The serial number of the unit can be found on the side label of the device (e.g., 3104200679). This number must be translated into hexadecimal language so that the sentence can be sent to the unit:

3104200679 (Decimal) \(\rightarrow\) B90657E7 (Hexadecimal)

The parameters to be set using the "broadcast" format to the 00 peripheral are restricted, as they are only for configuring the communication settings:

<table>
<thead>
<tr>
<th>Modbus Address</th>
<th>Variable</th>
<th>Valid data window</th>
</tr>
</thead>
<tbody>
<tr>
<td>0B8E 0B99</td>
<td>Unit serial number</td>
<td>0 to PFFFFFFFF (N)</td>
</tr>
<tr>
<td>0B8E Hi</td>
<td>Peripheral number</td>
<td>0 to 254 (Dec)</td>
</tr>
<tr>
<td>0B8F Hi</td>
<td>Port speed</td>
<td>0x 9600, 1x 19200 (C)</td>
</tr>
</tbody>
</table>

Example of a write command. Changing the peripheral number. From 03 (decimal) to 0F (15 decimal), at 9600 bps.

TX: 00 10 0B80000306 B90657E7 0F 00 CRC
RX: Time Out

2.2. - Transformation ratio settings

The CVM-NET-MC analyzer can perform indirect measurements (using voltage and current transformers). For this reason, it has an input table for setting the voltage and current transformation ratios. If the voltage measurement is performed directly, the ratio is 1/1.

<table>
<thead>
<tr>
<th>Modbus Address</th>
<th>Variable</th>
<th>Valid data window</th>
</tr>
</thead>
<tbody>
<tr>
<td>044C 044D</td>
<td>Primary voltage</td>
<td>0 to 00010000 (100,000)</td>
</tr>
<tr>
<td>044E</td>
<td>Secondary voltage</td>
<td>0 to 007 (999)</td>
</tr>
<tr>
<td>044F</td>
<td>Primary current</td>
<td>0 to 0010 (10,000)</td>
</tr>
<tr>
<td>0450 Low</td>
<td>Not used</td>
<td>0</td>
</tr>
<tr>
<td>0450 Hi</td>
<td>Not used</td>
<td>0</td>
</tr>
<tr>
<td>0451 Low</td>
<td>Not used</td>
<td>0</td>
</tr>
<tr>
<td>0451 Hi</td>
<td>Not used</td>
<td>0</td>
</tr>
</tbody>
</table>

Example of programming voltage ratios: Direct voltage measurement (230 ph-N), and current transformers with primary ratio of 63 A.

3. - Configuration settings

At the unit has no keypad, the configuration settings must be sent to the device via Modbus/RTU© commands, or using the CIRCUITOR PowerStudio Software, which can be downloaded for free from the website: www.circutor.com

2.1. - Keypad

CVM-NET-MC has a single button; it can be used to functionally reset the unit or to restore default communication parameters.

- To functionally reset the unit, press the button **xxxx** for at least one second, and the unit will reset itself within 5 s.
- To restore the default communication parameters (19200/8N/1 see section 2.1.-), disconnect the auxiliary power, then press the button **xxxx**, and while holding the button down, switch the unit back on. After 5 s, the unit restores its factory settings.

2.2. - Configuration

As the unit has no keypad, the configuration settings must be sent to the device via Modbus/RTU© commands, or using the CIRCUITOR PowerStudio Software, which can be downloaded for free from the website: www.circutor.com

2.1.1. - Using the peripheral number

The unit is fitted with two digital outputs, that can be remotely managed in both their opening and closing functions.

Forcing Digital Output number 1:

TX: NP 05 0000 XX 00 CRC
RX: NP 05 0000 XX 00 CRC
(Where XX \(\rightarrow\) FF Close / 00 Open)

Forcing Digital Output number 2:

TX: NP 05 0100 XX 00 CRC
RX: NP 05 0100 XX 00 CRC
(Where XX \(\rightarrow\) FF Close / 00 Open)

2.6.2. - Reading the digital output status

The user can request a reading of the digital output status via Modbus/RTU using the following sentence:

