POWER ANALYZER
CVM-MINI-Ethernet

This manual is a quick guide to the use and operation of the **CVM-MINI-ITF** & **CMV-MINI-MC** with Ethernet connection. For more information, the whole manual may be downloaded from CIRCUTOR's web page: **www.circutor.es**

⚠️ Before any maintenance, modification to the connections, repair, etc., the equipment must be disconnected from the supply. If any operation or protection fault is suspected the equipment must remain out of service ensuring against any accidental reconnection. The equipment is designed to be changed quickly in the event of any breakdown.

The **CVM-MINI** is an instrument which measures, calculates and displays the main electrical parameters for three-phase industrial systems (balanced or unbalanced). Measurements are in true effective value, via three AC voltage inputs and three AC. current inputs. (via I_n / 5 A or 1 A the **ITF** version and I_n 0,25A **MC** version). The parameters measured and calculated are shown in the variables table, paragraph 7.

1.- INSTALLATION

The equipment is mounted on DIN rail. Also the device has to be provided of an magnetic-thermal switch to be disconnected. The fuses has to be type gl (IEC 269) or type M between 0,5 to 2 A.

2.- ETHERNET NETWORK SETUP

The configuration software, IPSETUP.EXE, is available from the **CIRCUTOR** Web site. It must be executed under Windows operative system. Once executed it will appear the following screen

In the field "**MAC**" it must be typed the physical address of the unit using scripts as separator, this data is showed on to the lateral label of the equipment and the format is 14:A6:2C:XX:XX:XX.

In to the field "**Dirección**", type the assigned IP address to the equipment into the local area network

Into the field "**Netmask**" type the mask for the network.

In case of routing the equipment in a different network, setup the field "**Gateway**" with the IP address of the device that allows the route. For example, if the equipment must be accessible from Internet, will be necessary setup the IP address for the ADSL router that allows the Internet connection. Also the router will need convenient programming to allow Internet enroute and enable the traffic from/to the **CVM-MINI-Ethernet**. If it is not the case leave the filed "Gateway" in blank.

3.- DHCP IP assignment

To assign the DHCP name, choose this option using the arrow on the upper right, and select "On". Once the configuration fields have been enabled, enter the "**MAC**" address that can be seen on the permanent side label attached to the device, the format of which is **14:A6:2C:XX:XX:XX**. In the "**Dirección**" field, enter an unused, temporary IP address, which is within the working range of your computer. In the "**Host Name**" field, enter the **DHCP** name to be assigned to the equipment. Optionally, the user can configure the parameters of the "**ClientID**" field. The default "**VendorID**" of the device is **CIRCUTOR**.
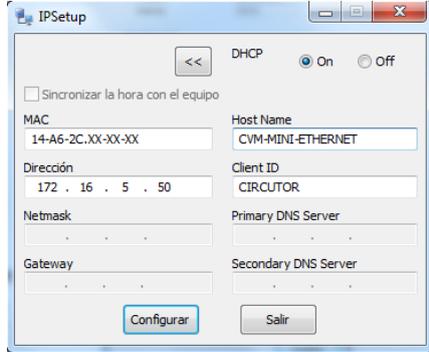
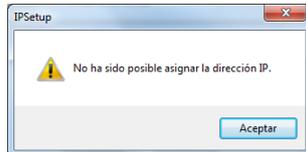Once the parameters have been configured click on "**Configurar**"

If the equipment is detected into the Ethernet network, it will appear the following screen.

By clicking "**Aceptar**" the internal setup WEB page of the equipment will be displayed.

If the equipment is not detected on the local network it will appear the following screen.

Review the settings assigned to the computer, check the connection to the router and the Ethernet Connector LEDs are lit and / or blink. The LED on the left side of the connector is the link status and the LED on the right side indicates activity receive / transmit TX / RX. Both can be lit in green or amber color. If everything appears correct, consult with your admin for the local area network.

4.- SETTING (SETUP menu)

(Press SETUP key for 5 seconds)

➢ The ⬛⬅ key validates the information and moves on to the next menu.

➢ The ⬛max▲ key allows the different options in a menu to be selected or increases a digit where a variable is being entered.

➢ The ⬛min▶ key is used to move the cursor among the digits.

The different options are sequentially described below.

4.1.- Voltage transformer primary

On screen the words "*SET PRIU*" appear followed by 6 digits. These allow the voltage transformer primary to be set (from *1* to *100,000*).

4.2.- Voltage transformer secondary

On screen the words "*SET SECU*" appear followed by 3 digits. These allow the voltage transformer secondary to be set (from *1* to *999*).

