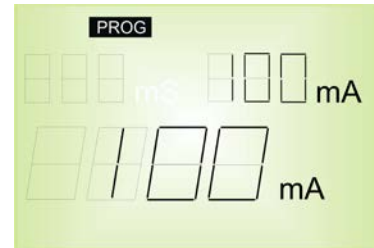
DEVICE ADJUSTMENTS

Direct adjustments

Hold and press one of the direct adjustment buttons to enter **PROG** mode (icon in LCD) and change the relay setting. If while in **PROG** mode any other direct function is activated (I_d , t_d , $S_{td}+$ and Auto), the setting of the parameter in the relay viewed is also enabled. Leaves the **PROG** mode after a period in which no button is pressed, with the last "SAVE" setting.

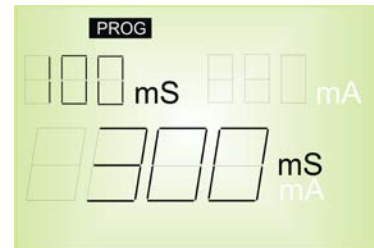
Adjustment of main relay current

Press I_d and hold for more than one second and PROG appears; press repeatedly to increase an adjustment in the list. The current adjustment can be seen in small figures, and the new adjustment in large ones. 30 mA, 100 mA, 300 mA, 500 mA, 1 A, 3 A, 5 A, 10 A, 30 A. There are limitations of scale, these are modified in the *SETUP* of the device. The default scale is 3 A



Adjustment of time and curve of the main relay

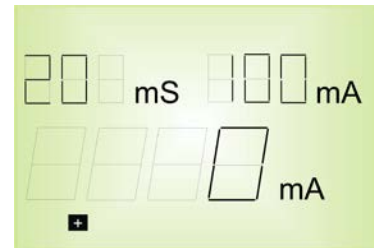
Press I_d for more than one second, PROG appears; press repeatedly to increase an adjustment in the list, including the types of curves. The current adjustment can be seen in small figures, and the new adjustment in large ones. INS Curve, SEL Curve [S], 20, 100, 200, 300, 400, 500, 750 ms, 1, 3, 5, 10 s. There are limitations of scale, these are modified in the *SETUP* of the device. The curves belong to the scale of 1 s, which is the default. If the adjustment of I_{dN} is 30 mA, only instantaneous, 20 ms, INS or SEL Curves adjustments are permitted.



Positive safety settings (main relays)

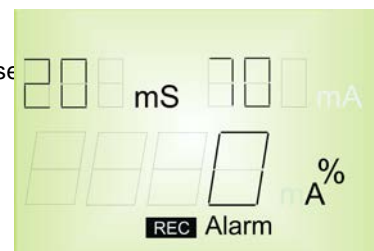
" S_{td} ", the contacts are in idle status, they are not shown on the display (NO).

"+", the contacts change status when they power the device, this is shown on the display. (NC).



Recovery setting

The device operates by signalling the faults. This option must not be used as earth leakage protection. When activating the REC, the device automatically resets when the leakage current drops below the programmed threshold once again.



Adjustments via SETUP

Press and hold to show a "PROG" on the display and the first menu option. Enter the menu programming mode, and press PROG to make different text indications appear on the display.

When you enter the desired menu, you can change the parameter by pressing the t_d (rotating) button. To confirm the adjustments, press the PROG button again and the "SAVE" message appears showing the device version, returning to the home screen.

If the keypad is inactive for a period of time an "EXIT" message is displayed and the main relay settings are displayed without saving anything.

Press briefly to display the different parameters of each channel.

COMMUNICATION SETUP Programming*(ONLY FOR TYPES WITH COMMUNICATION)

One or more **CBS-4C** devices can be connected to a computer or PLC to automate a production process or an energy control system. This system can be used to centralise data at one single point as well the day-to-day operations of each one; for this reason the **CBS-4C** has an RS - 485 serial communication output.

If more than one device is connected to a single line (RS - 485), a number or address has to be assigned to each one (from 1 to 99) so that the central computer or PLC can send the right requests for each peripheral to the addresses.

The communication parameters of the **CBS-4C** can be displayed and/or modified from the communication *SETUP*; and the parameters can be adapted to the requirements of the network and/or application topologies.