TX: NP 01 0000 0008 CRC
RX: NP 01 01 XX CRC

2.6.3. - Digital output settings

Digital outputs, in addition to being remotely managed, can be used as alarm elements, associated with an electric variable by a maximum or minimum value, or fulfill the power pulse function associated with any power consumption parameter (active or reactive). The following input table is provided for programming them:

<table>
<thead>
<tr>
<th>Digital output 1</th>
<th>Modbus Address</th>
<th>Variable</th>
<th>Valid data window</th>
</tr>
</thead>
<tbody>
<tr>
<td>045E</td>
<td>MAX value or W h imp</td>
<td>Hexadecimal value</td>
<td></td>
</tr>
<tr>
<td>045F</td>
<td>MIN value</td>
<td>Hexadecimal value</td>
<td></td>
</tr>
<tr>
<td>0462</td>
<td>Delay</td>
<td>0 to 270F (9,999) (Decimal)</td>
<td></td>
</tr>
<tr>
<td>0463 Hi</td>
<td>Variable number</td>
<td>00 (See table of variables)</td>
<td></td>
</tr>
<tr>
<td>0463 Low</td>
<td>Not used</td>
<td>00</td>
<td></td>
</tr>
</tbody>
</table>

*When a power variable is selected, the analysis automatically recognizes the power pulse function and applies the w/h value of the first record.

Example of alarm programming by maximum and minimum value with voltage V1. A maximum value of 240 V, a minimum value of 200 V (the value must be sent multiplied by 10 (as shown in the enclosed variables table), and delay of 10 s are programmed.

Maximum value: 2400 (Decimal) \(\rightarrow\) 00009060 (Hexadecimal)
Minimum value: 2000 (Decimal) \(\rightarrow\) 000072D0 (Hexadecimal)
Delay: 10 (Decimal) \(\rightarrow\) 0000A (Hexadecimal)
Var number: 01 (Decimal) \(\rightarrow\) 01 (Hex)
Not used: 00 (Decimal) \(\rightarrow\) 00 (Hexadecimal)

TX: NP 0104E7D00060C 00009060 000072D0 0000A 0100 CRC
RX: NP 03 04F7E0009E0 CRC
Next, reset the unit (see section 2.1.1.-).

<table>
<thead>
<tr>
<th>Digital output 2</th>
<th>Modbus Address</th>
<th>Variable</th>
<th>Valid data window</th>
</tr>
</thead>
<tbody>
<tr>
<td>0485</td>
<td>MAX value or W h imp</td>
<td>Hexadecimal value</td>
<td></td>
</tr>
<tr>
<td>0486</td>
<td>MIN value</td>
<td>Hexadecimal value</td>
<td></td>
</tr>
<tr>
<td>0488</td>
<td>Delay</td>
<td>0 to 270F (9,999) (Decimal)</td>
<td></td>
</tr>
<tr>
<td>0489 Hi</td>
<td>Variable number</td>
<td>00 (See table of variables)</td>
<td></td>
</tr>
<tr>
<td>0489 Low</td>
<td>Not used</td>
<td>00</td>
<td></td>
</tr>
</tbody>
</table>

*When a power variable is selected, the analysis automatically recognizes the power pulse function and applies the w/h value of the first record.

Example of alarm programming by maximum and minimum value with voltage V1. A maximum value of 240 V, a minimum value of 200 V (the value must be sent multiplied by 10 (as shown in the enclosed variables table), and delay of 10 s are programmed.

Maximum value: 2400 (Decimal) \(\rightarrow\) 00009060 (Hexadecimal)
Minimum value: 2000 (Decimal) \(\rightarrow\) 000072D0 (Hexadecimal)
Delay: 10 (Decimal) \(\rightarrow\) 0000A (Hexadecimal)
Var number: 01 (Decimal) \(\rightarrow\) 01 (Hex)
Not used: 00 (Decimal) \(\rightarrow\) 00 (Hexadecimal)

TX: NP 1004CD00060C 00009060 000072D0 0000A 0100 CRC
RX: NP 03 04F7E0009E0 CRC
Next, reset the unit (see section 2.1.1.-).

2.3. - Maximum demand settings

The power analyzer can calculate the maximum value, using the sliding window method. This calculation can be associated to one of the three available variables, as shown below.

