

**CVM-MINI-BACnet-C2/MC POWER ANALYZER**



**CVM-MINI** is an instrument that measures, calculates and displays the main electrical parameters in three-phase industrial power grids (balanced or unbalanced). The measurement is taken as an RMS value by three AC voltage inputs and three AC current inputs. (through current transformers,  $I_n/5A$  or  $I_n/1A/250$  mA). The measured and calculated parameters are shown in the table of variables.

This document provides the instructions for use and describes the operation of the CVM-MINI analyzer. You can download the manual from CIRCUTOR's web site in case it is misplaced: [www.circutor.es](http://www.circutor.es)

**Warning:** You must disconnect the unit from all power supplies before performing any maintenance operations, connection modifications, repairs, etc. If you suspect an operational fault in the unit or in its protection system, remove the unit from service. The design of the unit makes it easy to replace in the event of a fault.

**1.- SETUP - Metering**

To enter the metering setup menu, press the **SETUP** key for 5 seconds.

The **OK** key validates the data and skips to the next menu.

The **PRX** key can be used to select the different options in the menu or to raise one digit if a variable is being entered.

The **NUM** key is used to move the cursor between digits. The various options are described below in sequence.

**1.1.- Primary winding of the voltage transformer**

**SET PR1U:** programming of the value of the primary winding of the voltage transformer (from 1 to 100,000 volts).

**1.2.- Secondary winding of the voltage transformer**

**SET SECD:** programming of the value of the secondary winding of the voltage transformer (from 1 to 999 volts).

**1.3.- Primary winding of the current transformer**

**SET PR1A:** programming of the value of the primary winding of the current transformers between 1...10,000 amps.

**1.4.- Secondary winding of the current transformer**

**SET SECA:** programming the secondary ratio of the current transformer installed ( $5= I_n/5A$  /  $I_n= I_n/1A$ ). \* Secondary option does not exist in MC model.

**1.5.- Measurement in 2 or 4 quadrants**

**SET QUAD:** ( $2 =$  consumption /  $4 =$  consumption and generation)

**1.6.- Programming the maximeter:**

a) **SET PD CODE XX:** select the electrical variable to be integrated by means of the system of maximum demand in sliding window:

Parameter	Value
None	00
Active Three-phase Power	kW III 16
Apparent Three-phase Power	kVA III 34
Three-phase Current	A III 36
Current per phase	A1 - A2 - A3 R-PH

b) **PD PER:** value of the integration period of maximum demand, in a period that can be configured between 1...60 minutes

c) **CLR PD NO:** deletion of the maximum value of maximum demand registered (NO / YES)

**1.7.- Display or screen omission**

**DEF PAGE:** this option can be used to select the display format of the pages (NO / YES).

a) **YES:** displays all electrical measurements

a) **NO:** if NO is selected in the previous step, the pages to be displayed must be selected with the NO / YES options shown on each of the screens.

**1.8.- Initial start screen programming**

**SET INIT PAGE:** this option is used to select the screen and form of selecting the display screens:

a) **FIXED PAGE:** this is used to select which of the pages available will appear first of all when powering up the analyzer.

b) **ROTATING SCREENS:** selecting the rotating screens option (when all electrical magnitudes are flashing), will begin automatic page rotation, where each page is displayed every 5 seconds.

**1.9.- Backlighting time**

**DISP OFF:** disconnection time of the display backlighting after pressing any key on the analyzer (1...60 seconds). When programming 00, the backlighting remains on permanently.

**1.10.- Resetting energy meters**

**CLR ENER:** resetting the energy values (NO / YES)

**1.11.- THD or d Programming**

**SET HARM D:** this is used to select a method for calculating the voltage and current harmonic distortion:

b) **D:** % harmonic distortion with respect to fundamental (voltage and current).

c) **THD:** % harmonic distortion with respect to the RMS (voltage and current).

**1.12.- Digital outputs (RS485-C2)**

**OUT 1 CODE / OUT 2 CODE:** the 2 digital outputs of the analyzer can be programmed to:

**GENERATE ENERGY IMPULSES:** the kW.h corresponding to one impulse (100 ms) and a maximum 5 imp/s (see variable codes) is programmed using one of the energy codes.

**ALARM CONDITIONS:** the instant variable controlled, maximum and minimum values and delay for each output are programmed (see variable codes).

**2.- SETUP - Communication**

To enter the communication menu of the unit, press the **RESET** key and then press **SETUP** for five seconds until you enter the communication setup.

The configuration parameters for the device are:

- a) **SET PROT:** BAC (BacNet)
- b) **SET DEF:** NO (custom), YES (default configuration\*)
- c) **SET MAC:** mac address. 001 to 127
- d) **SET BAUD:** (speed) 9.6-19.2-38.4-57.6-76.8
- e) **SET ID:** (Device\_ID)
- f) **SET LOC:** UNLD (unlocked), LOC (locked)

\*Default configuration: 002 / 38400

**2.1.- SETUP - locking or unlocking**

By choosing the **LOC** option, on entering metering SETUP, it is only possible to see the programming, no parameter can be changed. When the **LOC** option is activated, the password 1234 must be entered to edit the programming of the unit.