The device does not record the programming changes until they are confirmed with the **PROG** button. When the keypad is detected as inactive for a certain period, it "EXITS" and leaves the programming menu without saving any changes.



To access the **COMMUNICATIONS SETUP**, press the **PROG** button to enter programming mode.

After entering programming mode, a screen is displayed reporting that the device has entered the communications programming mode.



Press the **PROG** button to enter the configuration mode.

Peripheral number

The display shows PERI and the peripheral number in the top left hand corner of the screen.



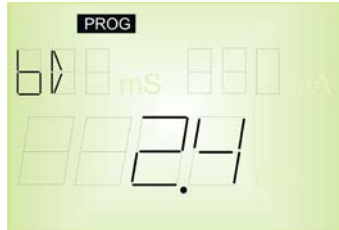
To write or modify the peripheral number, press the **td** button repeatedly to increase the value of the digit in the top left hand corner.

When the desired screen value is shown, confirm and go to the next menu by pressing the **PROG** button to modify the other device configuration values.

The peripheral number ranges from 1 to 99.

Transmission speed

The display shows the letters “bd” in the top left hand corner indicating bauds and the communication speed in devices of a thousand in the centre.



To modify the communication speed, press the **td** button repeatedly to increase the value of the digits in the centre of the screen.

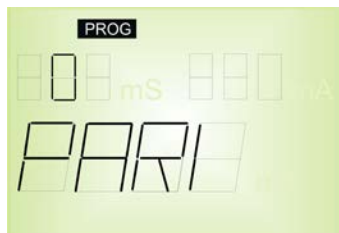
When the desired value is shown on the screen, press the **PROG** button to go to the next digit and modify the other values there.

The possible programming values are as follows:

Value by screen	Bauds
2.4	2 400
4.8	4 800
9.6	9 600
19.2	19 200
38.4	38 400
54.6	54 600
115	115 000

Parity

The display shows the term “PARI” with the configured value in the top left hand corner.



To modify the parity, press the **td** button repeatedly to change the value of the digits in the top left hand corner of the screen.


When the desired value is shown on the screen, confirm and go to the next screen by pressing the **PROG** button and modify the configuration.

The communication programming via *SETUP* ends at this screen. It directly links with the first device measurement screen of *SETUP*.

MEASUREMENT SETUP PROGRAMMING

The configuration parameters of the **CBS-4/CBS-4C** can be displayed and/or modified from the measurement *SETUP* menu; and the parameters can be adapted to the requirements of the network and/or application topologies. This *SETUP* menu is preceded by the communications *SETUP* menu if the device is a **CBS-4C**. If there are no **CBS-4** communications, it is the only device *SETUP* menu.

The device does not record the programming changes until they are confirmed with the **PROG** button. When the keypad is detected as inactive for a certain period, it completes an “**EXIT**” and leaves the programming menu without saving any changes.

 To access the **MEASUREMENTS SETUP** menu, press the **PROG** button to enter the programming mode(*)

(*) Only **CBS-4C**.

After entering the programming mode, a screen is displayed reporting that the device has entered programming mode with the symbol **PROG** at the top of the first menu screen.

Working frequency

The display shows **FREQ**. Press **PROG** to enter and modify. The value of the configured current frequency appears in the top left hand corner of the screen.



To modify the working frequency, press the **td** button repeatedly to increase the value of the digit in the top left hand corner.

When the desired value is shown on the screen, confirm and go to the next menu by pressing the **PROG** button, and leave *SETUP* with the **SAVE** message.

Scale limit

The display shows **LIM**. Press **PROG** to enter and modify. The scale end values of delay scales and configured present current sensitivity appear at the top of the screen.



To modify the operating scale, press the **td** button repeatedly to change the value of the digits at the top. There are two scales, one extended to 10 seconds and 30 A and the default scale of 1 s and 3 A.

When the desired values are shown on the screen, press the **PROG** button to confirm, exit the *SETUP* with the **SAVE** message.

ALARM SETUP PROGRAMMING

The display shows **ALAR**. Press **PROG** to enter and modify. The value of the configured current percentage appears in the bottom right hand corner of the screen.

