



**MULTIPOINT EARTH LEAKAGE
RELAY**

CBS-8 SERIES

USER'S MANUAL

(M 981 581 / 01D)

(c) CIRCUTOR S.A.

CBS-8 USER'S MANUAL CONTENT

	page
1.- CHECKING THE CONTENTS OF YOUR PACKAGE	2
2.- GENERAL FEATURES.....	3
3.- INSTALLATION AND STARTUP	5
3.1.- Installing the CBS-8.....	5
3.2.- CBS-8 connection terminal (according to specification in tables)	7
3.3.- CBS-8 connection drawings.....	8
3.3.1.- To function as an earth leakage current meter	8
3.3.2.- To function as a residual current protective device.....	9
4.- OPERATION MODE.....	10
4.1.- Normal mode.....	11
4.2.- Test Mode	14
4.3.- Reset mode	16
4.4.- Setup mode	17
5.- SETTING UP THE CBS-8	18
5.1.- Channel setting.....	18
5.1.1.- Common parameter setting	19
5.1.2.- Channel setting	20
5.2.- Communication setting	25
5.3.- On-board clock setting.....	26
6.- TECHNICAL SPECIFICATIONS.....	27
7.- SAFETY CONSIDERATIONS.....	29
8.- MAINTENANCE.....	29
9.- TECHNICAL SERVICE.....	29
10.- CBS-8 COMMUNICATIONS.....	30
10.1.- To take into account!	30
10.2.- Connection of a RS-485 network to a PC (RS-232).....	31
10.3.- MODBUS © Protocol	32
10.3.1.- Readout registers	33
10.3.2.- Working registers	35
10.3.3.- Self-reclosing feature	35

1.- CHECKING THE CONTENTS OF YOUR PACKAGE

This manual is aimed to familiarize the user with the operation of the central of residual current relays model **CBS-8**, in order to get the best from its features. After receiving the analyzer, please check the following points:

- a) The delivered material meets your order specifications.
- b) After unpacking, check that the instrument has not been damaged in transit.
- c) The standard set includes the pertinent user's manual.
- d) CD with software "Easycomm CBS-8".



The manual you hold in your hands contains information and warnings about the **CBS-8** that the user should respect in order to guarantee a proper operation of all the instrument functions and keep its safety conditions.

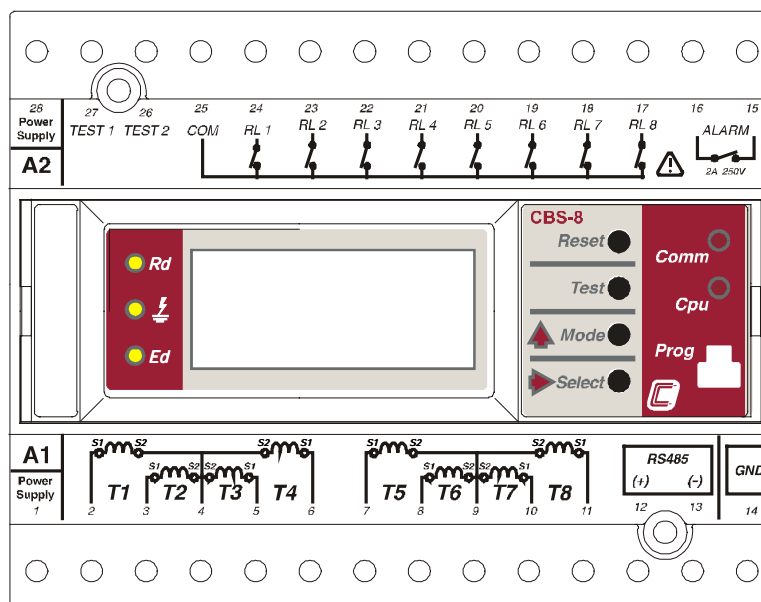


Before powering the instrument for the first time, verify following points:

- (a) Power supply: **see specifications in the side stuck lable.**
 - Standard : 230 V a.c.** - Single-phase, 50 ... 60 Hz
 - On demand: other supply voltages*
- (b) Maximum admissible current: according to the associated transformer (WG or WGP).

2.- GENERAL FEATURES

The **CBS-8** central of residual current relays is a DIN rail mounting apparatus that offers several operation possibilities which are selectable within its **SETUP** mode. Before power supplying the instrument, read the **INSTALLATION AND STARTUP** and **SETUP** sections and choose the most suitable operation mode in order to get your desired results.



The **CBS-8** is an instrument that measures, calculates and displays the earth leakage current, also with the ability of taking decisions about the action to be executed. For this purpose, it has 8 input channels, 8 relay-type outputs (1 per each channel), one configurable pre-alarm output, and one test output.

The measurement of the earth leakage current is accomplished by the calculation of the true RMS value over 1-cycle sliding window. If this measured value exceeds the allowable threshold (user-programmable) during, an also user-programmable, time period, then the pertinent relay output would be activated.

Depending on the **CBS-8** programming, the user will be able to set a series of delay times to define the schedule of self-reclosing actions executed by the **CBS-8** in case of an earth fault event. This option can only be activated by using the software "Easycomm CBS-8" included in the product package.

The **CBS-8** has one LCD display that permits the user to view the instantaneous RMS value of the earth leakage, as well as the relay status, at each of the 8 channels of the **CBS-8**.

OTHER FEATURES

- Low-size instrument for DIN rail mounting.
- True RMS measuring mode.
- Measurement of earth leakage currents at 8 single channels.
- Relay for pre-alarm purposes.
- Events log
- RS-485 communication to PC
- Possibility to program automatic reconnection (via RS-485)

3.- INSTALLATION AND STARTUP



The manual you hold in your hands contains information and warnings that the user should respect in order to guarantee a proper operation of all the instrument functions and keep its safety conditions. The instrument must not be powered and used until its definitive assembly inside the switchgear cabinet.

If the instrument is not used as manufacturer's specifications, the protection of the instrument can be damaged.

When any protection failure is suspected to exist (for example, it presents external visible damages), the instrument must be immediately powered off. In this case contact a qualified service representative.