<table>
<thead>
<tr>
<th>Modbus Address</th>
<th>Variable</th>
<th>Valid data window</th>
</tr>
</thead>
<tbody>
<tr>
<td>0482</td>
<td>PD calculation variable</td>
<td>0000 – No Pd</td>
</tr>
<tr>
<td>0483</td>
<td>Delay 0 to 270F</td>
<td>270F (9,999)</td>
</tr>
</tbody>
</table>

Example of maximum demand programming by three-phase power, with a 15 minute period.

TX: NP 04 04E00200204 0010 000F CRC
RX: NP 10 04E002002 CRC
Next, reset the unit (see section 2.1.1.-).

2.3.1. - Reading maximum demand setting

As additional information, the user has a Modbus command, for reading the maximum demand setting:

TX: NP 04 04E002002 CRC
RX: NP 04 04E002002 CRC

2.4. - Deleting maximum and minimum values

The power analyzer records all the maximum and minimum values for each parameter measured in the Modbus/RTU variables table. A command is available for resetting these records:

TX: NP 05 0836 FF 00 CRC
RX: NP 05 0836 FF 00 CRC

2.5. - Deleting maximum demand

The maximum demand parameter, when calculated using the sliding window, can be reset, allowing the calculation to be restarted.

TX: NP 05 0838 FF 00 CRC
RX: NP 05 0838 FF 00 CRC

2.6. - Configuration and use of digital outputs

The unit is fitted with two digital outputs, that can be remotely managed in both their opening and closing functions.

Forcing Digital Output number 1:

TX: NP 05 0000 XX 00 CRC
RX: NP 05 0000 XX 00 CRC
(Where XX \(\rightarrow\) FF Close / 00 Open)

Forcing Digital Output number 2:

TX: NP 05 0100 XX 00 CRC
RX: NP 05 0100 XX 00 CRC
(Where XX \(\rightarrow\) FF Close / 00 Open)
### 2.7. - CVM-NET-MC COMMUNICATIONS

One or several CVM-NET-MC analyzers can be connected to a computer or PLC. This system makes it possible to centralise the data in a single record point, in addition to the normal operation of each of them (PowerStudio® System). The CVM-NET-MC has an RS-485 serial communication output. If more than one analyzer is connected to a serial communication bus (RS-485), each analyzer must be assigned a peripheral number or address (from 01 to 255), with a maximum of 32 units per communication bus, so that the central computer sends the queries from the various records measured or calculated to these addresses.

The CVM-NET-MC power analyzer communicates using the MODBUS RTU© protocol (Pulling Question / Answer).

### 3. - TECHNICAL SPECIFICATIONS

#### Power circuit:

- **Single-phase:**
  - Voltage tolerance: -15% / +10%
  - Frequency: 50 - 60 Hz
  - Maximum consumption: 3.0 V·A
  - Working temperature: -10 …..+ 50 ºC
  - Humidity (non-condensing): 5 ….. 95%

- **AC version**
  - Voltage: 230 V AC
  - Frequency: 50 - 60 Hz
  - Maximum consumption: 30 A
  - Working temperature: -10 …..+ 50 ºC
  - Humidity (non-condensing): 5 ….. 95%

- **Plus version:**
  - Voltage: 230 V AC / 520 V AC
  - Frequency: 50 - 60 Hz (AC mode.)
  - Maximum consumption: 3.0 V·A
  - Working temperature: -10 …..+ 50 ºC
  - Humidity (non-condensing): 5 ….. 95%

#### Mechanical characteristics:

- **Case material:**
  - Protection fitted unit (frontal): IP 51
  - Protection non-fitted unit (sides and rear cover): IP 31

#### Precisions Class:

- **Voltage:**
  - 0.5% ± 1 digit
- **Current:**
  - 0.5% ± 1 digit
- **Power:**
  - 1% ± 1 digit

#### Measurement sensors:

- Current: External transformers / direct voltage
- Voltage: 0.5 A / 250mA

#### Full-scale measurement margin:

- ITF / Shunt: ± 2 % / -10 …..+50 ºC
- Temperature measurement: with forced ventilation
- Temperature measurement: without forced ventilation

#### Maximum altitude operating:

- 2000 meters

#### Safety:

- Category III - 300 V AC / 520 V AC
- EN-61010 Class II double-insulated electric shock protection.

**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
- CE

**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: sat@circutor.es  www.circutor.com