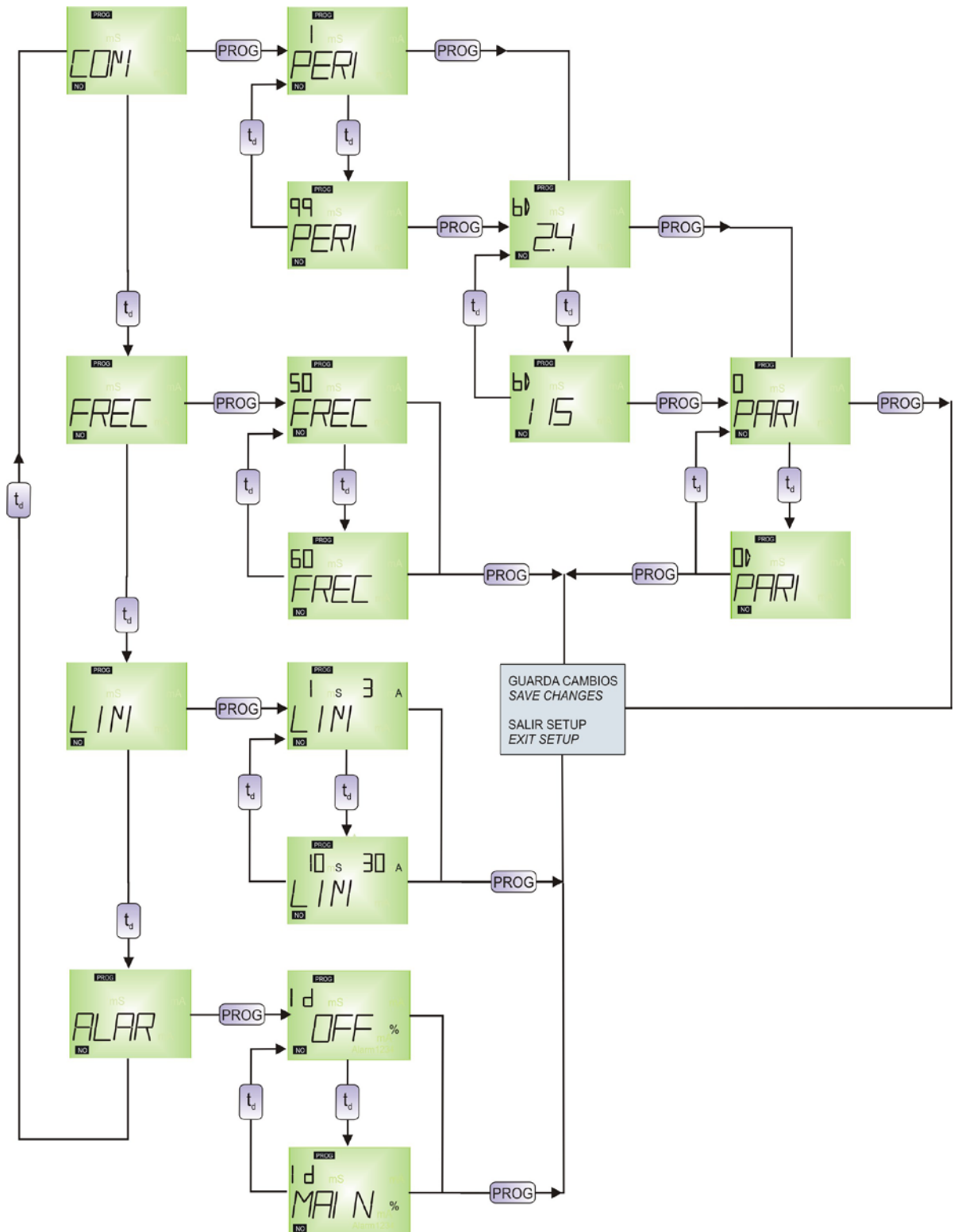


To modify the pre-alarm current, press the **td** button repeatedly, modifying the percentage.

When the desired value is shown on the screen, confirm and go to the next menu by pressing the **PROG** button, and exit the *SETUP* with the **SAVE** message.

SETUP MENUS DIAGRAM

THE **CBS-4** (**CBS-4C** WITH COMMUNICATIONS) STARTS PROGRAMMING VIA **SETUP** IN THE **COM** SUB-MENU. THIS WILL NOT APPEAR IN THE **CBS-4** TYPE.