3.1.- Installing the CBS-8

Before powering the apparatus up, please check following points:

a.- **Power supply: see the lable stuck in the side of the instrument.**

- **Standard supply:** *Single-phase 230 V~ (a.c.)*

On demand: other supply voltages

- *Frequency* : *50 - 60 Hz*
- *Supply tolerance* : *-20 % / +15 %*
- *Connection terminal* : *Terminals 1-28 (Power supply)*
- *Burden* : *4 VA*

b.- Maximum admissible current: according to the associated transformer


WGxx 30 mA - 3 A WGPxx 300 mA - 30 A

c.- Operation conditions:

- Operation temperature : -10 °C to +50 °C
- Relative humidity : 5 a 95 % HR (non condensing)
- Altitude : below 2000 m

e.- Safety

- Designed to meet protection class III- 300 V a.c. as per (EN 61010).
- Protection against electric shock by class II double-insulation

Mounting : 

The Instrument is to be onto DIN 46277 (EN 50022) rail. All connections keep inside the cabinet.

Note that with the instrument powered on, the terminals could be dangerous to touching and cover opening actions or elements removal may allow accessing dangerous parts. Therefore, the instrument must not be used until this is completely installed.

The instrument must be connected to a power supply circuit protected with gl type (IEC 269) or M type fuses rated between 0.5 and 2 A. This circuit should be provided with a circuit breaker or any equivalent element to connect (ON) or disconnect (OFF) the instrument from the power supply network.

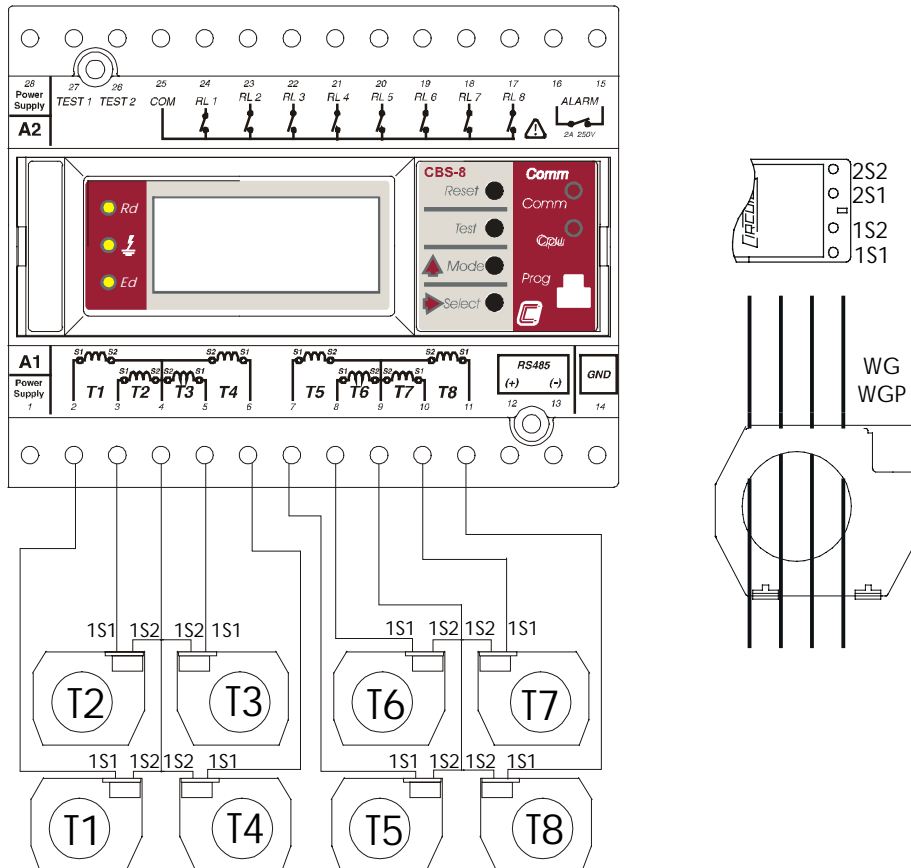
3.2.- CBS-8 connection terminal (according to specification in lables)

No.	Description	Concept
1 - 28	Power Supply A1 - A2	Power supply 230 V a.c.
27 - 26	Test 1 - Test 2	Test output
25	COM	Relay output common
24	RL1	Channel 1 relay output
23	RL2	Channel 2 relay output
22	RL3	Channel 3 relay output
21	RL4	Channel 4 relay output
20	RL5	Channel 5 relay output
19	RL6	Channel 6 relay output
18	RL7	Channel 7 relay output
17	RL8	Channel 8 relay output
16 - 15	ALARM	Pre-alarm relay output
14	GND	COM CBS-8: RS-485 connection to PC. 14 GND -----> 5 RS-485/RS-232 13 -- -----> 2 (--) converter 12 + -----> 1 (+)
13	(--)	
12	(+)	
11	T8-S1	S1 of Channel 8 C.T.
10	T7-S1	S1 of Channel 7 C.T.
9	common-S2	S2 of Channels 5,6, 7 & 8 C.T.'s
8	T6-S1	S1 of Channel 6 C.T.
7	T5-S1	S1 of Channel 5 C.T.
6	T4-S1	S1 of Channel 4 C.T.
5	T3-S1	S1 of Channel 3 C.T.
4	common-S2	S2 of Channels 4,3, 2 & 1 C.T.'s
3	T2-S1	S1 of Channel 2 C.T.
2	T1-S1	S1 of Channel 1 C.T.