The analyzer has variables that refer to the three phases simultaneously. If these variables are selected, the unit makes an OR type logical function, activating the alarm flag when any of the three phases meets the triggering conditions.

**VARIABLES AND ALARM CODES**

If no variable is to be programmed, select 00

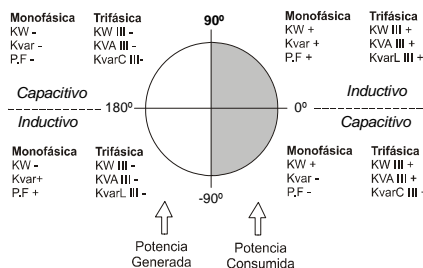
Magnitude	Symbol	Code L1	Code L2	Code L3
Phase-neutral voltage	V	01	06	11
Current	A	02	07	12
Active power	kW	03	08	13
Reactive power - (Ind/Cap)	kvar	04	09	14
Apparent power	kVA	38	39	40
Power factor	PF	05	10	15
% THD V	THD U	25	26	27
% THD A	THD I	28	29	30

Magnitude	Symbol	Code	Magnitude	Symbol	Code
Phase-neutral voltages	U1 or U2 or U3	90	Power factors	PF1 or PF2 or PF3	94
Currents	I1 or I2 or I3	91	Phase-phase voltages	U12 or U23 or U31	95
Active power	kW1 or kW2 or kW3	92	% THD U	THDU1 or U2 or U3	96
Reactive power	kvar1 or kvar2 or kvar3	93	% THD I	THDI1 or I2 or I3	97
Apparent power	kVA1 or kVA2 or kVA3	98			

Magnitude	Symbol	Code	Magnitude	Symbol	Code
Active three-phase power	kW III	16	Neutral current	$I_n$	37
Three-phase inductive power	kvarL III	17	Max. demand (L1)	Md (Pd)	35*
Three-phase capacitive power	kvarC III	18	Max. demand (L2)	Md (Pd)	42*
Three-phase $\phi$ cos	cos $\phi$	19	Max. demand (L3)	Md (Pd)	43*
Three-phase power factor	PF III	20	Active energy	kWh III	31
Frequency (L1)	Hz	21	Inductive reactive energy	Kvar-h L III	32
Phase-phase V L1- L2	U12	22	Capacitive reactive energy	Kvar-h C III	33
Phase-phase V L2 - L3	U23	23	Apparent energy	KVA-h III	44
Phase-phase V L3 - L1	U31	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	A III	36	Apparent energy generated	KVA-h III -	48
Temperature	°C / °F	41			

\*These variables are only valid when the maximum current demand per phase has been programmed.

**METERING IN FOUR QUADRANTS**



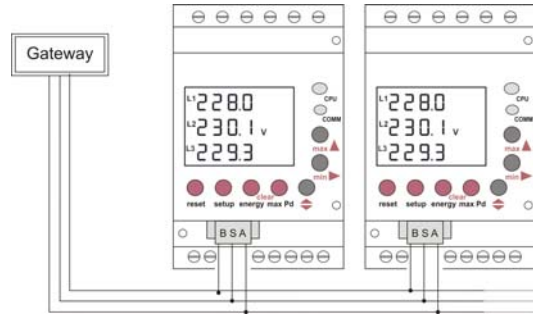
**3.- CVM-MINI communication**

The unit incorporates BACNet MS/TP communication, following the specifications of ANSI/ASHRAE 135 (ISO 16484-5). Using a RS485 connection, the analyzer can connect to a BACnet and include all of the objects and services defined in the attached PICS map (*Protocol Implementation Conformance Statement*). Instant, maximum and minimum variables can be read.

The default speed is 38400 bps and the MAC is 2 (node number), and can be changed with the keyboard or by writing the BaudRate and MAC\_Address variables. The identifier (Device\_ID) can be changed with the keyboard, with write property or by writing the Device\_ID variable. Another option is to write on the Object\_Name in Device:

- a) #Baud x – where x may be: 9600, 19200, 38400, 57600, 76800 bps
- b) #MAC x – where x may be: 0 ... 127
- c) #ID x – where x may be: 1 ... 4194303

