

## CVM-NRG 96 POWER ANALYZER

The **CVM-NRG 96** is an instrument that measures, calculates and displays the main electrical parameters in three phase industrial systems (balanced or unbalanced). Measurements are in true effective value, via three AC voltage inputs and three AC current inputs. (via In / 5 A current transformers). The parameters measured are shown in the variables list table.



This manual is a quick guide to the use and operation of the **CVM-NRG 96**. For more information, the whole manual may be downloaded from Circutor's web page: [www.circutor.es](http://www.circutor.es)

Before starting any maintenance, change in connections, repair, etc, it must be disconnected from all power sources. When an operating fault or protection fault is suspected, the equipment must be taken out of service. The equipment is designed to be quickly replaced in the event of any breakdown.

### 1.- SETTING (SETUP menu)

(press the **MAX** and **MIN** keys at the same time once in the main program)

- 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:

#### ■ List of variables and alarm codes for the CVM-NRG 96

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

| Parameter                            | Symbol | L1 Code | L2 Code | L2 Code |
|--------------------------------------|--------|---------|---------|---------|
| Simple Voltage                       | V      | 01      | 06      | 11      |
| Current                              | A      | 02      | 07      | 12      |
| Active power                         | kW     | 03      | 08      | 13      |
| Reactive power inductive/ capacitive | kvar   | 04      | 09      | 14      |
| 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 <sub>N</sub> | 37   |
| 3 pha. inductive power   | kvarL III | 17   | Max demand (L1)         | Md (Pd)        | 35*  |
| 3 pha capacitive 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           | 31   |
| Frequency (L1)           | Hz        | 21   | Induct reactive energy. | Kvar.h L       | 32   |
| V comp. L1- L2           | V 12      | 22   | Capacit reactive energy | Kvar.h C       | 33   |
| V comp. L2- L3           | V 23      | 23   | App. three pha. energy. | Kva.h III      | 44   |
| V comp. L3- L1           | V 31      | 24   | Active energy generated | kW.h III -     | 45   |

#### 1.1.- Simple or compound voltages

- Simple voltages (between phase and neutral): U1, U2, U3
- Compound voltages (between phase and phase): U12, U23, U31

#### 1.2.- Voltage transformer primary.

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

#### 1.3.- Voltage transformer secondary.

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

#### 1.4.- Current transformer primary.

On the screen "SET CURR PRI" appears with 5 digits. This allows the current transformer primary to be set. (from 1 to 10,000)

#### 1.5.- Setting the Power Demand Meter screens.

- a) PARAMETER TO CONTROL:  
("SET Pd Code xx")

|                            |          |      |
|----------------------------|----------|------|
| 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 |

Value of power integrated during set period.

- b) INTEGRATION PERIOD (from 1 to 60 minutes): ("SET Pd Per xx")  
 c) CLEAR MAXIMUM VALUE STORED IN MEMORY: ("CLr Pd no") no or YES

#### 1.6.- Setting preferred page.

This option allows the **fixed or rotating pages** ("SET def Page"):

- a) **Fixed page**: selects the page, from all possible pages, that will appear first when applying voltage to the NRG 96 (or on resetting).  
 b) **Rotating pages**: automatically rotates the 10 pages (every 5 seconds it moves on to the following screen).

#### 1.7.- Setting disconnection time for the "backlight"

("SET disp off"): Setting the time after which the light on the CVM-NRG 96's display switches off (low consumption) after a key is pressed. If 00 is set, the backlight is permanently on.

#### 1.8.- Returning the energy counters to zero.

"CLr ENER no" (Clear energy counters) appears on the display.

#### 1.9.- 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).

#### 1.10.- Additional screen with transistor alarm outputs

("OUT VAR CODE") With these outputs the CVM-NRG 96 relay may be set for:

- A. **Pulse every x kW.h or kvar.h (Energy)**.  
The value of consumed energy may be set so that it generates a pulse (lasting 0.1 secs.) kW.h / 1 pulse or kvar.h / 1 pulse. Maximum 5 imp/sec.
- B. **ALARM conditions**: the variable to be controlled is set for each output per transistor, i.e. the maximum value, minimum value and the "delay".

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

### 2.- Second CVM-NRG 96 SET UP

To access the menu where the equipment's communication may be changed:

Press the , **"max"** and **"min"** key at the same time to supply voltage to CVM-NRG 96 or RESET the equipment.

Configurable parameters:

- n PER : Peripheral no. 001 to 255
- Baud 1: (speed) 1200 - 2400 - 4800 - 9600 - 19200
- Parity: No, even, odd
- LEN: (length) 8 bits
- Stop bits: 1 or 2

Default configuration: 001 / 9,600 / 8 / N / 1

#### Block or unblock SETUP

- If the LOC option is selected, it is only possible to see the setting on entering SETUP and nothing may be changed.