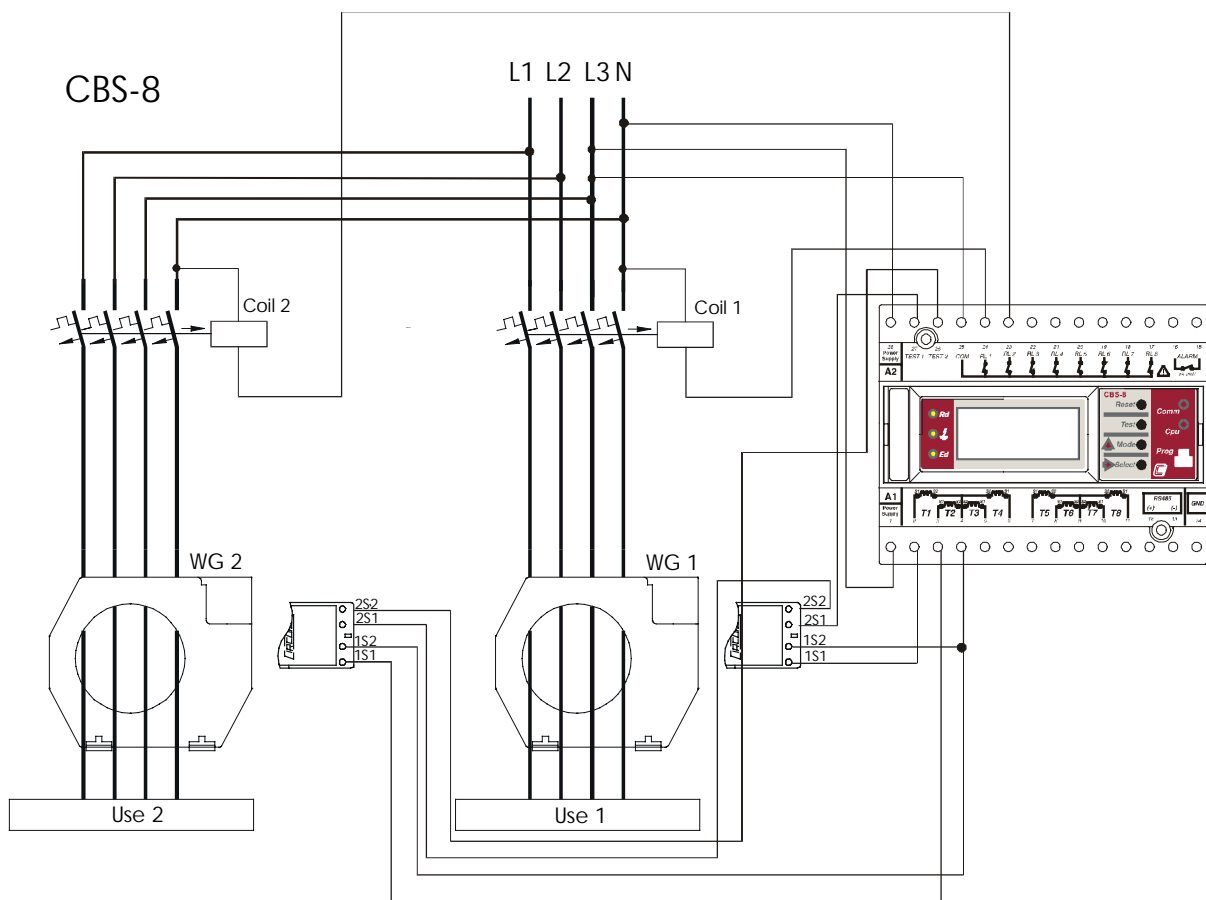
NOTE: Current inputs are suitable only for WG or WGP series transformers.

3.3.- CBS-8 connection drawings.

3.3.1.- To function as an earth leakage current meter



3.3.2.- To function as a residual current protective device



4.- OPERATION MODE

The device is suitable for either 50 Hz and 60 Hz power systems, so that the user must previously set it to the rated frequency of the working network (See Section 5.1.1.-).

This instrument can be either used to function as an earth leakage current meter or like a complete residual current protective system. The choice will depend on whether the relay outputs of the different channels are connected (residual current protection) or not (earth leakage current meter).

The **CBS-8** has diverse operation modes:

- Normal mode: The **CBS-8** functions as an earth leakage current meter. In case that the relay outputs are connected, then it will function as a residual current protection system.
- Test mode: Execution of an analysis of the transformer **CBS-8** connections, together with a test of the indicating leds.
- Reset mode: allows the reconnection of the channels that have been previously tripped off.
- Setup mode: To accomplish with the **CBS-8** programming actions.

*When the **CBS-8** is powered on, the normal mode will be always the active operation mode.*

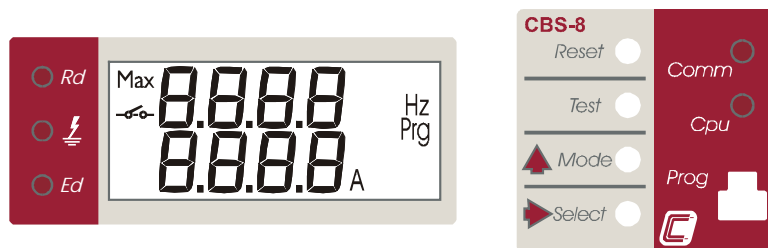
The **CBS-8** incorporates 4 keys and 5 indicating leds whose function will vary according to the operation mode.

The **CBS-8** is equipped with an on-board non-volatile rotary memory to save last 100 events into. Every log will contain information about:

- Date
- Tripped channel
- Tripping residual current

4.1.- Normal mode

The instrument has a 2-line LCD:



When the **CBS-8** is powered on, you can view in display some information about the instrument itself:

CbS8	
xxxx	☞ Software version

, and following you will view:

FrEC	
xx	☞ Network frequency (user-programmed)

After some seconds, the instrument is ready for its regular operation and shows one of the available screens depending on the user-defined programming.

NOTE: If the message “**max**” would be shown in display during the normal operation, this means that the measured value of the earth leakage current is higher than user-programmed value of the tripping threshold.

⇒ **Push-buttons:**


The 4 built-in push-buttons permit the user to execute following actions when working in this operation mode:

- **RESET Push-button:** By pressing this push-button during 3 seconds, the **CBS-8** will enter the reset menu that allows to unlatch one by one all activated relays. Additionally all counters of time and self-reclosing actions will be reset to zero.
- **TEST Push-button:** Access to the Test mode. By pressing this push-button during 3 seconds, the **CBS-8** will perform an auto-test of the selected channel and will check the output status, the indicating leds, the electronics, and the connections between the transformers and the **CBS-8**.
- **MODE Push-button:** By pressing this push-button, the **CBS-8** will alternatively change the visualization mode in the LCD. Following enumerated messages will be shown in screen during few seconds to indicate the visualization mode selected by the user:
 - **UIS.1:** The value of the residual current in every channel is alternatively displayed in screen, also indicating the status of the associated relay (activated or not).
 - **UIS.2:** Display of the value of the residual current in the active channel.
 - **UIS.3:** Indication of every channel status. If the output is latched or tripped, the screen of the indication of the relay status is alternated with other screen that shows the tripping setpoint programmed for this channel together with the value of the detected current which has caused the channel trip.
 - **UIS.4:** Data about the last earth leakage fault is shown in display. The time and date of the leakage occurrence are alternately shown in one line, and, equally, the number of the channel the leakage has been detected in and the value of the residual current are alternately shown in the other line.
 - **UIS.5:** in only one screen the user can have an overview of which are the channels that have been tripped off: "0" -> channel ON and "1" -> OFF or tripped.