MODBUS PROTOCOL[®]

The **CBS-4** multipoint earth leakage system communicates using the **MODBUS RTU[®]** protocol (*Pulling Question / Response*).

In the MODBUS protocol, the RTU (Remote Terminal Unit) mode is used; each 8-bit *byte* in a message contains two 4-bit hexadecimal characters. The format for each *byte* in RTU mode is:

Code	8-bit binary, hexadecimal 0-9, A-F
Bits per <i>byte</i>	2 hexadecimal characters contained in each 8-bit field of the message.
Check-Error field	8 data bits CRC (Cyclical Redundancy Check) type

Modbus functions used:

Function 04h	Read
Function 10h	Write

MODBUS MEMORY MAP[®]

Magnitude	Symbol	Values	U _{ds}	Address	Read Write
No. of peripheral	PERI	1 – 99	-	0000h	R/W
Communication speed	bd	2 400 (0h) – 4 800 (1h) – 9 600 (2h) – 19 200 (3h) 38 400 (4h)– 57 600 (5h)– 115 200 (6h)	Bauds	0001 h	R/W
Type of parity	PARI	None (0h), Odd (1h), Even (2h)	-	0002 h	R/W
Working frequency	FREQ	50 – 60	Hz	0003 h	R/W
Trip current Main relay in channels	<i>Id</i>	0.03 (1h) – 0.1 (2h) – 0.3 (3h) – 0.5 (4h) – 1 (5h) 3 (6h)– 5 (7h) – 10 (8h) –30 (9h)	A	0004h (C1)	R/W
				0005h (C2)	
				0006h (C3)	
				0007h (C4)	
Delay time Main relay in channels	<i>td</i>	INS(0h) – SEL(1h) – 0.02(2h) – 0.1(3h) – 0.2(4h) – 0.3(5h) – 0.4(6h) 0.5 (7h)– 0.75 (8h) – 1(9h) – 3(10h) – 5(11h) – 10(12h)	s	0008h (C1)	R/W
				0009h (C2)	
				000Ah (C3)	
				000Bh (C4)	
Contact polarity Relays	<i>Std/+</i>	Channel 1:0000h (NO), 0001h (NC) Channel 2: 0000h (NO), 0002h (NC) Channel 3: 0000h (NO), 0003h (NC) Channel 4: 0000h (NO), 0004h (NC)	-	Dh 000	R/W
Trip current Pre-alarm	<i>Id'</i>	OFF(0h) – 50 (1h) – 60 (2h) – 70 (4h) – 80 (5h)	%	000Eh	R/W
Device version	-	0 – 100	-	0015 h	R
Relay contact status	-	off - on (main) on (prealarm)	-	0019 h	R
RMS value Leakage current	-	0 – 65,000	mA	001Ah (C1)	R
				001Bh (C2)	
				001Ch (C3)	
				001Dh (C4)	
RMS value Trip current	-	0 – 65,000	mA	001Eh (C1)	R
				001Fh (C2)	
				0020h (C3)	
				0021h (C4)	
Disable channel	-	0001h:1,0002h:2, 0004h:3, 0008h:4 – Reset 0100h:1, 0200h:2, 0400h:3, 0800h:4 - Test	-	0022 h	W
Enable configuration recording	-	0000 h - Enable FFFF h - Record	-	0023 h	W

Example of MODBUS[®] read

QUESTION

0A 03 00 00 00 0A 71 76

0A Peripheral number, 10 in decimal
 03 Reading function
 00 00 Log in which reading is to start
 00 0A Number of logs to read: 10 in decimal
 71 76 CRC character

RESPONSE

0A 04 14 00 0A 00 02 00 00 00 32 00 00 00 01 00 00 00 01 00 14 00 00 7E C9

0A Number of peripheral that responds, 10 in decimal
 03 Reading function - the one used in the question
 14 Number of bytes received (20)
 00 0A Address 0000 h: Peripheral number (10)
 00 02 Address 0001 h: Communication speed (2- 9,600 bauds)
 00 00 Address 0001 h: Type of parity (0 - None)
 00 32 Address 0003 h: Working frequency (50 Hz)
 00 00 Address 0004 h: Programmed trip current (0-30mA)
 00 01 Address 0005 h: Programmed time for delay in trip (1-INS)
 00 00 Address 0006 h: Trip output relay polarity (0-Standard)
 00 01 Address 0007 h: % $I_{\Delta n}$ prealarm trip. (1-50%)
 00 14 Address 0008 h: Programmed time for prealarm delay. (1 -20 ms)
 00 00 Address 0009 h: Output relay polarity (0-Standard)
 7E C9 CRC character