4.3.- Current transformer primary

The display show "*SET PRIA*" followed by 5 digits. These allow the current transformer primary to be set (from *1* to *10,000*).

In the case of using a transforming system type MC1, introduces the primary of the transformer corresponding to the relation of the selected physical wiring. In case of using type MC3, introduces the value of the primary that appears in the label of the transformer.

4.4.- Current transformer secondary.

The display show "*SET SECA*". In the **ITF** versions, selection is allowed between 1 and 5 A. In the **MC** version, this parameter is not available in the equipment configuration menu.

4.5.- Measurement in 2 or 4 quadrants (power consumption and/or generation).

On screen the words "*SET QUAD*" appear (*2*=Power consumption / *4*=consumption and generation)

4.6.- Setting the Power demand meter:

a) Electrical parameter to control: ("*SET PD CODE*"):

None		*00*
Three-phase active power	kW III	*16*
Three-phase apparent power	kVA III	*34*
Three-phase current	AIII	*36*
Current per phase	A1-A2-A3	*A-PH*

Integrated parameter value according to the set period.

b) Integration period (1….60 minutes): ("*PD PER 15*")
c) Clear maximum value recordings of Pd: ("*CLR PD NO*") "*no*" or "*yes*".

4.7.- Setting display or omitting screens

This option allows the page display format to be displayed ("*DEF PAGE YES / NO*"):

I. *YES* | Standard: se all electrical parameters are displayed.
II. *NO* | Custom: by using the "**YES**" or "**no**" option the pages to be displayed when the equipment is on are selected.

4.8.- Setting the start screen

This option allows select the screen and selection mode of display screens ("*SET INIT PAGE*"):

I. *Fixed page*: selects which page from the possible pages will appear first when applying voltage (or on RESETTING) to the **CVM-MINI -Ethernet** .
II. *Rotating pages*: selecting rotating pages (when all of the electrical parameters flash), automatically rotates, every 5 seconds it moves on to the following screen.

4.9.- Setting the "backlight" disconnection time

("*DISP OFF*"): Setting the time in seconds, after which the light on the **CVM-MINI -Ethernet** display switches off (low consumption) after a key is pressed. If 00 is set, the backlight is permanently on.

4.10.- Returning the energy counters to zero

"*CLR ENER*" "*YES*" or "*NO*" (Clear energy counters) appears on the display.

4.11.- Setting THD or d

Two types of Harmonic distortion can be set ("*SET HAR D*"):
- **d %**: value harmonic distortion with respect to the fundamental.
- **Thd %**: value harmonic distortion with reference to the effective value (RMS).

4.12.- Additional screen with transistor alarm outputs

("*OUT 1 CODE*" / "*OUT 2 CODE*") With these outputs the **CVM-MINI-Ethernet** transistor output is set for:

I. **Impulse every *n* kW.h** or **kvar.h (Energy):** The value in kW.h is set corresponding to one impulse (100 msec. long.): kW.h / 1 impulse or kvar.h / 1

impulse. Maximum 5 imp/sec. (*see variable codes*).

II. **ALARM conditions**: each output is set per transistor the variable to be controlled, the maximum value, minimum value and the (*delay*) (*see variable codes*).

> **Note**: *The list of variable appears in the table below.*

5.- CVM-MINI-Ethernet Blocking SET UP

This menu allows to block the setup parameter to avoid changes. To access to this menu:

Press the ⬤**reset** key and pressing the ⬤**setup** key for five seconds until Set-Up is entered.

Briefly appear on the display "*SET UP INIT*" and afther "*SET UP*" with the option::

UNLO Allows configuration of the device parameters using the keypad.

LOC Bloquea la configuración de los parámetros del equipo mediante el teclado.

If the Loc, option is selected, it is only possible to see the setting on entering SETUP and the changes are not allowed.

To select this options press ⬤**max** ▲

NOTE: to disable the unlock mode enter the password 1234 when asked.

If a previously set option is to be changed, then it is necessary to enter a password. PASSWORD **CVM-MINI -Ethernet** 1234.

6.- CVM-MINI-Ethernet COMMUNICATIONS

One or more analysers **CVM-MINI-Ethernet** can be connected to a "router" or "switch" Ethernet and access their information through a PC connected to the same Ethernet local area network. This system allows centralizing data on a single registration point (Studio ® Power System).

To change the communication settings see section 2.

The network analyzer type **CVM-MINI-ETHERNET** communicates using **MODBUS TCP** © (Pulling Question / Answer).

7. - LIST OF VARIABLES AND ALARMS CODES FOR THE CVM-MINI -Ethernet

> If no variable is required enter No. par.= 00.