- **SELECT Push-button:** The function of this push-button will vary according to the user-selected visualization mode:
 - **UIS.2 or UIS.3 Mode:** the **CBS-8** switches the displayed channel
 - **UIS.4 Mode:** to advance within the recorded logs
- **MODE + SELECT Push-button:** If these two push-buttons are simultaneously pressed, then two different actions can be performed depending on the position of the “Prog” switch:
 - **Down:** enters the setup mode allowing the modification of any configuration parameter.
 - **Up (sealable position):** enters the setup mode allowing only to check or visualize the configuration of the equipment. It is not allowed to make any change in the configuration.
- **RESET + SELECT Push-button:** To set the time of the **CBS-8** on-board clock.

⇒ **Leds**

The 5 built-in leds in the **CBS-8** indicate following parameters:

- **Cpu Led:** Lights on when the **CBS-8** is running
- **Comm Led:** Blinks when any communication is established via the serial RS-485 communication channel.
- **Rd Led:** Lights on when automatic self-reclosing actions are enabled.
-  **Led:** Lights on when any channel is tripped. It will flash in case that in any channel the prealarm condition is accomplished, having no other channel tripped off.
- **Ed Led:** Lights on when any channel is latched.

4.2.- Test Mode

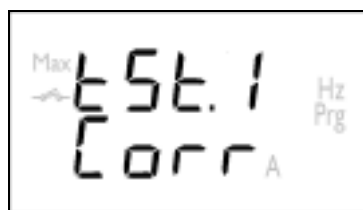
This mode is used to check the functioning of the link between toroid & CBS-8, the relay outputs, the internal electronics of the device and the frontal LED.

During the test procedure, the CBS-8 stops the line surveillance

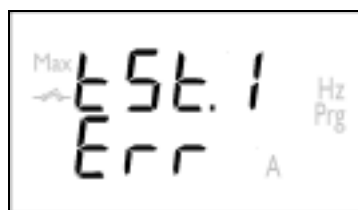
This mode will be entered by pressing the “**TEST**” button for more than 3 seconds when the instrument is running in normal mode.

The test procedure is based on the injection of an external current through the test terminals of the transformer that simulates a current fault, tripping off the relays related to the selected channels.



The result of the transformer-**CBS-8** connections check can be noticed from the different messages that will be shown in display:



Correct or right functioning
Correct!



Wrong functioning
Error!

-  channel tested
-  result of the test

If no push-button is pressed during 30 s, then the normal operation mode is automatically set again, without reclosing any latched relay.

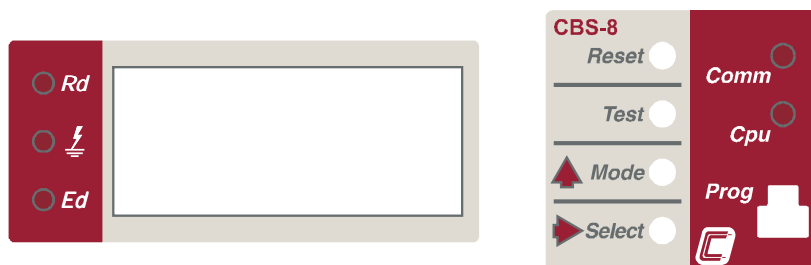
⇒ Push-buttons:

Once in the test menu, the push-buttons will allow the user to execute the following actions:

- **RESET push-button:** exits this mode and enables the **CBS-8** for its normal operation.
- **MODE push-button:** to choose the channel to be tested.
- **SELECT push-button:** begins the test of the selected channel.

⇒ Leds

The **CBS-8** also checks the correct operation of the indicating leds, thus, all the indicating leds should be on during the whole time that **CBS-8** is in the test mode.



4.3.- Reset mode

This mode is used to reconnect the relay outputs that were tripped off.

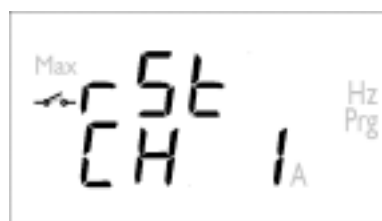
During the setup procedure, the CBS-8 goes on with its surveillance tasks over the different enabled channels

To enter this mode press “RESET” for 3 seconds when the instrument is in “normal” mode.

In the screen the user can choose the channel over which the reset will be performed.



No channel tripped off



Channel tripped off



Channel closed

In case of not pressing any key for more than 30 seconds, then the equipment passes automatically to normal mode without reclosing any relay.

⇒ Push-buttons:

Once in reset mode, the function of the buttons will be:

- **RESET push-button:** exits this mode.
- **MODE push-button:** to choose the channel to be reclosed.
- **SELEC push-button:** recloses the selected channel.

4.4.- Setup mode

This mode is used program the CBS-8.

To enter this mode push simultaneously **MODE** & **SELECT**.

For the time in which the equipment is in setup mode, the power lines will be permanently controlled considering the parameters selected before entering this mode.

The multipoint scanning system, CBS-8, has an external switch to protect the modification of the setup (switch "PROG").

⇒ **Switch "PROG"**

Depending on the position of this switch, the user will be enabled to:

- **Up** (sealable position): the **CBS-8** setup mode can be entered but not modified.
- **Down**: The **CBS-8** setup mode can be accessed and the modification of any programming parameter is enabled.

⇒ **Push-buttons:**

The push-buttons in this mode permit the user to execute following actions:

- **RESET push-button:** exits without saving any modification.
- **MODE push-button:** changes the selected menu option.
- **SELECT push-button:** to validate the option in screen.
- **MODE + SELECT push-button:** To start the normal operation according to the new programming.