Example of MODBUS[®] write

QUESTION

01 10 00 00 00 05 0A 00 01 00 03 00 00 00 3C 00 00 FF 64

01 Peripheral number (1)
 10 Number of Modbus instruction: Multiple parameter writing (16)
 00 00 Initial writing log (0)
 00 05 Number of logs to be modified (5)
 0A Number of bytes passed (10)
 00 01 Address 0000 h: Peripheral number of device.
 00 03 Address 0001 h: Communication speed (3 - 19,200 bauds)
 00 00 Address 0002 h: Type of progressive parity (0 -None)
 00 3C Address 0003 h: Working frequency (3C - 60 Hz)
 00 1E Address 0004 h: Trip current (0 - 30mA)
 FF 64 CRC character

RESPONSE

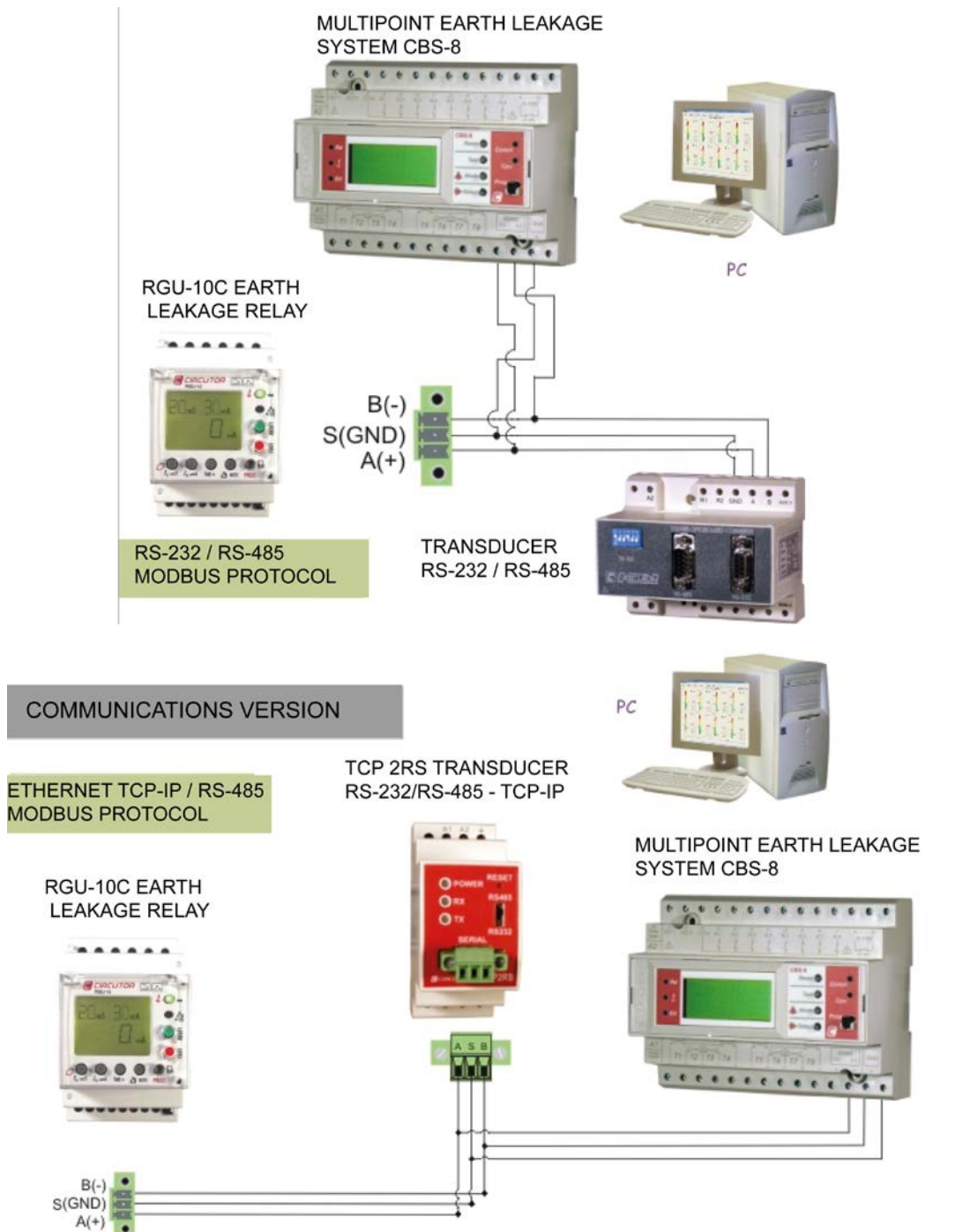
01 10 00 00 00 05 00 0A

01 Peripheral number (1)
 10 Number of Modbus instruction: Multiple parameter writing (16)
 00 00 Initial writing log (0)
 00 05 Number of logs to be modified (5)
 00 0A Frame CRC

Every Modbus frame has a maximum limit of 26 logs

CONNECTING THE RS485 BUS

The RS - 485 cabling should be completed using twisted pair cables with mesh shielding (minimum 3 wires), with a maximum distance of 1.2 m between the **CBS-4** and the master device. A maximum of 32 devices can be connected to the Bus in series.



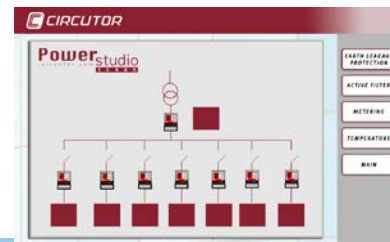
For communication with the master device or PC, the following should be used:

1. The RS-232 to RS-485 Protocol Network Intelligent Converter. Intelligent Converter (M54020)
2. TCP2RS Converter (M54031) of the RS-232/RS-485 Mains protocol to Ethernet TCP/IP.