- If a previously set option is to be changed, then it is necessary to enter a password.

**PASSWORD for the CVM-NRG 96: 1234**

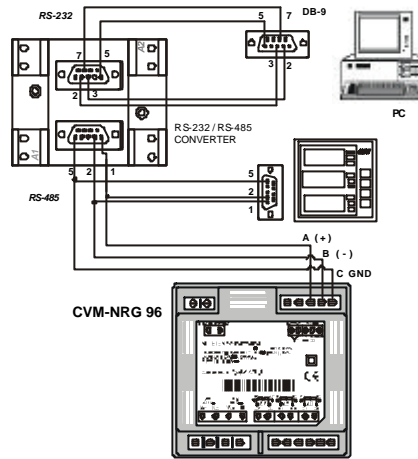
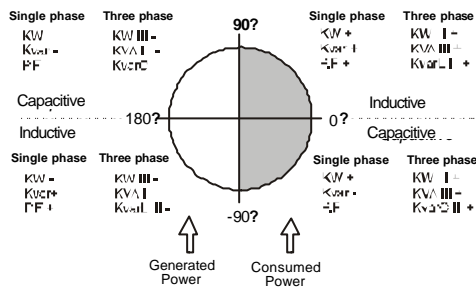
|                     |         |    |                          |             |    |
|---------------------|---------|----|--------------------------|-------------|----|
| Apparent power      | kVA III | 34 | Inductive enr. generated | KvarhLIII - | 46 |
| Maximum demand      | Md (Pd) | 35 | Capacit. ener. generated | KvarhCIII - | 47 |
| Three phase current | AIII    | 36 | Apparent ener. generated | KvahIII -   | 48 |

\*Variables valid only if the maximum demand of current per phase has been set.

There are also some variables that refer to the three phases at the same time. If one of these variables is chosen, the alarm will activate when any of the three phases match the set conditions.

| Parameter       | Symbol            | Code | Parameter         | Symbol            | Code |
|-----------------|-------------------|------|-------------------|-------------------|------|
| Simple voltages | V1 or V2 or V3    | 90   | Power factors     | PF1 or PF2 or PF3 | 94   |
| Currents        | I1 or I2 or I3    | 91   | Compound voltages | V12 or V23 or V31 | 95   |
| Active powers   | KW1 or KW2 or KW3 | 92   | % THD V           | THDV1 / V2 / V3   | 96   |
| Reactive powers | kvar1 or 2 or 3   | 93   | % THD I           | THDI1 / I2 / I3   | 97   |

#### ■ FOUR QUADRANTS OF THE CVM-NRG 96



### 3.- CVM-NRG 96 COMMUNICATIONS

One or more **CVM-NRG 96's** can be connected to a computer or PLC. As well as the usual operation of each piece of equipment, data may also be centralised at one single point by using this system (Power Studio) System. The **CVM-NRG 96** has an RS-485 series communications output. If more than one unit is connected to one RS-485 series line, it is necessary to assign a number or address to each (from 01 to 255) so that the central computer sends data to those addresses.

To change the setting for the communications see section 2.

The RS-485 connection is made with woven mesh shielded communications cables, with a minimum of three wires and with a maximum distance between PC and the last analyzer of 1,200 metres. The **CVM-NRG 96** uses an RS-485 communications line which can be connected to a maximum of 32 analyzers in parallel (multi-point Bus) for each series port on the computer used.

The CVM-NRG 96 system analyzer communicates using the **MODBUS RTU** © protocol (Question/ Answer).

### 4.- TECHNICAL FEATURES

|  |                                 |
|--|---------------------------------|
| <b>Power supply:</b>                                 |                                 |
| - Single phase:                                      | 230 V AC.                       |
| - Voltage tolerance:                                 | -15 % / +15 %                   |
| - Frequency:   | 50 - 60 Hz                      |
| - Consumption:                                       | 4.2 W                           |
| - Operating temperature:                             | -10° ~ 50 ° C                   |
| - Humidity (without condensation):                   | 5% ~ 95%                        |
| <b>Mechanical features:</b>                          |                                 |
| - Casing material:                                   | Self extinguishing V0 plastic   |
| - Protection:  |                                 |
| Equipment assembly (front) :                         | IP 54                           |
| Non assembled equipment (sides and rear cover) :     | IP 31                           |
| - Sizes (mm) :                                       | 96 x 96 x 63                    |
| - Weight:  | 0.400 kg                        |
| <b>Accuracy class:</b>                               |                                 |
| - Voltage:   | 0.5 % of scale range ± 2 digits |
| - Current :  | 0.5 % of scale range ± 2 digits |
| - Powers:  | 1 % of scale range ± 2 digits   |
| Measurement conditions :                             |                                 |
| Current transformer not included and direct voltage: |                                 |
| Temperature :  | + 5 °C + 45 °C                  |
| Power factor :                                       | 0.5 to 1                        |
| Scale range measurement margin:                      | 10 ..... 100%                   |