5.- SETTING UP THE CBS-8

The setup procedure of the **CBS-8** is accomplished by means of several SETUP options.

☞ To access the setup menu the keys **MODE** and **SELECT** must be simultaneously pressed from the normal operation mode (see 4.4.- for more details)

When accessing the **SETUP**, the initial screen permits the user to select among the channel characteristics setting or the communications settings:

P.CHA	Channel configuration
C.SEr	Communications configuration

The selected option blinks.

- The **MODE** key allows to scroll over the configurable options.
- The **SELECT** key to validate his choice.
- **RESET** to exit the setup without storing any change.
- **MODE** & **SELECT** are used to confirm the new setup and return to normal mode.

5.1.- Channel setting

Once into the SETUP, use the keyboard to select different options and set desired values:



Where:

- P.CH - : indicates common user-configurable parameters
- P.CH1 ... P.CH8: Single setting of each channel.

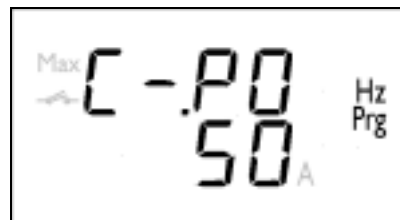
5.1.1.- Common parameter setting

User-configurable points are these below enumerated:

1. Network rated frequency
2. Pre-alarm relay type
3. Pre-alarm threshold

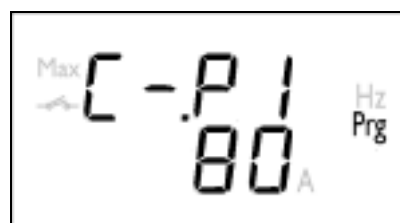
Network rated frequency

For a right operation of the instrument it is necessary to set the network rated frequency, since duration of one semi-cycle is different in a 50 Hz or 60 Hz power system.



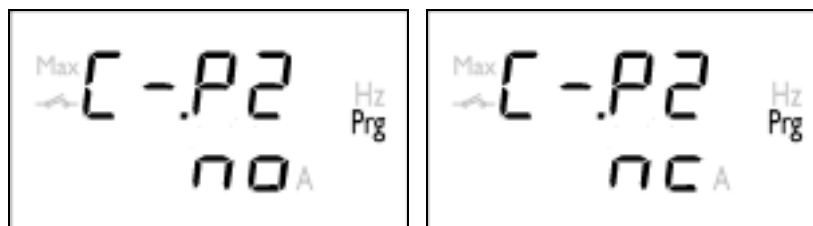
Pre-alarm threshold.

The minimum tripping threshold of the 8 channels can be set from the 50% and the 100%, in 10% steps.



Pre-alarm relay type

Two values are available for their choice: nO for normally open outputs, and nC for normally closed outputs.



Normally open

Normally closed

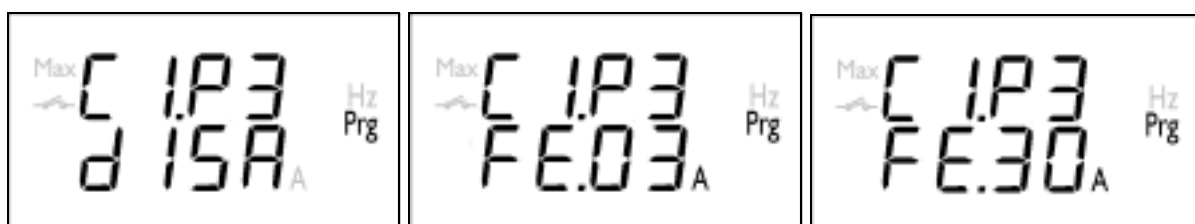
5.1.2.- Channel setting

Each of the 8 discrete channels of the **CBS-8** must be particularly user-programmed as below described:

In case that the **CBS-8** is used just as an earth leakage current meter, then only the type of transformer connected to each channel and the tripping threshold must be set.

5.1.2.1.- Selection of the type of transformer connected to each channel

Three values are here available for their choice:



Not used

WG 30 mA - 3A

WGP 300 mA - 30A

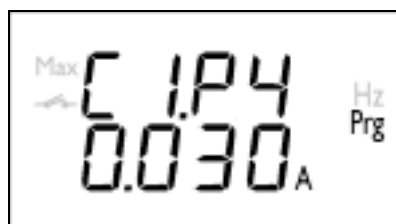
5.1.2.2.- Tripping characteristics

For these instruments to be used just as earth leakage current meter, only the tripping threshold value must be programmed.

Tripping threshold

The user must set here the current value that will define the residual current relay trip (output relay).

When the CBS-8 is to be used just as an earth leakage current meter (only visualization functions), the user must set the maximum value of earth leakage current that is to be measured (end of scale). This value is very important because if the user selects a value too high the instrument will lose accuracy and in case that it is too low the input will reach saturation and the measurement shown will be wrong. Therefore it should be chosen depending on each specific application.

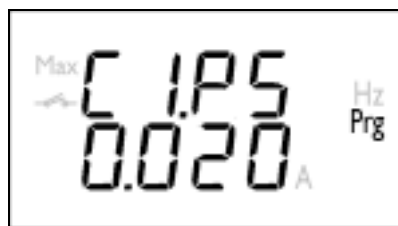


16 different values can be chosen depending on the used transformer:

30 mA ...3 ^a		300 mA ... 30A	
30 mA	700 mA	300 mA	7 A
50 mA	800 mA	500 mA	8 A
100 mA	900 mA	1 A	9 A
200 mA	1 A	2 A	10 A
300 mA	1,5 A	3 A	15 A
400 mA	2 A	4 A	20 A
500 mA	2,5 A	5 A	25 A
600 mA	3 A	6 A	30 A

Delay time

This is the period of time that the tripping threshold value must be exceeded by the earth leakage current to activate the output relay of the pertinent channel.



8 different delay times can be selected:

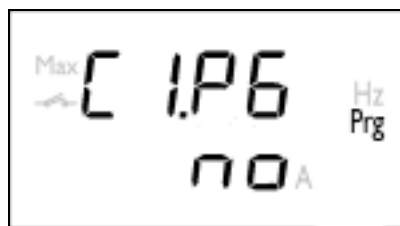
0,02 s	0,04 s	0,06 s	0,08 s
0,1 s	0,4 s.	0,8 s	1 s

Note: when the tripping threshold is 30 mA, only a delay time of 0,02 s can be chosen.

