

CVM-NRG96-ITF BACnet-C POWER ANALYZER



CVM-NRG96 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 /1A). 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-NRG96 analyzer. You can download the manual from CIRCUTOR's web site in case it is misplaced:
www.circutor.com

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 **MAX** and **MIN** keys for 5 seconds.

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

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

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

1.1.- Voltage phase-phase or phase-neutral

This option allows to display the voltage phase to phase or phase to neutral in the device:

- a) **SET U1/U2/U3:** voltage phase to neutral
- b) **SET U12/U23/U31:** voltage phase to phase

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 V	25	26	27
% THD A	THD A	28	29	30

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 ϕ cos	cos ϕ	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	V12	22	Capacitive reactive energy	Kvar-h C III	33
Phase-phase V L2 - L3	V23	23	Apparent energy	KVA-h III	44
Phase-phase V L3 - L1	V31	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	41			

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

1.2.- Primary winding of the voltage transformer

SET PRIU: programming of the value of the primary winding of the voltage transformer (from 1 to 100.000 volts).

1.3.- 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).

1.4.- Primary winding of the current transformer

SET PRIA: programming of the value of the primary winding of the current transformers between 1...10.000 amps.

1.5.- Secondary winding of the current transformer (ver. ..5A ..1A)

SET SECA: choose the value of the secondary winding of the current transformers between 5 or 1 amps.

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	-
Active Three-phase Power	kW III
Apparent Three-phase Power	kVA III
Three-phase Current	A III
Current per phase	A1 - A2 -A3

- 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 MD:** deletion of the maximum value of maximum demand registered (NO / YES)

1.7.- 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.

1.8.- Initial start energy selection

SET INIT PAGE: this option is used to select the energy displayed in the device. The user must select from the following energy meters (consumed or generated "-"):

- Active energy: **KW-H**
- Reactive inductive energy: **KVARL-H**
- Reactive capacitive energy: **KVARC-H**
- Apparent energy: **KVA-H**

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 EMER: 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:

- a) **D:** % harmonic distortion with respect to fundamental (voltage and current).
- b) **THD:** % harmonic distortion with respect to the RMS (voltage and current).

1.12.- Digital output (C)

OUT 1 CODE: The digital output can be programmed for:

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.

ALARMA CONDITIONS: the instant variable controlled, maximum, minimum values and delay for the output is programmed (see variable codes).

2.- SETUP - Communication

To enter the communication menu of the unit, press the **RESET** key and then press **ENTER**, **MAX** and **MIN** 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 PARC:** peripheral no. **001** to **255**
- d) **SET BAUD:** (speed) **9.6-19.2-38.4-76.8-115.2**
- e) **SET ID:** (Device_ID)
- f) **SET LDC: UNLKD** (unlocked), **LDC** (locked)

*Default configuration: **002 / 38400**

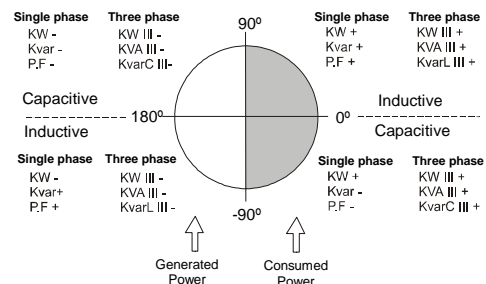
2.1.- SETUP - locking or unlocking

By choosing the **LDC** option, on entering metering SETUP, it is only possible to see the programming, no parameter can be changed. When the **LDC** 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.

Magnitude	Symbol	Code	Magnitude	Symbol	Code
Phase-neutral voltages	V1 or V2 or V3	90	Power factors	PF1 or PF2 or PF3	94
Currents	I1 or I2 or I3	91	Phase-phase voltages	V12 or V23 or V31	95
Active power	kW1 or kW2 or kW3	92	% THD V	THDV1 or V2 or V3	96
Reactive power	Kvar1 or kvar2 or kvar3	93	% THD I	THDI1 or I2 or I3	97
Apparent power	kVA or kVA2 or kVA3	98			

METERING IN FOUR QUADRANTS



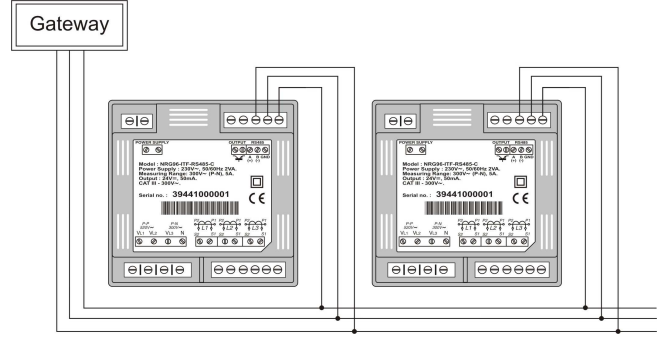
3.- CVM-NRG96 communication

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 NRG96mum 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, 115200 bps
- b) #MAC x – where x may be: 1 ... 255
- c) #ID x – where x may be: 1 ... 4194303