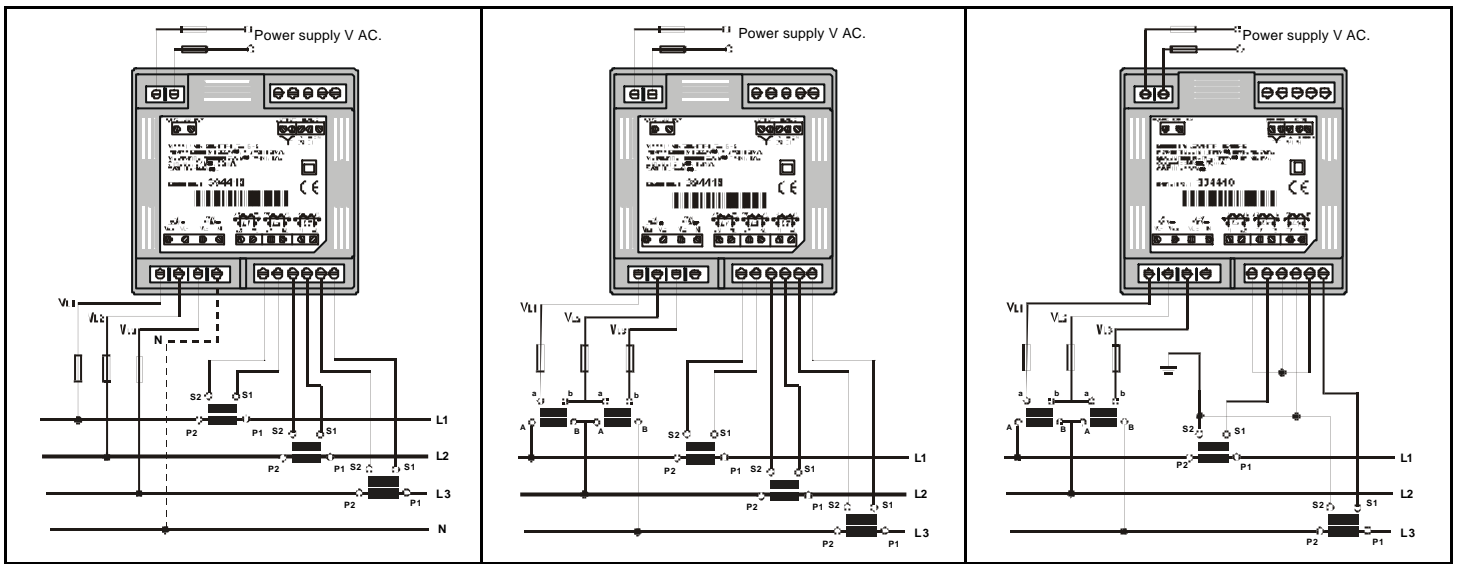
|   |                   |
|---|-------------------|
| <b>Measurement circuit:</b>   |                   |
| - Nominal voltage phase-neutral :   | 300 V AC.         |
| between phases :  | 520 V AC.         |
| - Frequency :   | 45 ~ 65 Hz        |
| - Nominal current :   | In / 5 A          |
| - Permanent overload :  | 1.1 In            |
| - Current circuit consumption :   | 0.75 W            |
| <b>Relay output features</b>  |                   |
| - Type: Opto-isolated transistor (open collector).  | NPN               |
| - Maximum operating voltage:  | 24 V DC.          |
| - Maximum operating current:  | 50 mA             |
| - Maximum frequency:  | 5 pulses / second |
| - Energy Output:  | 100 pulses / kW.h |
| - Length of pulse:  | 100 ms            |
| <b>Safety:</b>  |                   |
| Category III - 300 V AC. / 520 AC. EN-61010 Class II double insulation against electric shock |                   |
| <b>Standards :</b>  |                   |
| IEC 664, VDE 0110, UL 94, IEC 801, IEC 348, IEC 571-1, EN 61000-6-3, EN 61000-6-1, EN-61010-1 |                   |

### 5.- CONNECTION

4 wire / 3 wire (low voltage)

3 wire (2 voltage transformers and 3 current transformers):

3 wire (2 voltage transformers and 2 current transformers):



**NOTE:** In the event of displaying negative or incoherent power factors or when 0 powers are displayed, check the correct direction of the current transformers (from P1 to P2) and that each voltage line corresponds to its current transformer.

## 6.- TECHNICAL SERVICE

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

*CIRCUTOR S.A. - After sales service*

*Vial Sant Jordi, s/n*

*08232 -Viladecavalls (Barcelona)*

*tel - (+34) 93 745 29 00 & fax - (+34) 93 745 29 14*

*E-mail : central @ circutor.es*