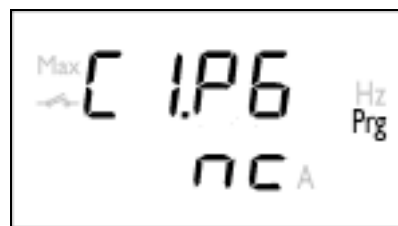
The delay times that can be selected directly by means of the frontal keyboard of the instrument are the ones shown on the previous table. However, via communications a much wider range of times can be selected, up to 10 s.

Type of relay output

Two values are available for their choice to define the normal position of the relay: nO for normally open outputs, and nC for normally closed outputs.



Normally open

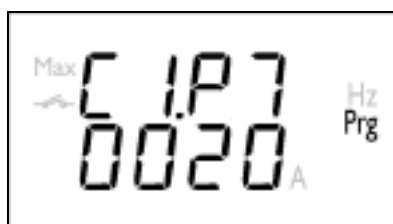


Normally closed

5.1.2.3.- Self-reclosing actions

Following outlined options will be only available in case that this option has been previously enabled through the software "Easycomm CBS-8" appropriate communication commands (MODBUS commands).

Delay time between successive reclosing actions

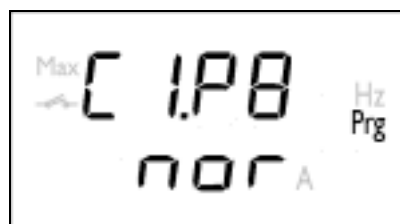


☞ Value between 1 and 900 s

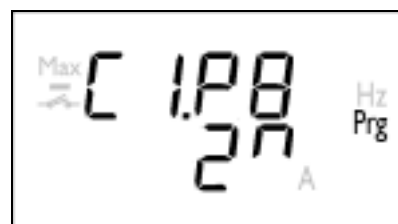
Type of delay time between successive reclosing actions

The application of delay times between successive reclosing actions gives rise to two reclosing modes:

- **Normal:** The delay time between successive reclosing actions is equal to the value set by the user in the previous parameter.
- **Exponential:** After each self-reclosing attempt, the delay time to be waited until the next self-reclosing attempt follows this rule: $trec_{n+1} = trec \cdot 2^n$, where n stands for the number of self-reclosing attempts occurred until the present moment, and $trec$ stands for the delay time set by the user in the previous parameter.

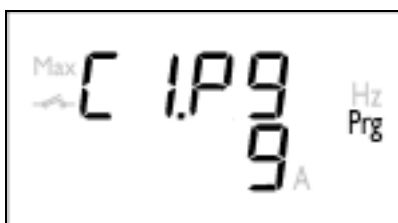


Normal



Exponential

Number of self-reclosing attempts



Value between 0 and 10 attempts

The user can define the maximum number of self-reclosing attempts to be executed by the CBS-8. If this number is completed without any successful attempt, then the referred relay will keep latched until a manual or remote reset action is executed.

Note: if the programmed number of reconnections is 0, then the self-reclosing will be disabled.

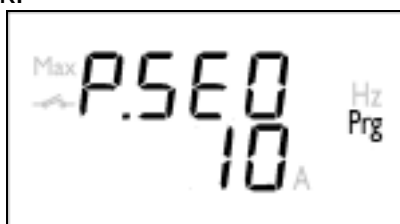
5.2.- Communication setting

When the user choose the option C.SEr, then the menus that permit him to modify all those parameters related to serial communications are accessed.

Following screens are successively shown in display:

Peripheral number (identification code):

Peripheral number of each **CBS-8** within the MODBUS communication network.

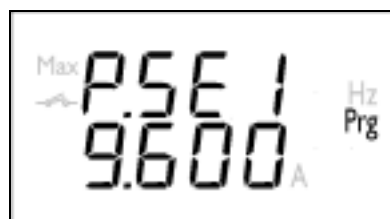


☞ Peripheral No. between 1 and 255.

In this point, the key **Mode** executes following actions:

- Short touch: The peripheral number is increased by 1
- Long touch: The peripheral number is increased by 10

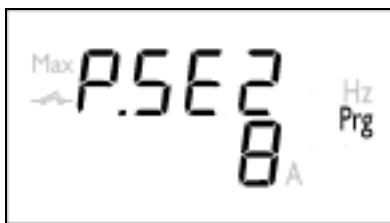
Baud rate:



Three baud rate values are available for their choice:

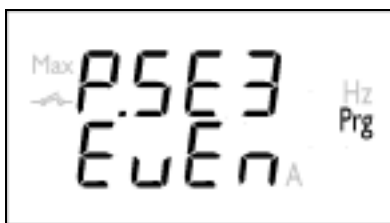
4800 bauds - 9600 bauds - 19200 bauds

Data bits:



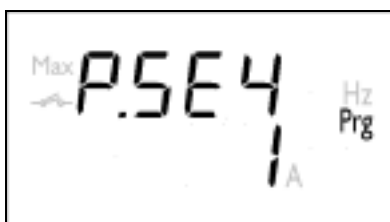
☞ This value is always set at 8.

Parity:



☞ No parity → none
 Even parity → even
 Odd parity → odd

Stop bits:



☞ 1 or 2 stop bits

5.3.- On-board clock setting

To set the **CBS-8** on-board clock, just simultaneously press the keys **RESET** and **SELECT**. Once accessed, then the time and date of the on-board clock can be modified as below described:

- **MODE push-button:** to move along menu options.
- **SELECT push-button:** To validate the selected option.
- **RESET + SELECT push-buttons:** To validate and exit the clock setting.