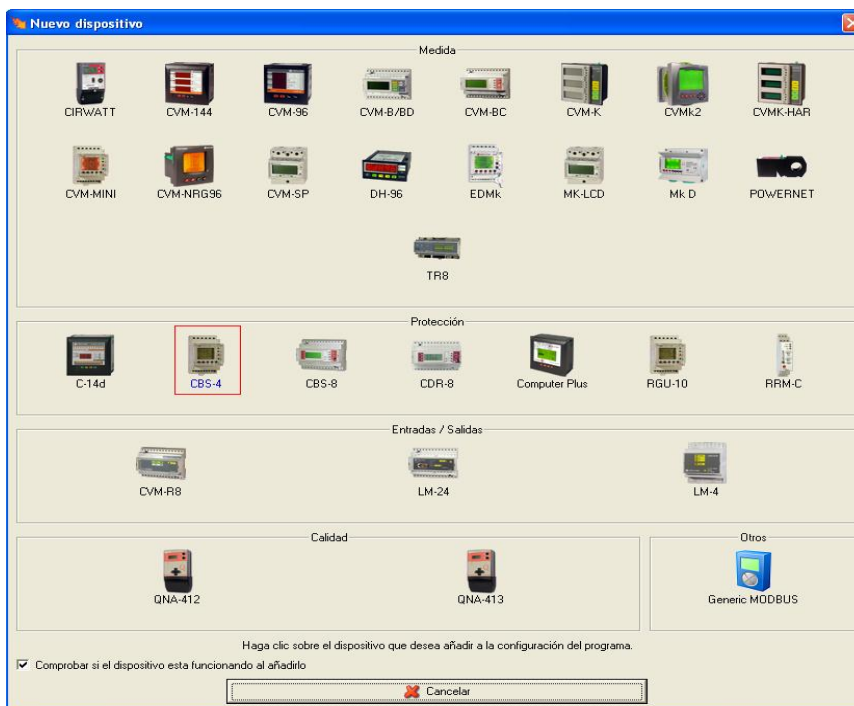
APPLICATIONS

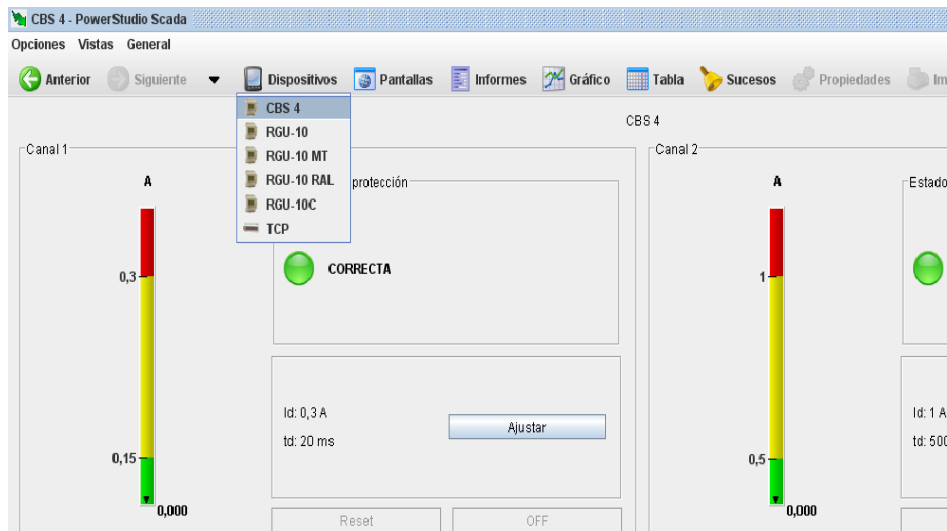
This system can be used not only for the day-to-day operation of each one, but also to centralise data in a single log point (Software Power Studio®, M90221).

The different devices and **CBS-4C** in a network can be monitored and configured in an installation.