Parameter	Symbol	L1 Code	L2 Code	L3 Code
Voltage (phase-neutral)	V	01	06	11
Current	A	02	07	12
Active power	kW	03	08	13
Reactive power -(Ind/Cap)	kvar	04	09	14
Apparent power	kVA	38	39	40
Power factor	PF	05	10	15
% THD V	THD V	25	26	27
% THD A	THD A	28	29	30

Parameter	Symbol	Code	Parameter	Symbol	Code
Three-phase active power	kW III	16	Neutral current	I_N	37
3 pha. inductive power	kvarL III	17	Max demand (L1)	Md (Pd)	35*
3 pha. capacitve power	kvarC III	18	Max demand (L2)	Md (Pd)	42*
cos φ three-phase	cos φ	19	Max demand (L3)	Md (Pd)	43*
3 pha. power factor	PF III	20	Active energy	kW.h III	31
Frequency (L1)	Hz	21	Inductive reactive energy	Kvar·h L III	32
V phase phase L1- L2	V 12	22	Capacitive reactive energy	Kvar·h C III	33
V phase phase L2 - L3	V 23	23	Apparent energy	KVA·h III	44
V phase phase L3 - L1	V 31	24	Active energy generated	Kw·h III -	45
Apparent power	kVA III	34	Inductive energy generated	Kvar·h L III -	46
Maximum demand	Md (Pd)	35	Capacitive energy generated	Kvar·h C III -	47
Three-phase current	AIII	36	Apparent energy generated	KVA·h III -	48
Temperature	ºC	41			

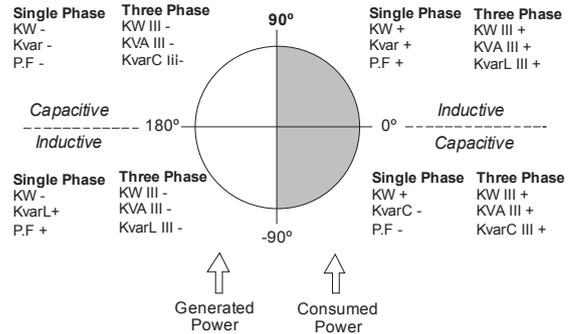*Variables only valid if the Maximum Demand for current has been set per phase.

There are also some variables that refer to the three-phases at the same time. If one of these variables has been selected, the alarm will go off when any of the three-phases meet the preset conditions.

Parameter	Symbol	Code	Parameter	Symbol	Code
Voltages (phase-neutral)	V1 or V2 or V3	90	Power factors	PF1 or PF2 or PF3	94
Currents	I1 or I2 or I3	91	Voltages (phase-phase)	V12 or V23 or V31	95
Active powers	kW1 or kW2 or kW3	92	% THD V	THDV1 or V2 or V3	96
Reactive powers	kvar1 or kvar2 or kvar 3	93	% THD I	THDI1 or I2 or I3	97
Apparent powers	kVA1 or kVA 2 or kVA 3	98			

8. - FOUR QUADRANTS OF THE CVM-MINI -Ethernet

9.- TECHNICAL FEATURES

Power supply circuit:	AC. version	Plus version: AC. & DC.
- Single-phase:	230 V AC.	85..265 V AC./ 95..300V DC.
- Voltage tolerance:	-15 % / +10 %	
- Frequency:	50 - 60 Hz	50 - 60 Hz (AC. mode)
- Maximum consumption:	3,0 VA	3,0 VA
- Operating temperature:	-10ºC …..+ 50ºC	-10ºC …..+ 50 º C
- Humidity (without condensation):	5% ….. 95%	5% ….. 95%

Mechanical features:	
- Casing material:	Self extinguishing V0 plastic
- Protection:	
Assembled equipment (front):	IP 51
Non assembled equipment (sides and rear cover):	IP 31
- Dimensions (mm):	85 x 52 x 70 mm (3 step)
- Weight:	0.210 kg
- Voltage measure and supply wires:	Minimum section 1 mm²
- Secondary current transformers wires:	Minimum section 2,5 mm²
- Maximum altitude:	2.000 m.