6.- TECHNICAL SPECIFICATIONS

Power supply : see specifications on the side of the CBS-8

- CBS-8....	: Single-phase	230 V a.c.
	Voltage tolerance:	-15 % / +20 %
	Frequency :	50 - 60 Hz

Burden	4 VA
Operation temperature	-10° to 50 ° C

Measuring circuit

Current range: According to the associated transformer	
WGxx 30 mA - 3 A	WGPxx 300 mA - 30 A
Measuring mode: True RMS value	
Sampling time: 1250 μ s	

Pre-alarm:

Delay time: 500 ms
Hysteresis: 50%
Accuracy in current: <15%

Accuracy class

Current	< 5 %
Test conditions :	
- Current transformers not included	
- Temperature between + 5 °C and + 45 °C	

Mechanical characteristics

- Case material: Self-extinguishable plastic
- Connection: Metallic terminals with "posidraft" screws
- Mounting: To fit onto symmetric DIN 46277 (EN 50022) rail. Possibility of screw fixing (4.2 mm \varnothing passing hole for fixing).
- Frontal cover: Made of lexan
- Protection Assembled unit : IP 41 Terminals : IP 20
- Dimensions: 140 x 70 x 110 mm (8-module size as per DIN 43 880)
- Weight: 0.560 kg

Output relays characteristics

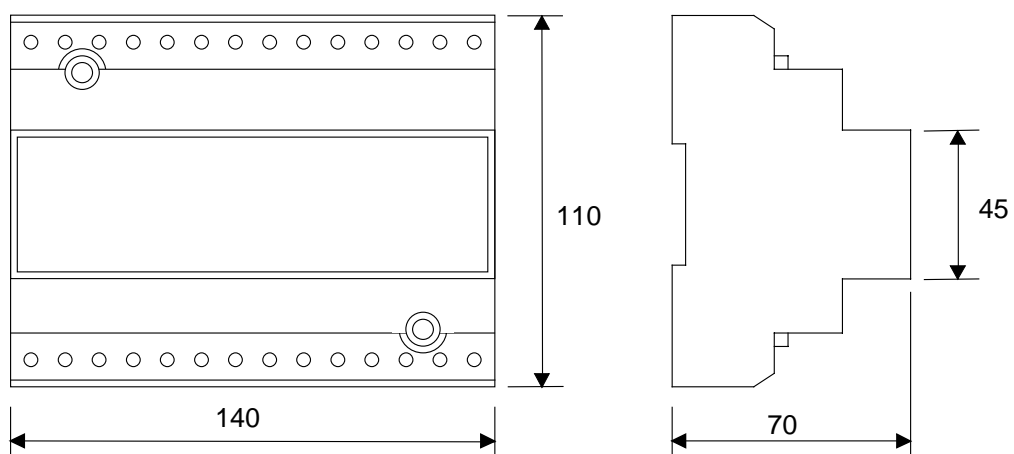
- Maximum switching voltage : 250 V a.c.
- Maximum switching current : 5 A

Safety Class III - 300 V a.c. , EN-61010

Protection against electric shock by class II double-insulation

Standards: IEC 1008, IEC 1010, IEC 255-5, UNE 801-2, UNE 801-3, UNE 801-4, UNE 60730-1, UNE 61010

Dimensions :



7.- SAFETY CONSIDERATIONS



The user should take into account all installation instructions indicated in sections INSTALLATION & STARTUP and TECHNICAL SPECIFICATIONS of this manual.

Note that with the instrument powered on, the terminals could be dangerous to touching and cover opening actions or elements removal may allow accessing dangerous parts. This instrument is factory-shipped at proper operation condition.

8.- MAINTENANCE

The **CBS-8** does not require any special maintenance. No adjustment, maintenance or repairing action should be done over the instrument open and powered and, should those actions are essential, high-qualified operators must perform them.

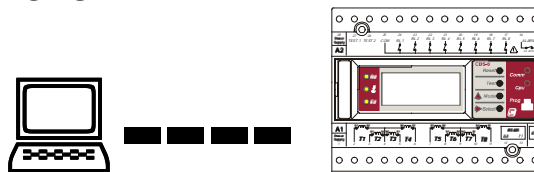
Before any adjustment, replacement, maintenance or repairing operation is carried out, the instrument must be totally disconnected from any power supply source. When any protection failure is suspected to exist, the instrument must be immediately put out of service. The instrument's design allows a quick replacement in case of any failure.

9.- TECHNICAL SERVICE

For any inquiry about the instrument performance or If any failure happens, please contact to CIRCUTOR's technical service:

CIRCUTOR S.A. - After-sales service
Lepanto, 49
08223 - TERRASSA (BARCELONA - SPAIN)
Tel - + 34 93 745 29 00 fax - + 34 93 745 29 14
E-mail : central@circutor.es

10.- CBS-8 COMMUNICATIONS



One or some **CBS-8** units can be connected to a PC. With this system we can get all the parameters in one central point of reading. The **CBS-8** has a serial RS-485 output, so, if we connect more than one device to the same communication line, we have to assign to each discrete analyzer a different code or direction (from 01 to 255), since the PC needs the identification of every measuring point.

10.1.- To take into account!:

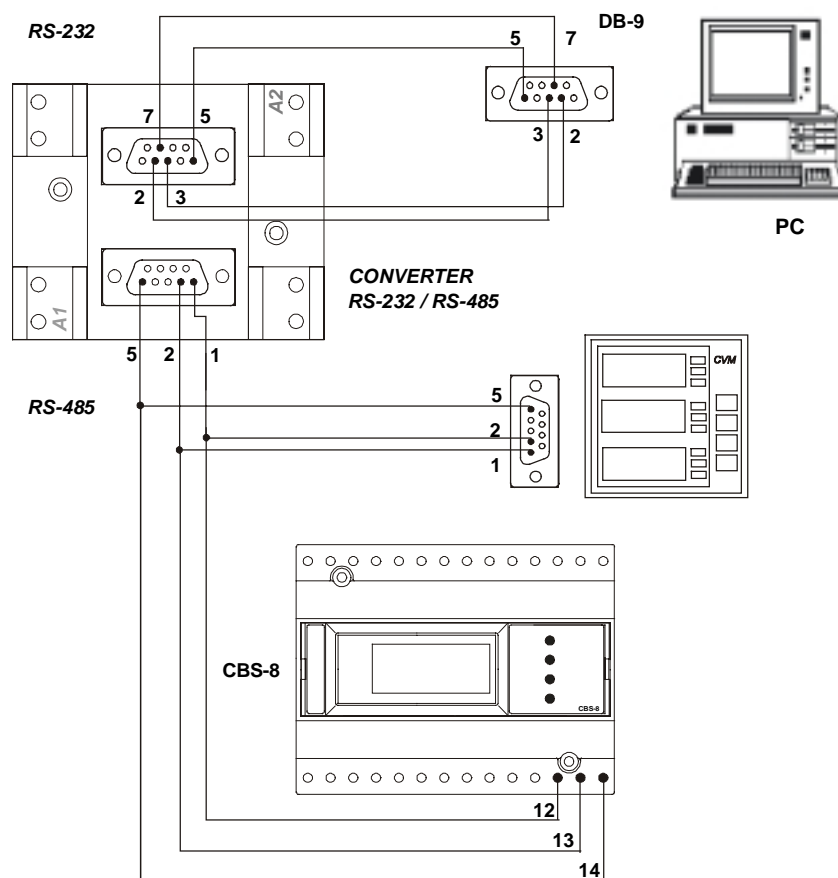
- **PROTOCOL:** MODBUS © (Question / Answer)
- **CBS-8 DEFAULT CONFIGURATION:** 001/9,600 / 8 bits / N / 1 bit
- Available baud rates: 4,800 – 9,600 – 19,200 bauds