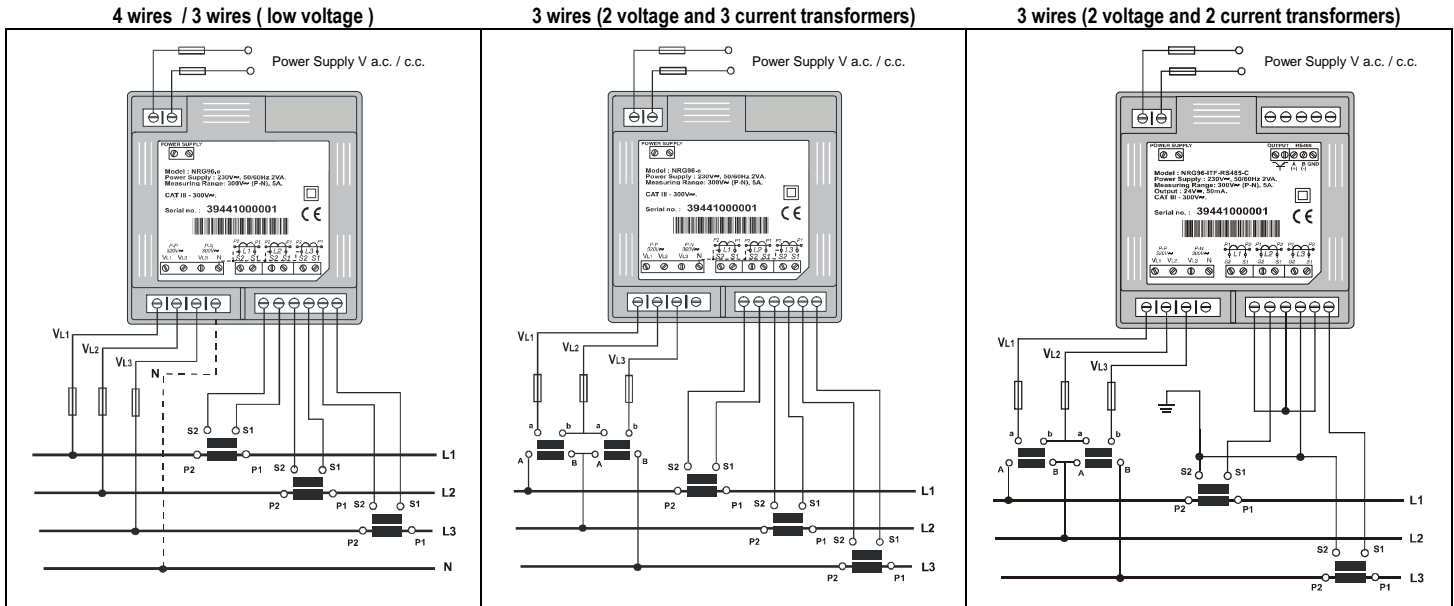
For further information on the protocol www.bacnet.org.



4.- TECHNICAL FEATURES

<p>Power circuit:</p> <ul style="list-style-type: none"> - Single-phase : - Voltage tolerance : - Frequency : - Maximum consumption : - Working temperature : - Humidity (no condensation) : - Altitude : 	<p>230 V a.c. -15...10 % 50 - 60 Hz 1,8 ... 3,6 VA -10 ..+ 50 °C 5 .. 95% 2000 m</p>	<p>Metering circuit:</p> <ul style="list-style-type: none"> - Nominal voltage: phase-neutral / phase-phase - Frequency : - Minimum current - Nominal current : - Permanent overload : - Voltage Input consumption: - Current Input consumption: ITF / Shunt 	<p>300 V a.c. / 520 V a.c. 45 ~ 65 Hz 50mA I_n /5A or /1A 1.1 I_n 0.7 VA 0.9 VA / 0.75 VA</p>
<p>Mechanical features:</p> <ul style="list-style-type: none"> - Case material : - Protection : Fitted unit (frontal) : - Non-fitted unit (sides and rear cover) : - Dimensions (mm) : - Weight: 	<p>Self extinguishing V0 plastic IP 51 IP 31 96 x 96 x 63 400 g</p>	<p>Features of the output transistors</p> <ul style="list-style-type: none"> - Type: Opto-isolated transistor - Maximum switching voltage : - Maximum switching current : - Maximum frequency : - Impulse duration : 	<p>(open collector)NPN 24 V d.c. 50 mA 5 pulses / second 100 ms</p>
<p>Accuracy class:</p> <ul style="list-style-type: none"> - Voltage : - Current : - Powers : <p>Measurement conditions :</p> <ul style="list-style-type: none"> - Voltage : - Current : - Power Factor : - Scale range measurement margin: ITF / Shunt 	<p>0.5 % ± 2 digits 0.5 % ± 2 digits 1 % ± 2 digits Direct or indirect measurement with transformer Indirect measurement by means of transformer 0.5 to 1 0,2...120% / 2...120%</p>	<p>Safety: 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 NRG96mum diameter of the power supply cable shall be 1mm².</p> <p>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</p>	

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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