Accuracy class:	
- Voltage:	0.5 % ± 1 digit
- Current :	0.5 % ± 1 digit
- Power / Energy:	0.5 % ± 1 digit
Measurement loggers: Current / Voltage	External transformers / direct voltage
Power factor:	0.5 to 1
Scale range measurement margin: ITF / Shunt	0.2 % ..... 120 % / 2 % ..... 120 %
Temperature sensor: Accuracy / Operating window	± 2ºC / -10ºC ….. +50ºC
- Tª measurement: Without / with forced ventilation	+ 14.0 ºC / + 3.5 ºC

Measurement circuit:	
- Rated voltage: phase-neutral / between phases	300 V AC. / 520 V AC.
- Frequency:	45 ~ 65 Hz
- Rated current:	ITF I_n / 5A-1A
- Permanent overload:	1.2 I_n
- Power consumption voltage circuit:	0.7 VA
- Power consumption current circuit: ITF / Shunt	0.18 VA

Output transistors features	
- Type: Opto-islolated transistor (open collector).	NPN
- Maximum operating voltage:	24 V DC.
- Maximum operating current:	50 mA
- Maximum frequency:	5 impulses / second
- Impulse length:	100 ms

Ethernet connexion
Internal WEB for Ethernet setup.
IP address assignment by DHCP or name
Password access protection
RJ45 connection

Left LED Connector Indicator. Link Status:	Greem FULLDUPLEX Ambar HALFDUPLEX
Right LED Connector Indicator 10M/100M:	Green 100 Mb/s Ambar 10 Mb/s
Standard IEEE802-3u	

Safety:
Category III - 300 V AC. / 520 AC. EN-61010 Class II double insulation against electric shock

Standards:
IEC 664, VDE 0110, UL 94, IEC 801, IEC 348, IEC 571-1, EN 61000-6-3, EN 61000-6-1, EN 61010-1, EN 61000-4-11, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 55011

10.- CONNECTIONS

4 wire / 3 wire (low voltage)

Detail of MC3 connection

Detail of MC1 connection - 4 wire / 3 wire

In case of using transformes type MC1, the selected relation must be the same in the three transforming and must be agree with the programmed in the **CVM-MINI-MCEthernet-C2**
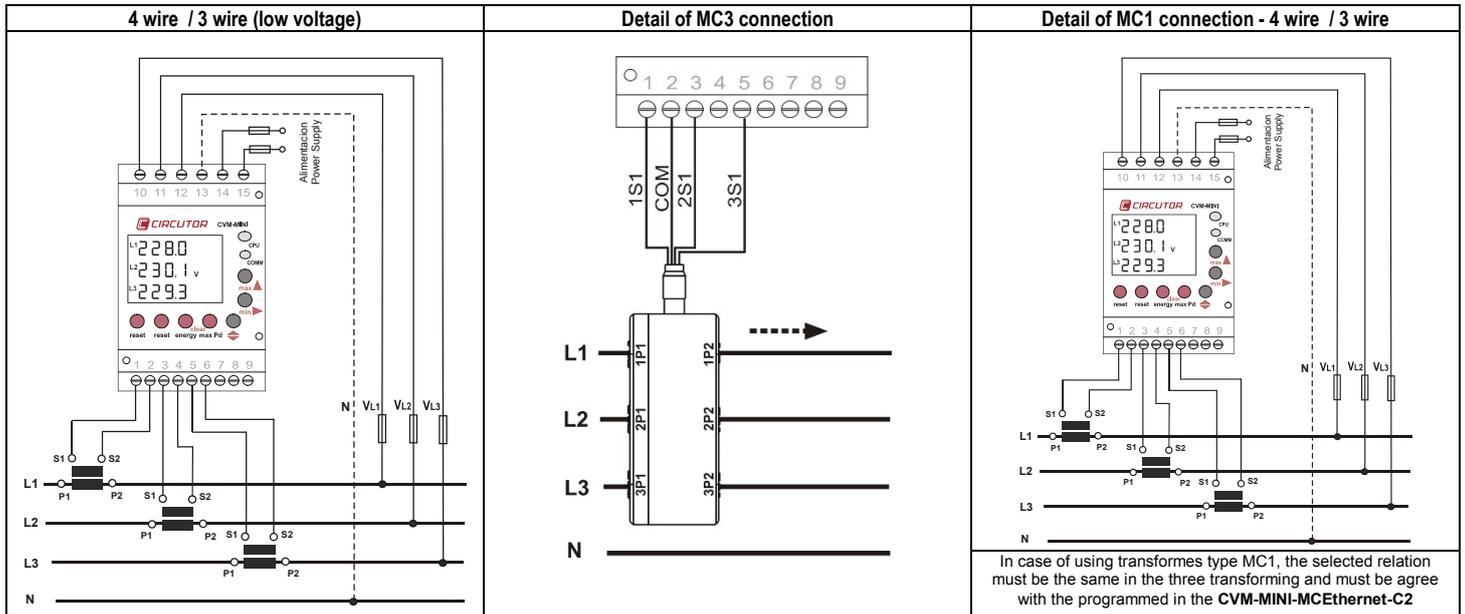
11.- TECHNICAL SERVICE

In the event of any equipment failure or any operational queries please contact the technical service of **CIRCUTOR**.

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