- **RS-485 Output:** *Terminal No.* *Signal*

12	-----	TX +
13	-----	TX -
14	-----	GND

- The RS-485 connection will be carried out by means of a **twisted and screened cable**, with a minimum of 3 wires, with a maximum distance between the **CBS-8** and the last peripheral of 1,200 m. The **CBS-8** uses a RS-485 communication bus that enables the connection of **a maximum of 32 devices in parallel (multi-point bus) per each single port used in the PC.**

10.2.- Connection of a RS-485 network to a PC (RS-232)



* If you are using the RS485/232 converter with RTS control ability (code 770208), then the connection of the pin#7 in the RS-232 side is not required.

10.3.- MODBUS © Protocol

The **CBS-8** apparatus can communicate by means of the **MODBUS ©** protocol, as it is following described:

When the **CBS-8** communicates with MODBUS protocol, it uses the **RTU mode** (Remote Terminal Unit). Each 8-bits byte in a message contains two 4-bits hexadecimal characters.

The format for each byte in RTU mode is:

- * *Code* : **8-bits binary**, hexadecimal 0-9, A-F
2 hexadecimal characters contained in each 8-bits field of the message.
- * *Bits per Byte* : 8 data bits
- * *CHECK- ERROR Field* : **CRC type** (Cyclical Redundancy Check).

MODBUS FUNCTIONS IMPLEMENTED IN THE CBS-8:

- | | |
|-------------------------------|---|
| FUNCTION 03h & 04h | Reading n WORDS (16 bits-2 bytes). This function permits to read all the parameters from the CBS-8 . |
| FUNCTION 06h | Writing one WORD (16 bits-2 bytes) into a memory position. |
| FUNCTION 10h | Writing n WORDS (16 bits-2 bytes) into consecutive memory positions. |

10.3.1.- Readout registers

To read these type of registers use the 03H or 04H MODBUS function.

Two kind of data is saved into the **CBS-8** on-board memory:

- **Parameters:** Involve all information provided by the **CBS-8** related to measurements and output relays status.
- **Logs:** These records store the last 100 operations executed by the **CBS-8**.

Parameters:

Description	Unit	MODBUS REGISTERS HEXA-DECIMAL (longs)							
		Channel							
		1	2	3	4	5	6	7	8
Date*		0000-0001							
Residual current	(mA)	0002	0003	004	0005	0006	0007	0008	0009
Output status	0=Not tripped 1=Excedded 2=Tripped 3=Latched	000A	000B	000C	000D	000E	000F	0010	0011
Pre-alarm relay status	0=Diactivated 1=Activated	0012							
Tripping or latching current	(mA)	0013	0014	0015	0016	0017	0018	0019	001A
Latest saved record		001B							
Operation mode		001C							
switch "PROG"	0=Up 1=Down	001D							
Software version		001E							
Pre-alarm ON	0=Diactivated 1=Activated	001F	0020	0021	0022	0023	0024	0025	0026

* Date format:

b0 - b5 Seconds
b6 - b11 Minutes
b12 - b16 Hour
b17 - b21 Day of the month
b22 - b25 Month
b26 - b31 Year + 2000

Logs in memory

Relay tripping events are recorded in the **CBS-8** on-board. The structure of this data in memory consists of 4-register blocks.

The below table shows the initial and ending reading registers:

Event	0	1	2	3	4	5	6	7	8	9
00	0400	0404	0408	040C	0410	0414	0418	041C	0420	0424
10	0428	042C	0430	0434	0438	043C	0440	0444	0448	044C
20	0450	0454	0458	045C	0460	0464	0468	046C	0470	0474
30	0478	047C	0480	0484	0488	048C	0490	0494	0498	049C
40	04A0	04A4	04A8	04AC	04B0	04B4	04B8	04BC	04C0	04C4
50	04C8	04CC	04D0	04D4	04D8	04DC	04E0	04E4	04E8	04EC
60	04F0	04F4	04F8	04FC	0500	0504	0508	050C	0510	0514
70	0518	051C	0520	0524	0528	052C	0530	0534	0538	053C
80	0540	0544	0548	054C	0550	0554	0558	055C	0560	0564
90	0568	056C	0570	0574	0578	057C	0580	0584	0588	058C

The format of the recorded event (8 bytes) will be as follows:

1 byte	Tripping action date
2 byte	
3 byte	
4 byte	
5 byte	Tripping current
6 byte	
7 byte	Tripped channel
8 byte	Not used

10.3.2.- Working registers

Some actions can only be executed by means of communication commands.

These operations are completed using the function for writing one register.

Channel reset

Question	
NP06030XFFFFCRC	
Answer	
NP06030XFFFFCRC	

Where **X** stands for the number of the channel (1-8) to be reset (0-All channels).

Deleting the file of event logs

Question	
NP06030EFFFFCRC	
Answer	
NP06030EFFFFCRC	

10.3.3.- Self-reclosing feature

One of the features of the CBS-8 is the possibility of enabling the reconnection (self-reclosing) of those channels that have been tripped off.

To enable this option the software “Easycomm CBS-8” has to be used. The software can be found in the product package.

The instruction manual can be also found in the enclosed CD.