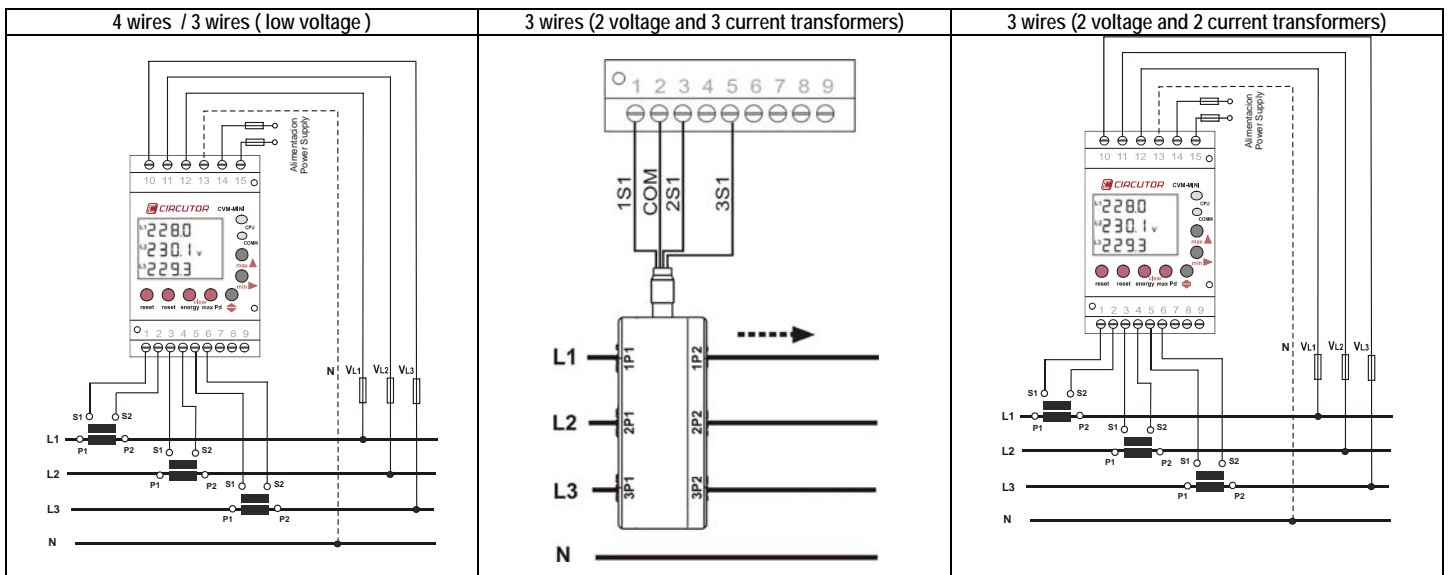
For further information on the protocol [www.bacnet.org](http://www.bacnet.org).



**4.- TECHNICAL FEATURES**

<b>Power circuit:</b> - Single-phase: - Voltage tolerance: - Frequency: - Consumption: - Working temperature: - Humidity (no condensation) / Altitude:	230 VAC -15...10 % 50 - 60 Hz 1,4 ... 3,0 VA -10...+ 50°C 5...95% / 2000 meters	<b>Metering circuit:</b> - Nominal voltage: phase-neutral / phase-phase - Frequency: - Nominal current: - Permanent overload: - Voltage consumption of the circuit: - Current consumption of the circuit: ITF / Shunt	300 VAC / 520 VAC 45 - 65 Hz $I_n / 5 A$ or $I_n / 1 A / 250 mA$ (MC type) 1.2 $I_n$ 0.7 VA 0.9 VA / 0.75 VA
<b>Mechanical features:</b> - Case material: - Protection: Fitted unit (frontal): Non-fitted unit (sides and rear cover): - Dimensions (mm): - Weight:	V0 self-extinguishing plastic IP 51 IP 31 85 x 52 x 70 mm (3 steps) 210 g	<b>Features of the output transistors</b> - Type: Opto-isolated transistor (switch open). - Maximum switching voltage: - Maximum switching current: - Maximum frequency: - Impulse duration:	NPN 24 V DC 50 mA 5 impulses / second 100 ms
<b>Accuracy Class:</b> - Voltage: - Current: - Power / Energy: <b>Measurement sensors:</b> - Voltage: - Current: <b>Power factor</b> Full-scale measurement margin: ITF / Shunt Temperature sensor: Accuracy / Working window - Offset from external temperature: With / without forced ventilation	0.5% ± 1 digit 0.5% ± 1 digit 0.5% ± 1 digit Direct or indirect measurement with transformer Indirect measurement by means of transformer 0.5 to 1 0.2...120% / 2...120% ± 2°C / -10...+50°C ( ± 3.6°F / + 14...+ 122°F ) + 14.0°C / + 3.5°C ( + 25.2°F / + 6.3°F )	<b>Safety:</b> Installation category III / EN61010. Double-insulated electric shock protection class II. The equipment must be connected to a power circuit protected with type gI fuses, in compliance with IEC 269, or type M, with values from 0.5 to 1A. It must be fitted with a circuit breaker switch or an equivalent device, in order to be able to disconnect the equipment from the power supply grid. The minimum diameter of the power supply cable shall be 1mm <sup>2</sup> . <b>Standards:</b> IEC 664, VDE 0110, UL 94, IEC 801, IEC 348, IEC 571-1, EN 61000-6-4, EN 61000-6-2, 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	

**5.- CONNECTIONS**



**6.- TECHNICAL SERVICE**

If you have any doubts about the operation of the unit or suspect any malfunction, contact our service staff at **CIRCUTOR, SA**

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