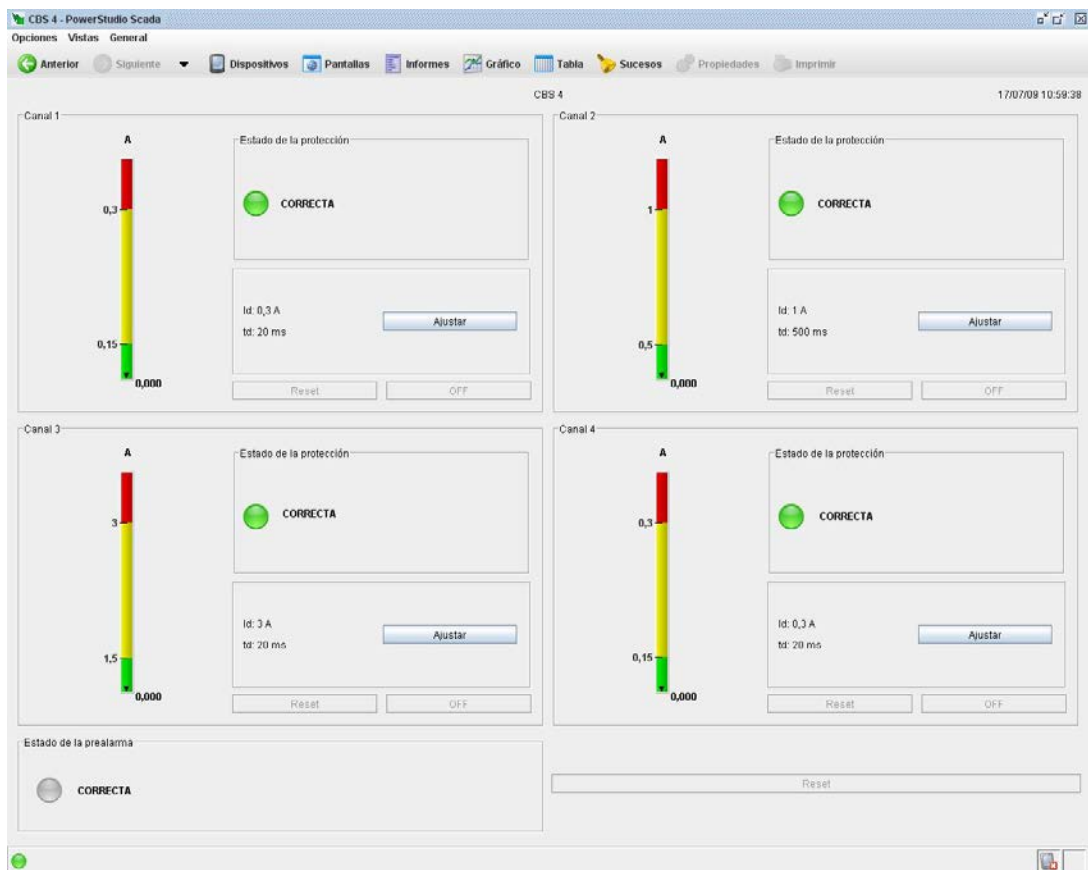


The system allows easy configuration of communications in the network

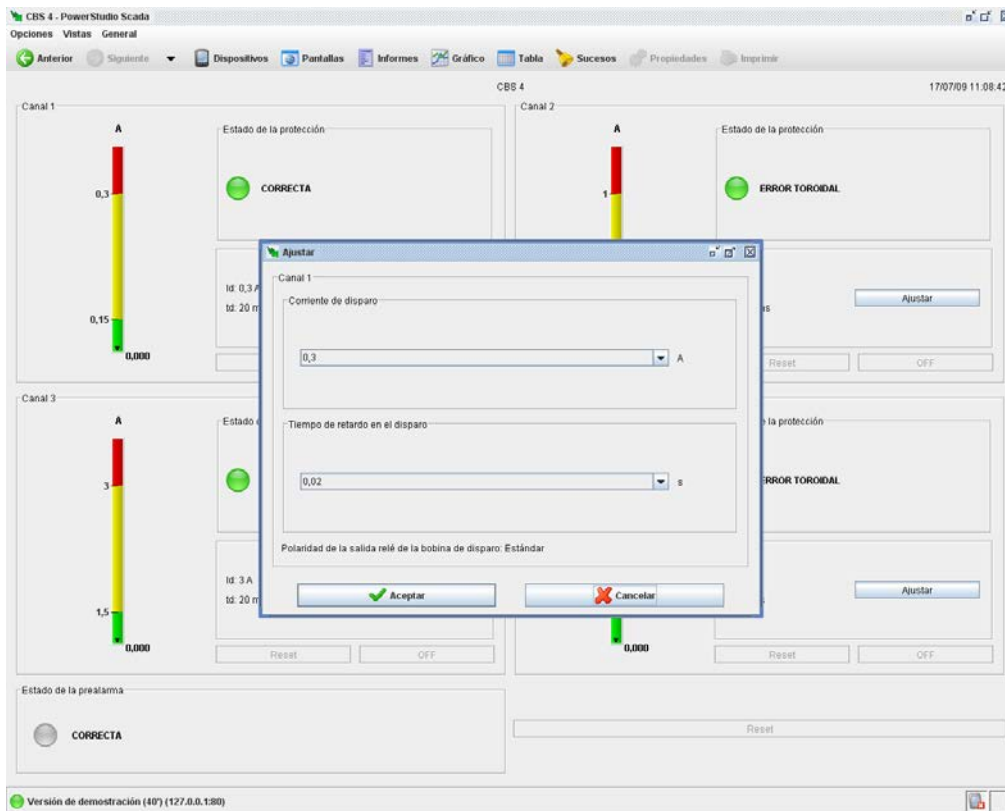
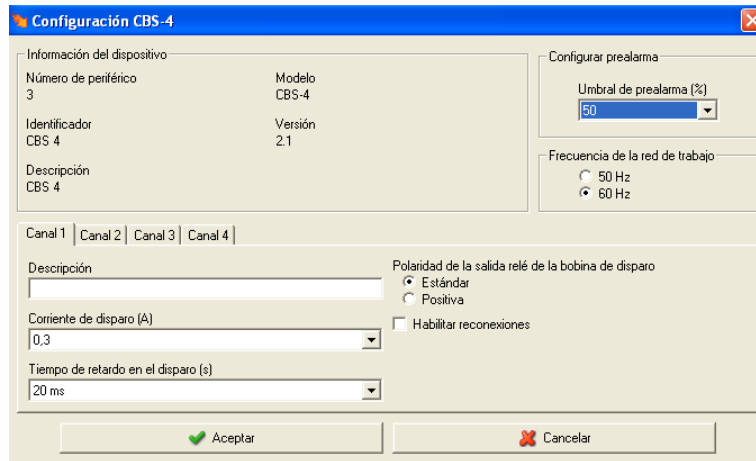




You can see the operating status of the device from the PC.



You can program all the values of the device that can be configured with the device's keypad from the PC.



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